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CONTENT

FACTORS INFLUENCING STUDENTS' PATRONAGE OF FAST FOOD DELIVERY SERVICES AMONG UNIVERSITY STUDENTS IN CAPE COAST, GHANA: A QUALITATIVE APPROACH

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Abstract

Understanding consumer behaviour is critical for marketing efforts of businesses that aim to succeed in any business environment. Consumer behaviour includes, among others, the actions, thoughts, and emotions that influence the purchasing, usage and disposal of goods and services which inform decisions that individuals are confronted with on daily bases. Literature is replete with consumer decision-making processes as well as factors influencing consumer decisions. However, there is paucity regarding factors that influence the decision-making processes of university students from a developing country like Ghana. Also, as a point of departure, the present study is situated in a university setting and employs a qualitative design. This study therefore explores factors that influence students of University of Cape Coast (UCC) in respect of patronage of specific fast food delivery vendors. Relying on one-on-one interviews, a total of 12 University of Cape Coast students were recruited and interviewed using the multi-stage sampling procedure to solicit their views. Results from the interviews revealed that convenience/proximity, timely delivery and taste of food constitute the top three factors that influenced students' resolve to patronize fast-food joints delivery services. The sub-categories include quantity of food, packaging and appearance of delivery motor riders. Implications for marketing communications have been discussed.

Keywords: Consumer behaviour, fast-food, delivery services, university campus, marketing communications, Ghana.

1 INTRODUCTION

Understanding consumer behaviour is crucial for businesses and institutions operating on a university campus, as it enables them to develop effective marketing strategies and tailor their offerings to meet the needs and preferences of their target audience (Hoyer, MacInnis, & Pieters, 2012). A university campus serves as a microcosm of society, bringing together individuals from different backgrounds, disciplines, and interests (Sargin & Savas, 2016). As students go through their academic journey, they engage in a range of consumer activities, including purchasing textbooks, accessing food services, utilizing transportation options, and exploring recreational opportunities (see Jadhav & Khanna, 2016; Saha et al, 2022). The decisions made by students during their time on campus can have significant implications not only for their personal well-being but also for the local economy and the businesses operating within the university ecosystem.

In the context of Ghana, a country known for its vibrant and diverse university campuses (Ainoo, 2019), studying the factors that influence consumer behaviour within these educational settings becomes particularly relevant. The Ghanaian context adds a distinctive dimension to the study of consumer behaviour on university campuses (Jibril & Adzovie, 2022). With its diverse cultural heritage, Ghana showcases a variety of traditional and contemporary practices that shape consumer preferences and decision-making. Students from different regions (with diverse cultural experiences) converge on such a university campus. It is therefore interesting to delve into the factors that influence these students in selecting food delivery vendors/services

on campus. Furthermore, the economic landscape and socio-economic disparities prevalent in Ghana impact students' purchasing power and choices (see Babin & Harris, 2023). Exploring these contextual factors through a qualitative lens will provide valuable insights into the specific challenges and opportunities faced by businesses and institutions seeking to engage with the student population.

The rationale for the study is the realization that several fast-food joints as well as food delivery services have sprung up in and around the higher learning education environments thereby attracting patronage of students, particularly the University of Cape Coast campus. However, there appears to be paucity of research regarding the factors influencing for the patronage of these fast-food and food delivery services by students in the University of Cape Coast. This phenomenon appears strange but fascinating because generally, Ghanaians have a different way of trading goods and services (Asiedu & Agyei-Mensah, 2008). The idea of making orders online or via the phone is not entirely new, but did not used to be widespread as it is experienced today. In view of this, the following research question becomes pertinent: *What factors influence university students to patronize fast-food joints and fast-food delivery vendors/services and why do these factors influence students' decision regarding the patronage of fast-food joints and fast-food delivery/vendor services on campus?* The study will therefore provide valuable insights for businesses, marketers, and institutions looking to effectively engage with the student population and enhance their campus experience.

In responding to the question, the study aims to uncover the underlying motivations, perceptions, and experiences that influence students' choices and behaviours. The authors of the present study recognize that consumer behaviour is not solely driven by rational economic factors but it is also influenced by social and cultural dynamics, individual beliefs, and personal experiences. Hence, this study adopts a qualitative approach, particularly, in-depth interviews, to capture the rich and nuanced aspects of consumer behaviour on the university of Cape Coast campus in Ghana. In other words, this approach will help delve into the various factors shaping consumer behaviour on a university campus in Ghana, particularly, shedding light on the unique socio-cultural, economic, and environmental dynamics that affect students' purchasing decisions.

Ultimately, the findings of this research will contribute to a deeper understanding of consumer behaviour on a university campus, particularly in a developing country context regarding patronage of fast-food delivery services. By identifying the key factors that shape students' choices, businesses, marketers, and university administrators can develop targeted strategies to better cater to their needs and preferences. The outcomes of this study may inform the development of marketing campaigns, pricing strategies, and service offerings that resonate with the diverse student body, fostering a more vibrant and inclusive campus environment.

2 LITERATURE REVIEW

Prior studies have been reviewed in order to direct the focus of the study. Consumer behaviour is a complex and multidimensional field of study that encompasses various factors influencing individuals' decision-making processes when purchasing goods and services (Babin & Harris, 2023). Food choice is defined by the FSA (Food Standards Agency of the United Kingdom) as the process of choosing foods to eat based on a number of competing, reinforcing, and interacting forces. The most significant factor influencing customer satisfaction has been found to be food quality in several empirical investigations (Namkung & Jang, 2007; Peri, 2006; Sulek & Hensley, 2004).

Related studies on fast-food sector have shown that there is a continue shift of consumer preferences and habits resulting from a substantial change to the market environment, and this

has continued to attract scholarship (Nondzor & Tawiah, 2015; Peri, 2006; Ramli, Omar, & Jamaludin, 2021). On this note, fast-food delivery services have been significantly more popular in recent years, and it is plausible to postulate that this has somewhat made it a bit more demanding to analyse consumer behaviour in this sector. More importantly, it is essential for marketers and business owners in the sector to have a thorough understanding of the elements that affect customer behaviour at fast-food restaurants and delivery services. It is with this understanding that marketers and business owners can generate informed judgments and successful strategies to suit the changing demands and preferences of their clients. With emphasis on the elements that affect customers' decision-making processes and the consequences of these insights for marketing and business strategy, this literature review section attempts to provide an overview of the body of knowledge on consumer behaviour in the fast-food business and delivery services.

The literature review section is presented under three major headings: *Consumer behaviour of patrons of food and fast-food delivery services; Factors influencing students to patronize fast-food joints; and Factors influencing the choice of fast-food delivery services on university campuses.*

Consumer behaviour of patrons of food and fast-food delivery services

Despite the fact that the study of consumer behaviour might potentially address all possible consumer behaviours, it often focuses on actions connected to finding, acquiring, and using goods and services (Schiffman & Kanuk, 1991). The treatment of consumers as groups, or market segments, is possible. These groupings are often determined by geodemographic traits and are presumed to have a set of attitudes and behaviours. Individual, subjective viewpoints, on the other hand, might shed light on disparate behaviour patterns.

In recent years, the primary trend in food consumption in metropolitan areas of developing countries has been an increase in the number of consumers having meals away from home, with the fast-food industry accounting for the majority of this expansion (Kaynak et al., 2006; Adzovie & Jibril, 2020). Platania and Donatella (2003), strongly postulate that the issue of increased fast-food patronage has been evident on a national and international level across countries and that the lack of time in a fast-paced, competitive, and urban lifestyle is the root of the interest in fast-food. Due to the busy consumer lifestyle and dual-working households with children (Schiffman & Kanuk, 1991; Atkins & Bowler 2001) claim that focus is being placed more and more on quick meal options. The amount of time available for food preparation is being reduced as a result of consumers' increasingly hectic lives. In the earlier work of Habib, Abu Dardak & Zakaria (2011), affirm the fact that fast-food is a globally expanding industry.

Habib, Abu Dardak and Zakaria (2011) identify fast-foods as alternatives to home-cooked cuisine that are swiftly prepared, affordably priced, and widely accessible. Laudan, R. (2001) argues that the fast-food industry to have originated from the United States and adds that the "fish-and-chips" style, on the other hand, has been popular in the UK since the eighteenth century as a place where the working class could conveniently get affordable prepared dishes. The fast-food concept, along with its services, traversed the borders of the western world and is now being practiced in innovative and competitive ways compared to those run by its originators (the westerners). Africa, precisely Ghana, has had its fair share of the circularizing of the fast-food culture. Without cancelling the appropriateness health-wise of the traditional method of cooking or preparing home-made meals, the fast-food culture has been widely accepted by the Ghanaian society, given the current fast-paced lifestyle of the working class and western influence.

According to Nondzor & Tawiah (2015), Ghana has seen a rise in the popularity of fast-food restaurants in recent years because of the rise in demand driven by many factors including the

ones already mentioned. They provide the Ghanaian consumer with a variety of exotic cuisine, including as pizza, hamburgers, fried chicken, French fries, among other local foods and rice dishes like fried rice, jollof, etc., and are operated by both local businesspeople and foreign multinational corporations. Nondzor & Tawiah add that their activities are more formal, and they are typically housed in buildings on busy city streets and in gas stations.

Factors influencing students to patronize fast-food joints

Watson's (2006) and Zhong & Moon, (2020) intimated that customers won't hesitate to go on to another restaurant if a current one doesn't offer high-quality service because there are so many options available, is one crucial ground because many fast-food joints thrive to achieve customer satisfaction. One commonly accepted approach to understanding what influences consumers' choices of fast-food joints is by Kennedy, Nantel, & Shetty's (2004) which advances nine primary elements that influence fast-food consumption: social development, economic forces, political climate, technological development, ecological development, market forecasts, buying groups, equilibrium of power, and regulatory framework (SEPTEMBER, for short).

Habib et al., (2011) note that the most significant influencing element among them was considered to be societal development, which comprised (i) time restrictions due to a busy lifestyle, longer working hours, and the predominance of career and family women, (ii) new demographics, including the rise of the "sandwich" generation, single-person families, and age re-targeting (iii) the need for healthier meals and food sources; (iv) eating habits when away from home; and (v) new consumer preferences and eating patterns.

Jibril and Adzovie (2022) found that convenience and time constitute factors influencing consumers' decision regarding fast-food joint selection in Cape Coast metropolis of Ghana. Richardson and Aguir's (2003) efforts in examining influencing factors to fast-food patronage cannot be marginalized in discussions at hand. The scholars also contributed to knowledge existing on the factors influencing the intake of fast-food. They discovered that the primary characteristics of traditional fast-food offerings, including "taste," "cleanliness," "convenience," "speed," and "predictability," were highly valued when choosing a fast-food item. When consumers considered alternative venues, other qualities like "healthiness," "provision of choice," and "friendly staff" were important to them.

To Kennedy et al., (2004), what would influence people to patronize a fast-food joint is the adept ability of the fast-food manager to provide perceived high-quality service, make sure it is aware of its patrons' demands, manage its staff to accommodate those needs, and fulfill its promises to those patrons. Notwithstanding with, Habib, et al. (2011) advance 14 attributes that serve as powerful influencing factors to a patron's choice of a fast-food joint. According to the scholars, the factors were chosen on the basis of previous literatures and some few additions that are assumed by the researchers to be factors that would have carried the greatest impact in regard of their culture (the Malaysian culture and socio-economic perspective). The scholars advance these 14 attributes to include price, quality, freshness, taste that suits them, local vs. imported products, food safety, attractive packaging, "halal" status, healthy food, nearby store, easy to prepare, advertisement, influence of friends vs. family, and influence of preferred brand.

Factors influencing the choice of fast-food delivery services on university campuses

Varying age groups have been discovered to be part of fast-food patronage. Notwithstanding, youths, particularly students can be argued to form a significant percentage. Bakar et al. (2017), somewhat buttress this assertion with the report that students, particularly the teen market, make about 70% of customers at fast-food outlets in Malaysia. Another evidence can be found in

Kolak, et al (2018) report, which stressed that the market for college students is growing and that these young adults have created a sizable market for the fast-food business.

In a study on fast-food perception, Bryant & Dundes (2008) analyzed survey data from college students in the United States and Spain. The study's findings suggested that gender and cultural differences influence how consumers see fast-food. Value (quantity of food for the money) was prioritized more by American college males (61%) than by other respondents (35%), while nutritional status was mentioned by just a small percentage of American college males (29%) compared to other college respondents (60%) who cited it as a priority. Americans (69%) value convenience of fast-food more than Spaniards (48%) do, whereas more Spanish college students (49%) than Americans (18%) disapprove of the growth of fast-food outlets in their respective nations. Ramli et al (2021), conducted a research among university students in Malaysia and concluded that students at the University Teknologi Mara (UiTM) Terengganu Campus and the University Sultan Zainal Abidin (UniSZA) Campus have a positive intention to use electronic food ordering due to perceived convenience, perceived customer control, an alluring marketing strategy, and a desire to use technology.

Again, Nondzor & Tawiah (2015) probed fast-food preferences and consumer perceptions among Ghanaian university students with a focus on tertiary students located in the Cape Coast Metropolis. According to their findings, men (59.7%) purchased more fast-food than women (40.3%), and the majority of them were between the ages of 18 and 25. While the study found that tertiary students frequently ate fast-food, another report shows that this was not the case for most respondents (76%), who reported eating it occasionally (14.5%), once a week (at least), and daily (7.5%). Their survey further indicated that when it comes to the meal type (breakfast, lunch, or dinner), going out for lunch was the favourite time of visiting fast-food outlets, followed by supper and breakfast. Their study also examined influencing factors of these fast-food joints and found that people eat fast-food because it is convenient, tasty, offers a range of menu options, and they enjoy the atmosphere. However, the study fell short in establishing the hierarchy or order of importance among the influencing factors identified amidst the students.

However, Adam, Hiamey and Afenyo (2014), reveal some dangers that fast-food patronage can pose to student health. The scholars report that thirty University of Ghana students were once sent to the hospital in 2007 after consuming "waakye", a traditional meal of rice and beans supplied by food vendors on campus. They add that tertiary students are at risk of consuming contaminated food despite being expected to assess food safety and the hygienic conditions in which foods are prepared and sold before making purchases of such foods (Morris, et al., 2005; Amoako, 2023). It is concerning such issues surrounding fast-food purchasing that students are sceptical of the health implications of where they purchase their food (Kris-Etherton, Harris & Apple, 2002; Mozaffarian & Rimm, 2006).

Most often, the cost of food plays the biggest role in determining where university students choose to eat on campus (Adderley-Kelly, 2007; Haapala & Probart, 2004). However, scholars have hinted a growing importance in hygiene among students when it comes to the choice of fast-food joint to pick (Morris, Evans, Tangney, Bienias, & Wilson, 2005). Shearer et al., (2015) adds that the availability of foods in one's environment heavily influences the foods one chooses to eat, that is, a consumer may be forced to make a choice out of what is available and accessible to them whether that specific choice is above or below their standard thresholds.

Eu and Sameeha (2021) did an in-depth study into finding whether students on university campuses had food safety concerns influencing their choice of joint. According to the study's findings, students' concerns about food safety greatly affect where they eat on campus. The study's findings also provided enough data to support the conclusion that students' worries about food safety extend beyond the actual food to the setting in which it is prepared and served.

The fact that students' worries about food safety influence their choice of dining establishment on campus suggests that once the students' food safety concerns are addressed and improved upon, it will invariably lead to increased patronage and consequently revenue from sales.

3 METHODOLOGY

The study rests purely on the qualitative research paradigm, using the case study approach. The authors employed interview as the main data gathering technique with the use of an interview guide. The authors used the multi-stage sampling procedure in locating the participants (who were all undergraduate students at the University of Cape Coast) for the study. First, the purposive sampling technique was employed in selecting the initial participants (n=4). Second, using the snowball sampling technique, the initial participants introduced the authors to their colleagues who met the inclusion criteria – to be eligible as interviewee for the study; the person must be a current university of Cape Coast undergraduate student. He or she must have patronized fast-food joint(s) as well as fast-food delivery services for at least three times. Lastly, he/she must be willing to be interviewed with no demand for monetary or any other benefit aside from contributing to the success of the study.

A total of 12 students were interviewed (N=12). All participants provided verbal consent. The participants were interviewed individually, one-on-one. All interview sessions were audio-recorded, and each interview session lasted between 20 and 30 minutes. The audio recordings were transcribed verbatim and coded. Relying on inductive analysis, the authors identified.

4 RESULTS AND DISCUSSION

In this section, we present the results of the study first, in a summarized table, and then we present the detailed results under the research question before moving on to the discussion section. In order to protect their identities, we used the following pseudonyms for the interviewees, by prefixing each pseudonym with the letters IN (short form of INTERVIEWEE): IN-Jesse; IN-Kofi; IN-Esi; IN-Evans; IN-Joan; IN-Neli; IN-Laud; IN-Nash; IN-Ama; IN-King; IN-Mends; and IN-David. Three major categories (convenience, timely delivery of food and taste of food) emerged from the transcripts. The following three sub-categories also emerged: quantity of food, packaging and appearance of delivery motor riders.

Tab. 1 – Summary of results of the study. Source: authors' own research

Category	Description	No. of IN	Extract
Major Category 1	Convenience/Proximity	7	*As for me, even though their food is quite expensive compared to other sellers, I like the Kenkey Boutique people because they are located very close to my hostel accommodation. (IN-Jesse).*
Major Category 2	Timely delivery of food	9	*Most of these fast-food people are nice when you go there to buy but when you order for it to be delivered, they can take the whole day and errmm I hate it (IN-Ama).*
Major Category 3	Taste of food	5	*Ok so with that, Mickylan is one of the food vendors whose food tastes so well that I can't*

			get enough of it. I'm in love with the taste (IN-Mends).
Sub-Category 1	Quantity of food	3	You know that we are students and we don't have much money so we try to get more food for little money. It is about filling the stomach lol (IN-King).
Sub-Category 2	Packaging	3	I think how food is packaged speaks about volumes about the person selling the food. To me even if the food doesn't taste so good but the package appears neat and presentable, I will go for it (IN-Joan).
Sub-Category 3	Appearance of delivery motor riders	2	As for me once the delivery guys come to deliver my food, I observe them very well. If they do not appear good as in their clothes and shoes, I would not buy from that vendor anymore (IN-Laud).

Detailed Results and Discussion

Research Question: *What factors influence university students to patronize fast-food joints and fast-food delivery vendors/services and why do these factors influence students' decision regarding the patronage of fast-food joints and fast-food delivery/vendor services on campus?*

Convenience/Proximity

In respect of this research question, the authors were interested in investigating factors that influence students to patronize a fast-food and/or fast-food delivery service. Out of the 12 interviewees, majority (7 out of 12) stated that their decisions were influenced by convenience/proximity. We chose to combine these two factors because it appeared that the interviewees used both words interchangeably, to convey the same idea. The following extracts display evidence from the data:

> *As for me, even though their food is quite expensive compared to other sellers, I like the Kenkey Boutique people because they are located very close to my hostel accommodation. (IN-Jesse).*

Similarly, three other interviewees (IN-Nash; IN-Evans; and IN-Esi) disclosed that they chose Chedda Chops because of convenience. The following are verbatim extracts from them:

> *I always choose Chedda Chops because it is very convenient for me. My roommate also likes it because in few minutes I am able to bring good food for us. (IN-Nash).*

> *Proximity, proximity, proximity is the key. I cannot compromise on that so I will always buy from Oseikrom (IN-Evans).*

> *Hmmmmm, it is very convenient for me to buy from Chedda. Aside from the good taste of their food, I find it very convenient buying from them (IN-Esi).*

Two interviewees expressed the notion of convenience with other words such as cool and comfortable. However, when they were asked to explain, they ended up indicating that by those words, they meant convenient and proximity respectively: The following extracts capture their responses:

> *Ooo, it is cool to buy from them (Chedda Chops). I mean it is convenient for me when I buy from Chedda (IN-David).*

> *Ok, I feel comfortable buying from Oseikrom and I like it that way. O yeah, I mean because of the closeness of their joint to my hostel (IN-Ama).*

The last interviewee expressed the notion of convenience in a rather different fashion. This interviewee aligns convenience to good feeling. The extract below captures his thought:

> *I mean it feels good buying from them. Everything feels good about the experience. I will always choose them for that good feeling (IN-Mends).*

For the students to consider convenience/proximity over other factors in patronizing fast-food vendors it may be an indication that students are saddled with many academic activities and so may not have the luxury of time which may be influencing their decision for the choice of fast-food vendors. As displayed by the response from IN-Jesse, the costly nature of fast-food does not influence her. It is obvious that the decision to patronize a fast-food joint is highly influenced by convenience/proximity. This finding therefore agrees with Jibril and Adzovie (2022) who found convenience and time to be the most influencing factor for fast-food joint selection.

Time of Delivery

Also, regarding the choice of delivery services, what stood out for the interviewees was the timely delivery of food they ordered. Nine, out of the 12 students interviewed said that they could not compromise on time factor when it came to patronage of delivery services, particularly, food delivery services. Other interviewees were however indifferent. The following are some of the responses from the nine interviewees:

I have tried some of the delivery services before but I did not like them. They took so long to deliver my food. So, I prefer to walk to the venue to buy the food myself (IN-Laud).

Four of the interviewees – IN-King, IN-Ama, IN-Nash and IN-Jesse expressed their thoughts on delivery services:

I like eating my food on time so it must be delivered on time for me (IN-King).

Most of these fast-food people are nice when you go there to buy but when you order for it to be delivered, they can take the whole day and errmm I hate it (IN-Ama).

Chedda Chops used to delay with delivery but they are now on point. They deliver my food to me mostly on time (IN-Nash).

The fast-food people joke with time and so I usually go there to buy or send a friend because a delivery guy has messed me up before eh (IN-Jesse).

From the above, it is clear that the interviewees value time and so would not like any delivery service provider to mar their orders. This is an indication that delivery service providers must reconsider the time factor. It could also be that as one of the interviewees stated, a fast-food vendor operates a delivery service which has improved its delivery in respect of time and this act has endeared this customer to that vendor.

Taste of food

The third major category identified is taste of food. Five of the students interviewed placed some form of emphasis on the taste of food constituting an influence on their choices. The extracts below display the evidence from the interviewees:

Okay so I would always choose taste over any other thing when it comes to food. My dear, taste of food is everything oo! (IN-Evans).

Similarly, these two students said:

So I purchase Mally Heels because of that unique taste. It always does something to my feelings. So I will choose taste any day (IN-Kofi).

Ok so with that, Mickylan is one of the food vendors whose food tastes so well that I can't get enough of it. I'm in love with the taste (IN-Mends).

Quantity of food

Regarding this sub-category, three students' decision on patronage is highly dependent on the quantity of food from a vendor. The following extracts capture their exact words:

With Cheddar chops, it has to do with the quantity of the food. The price is moderate too oo (IN-Kofi).

As for me I want to be satisfied so I need more food for less amount (IN-Laud).

You know that we are students and we don't have much money so we try to get more food for little money. It is about filling the stomach lol (IN-King).

From the extracts, it appears that these students are quantity-conscious, not necessarily, because they do not value taste of food or other factors. It appears that getting satisfied constitute the major reason they patronize certain fast-food joints.

Packaging

Regarding this sub-category, three interviewees expressed their thoughts in respect of the fact that they made their decisions to patronize a particular fast-food joint or fast-food delivery service based on how a vendor packages the food. The following extracts capture their exact views:

> *I will continue buying from Tasty Chef Food Services because not only is their food nice but their packaging is also on point. I feel ok carrying their food in public because the packaging looks really great (IN-Evans).*

Another explained the reason why packaging convinces her:

> *It was my boyfriend who sent me lunch one day and ooo my gosh! I didn't even believe it was from a food vendor here in Cape Coast. The packaging is guy. So I can say that I also become a loyal customer because I fell in love with the way Tasty Chef presents their food to their customers (IN-Esi).*

> *I think how food is packaged speaks about volumes about the person selling the food. To me even if the food doesn't taste so good but the package appears neat and presentable, I will go for it (IN-Joan).*

From the above, it appears that even though the interviewees who rated packaging as the reason why they would patronize a fast-food joint, it is worthy to note that packaging is important to customers.

Appearance of delivery motor riders

The last sub-category is a concern three interviewees raised as the reason why they patronized fast-food delivery services, and below are their sentiments:

> *I remember dashing food delivered to me to a friend because when I went out to pick the food from the delivery guy I did not like the unkempt nature of the guy.*

> *He looked so dirty. I observed that his fingernails were not trimmed and they were dirty too. So, I did not feel ok to eat the food (IN-Ama).*

Two other students expressed similar views:

> *You know, I enjoy buying from Authentic because not only is their environment very clean but also, their delivery guys look cool and they always put up a smile when they hand over my food to me. Their motor bikes also look clean all the time (IN-Neli).*

> *As for me once the delivery guys come to deliver my food, I observe them very well. If they do not appear good as in their clothes and shoes, I would not buy from that vendor anymore (IN-Laud).*

Even though this might appear insignificant, it seems to be the reason why some customers would or would not patronize a fast-food delivery service. This means that fast-food vendors must not only be interested in the packaging of food but also they must be interested in packaging of delivery guys.

5   CONCLUSION

Based on the findings of the study, we conclude that factors influencing consumer decision in respect of fast-food joint selection and fast-food delivery service are complex and multi-faceted especially on a university campus such as the University of Cape Coast campus. The findings clearly show that three main factors – convenience/proximity; timely delivery of ordered food and taste of food play a major role in influencing university of Cape Coast students (consumers). This corroborated with earlier quantitative works (see Kennedy, et al., 2004; Habib et al., 2011; Jibril & Adzovie, 2022; Bakar et al., 2017; Nondzor & Tawiah (2015) found at the literature review section of this present paper. Other factors – quantity of food, packaging, and appearance of delivery guys also influence consumers. It is intriguing to note that patrons of fast-food and delivery services (students of University of Cape Coast) appear to be interested in the appearance of delivery guys. Since the fast-food and delivery services are attracting a lot of people, it is prudent for each vendor to consider these factors keenly and inculcate them into planning in order to either penetrate the market or expand their market share. The caution however, is that, this study is a case study of one university campus in Ghana, hence; the findings cannot be generalized. Even if there is the need for any form of generalization, it must be done with much caution.

Implications

The findings of the present study have implications for marketing communications regarding fast-food business and delivery services on university campuses, particularly in developing countries. Fast-food vendors as well as delivery service providers could re-consider their priorities to include the views as expressed in the results of this study in order to maximize their profit while winning new clients as well as maintaining existing clients. It is not enough to package food nicely, but to make sure that delivery riders appear presentable. Also, international fast-food companies such as KFC, which recently launched its operation in Cape Coast, Ghana could take a cue from the views of the interviewees to inform their strategies for reaching the university students knowing very well that there are local competitors.

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ABANDONMENT OF BRAND AND THE PERSPECTIVE OF CONSUMER BEHAVIOUR IN THE DIGITALIZATION ERA: A STUDY OF THE AUTOMOBILE COMPANIES

Charles Randy Afful, Ján Dvorský

Abstract

The authors present a current theoretical review based on a qualitative approach dealing with the Influence of brand abandonment and closed brand relationships in the automobile industry, one of the emerging challenges to business product advertisement and marginally researched. The review is focused on a systematic critical analysis of brand abandonment, using articles from 11 journals on closed brands, and customers' behaviour from 2017 to 2023 using 15 articles from high-impact journals.

The authors firstly outdoors the different theoretical expatiation taken to guide the research, using a qualitative systematic literature review approach; the result indicates that there is a positive influence of closed brand relationship to brand abandonment; the pandemic restriction complicated the issues because many abandonments were due to inadequate funds, inability to in-house checks and lack of trust for online deliveries in terms of automobiles. The study reveals that some research focused on mixed products and others on online apps. Also, the result shows that most research used resource base theory and the social exchange theory with less on technology adoption theory. The result of this study will help researchers in future research and help business managers' strategies well on the brand abandonment phenomena.

Keywords: Brands, abandonment, brand marketing, adoption, automobile, brand avoidance.

1 INTRODUCTION

Brand avoidance is prominent, especially in the post-COVID era, from an abandonment perspective because abandoning brands means the consumer has used the brand previously and is not always loyal to its use, no matter the love bonds. Lee, S.M, Motion J., and Conroy (2009) affirm that there are three reasons for consumers to avoid a brand. The first one they referred to as experiential, deals with the battle between the consumer's anticipated and perceived high-quality, translating the impressions into dissatisfaction with the product. As clients seek personal and social identity through consumption, brands that don't suit the picture they seek to convey are rejected. This is when customers avoid a logo based on its values and impact on society (Diniz, F. and Suarez M., 2018). Due to the growing concern about brand loyalty and its related challenges, this study seeks to review the literature on brand abandonment and how close brand relationships influence abandonment. Given how essential the presence of food is for lifestyles, the practice of anti-consumption of a specific meal class requires the lifestyles of some other food that can substitute the abandoned category (Dalmoro, M., Matos, C. A., & Barcellos, M. D, 2020).

This study rolls on numerous benefits by helping to communicate better to customers with imaginary signs and symbols about the firm's products. Most organizations in green technology utilize green plants as part of their logo to communicate to customers about natural and organic products.

Also, the merits of this study include creating recognition among customers and employees who would like to associate with the brand image.

The study gaps studies on the topic sought to accentuate the reason for customers' rampant abandonment of brands, from online app brands to food and drinks brands, automobiles, and mobile phones. To our research know-how, the latest major review on Brand abandonment and close brand relationships was by Purvi Shah (2020) and Man Xu, Wansheng Tang, and Ruiqing Zhao (2023). Much other research on abandonments in online app carts has also been investigated and published; however, it is not in tune with the current study. The essence of this is to communicate to policymakers and business owners about the continual dynamism in brands by consumers due to several factors. Previous studies sought to delineate the behavioural aspect of this abandonment of brands; however, this study aimed to collate various research ideas and recommendations for improvement.

Although most of the previous literature under review emphasized online brand marketing, The study seeks to understand the impacts of the various research on online and product abandonment, especially in the automobile industry. Close brands have been identified as the substitute for ubiquitous brands when customers consider making decisions based on many intriguing factors. However, others have only seen closed brands complementary to the primary brand usage. For instance, good brand images help to attract well-skilled employees to the business, e.g., Apple brand, Google, and Twitter. Branding also helps motivate employees by creating a sense of unity among them, thus increasing their commitment and dedication. In line with reviewing latent literature, our focus is to understand the continued dwindling of sales of branded automobile companies while emerging firms' sales increase to be market leaders. In cognizance of recent industrial performance, our study will broadly seek contextual reviews on the Abandonment and Influence of close brand relationships, especially in a heterogenous market where competition is intense regarding quality, technology, efficiency, durability, and designs.

This present qualitative research is divided into two main objectives based on the premise. Firstly, outline a systematic theoretical-based overview of research on the theme, based on chronicling theoretical, and empirical knowledge and expatriate behavioural abandonment and close relationships. Secondly, identifying gaps in knowledge creates the backbone for further research in the field of brands. The main aim is to collate data on brand abandonments to restructure theoretical understanding and methodical debate to analyze the content of this research in resolving band abandonment and close brand relationships, to discuss methods used in the study and limitations, and to recommend them.

2   LITERATURE REVIEW

Brand and brand use attachment has become topical for researchers. Many researchers are seeking ways to adapt in determining how phones, fashion, technology, and automobiles influence users' decisions at each point. However, with digitalized innovation, many customers can visualize their dream products and even watch their usage before purchasing.

This study reviewed literature from 2018 to 2022 on brand abandonment and the Influence of closed brand relationships. The literature review captures how the brand concept has been explained in the context of thematic reviews, theories used in the research, and the current outlook. This is explained more by the 2023 automobile report by Brand Finance, which reported that Tesla had overtaken Mercedes-Benz and Toyota to take pole position as the world's most valuable automobile brand. Also, Skoton's brand popularity continues to surge. While others follow closely. This means most traditional brand admirers are abandoning their prestigious brands for another need, mainly after the Pandemic. Many pinnacle automobile agencies are selling their environmentally responsible brands, which include using electric and hybrid motors, sustainable production practices, and green substances.

2.1 The concept of Brand abandonment

Diniz and Suarez (2018) defined brand abandonment as the process whereby a prestige brand or consumed brand is reduced or eliminated from consumption. Also, Suarez et al. (2012) described abandonment as the process of forgoing a previously consumed brand.

Brand abandonment is described as the attitude toward an app, a phenomenon relevant to a mobile app, and a notion when app customers can give up using an app (Lim et al., 2015). Suarez et al. (2012) define abandonment because of the manner of giving something up, which becomes formerly eaten up. As such, emblem abandonment refers to decreasing or casting off consumption of previously valued and eaten-up brands. Mondal and Chakrabarti (2021) Considered abandonment as the state of being a customer from using a service or product within a stipulated time due to a selection of things consisting of loss of liking, consideration, and commitment. Discussing brand avoidance is outstanding, particularly from abandonment, because one could avoid something you never fed on. Lee, Motion, and Conroy (2009) verify that customers have three motives for avoiding a brand. The first one, called experiential, is handling the battle between customer-predicted and perceived high-quality, translating those impressions into dissatisfaction with the product. The second is identification avoidance, which is associated with the symbolic consumption of manufacturers. In other words, brands are a means to differentiate from competitors (or future competitors). A brand can be defined as a set of tangible and intangible attributes designed to create awareness and identity and to build the reputation of a product, service, person, place, or organization (Tanya Sammut-Bonnici, 2017).

The study by Mondal and Chakrabarti (2021) was expected to contribute immensely to academics and the practising world. So, in academics, it sought to extend the understanding of "the anatomy of app abandonment behaviours" in a structured relational framework. At the same time, practitioners are expected to understand critical factors that influence the retention of branded app consumers and accordingly prioritize their marketing intervention, but this was not realized.

2.2 Thematic Review

Despite the numerous digital interventions to resolve customer complaints and provide brand identity and cutting-edge apps for use by customers, there persists a growing rate of abandonment for competing brands. The research by Mondal and Chakrabarti (2021) posits that 71% of brand users remain inactive within the last three months in 2021. Although several studies have been conducted on abandonment, none was specific in unearthing the plethora of phenomena in marketing. Also, most studies focused on abandoning the digital media brand to neglect other equally essential brand concepts in literature. In the study by Yuan and Lei 2017, they reviewed the cultural attachment and brand relationship by seeking to measure how brand attachment impacts anti-brand behaviour. However, previous research focused on the negative aspects of relationships. Freberg et al. (2019) promogulated in their studies factors that predict abandonment in social media. About 90 per cent of the abandonment studies were in the context of social media.

Despite a healthy body of research on why individuals quit social media, there is little research on how brands abandon their social media accounts or the factors that predict abandonment. This study finds guides for at-risk justifications and supplies assistance concerning best practices when abandoning brand accounts. To buttress knowledge on brand abandonment, (Peng, N. and Chen, S, 2021) research examined how consumer attachment to luxury restaurants and some emotional changes led to their brand abandonment during the pandemic era. This assertion of the dynamism of the human character depends on situational characteristics. The study examined, the moderating effect of luxury consumption goals (e.g.,

self-presentation motives, status consumption, and need for uniqueness). A survey was conducted on 408 participants through questionnaires, and the results reveal that luxury restaurant addition significantly influences consumers' emotional indecision, which in turn causes them not to complete their reservation sessions. Due to restrictions on the populace and the need for some adjustment, many consumers could abandon their preferred areas and food to stick to other measures to stay in the house. For this, there were a lot of brands abandoned in the wake of the Pandemic, which needs to be studied and understood, how other brands gained:

Adverse Outcomes of Positive Brand Relationship by Jain K. and Sharma I. (2019) aimed to investigate how consumers make causal attributions for negative experiences when a strong brand attachment exists and understand how strong brand attachment can intensify the feeling of perceived betrayal, leading to brand hate after a negative experience with the brand.

Further studies were reviewed to understand the psychology and cognitive factors behind online shopping and cart brand abandonment behaviour by Mishra, S., Malhotra G. and Tiwari, S. R. (2021). The study provides valuable insights regarding psychological and cognitive factors behind shopping cart abandonment. For more clarity on the theme, Khan et al. (2022) shed more light on social media brands' avoidance behaviour in their study of understanding shopping cart abandonment behaviour as an outcome of advertisement avoidance on social media platforms. This research dwelled on cognitive, affective, and behavioural ad avoidance; alongside its antecedent conditions of perceived goal impediment, perceived add clutter, and prior negative experiences on social media.

In laying more emphasis on brand Abandonment, a recent study by Gregory and Dalmoro (2022) was based on a consumer-oriented perspective to understand how consumers abandon some unhealthy food brands, mainly because of improved social status, health, or other behavioural euphemisms. The study outcomes adopt an interpretive perspective to describe practices of abandoning soft drinks and meats and how new relationships are built with consumers' objectives. The resultant effect indicates that these foods' nutritional and production characteristics negatively impact the lives of consumers, other living beings, and nature. So as social humans seeking to live long will adapt to abandonment to mitigate this impact. Emphatically, a study by Wang et al.,2022 on online brand abandonment on shopping carts states that it is an eternal nemesis of e-retailers. The research was to provide extant research on online shopping cart abandonment (OSCA), a framework-based systematic literature review to gain more insights into existing studies in this context to provide (i) a comprehensive review of the current state of research and (ii) constructive future research agenda in the area.

2.3 Theoretical review

According to the literature, the motives for leaving behind a particular product category are primarily associated with purchasers' psychological, social, and ideological desires to renounce something formerly fed on, assuming that a choice was made (Suarez, M. C., Chauvel, M. A., & Casotti, L., 2012). However, Diniz and Suarez (2018) elaborated on that factor, stressing that this abandonment decision is not binary (yes or no) but an alternative manner that may be slow or partial and full of uncertainties. The accrued data help explain this technique by showing that clients establish an intersubjective relationship (Coole, 2013) with ingredients in line with their fabric traits. In the study by Yuan Y., and Lei M. (2017), they reviewed cultural attachment and brand relationship by seeking to measure how brand attachment impacts anti-brand behaviour. However, previous research focused on the negative aspects of relationships. The research outcome illustrated two kinds of incentives for anti-brand behaviour: 1) the loss of functional benefit; and 2) the violation of self-concept. The article further reaffirms anti-brand behaviour from the perspective of consumers' characteristics. The main objective of the study of (Yuan Y., and Lei M., 2017) was to investigate the strong brand attachment relationship between

consumers and brands and when and why it will be transformed into a strongly negative brand behaviour, mainly to provide a new dimension in the brand attachment derivatives.

Furtherance to improving understanding of brand abandonment, Diniz and Suarez (2018) pointed out that brand abandonment is a distinct behaviour by consumers used to explain their cultural discourse to the public. It also exposed different aspects of brand abandonment. The study of Diniz and Suarez was on two specific products (Soft drinks and Automobiles), and the study's outcome presented three types of Abandonment: 1. Contingent Abandonment; 2. Balance abandonment, and 3. Aversive. The research also proposes social discourse among consumers in their decision to abandon a brand; 1. Rationality, self-control, or sovereignty 2. Life evolution. Studies on brand abandonment are a new dimension of critically understanding a brand and its management.

Other findings confirm the proposition with the aid of Diniz and Suarez (2018), consistent with which the abandonment of a specific product isn't a binary preference (sure or no), as a substitute, a technique involving the animation of objects and the development of practices of annulment of these gadgets' agentic capability. It is suggested that the human condition may additionally provide some prominence for its miles as much as the client can manage and interrupt this intersubjective courting because abandonment did not contain meal intolerance or different contingent factors that might require intake abandonment.

According to the reviewed literature by Diniz and Suarez, work published in 2018, which schooled that in most previous studies, abandonment was not the object under investigation but a consequence or by-product of the range of processes examined, such as satisfaction, loyalty, and switching behaviour. The study reckoned that recently, (Lehmann, D., & Parker J., 2012) called for more systematic attention to the failed adoption of integrating perspectives into a unified theory. They define dis-adoption as "the cessation or substantial reduction in the use of a previously valued behaviour or possession" (Lehmann, D., & Parker J., 2012). However, prior experiences always support failed adoption as consumers know what they are deadapting. Abandonment also includes non-reflective dynamics, e.g., abandoning without effectively making the decision, and other non-choice situations, such as when the product is no longer within the consumer's means, The present research advances abandonment discussion, addressing consumers who continue to buy the category, but decide on a different brand, thus distancing from a previously preferred product.

The afore literature review on abandonment does not spell out the critical issues of the study under investigation; however, it articulates the relevance of abandonment and its relationship with failed adoption. Suarez et al. (2012) present a broader concept, defining abandonment as giving up something previously consumed. While the term failed adoption suggests a decision that the consumer made. The term abandonment for the sake of consistency and to denote the focus on cultural rather than the cognitive aspect. In category abandonment, the consumer is not interested in the consumption of the product anymore, unlike in brand abandonment, where the consumer seeks other alternatives. Hogg et al. (2009) depicted differences and articulation of avoidance, aversion, and abandonment aversion as more effective, involving dislikes, disgusts, and revulsion, and avoidance refers to staying away from something. Abandonment is usually related to avoidance but not always to aversion since consumers may abandon neutral or even beloved products/brands. Brand abandonment was peripherally addressed through the lens of brand relationships, Fournier S., 1998; Diniz, F. and Suarez M.,(2018).

Our present study enriches this cultural perspective, demonstrating the abandonment of meanings created by regular consumers in their almost banal movement to distance from a previously preferred brand. Previous studies explore different typologies to explain variations in anti-consumption behaviour and abandonment of product categories from a consumer-

oriented perspective. In this study, we follow the new materialism onto epistemology to recognize that objects have agentic capacities in anti-consumption practices. Specifically, we highlight the abandonment of specific food categories as interrupting an intersubjective relationship involving consumers and objects. Thus, the idea of abandonment of consumption of a product allows describing exact attempts and an actual rupture with the intersubjective relationship between consumers and objects. Abandonment is situated in an intermediate position between non-choice and anti-choice, defined as the act of renouncing something previously consumed, and it presupposes that a decision was made (Suarez, M. C., & Chauvel, M. A., 2012). The research by Mondal and Chakrabarti (2021) posits that 71% of brand users remain inactive within the last three months of 2021. The study was rooted in the interpretive structural model (ISM) to expound the factors influencing Brand app abandonment. Although few studies have been conducted on abandonment, none was specific in unearthing the plethora of phenomena in marketing. Also, most studies focused on abandoning the digital media brand to neglect other equally essential brand concepts in literature.

According to the theoretical arguments by Kukar-Kinney et al., 2022, Behavioral aspects of online abandonment represent purchase, economic control, organization, and information motivations. The study adopted the uses and gratification theoretical concept, the Unified theory of acceptance, and uses of technology (UTAUT) to explain how customers return to an existing online cart transaction and the factors that drive using a particular technology. Several merchandises are visible to reduce cart use Uses and gratifications technology (UGT) principle. The proposed conceptual model of online buying cart use and abandonment is frequently rooted in the Uses and Gratifications Theory (UGT) and is the reason why consumers are trying to find the use of a particular medium to compensate for their desires (Blumler, 1979) Assumptions of this idea are that clients are lively media users, goal-directed, aware of their passions, and might pick out the best outlet to gratify those needs. Drawing from UGT and overviewed subsequent, we endorse that purchasers' online buying behaviours, from surfing to completing the transaction, can be used to determine their makes use of and gratifications at numerous ranges of the net buy funnel. In Unique, UTAUT explains which elements pressure using unique technologies and why (Venkatesh, V., Thong, J. Y. L., & Xu, X., 2012). Under the umbrella of UTAUT is the Technology Acceptance Model (TAM) framework, which has been applied to explain cell tool use while shopping (Hubert, M., Blut, M., Brock, C., Backhaus, C., & Eberhardt, T., 2017). Consistent with both UTAUT and TAM, (Hubert, M., Blut, M., Brock, C., Backhaus, C., & Eberhardt, T., 2017) demonstrate that purchasers with earlier fine telephone studies are much more likely to use their smartphones for mobile commerce sports. In a later section, we turn back to UTAUT, UGT, and the idea of the acquisition funnel to develop hypotheses concerning the moderating position of telephone-based total shopping. The overview of literature using Kukar-Kinney et al. (2022) failed to deal with the idea of Brand Abandonment and the impact of close brand relationships; however, the theory used within the dialogue on customer behaviouristic may want to equally follow to have a look at, apart from the idea of recognition and use of generation, which if carried out to modern research will malign the take a look at of abandonment to best the idea of technology, which within the real essence it isn't authentic due to the fact the abandonment of logo is unique to all the advertising and marketing and income environment but not constrained to the net discourse.

The studies using Mondal and Chakrabarti (2021) sought to review the literature on the abandonment behaviour of the brand app patron using an interpretative structural modelling (ISM) technique. They stated that the branded app has four defining ideas; an era product, a media channel, an advertising engagement tool, and a service product, and consequently showcased the combination of branded app research with 25 various established marketing and purchaser behaviour theories. They also categorized forty relevant factors used in the branded

app research. This study views a branded app as a generic platform to allow entrepreneurs to talk and interact with their purchasers on an actual-time basis. Furthermore, apps help them to offer their clients' self-service care equipment' and accordingly grow their service outreach. Interestingly, within the preliminary section, a maximum of the research was carried out in the I.S. place in comparison to the advertising vicinity (Fang Y. H., 2017b.) ; (Mondal, J., & Chakrabarti, S., 2019), maybe due to the higher recognition of design and adoption.

However, over the past decade, branded app research further evolved on five excellent topics Mondal, J., & Chakrabarti, S., (2019). First, "branded app design" (BAD) offers associated factors inclusive of ease of use, social functions, and informative elements (Zhao, Z., Balague, C., 2015); (Fang Y. H., 2017b.). Second, 'branded app adoption' (Adoption) on which the studies paintings is advanced by using integrating diverse adoption theories, which include the concept of planned behaviour (TPB), information adoption version (IAM), generation popularity version (TAM), and related elements consisting of perceived usefulness (Kim, D.-H., Spiller, L. and Hettche, M., 2015), perceived leisure and excitement (Wang, 2015); (Wang, Y.Y., Lin, H.H., Wang, Y.S., Shih, Y.W., and Wang, S.T., 2018) and manipulate (Yang, 2013) to predict the adoption behaviour of branded app purchasers. Third, 'customer utilization and retention' (U&R) primarily addressed the utilitarian benefits of the app (Fang Y. H., 2017b.) and its mission traits (Fang Y. H., 2017a), venture-service healthy (TSF), and interactivity (Fang Y. H., 2017a). This observation focuses more on the retention of the U&R measurement; however, extra elements will cause patron inaction. For instance, at the same time as TSF and 'interactivity' influence the higher usage of an app (Fang Y. H., 2017a), they will nevertheless have boundaries to explain the early abandonment conduct (Fig. 1), perhaps because of their higher relevance most effective after the users get over with the gestation length and turn out to be nicely conversant with an app. This looks at reviewing the literature on the following elements: Branded app abandonment (BAA) and its vital influencing factors. Factors introduced new to the branded app or patron retention include Gestation length, Onboarding experience, Acquisition provide, Alternative beauty, and a few others.

Also, a conceptual framework was developed known as the ISM framework practical, theoretical application based totally on (Kannan, G., Pokharel, S., and Kumar, P.S., 2009) and (Janssen, Marijn, Rana, N.P., Slade, E.L., Dwivedi, Y.K., 2018). Based on the above discussion, this observer believes that the ISM is the appropriate approach for constructing an interpretive structural courting between the recognized elements of the abandonment of the branded app. The results of the ISM are used in addition as an entry to the MICMAC diagram to decide the riding energy (DRP) and dependence strength (DNP) of the elements (Mandal, A., and Deshmukh, S.G., 1994). The relevance of this framework of ISM supports the theoretical underpinning of current theories in customer retention; as a result, it's far more applicable for future capacity studies. Furthermore, this examination recommends using empirical techniques consisting of confirmatory component evaluation (to optimize the wide variety of variables) and structural equation modelling (to do the route evaluation) to validate and test the version in the future.

In summary, this study also explored the understanding of the abandonment concept in literature, particularly in online marketing pedagogy. It also used some behavioural theories in marketing, including the theory of planned behaviour, information adoption version (IAM), and generation popularity version (AM) to expatiate the consumers' buying behaviour. This literature added to knowledge in the field of online marketing, and the behavioural reactions of consumers to brand decisions did not impact much on the theme for this current study.

Similarly, the literature of Khan A. Rezaei, S. and Valaei, N. (2022) further elucidates the social media shopping and the brand cart abandonment behaviour of the consumer using the social

cognitive theory. The exposition of the study reviewed previous literature on the study of social commerce and developed a Stimulus–organism–reaction model for all tiers of the client selection-making process. According to them, studying social trade is fragmented, and examining how social commerce affects customers may be necessary. Ko (2018) indicates that users' social choices and business dreams are conducive to their social purchasing intention. In addition, the consequences of the Look by Aladwani (2018), Hajli, N., and Sims, J. (2015) display that the purpose of shopping through social media is resorted to the perceived fine of social support and perceived social commerce satisfaction. Drawing on a sample of 230 UK users, the consequences of the observation via Gregory and Dalmoro (2023) confirmed emotional support and information. Kukar-Kinney, M., & Close, A. (2010) define shopping cart abandonment conduct as the position of any object(s) using consumers in their online internet-based buying cart and not finishing the acquisition process all through that online purchasing session. Shin et al. (2016) outlined abandonment as a scenario wherein the consumers or customers of a selected product depart a website without making a buy. The metrics which the agencies might use the degree of the price of abandonment aim at assisting the proprietors of the corporations in discovering the causes and giving techniques to motivate the consumers to complete their shopping process (Yılmaz, H., and Enginkaya, E, 2015) (Yim, M.Y.-C., Yoo, S.-C., Sauer, P.L., Seo, J.H., 2014)

Shin et al. (2016) confirm that a man's or woman's behavioural responses have a sizeable effect on making product selections. An instance of a cognitive appraisal version in advertising and marketing pertains to the element of the intake styles of consumers who come from a specific cultural history (Bambauer-Sachse, S., Mangold, S, 2013), (Vakratsas, D., and Ambler, T.,, 1999). Shin and Lin (2016) argue that the appraisal dimensions are distinct because there needs to be an interpretation of the scenario before making the final evaluation. These dimensions are distinct, and, in most instances, they replicate an affiliated disposition that may be cognizant at the time while they're required to be managed (Hoffman, D.L., Fodor, M, 2010). From the organizational angle, the traditional notion suggests that buying cart abandonment is an "awful factor" as it lowers buying prices or can lead to an unfriendly patron journey (Teng, L., Laroche, M., Zhu, H., 2007).

According to Bandura (2014), Social Cognitive Theory (SCT) is a concept based on reciprocal determinism. It is a 3-way affiliation among behaviour, some personal factors together with cognition, and environmental variables, which provide a beneficial method for information purchaser conduct, explicitly accounting for cognitive elements that could impact people's behaviours and representing a triangular relationship among the three principal aspects of human courting (Young et al., 2005).

According to Khan A., Rezaei S., and Valaei N. (2022), As a non-shopping conduct, this study posits that social media commercials also cause cart abandonment. In addition, the initial research had asymmetric views toward our proposed version's antecedents and outcome situations. The present-day study has a fuzzy view of the problem of social media ad avoidance and purchasing cart abandonment. In addition, this looks at the primary to draw on social cognitive theory to shed light on social trade customers' ad avoidance and purchasing cart abandonment. Although the study by (Wang, Y.Y., Lin, H.H., Wang, Y.S., Shih, Y.W., and Wang, S.T., 2018) was on online brand marketing, it posits an interesting revelation that seeks to resolve brand abandonment and the Influence of close brands on behaviour. It also suggested some contextual factors in the literature review (or external attributes) (including price and time pressures; (Cho, C.-H., Kang, J., & Cheon, H., 2006), which have the propensity to influence consumers' purchase decisions, which in turn affect cart abandonment or purchase intentions. These are detailed: Price: Monetary factors that considerably affect consumers' motivation to proceed with purchasing activities (Song J.-D. , 2019). The literature propounds the deserves

of the price that influences OSCA (Cho, C.-H., Kang, J., & Cheon, H., 2006); (Kapoor, A. P., and Vij, M., 2021); (Kukar-Kinney, M., & Close, A, 2010); affirmatively, the look by (Rejikumar, G., & Asokan-Ajitha, A, 2020) showed the relationship between price and buy Intention, where the smaller the cut price supplied by using the e-retailer, the extra the chance of cart abandonment. Based on this proof, Wang et al., (2022) confirmed that purchasers worried about the full fee are more likely to desert their online buying carts. Another contextual factor is Time strain: Time is an idea that affects customers' cognitive procedures while shopping for objects (Cho, C.-H., Kang, J., & Cheon, H., 2006). The literature suggests that any put-off and increase in real or perceived waiting time is one of the antecedents that result in OSCA (Rajamma, R., Paswan, A., & Hossain, M., 2009). (Rajamma, R. K., Paswan, A. K., & Hossain, M. M. , 2009) highlighted that waiting instances include gradual web page downloads (awaiting pages to open), uploads (awaiting web page submissions to be uploaded to the website), lengthy bureaucracy, and particular codecs of bureaucracy for clearances, which could lead to the OSCA phenomenon. The literature on perceived threat risk factors showed that psychological, social, and trust risks are this category's most frequently used factors. Extant research suggests that when consumers engage in comparison shopping (e.g., comparing product quality, price, payment options, etc.), the likelihood of abandonment behaviour is high (Cho, C.-H., Kang, J., & Cheon, H., 2006). The level of mindful interpretation is also found to affect the level of engagement with one's items in the shopping cart, affecting purchase intention (Rubin, D., Martins, C., Ilyuk, V., & Hildebrand, D., 2020). Social risk: An important factor often included when studying behavioural intentions, as consumers often try to get advice from others (e.g., family members, salespeople) to reduce social risk (Cho et al., 2006). The literature suggests that incongruence between own and significant others can trigger interpersonal conflict, which increases the probability of OSCA (Huang et al., 2018). Other factors that are closely related to the concept of social risk, including perceived importance and symbolic value (Midgley, 1983; (Ravasi, D., & Rindova, V., 2004); (Song J. D., 2019), are documented as significant drivers that influence purchase decisions and abandonment behaviour. Another study by (Kapoor, A. P., and Vij, M., 2021), evidenced that the likelihood of OSCA is influenced by rating valence, review volume, and seller ratings. Trust risk: Consumers are less likely to patronize websites that do not guarantee a sense of trust (Cho et al., 2006). Literature shows that when purchasers are involved in the security and privacy of their records for the duration of the checkout technique, they will lose the incentive to finish the transaction, which ultimately leads to OSCA ((Cho, C.-H., Kang, J., & Cheon, H., 2006); (Kapoor, A. P., and Vij, M., 2021); (Kukar-Kinney, M., & Close, A, 2010); (Rajamma, R., Paswan, A., & Hossain, M., 2009). Personal factors: Previous research has proven that personal factors (which include revel in, enjoyment reason, organizational rationale, and emotional ambivalence; see (Cho, C.-H., Kang, J., & Cheon, H., 2006); (Kukar-Kinney, M., & Close, A, 2010) could affect the adoption of digital technologies, explaining the essential role of continued willingness to use in a web environment (Jahanmir, S. F., Silva, G. M., Gomes, P. J., & Gonçalves, H. M. , 2020). Experience: A qualitative assessment of enjoyable attributes that emerge from purchase and subsequent use (Basu, 2018). If customers are sceptical of experiential statistics, they generally tend not to delay purchase selection (Song J.-D. , 2019). Likewise, the look at by using (Cho, C.-H., Kang, J., & Cheon, H., 2006) and Khan et al. (2022) advise that poor past studies (i.e., dissatisfaction) can considerably affect buying selections and boost the probability of OSCA. Organizational rationale: "the volume to which purchasers upload gadgets to their online shopping cart to create a wish list of preferred gadgets, bookmark products for a possible future buy, and slim down objects for further evaluation" (Kukar-Kinney, M., & Close, A, 2010). Emotional ambivalence: This idea describes complex feelings approximately online buying resulting from incompatible emotional or cognitive conflicts (Huang, G. H., Korfiatis, N., & Chang, C. T., 2018) (Huang, G. H., Korfiatis, N., & Chang, C. T., 2018). Studies have shown

that having inner conflicts (e.g., characteristic conflicts and self-efficacy) and interpersonal conflicts can intrude with purchasers' emotions in online shopping, consequently leading to OSCA (Huang, G. H., Korfiatis, N., & Chang, C. T., 2018); (Mir, 2021); (Wang S., Cheah, J-H and Lim X, 2022). Also, when clients become harassed or overloaded by online facts, the chances of them forsaking shopping carts are higher ((Cho, C.-H., Kang, J., & Cheon, H., 2006); (Kukar-Kinney, M.,& Scheinbaum, A. C & Orimoloye, O. L. & R. Carlson, J. & Heping He., 2022). Technological factors: Complex technological features regularly frustrate online purchasers, and they are broadly regarded as a major factor influencing customer buying conduct. (Davis, 1989)(Davis, 1989). This review explains the rationale for brand abandonment and how close brand relations could influence abandonment. Using the behavioural concept.

3   METHODOLOGY

In the systematic qualitative literature studies on brand abandonment in high impacts, refereed journals in the field of business and management, consumer behaviour, the International Journal of Corporate Communication, Administrative Review, Journal of Contemporary Administration, and Journal of Consumer Studies, data were sorted from the Web of Science database, Science direct and google scholar. However, most of the ten articles were from journals in the Web of Science. Data was selected from 2018 to 2022 with a restriction of only ten articles. This is to better inform researchers about brand abandonment before COVID-19 and after COVID-19 impact of the brand abandonment. Purposive sampling was used in gathering this data to reflect the research topic by using the keywords to search for research, scan abstracts and eliminate irrelevant ones. However, a different brand is chosen due to its relevance to the consumers. Sanders and Freberg's (2019) data were collected from the Twitter ApI group and analyzed using Survival analysis (i.e., event history/failure analysis), a family of statistical techniques that models the Influence of a set of variables on the length of time until an event occurs. A hypothetical review was also conducted. The extended Cox regression model was also used. The study was limited because the survival analysis only considered inactive accounts because it was impossible to identify precisely when protected or deleted accounts were closed via the Twitter API.

The study by Diniz and Suarez (2018) used a qualitative approach where an interview was designed to collect data from some 14 ex-consumers. In the in-depth study by (Gregory and Dalmoro, 2023), interviews with 15 consumers who have recently abandoned the consumption of meats or soft drinks were used to collect primary data. To that end, a semi-structured script with 15 questions was designed. (Mondal and Chakrabarti, 2021) used a qualitative approach by interviewing 31 online domain experts on brand abandonment behaviour. Survival analysis (i.e., event history/failure analysis). The study deployed ISM and fuzzy MICMAC analysis for the data analysis. The study was limited because not all online account holders who abandon their accounts may not be customers. After all, others may be either students or other classes of personnel from different fields, and the data could not differentiate. Also, the analysis focused on the discursive aspects of the process. Still, it failed to consider practical and material limitations, which differed from the approach in this research; as such, it was unable to consider brand abandonment behaviour.

 Khan, Rezaei, and Naser Valaei; 2022 using Fuzzy sets/Qualitative Comparative Analysis (fs/QCA). The population of this study is individuals from Germany who are all engaged in social media and online buying. Snowball sampling was applied, and the Survey tool (based in Hamburg, Germany) was used to create the online questionnaire. A token incentive (Amazon gift vouchers) was used to maximize the response rate. A total of 191 responses were received, and fuzzy set-qualitative Comparative Analysis (fsQCA)

4 RESULTS

The results from all the journals indicate mixed reactions. However, all the journals delineated brand abandonment, with four specifically on online abandonments, and one measured how culture influences abandonment. Two were focused on the behavioural impacts of abandonments, and two on product abandonments.

Tab. 1 - List journal sources and papers used in the research. Source: own Research.

Name of Journal	Quantity
Journal of Business Research	1
Journal of Retail and Consumer Services	4
Journal of Public Economics	1
Journal of Contemporary Administration	1
The International Review of Retail, Distribution, and Consumer Research	2
Corporate communication	1
Brazilian Administration Review	1
Int. Journal of Consumer Behaviour	1
Heliyon	1
Open Journal of Business Management	1
Journal of the Academy of Marketing Science	1
Total	15

5 DISCUSSION

Keywords in the theme' brand abandonment and close brand relationship'. The measures of consistency (a measure that is analogous to a correlation) and coverage (a measure of effect size) in QCA provide estimations of how good alternative conjunctive models explain a behaviour instead of being dependent on a symmetric-based methodology of data analysis (i.e., correlations, multiple regression, and structural equation model). The search for brand abandonment resulted in many variables of interest linked to brand abandonment in the research. They include Online shop cart abandonment, app abandonment, product abandonment, political party abandonment, and brand avoidance.

For (Mishra, S., Malhotra G. & Tiwari S. R., 2021), the study used structural equation modelling and SPSS process Macro for data analysis, and questionnaires were administered.

Confirmatory factor analysis (CFA) in AMOS 25 to evaluate the dimensionality and psychometric properties of the construct.

(Yuan Y., and Lei M., 2017) The study explained the theory and developed a conceptual framework to guide the analysis of brand abandonment behaviour. This study used attribution theory to view people as rational information processors whose actions are influenced by their causal inferences. Wang et al., a review of 52 articles using the qualitative approach, address this research gap; qualitative research was conducted in different areas through interviews (Liu et al., 2020). Researchers interested in accessing the global population for online research can obtain more excellent coverage through online interviews (Evans & Mathur, 2018).

The study by Gregory and Dalmoro (2023) was limited by the selected consumer group centred on two specific food categories. The study emphasized the multifaceted relationship between human and non-human actors based on the distributive agency arising from new materialism, as proposed by Coole (2005; 2013). Context limitations were also identified, which mitigates the generalization of the result.

Data obtained were categorized, coded, and analyzed based on the themes, literature, methodology, findings, and conclusion.

The standard method featured in the ten articles reviewed is the qualitative approach using interviews. However, others used a literature review and a few quantitative approaches. One of the Research used Fuzzy set Comparative analysis (Fs/QCA), combining quantitative and qualitative methods. Still, a small sample size limited the study, and the data was on online brand apps, which many customers are not glued to its usage, other than products. However, for effective generalization of data and representation of brand abandonment samples, I would recommend using a mixed method approach using different samples from both online and field to measure the abandonment behaviour of clients.

5.1 Finding

The findings from the review of the 15 articles depict that brand and brand abandonment is an emerging field of research to analyse the behavioural decision of the customer or consumer with the array of several complementary and substitute products, regular product promotional sales, market price competition, products design, and enhancement, coupled with some loyalty characteristics have a relatively high influence on the buyer decisions.

Also, consumers abandon their previous brands based on many factors, including referrals. On brand selection online, consumers decide if they are sure of receiving value for money. Many are reluctant to make such a decision without prior user experience. The review outlined two types of brand abandonment, cart abandonment and checkout abandonment, which demand future empirical research.

Some researchers considered other factors that influence other than only brand abandonment. For instance, Cheng, Gu, and Shen (2019) consider social buying intention from the supposed attitude.

6 CONCLUSION

Most of the studies conducted on brand abandonment are on using an online app or marketing media or online cart abandonment with fewer product surveys; also, most of the research used a qualitative approach with few quantitative ones. There was no in-depth research on consumers' motivation for abandonment. To my independent review comment, the theme' brand abandonment and the Influence of close brands on abandonment behaviour' is yet to be critically

considered in different fields, such as health, consumer goods, automobile, food, and clothing, to accentuate its impacts on other products critically.

This study was limited by the fact that not all research on brand abandonment was selected; as such, the sample size used for the study is small for generalization. Future studies should consider brand product abandonment and close brand relationships on different product lines since food products abandoned may have different contributory factors than medicine, luxury, or fashion. The issue of brand abandonment will continue to become more complex due to the continual digitalization, rational choices by consumers, the increasing economic hardship reducing consumers purchasing power, increased business referrals advertisements, and uncertainty about the digital security system. More studies in different marketing mixes are needed to understand the dynamics backed by literature.

Results from the studies illustrate that brand abandonment was researched from various countries' points of view and depends on the customer satisfaction level of the brand's financial and innovativeness.

Limitations of this study included small data size making it impossible to generalize findings, and research on Brand abandonment is tilted towards online shopping, with fewer studies on offline marketing. Also, there is a lot of research in 2022 but less in other years on brand abandonment, which is currently gaining more research attention.

Future studies should use a mixed approach to primary data on offline brand abandonment since online shopping has challenges.

6.1 Practical Implication

This extensive literature review will seek to summarize research findings on brand abandonment and close brand relationships guiding strategic marketing policies on brand development. It will help businesses explore different advertisement modes to reduce brand aversion's effect on firms' investment.

6.2 Theoretically implication

Studies on brand abandonment will expatiate the exodus of brand marketing effects and help craft theories to guide regulations.

It will help to expose the complexity of consumer behavioural actions on purchasing and delineate other factors that influence brand abandonment behaviour for future research. Finally, it will help test brand and consumer behaviour theories and their applicability to real-time issues.

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APPENDIX

Tab. 2 - Selected Journal Sources and Findings. Source: Own Research

Author	Journal	Date	Topic	Findings
Sita Mishra, Gunjan Malhotra & Shalini Rahul Tiwari	The International Review of Retail, Distribution and Consumer Research	2021	Moderating effect of cognitive conflict on the relationship between value consciousness and online shopping cart abandonment	The results show that 'comparison shopping' mediates the relationship between value-consciousness and shopping cart abandonment. Further, cognitive conflicts moderate the mediating effect of value-consciousness on shopping cart abandonment through comparison shopping
Siqi Wang, Jun-Hwa Cheah,Xin-Jean Lim	INT. Journal of Consumer behaviour	2022	Online shopping cart abandonment: A review and research agenda	The results revealed that most research was founded by the stimulus-organism-response (S-O-R) model and the buyer behavior theory, focused in the context of the United States and China, and appeared to use quantitative methods. As a result, this review is expected to assist researchers in better understanding the OSCA context, thus paving the way for further research and development in the area.
Asad Khan , Sajad Rezaei , Naser Valaei	Journal of Retailing and Consumer Services	2022	Social commerce advertising avoidance and shopping cart abandonment: A	The findings imply that ad avoidance can create a learning mechanism for consumers about shopping cart abandonment of a brand

			fs/QCA analysis of German consumers	or product if interrupted by a futile message or content.
Monika Kukar-Kinney, Angeline Close Scheinbaum, Larry Olanrewaju Orimoloye, Jeffrey R. Carlson, Heping He	Journal of the Academy of Marketing Science	2022	A model of online shopping cart abandonment: evidence from e-tail clickstream data	. Empirical findings based on clickstream data show that returning to an existing cart increases the subsequent cart use and decreases cart abandonment. Conversely, viewing clearance pages and viewing a large number of product reviews increases both cart use and cart abandonment
Jalaluddin Mondal and Somnath Chakrabarti	Journal of Retailing and Consumer Services	2021	The abandonment behaviour of the branded app consumer: A study using interpretive structural modelling approach	The academic contribution of this paper lies, first, in identifying four new factors (onboarding experience, acquisition offer, value for time, and gestation period) and assimilating them into the extant consumer retention research. Second, this study conceptualizes a new model by integrating two existing theories of the Investment and Relationship Stability Model and the Commitment–Trust Theory
W. Scott Sanders and Karen Freberg	Corporate Communications : An International	2020	Predicting abandonment of brand social media accounts	Results found that both posting volume and consistency as well as network position were significant predictors of account survival

	Journal Vol. 25 No. 2,			time yet surprisingly, the number of account followers was not. Brand social media accounts were often not formally closed or protected but allowed to fall inactive.
Fillipe Diniz, Maribel Carvalho Suarez	Brazilian Administrative Review	2018	Cultural Meanings and Consumers' Discourses about Their Brand Abandonment	The analysis illustrates cultural discourses that consumers use to give meanings and socially negotiate their brand abandonment. Considering the repertoire of meanings attached to both the brands and consumers' commitment to their distancing behavior, the analysis presents three types of brand abandonment: (a) contingent, (b) balanced and (c) aversive.
Yuan Yuan, Ming Lei	Open Journal of Business and management	2017	The Negative Effect of Brand Attachment: How Attachment Styles Help Explain Anti-Brand Behavior	we firstly illustrate two kinds of incentive of anti-brand behavior: 1) the loss of functional benefit; 2) the violation of self-concept, and then discussed the theoretical framework that brand attachment leads to anti-brand behavior from the perspective of consumers' individual characteristics
Sita Mishra, Gunjan Malhotra &	The International Review of Retail,	2021	Moderating effect of cognitive conflict on the	The results show that 'comparison shopping' mediates the relationship

			relationship between value consciousness and online shopping cart abandonment	between value-consciousness and shopping cart abandonment. Further, cognitive conflicts moderate the mediating effect of value-consciousness on shopping cart abandonment through comparison shopping
Shalini Rahul Tiwar	Distribution and Consumer Research			
Enrique Bign´e Carla Ruiz-Maf´e , Alberto Badenes-Rocha	Journal of Business Research	2023	The influence of negative emotions on brand trust and intention to share cause-related posts: A neuroscientific study	The findings suggest that emotions with similar valence and arousal levels cause differing trust perceptions and consumer behavioral responses (sharing intentions), based on the presence or absence of brand feedback. Brand feedback diminishes customers' visual attention to negative comments in cause-related marketing posts
Siqi Wang a, Jun-Hwa Cheah a,* , Xin-Jean Lim b , Yee Choy Leong a , Wei Chong Choo	Journal of Retailing and Consumer Services	2020	Thanks, COVID-19, I'll reconsider my purchase: Can fear appeal reduce online shopping cart abandonment?	The findings reveal that hesitation at checkout increases OSCA, while consumers' decision to buy from a land-based retailer is influenced by their emotional ambivalence and OSCA. Furthermore, fear appeals appear to weaken the relationship between OSCA and the decision to buy from a land-based retailer

Ivana Graziele Gregory and Marlon Dalmoro	Journal of Contemporary Administration	2022	Agency of Objects in the Food Consumption Abandonment	the results indicate that the nutritional and production characteristics of these foods negatively impact the lives of consumers, other living beings, and nature.
Gianmarco Daniele, Sergio Galletta and, Benny Geys	Journal of Public Economics	2020	Abandonship? Party brands and politicians' responses to a political scandal	Results show that local politicians withdraw support from incumbents in parties hit by Clean Hands – inducing early government dissolutions in such municipalities. Consistent with these municipality-level findings, we then illustrate that local politicians from the implicated parties exhibit lower re-running rates and higher rates of party switching in the short term.
Ardvin Kester S. Ong a, Marjorie Joy R. Dejucos , Mary Anne F. Rivera, John Vincent D.J. Munoz , Miguel S. Obed, Kirstien Paola E. Robas	Heliyon 8	2022	Utilizing SEM-RFC to predict factors affecting online shopping cart abandonment during the COVID-19 pandemic	Results showed that Attitude, Attribute Conflict, Self-Efficacy, and Emotional Ambivalence are the primary significant factors affecting SCA. Amidst the pandemic, consumers still value the ease of use, convenience, and safety of the mobile online shopping applications that they have, which they do not positively experience at this time. The findings of this study may be

				applied and extended by researchers, online retailers, and businesses to understand consumer's abandonment intentions.
Anuj Pal Kapoor and Madhu Vij	Journal of retail and consumer services	2021	Following you wherever you go: Mobile shopping 'cart-checkout' abandonment	Empirical results reveal that cart abandonment is a result of multiple variables starting from cross channel price disparity, free shipping, ratings, and review to platform aesthetic design. Whereas check-out abandonment, is a result of shipping policy and account fatigue

THE EFFECTS OF SOCIAL MEDIA ON BRAND PERCEPTION AND CONSUMER BEHAVIOR: SOCIAL LEARNING THEORY AND COGNITIVE DISSONANCE THEORY PERSPECTIVE

George Yaw Bludo, Kwabena Nsiah Takyi, Miloslava Chovancova

Abstract

This paper explores the effects of social media on brand perception and consumer behavior, incorporating the theoretical frameworks of social learning theory and cognitive dissonance theory. The study aims to provide insights into how social media influences brand perception and consumer behavior and address the research gaps and limitations in the existing literature. The literature review highlights the significant impact of social media on brand perception and consumer behavior, emphasizing the need for a deeper understanding of the underlying mechanisms. Building upon this foundation, the proposed theoretical framework integrates Social Learning Theory (SLT), which emphasizes the role of observational learning and modeling, and Cognitive Dissonance Theory (CDT), which explains the discomfort arising from inconsistent beliefs or behaviors. Document Analysis (DA) was used to develop a conceptual framework based on data gathered from open databases. The researchers used theme analysis to determine the relationships and conformity of research constructs. This approach broadened the scope of branding as the theme of attention in the existing literature. The implications of this study are twofold. Firstly, it provides valuable insights for marketers and practitioners to develop effective social media strategies that enhance brand perception and influence consumer behavior. Secondly, it contributes to the existing literature by integrating social learning and cognitive dissonance theories. It comprehensively explains the complex relationship between social media, brand perception, and consumer behavior. While this study makes significant contributions, there are opportunities for future research. Future studies can explore the effects of specific social media platforms, investigate the moderating effects of individual and cultural differences, and examine other marketing outcomes such as purchase intention and brand loyalty.

Keywords: Social Media, Brand Perception, Consumer Behaviour, Social Learning Theory, and Cognitive Dissonance Theory

1 INTRODUCTION

For millions worldwide, social media (SM) has become essential daily (Santos et al., 2022). With the advent of platforms such as Facebook, Instagram, and Twitter, SM has changed how individuals communicate and interact with each other, as well as businesses and brands (Hanaysha, 2022a; Nafees et al., 2021). Additionally, Hutchings et al. (2023) posit that SM has become a potent marketing tool for companies, enabling them to connect and engage with their target audience innovatively. However, a complicated and ill-defined link exists between SM use and Consumer Behavior (CB). While some studies have shown that SM can positively impact Brand Perception (BP) and CB (Makudza et al., 2020; Tsimonis & Dimitriadis, 2014; Nafees et al., 2021), others have found adverse effects, such as information overload and decreased trust in brands (Kim & Ko, 2012; Kumar et al., 2016). There is a need for the study to look at how SM affects BP and CB, given the growing relevance of social media as a marketing tool for businesses. The study, therefore, seeks to answer the following questions: (1) What is the effect of social media usage on brand perception? (2) How does social media

usage influence consumer behavior? (3) How does brand perception mediate the relationship between social media usage and consumer behavior?

While several studies have investigated the impact of SM on BP and CB, there are still some research gaps in this area. Firstly, most existing studies have focused on the positive effects of SM on BP and CB while neglecting the negative effects (Hasan & Sohail, 2020). Secondly, there is a need for more empirical studies that investigate the impact of SM on CB in different cultural and societal contexts (Dwivedi et al., 2021). Thirdly, there is a need for a comprehensive understanding of the mechanisms through which SM influences BP and CB (Hanaysha, 2022).

The study aims to examine the relationship between social media use, brand perception, and consumer behavior and to provide insights that can inform the development of effective social media marketing strategies. The study will use Social Learning and Cognitive Dissonance Theories to accomplish this goal. Social Learning Theory (SLT) posits that individuals learn by observing and imitating the behavior of others and that this learning process can be influenced by factors such as reinforcement and self-efficacy (Bandura & Walters, 1977). On the other hand, Cognitive Dissonance Theory (CDT) suggests that individuals experience psychological discomfort when they hold conflicting beliefs or values and that this discomfort can lead to changes in attitudes or behavior (Festinger, 1957).

By applying these theories to the study of social media and consumer behavior, we hope to gain a deeper understanding of the factors that influence brand perception and consumer behavior in the context of social media use. This understanding can then be used to develop effective social media marketing strategies informed by theory and evidence-based research.

2 LITERATURE REVIEW

The literature review focuses on the effects of SM on BP and CB. The section is divided into two parts: The first part reviews the literature on the impact of SM on BP. In contrast, the second part examines the literature on the effect of SM on CB. SM has revolutionized how people communicate, interact, and share information. As a result, it now plays a significant role in people's lives and impacts CB and BP. Several research studies have examined the connection between SM and CB, but there isn't enough information in literature to fully comprehend how SM impacts BP and CB.

One critical factor determining BP and CB is the information available to consumers. SM has enabled consumers to access vast amounts of information they use to make purchasing decisions. According to Yun et al., (2020), SM gives customers a forum to share their encounters with various brands, impacting other customers' decisions. Therefore, the more positive the reviews and experiences shared on SM platforms, the more likely consumers will have a positive BP and make purchases.

Despite the significant attention SM has received in the literature, there is a research gap concerning the role of SM in shaping BP and CB. Moreover, the available literature lacks a comprehensive understanding of how SM affects BP and CB in the context of different industries and cultures. Therefore, this study seeks to address these gaps by examining the effects of SM on BP and CB in a developing economy in Africa.

SM has been recognized as one of the most influential platforms for brand communication and consumer behavior (Makudza et al., 2020; Fong & Burton, 2019). Social media platforms have allowed brands to reach a larger audience, build brand reputation, and engage with customers on a personal level. The potential benefits of the effect of SM on BP and CB have been documented in various studies. However, there is still a need for a comprehensive

understanding of the effects of SM on BP and CB. This literature review aims to identify the current research on the impact of SM on BP and CB and to highlight the research gaps in this area.

2.1 Definition of Social Media

In virtual communities and networks, people can produce, share, or exchange information, opinions, and material using the digital communication method known as SM (Kaplan & Haenlein, 2010). Facebook, Instagram, Twitter, LinkedIn, YouTube, and Snapchat are the social media sites that are used the most frequently.

2.2 Impact of Social Media on Brand Perception

SM is changing the way consumers perceive brands. Kaplan and Haenlein (2010) postulated that SM platforms have become essential for brand communication and engagement. SM platforms allow brands to connect and build relationships with their target audience. The interaction on SM platforms can help to shape BP positively or negatively. SM platforms have become a significant source of brand information for consumers. Hence, it is essential to study the impact of SM on BP. The type of SM platform brands use can also affect BP. A study by Fournier and Alverez (2019) found that using Instagram by brands positively affects brand image while using Facebook has no significant effect. Similarly, a study by Safko (2010) found that the use of Twitter by brands positively affects brand image. The impact of SM on BP has been widely studied. SM platforms allow brands to create and maintain customer relationships by providing relevant and engaging content (Duffett, 2017). Brands can use SM to increase their visibility and create brand awareness. A study by Järvinen and Karjaluoto (2015) found that social media positively impacts brand perception. The study reported that SM positively influences brand image, loyalty, and trust. Similarly, another study by Mammadli (2021) found that SM significantly positively impacts brand awareness, brand loyalty, and brand reputation. The study also reported that SM enhances consumers' emotional attachment to the brand, increasing brand loyalty.

Furthermore, a study by Lim et al. (2019) found that social media positively influences consumers' perceived brand quality. Several studies have investigated the impact of SM on BP. Kim and Ko (2012) found that SM activities significantly impact brand image, with positive SM interactions improving brand reputation and negative interactions having the opposite effect. Similarly, Bilgin (2018) found that SM activities can influence consumers' perception of brand personality, with a strong brand personality leading to greater consumer loyalty.

Other studies have also found that SM can influence BP through various mechanisms. For example, Marjerison et al., (2020) found that SM content can impact consumers' perceived brand value. Li et al., (2021) found that SM activities can influence consumers' trust in a brand.

However, the impact of SM on BP is not universal, and several factors can affect its effectiveness. For example, Kamboj and Sharma (2023) found that the effect of SM on BP is more substantial for younger consumers, while SM activities may less influence older consumers. Similarly, Marjerison et al., (2020) found that the type of SM platform can also affect BP, with visual platforms like Instagram being more effective than text-based platforms like Twitter.

2.3 Effect of Social Media on Consumer Behavior

SM has a significant impact on CB. Kumar et al. (2019) state that SM platforms have become essential for consumers searching for product and service information. SM platforms also provide consumers with a platform to share their experiences with products and services with

other consumers. Hence, the study of the impact of SM on CB is essential. Chen et al., (2018) found that SM platforms positively affect purchase intention. Similarly, Wu et al., (2019) found that SM positively influences consumer decision-making. However, a Mammadli (2021) study found that SM has no significant effect on purchase intention. SM has also been recognized as influential in CB (Fong & Burton, 2019). SM platforms give consumers fast and easy access to products and services information, which can influence their purchasing decisions. Makudza et al., (2020) found that SM positively impacts consumers' purchase intentions. The study reported that SM positively influences consumers' perceived usefulness, ease of use, and enjoyment, leading to increased purchase intentions. Similarly, Pham et al. (2021) found that SM positively influences consumers' online purchase behavior. The study reported that SM enhances consumers' trust in the brand, which leads to increased online purchase behavior. Additionally, a study by Salhab et al., (2023) found that SM positively influences consumers' word-of-mouth behavior. However, some studies have reported adverse effects of SM on CB. For instance, a study by Shen and Bissell (2013) found that SM negatively influences consumers' purchase intentions. The study reported that consumers' perceived risk and privacy concerns about SM could significantly reduce their purchase intentions.

2.4 Social Media and Consumer Behavior

CB refers to consumers' actions and decisions when purchasing goods and services. SM can impact CB in various ways, including social influence and social comparison (Chu & Kim, 2011). Social influence refers to other people's impact on an individual's behavior, while social comparison refers to the tendency for individuals to compare themselves to others. SM can impact CB through personalized advertising. Personalized advertising uses data collected from SM platforms to target advertising to individuals based on their interests, behaviors, and demographics (Li et al., (2021)). This can influence CB by providing individuals with targeted ads more relevant to their interests and needs. SM has transformed how brands interact with customers and significantly impacted CB. Literature has shown that SM positively impacts BP, primarily through user-generated content, and can impact CB through social influence, social proof, and personalized advertising. Therefore, companies must know SM's potential in building and managing BP and influencing CB. Several studies have also investigated the impact of SM on CB. Li et al., (2021) found that SM activities, particularly those that involve peer recommendations, can significantly impact consumer purchase decisions. Other studies have also highlighted the role of SM in shaping CB. For example, Makudza et al., (2020) found that SM activities can impact consumers' perceived risk and trust in a brand, which can, in turn, influence their purchase decisions. For example, Makudza et al., (2020) found that the type of SM platform can affect CB, with visual platforms like Instagram more effective at shaping consumers' attitudes and purchase intentions. Additionally, factors such as the target audience and the type of product or service being promoted can also affect the effectiveness of SMM (Kamboj et al., 2019; Marjerison et al., (2020).

2.5 Theoretical Framework

In this study, the following theoretical constructs and variables are considered:

SM: This construct refers to the platforms and technologies that allow individuals and organizations to create, share, and exchange information and ideas through virtual communities and networks. SM platforms include Facebook, Twitter, Instagram, and LinkedIn.

BP: This construct refers to the way consumers perceive a brand based on their experiences, beliefs, and attitudes toward the brand. It includes factors such as brand awareness, brand image, brand loyalty, and brand reputation.

CB: This construct refers to consumers' actions and decisions when purchasing products or services. It includes product perception, purchase intention, and post-purchase behavior.

SLT: This theory emphasizes the role of observation, imitation, and reinforcement in learning. According to this theory, individuals learn through observing others and the consequences of their actions.

CDT: This theory explains the psychological discomfort that arises when an individual holds two conflicting beliefs or values. The theory posits that individuals are motivated to reduce this dissonance by changing their thoughts or behaviors.

The framework includes the independent variable of SM usage, which is proposed to have an impact on BP and CB through the moderating variables of social learning and cognitive dissonance. SLT suggests that individuals learn by observing the behaviors and outcomes of others in their social environment. CDT suggests that individuals experience discomfort when their beliefs or behaviors are inconsistent, leading them to seek a resolution.

The effect of SM on BP and CB has been studied extensively in the literature, and several studies have explored the role of social learning and cognitive dissonance in this relationship. For example, Kim and Ko (2012) found that SM usage had a positive impact on brand awareness and purchase intentions through the mediating variable of social influence. Similarly, Pappas (2016) found that SM usage had a positive impact on brand loyalty through the mediating variable of cognitive dissonance reduction.

Therefore, this proposed framework builds upon previous research and seeks to understand further the mechanisms through which SM impacts BP and CB. By examining the mediating role of social learning and cognitive dissonance, this study aims to provide insights into how companies can effectively leverage SM to enhance their brand image and influence CB.

The use of SLT and CDT is justified in this study as they provide a theoretical basis for understanding how SM can influence BP and CB.

SLT emphasizes the role of observational learning and modeling in shaping individual behavior (Bandura & Walters, 1977). In the context of SM, individuals can observe and learn from the behavior of others, such as influencers and peers, which can influence their attitudes and behaviors toward brands (Chen & Li, 2017; Shiekh, & Aziz, 2021). Thus, SLT can provide insight into how SM can impact BP and CB through the observation and modeling of others.

On the other hand, CDT emphasizes the role of inconsistency between attitudes and behaviors in driving individual behavior change (Festinger, 1957). In the context of SM, individuals may encounter conflicting information about a brand or product, leading to cognitive dissonance and a desire to resolve the inconsistency (Chen & Li, 2017). This can lead to changes in BP and CB. Thus, CDT can provide insight into how SM can impact BP and CB through the management of inconsistent information.

Using SLT and CDT can comprehensively provide an understanding of how SM can influence BP and CB.

2.6 Summary of proposed conceptual framework and proposition development

Per the reviewed literature above, the following document analysis and validation prepositions were deduced.

P1: SM usage has a positive effect on BP.

P2: SM usage positively affects CB.

P3: BP mediates the relationship between SM usage and CB
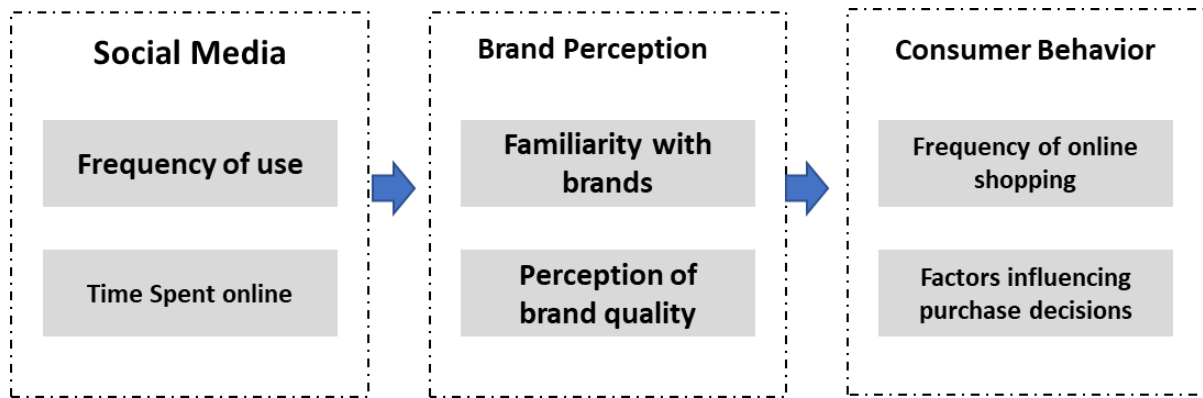
Fig. 1 – Conceptual Framework. Source: own research

3 METHODOLOGY

Developing a conceptual framework is the ultimate goal of the current investigation. The research's fundamental objective was carried out using Document Analysis (DA), a technique dependent on the present study's qualitative inquiry (Bowen, 2009). Document Analysis as a form of qualitative approach has been used by scholars like Odei et al., (2021); Amoah et al., (2020). Document analysis may be a streamlined method for this study; however, given the more significant coverage areas, it was a great place to start when looking for a current and pertinent issue (Osakwe, 2016; Jibril et al., 2019). In that sense, a substantial number of scientific articles were the foundation for the document analysis, based on data gathered from open databases, including EBSCO, Thomson Reuters' WoS, SCOPUS, and Google Scholar, using keyword searches (Zahra & Nurmandi, 2021). EBSCO, Thomson Reuters' WoS, SCOPUS, and Google Scholar are the most comprehensive citation databases, with a repository of abstracts subjected to rigorous evaluation by academicians worldwide. The researchers limited the search to the period 2015 – 2023. These databases were considered for the review as previous scholars had adopted one or a combination of similar databases for such studies. (Odei et al., 2021; Amoah et al., 2020; Donthu et al., 2020). Institutions, academics, and other stakeholders mainly accept publications in these databases. Using these databases helps close the gaps that exist in research. The researcher used theme analysis in addition to the TCCM approach (Paul & Rasado-Serrano, 2019) to determine the relationships and conformity of research constructs to gain a deeper understanding. Given the interaction of the current study focus, this approach provided the writers with the benefit of searching for relations and patterns across several connected papers. Despite this, the approach broadened the scope of branding as the theme of attention in the existing literature; therefore, it was permissible to employ document analysis as our methodology since it offered a range of study situations (Bowen, 2009).

The search produced over 600 documents on SM, BP, and CB from the various databases spanning from 2018 – June 2023. These databases are the repositories of citations and abstracts for journals, books, and conference proceedings. The filters selected by the authors include articles, conference proceedings, reviews, business management and accounting, economics, social science, and finance journals. Additionally, only articles in management and written in English were considered. After limiting the search filters in the various databases, the remaining total was 209 documents. The authors thoroughly read these papers to identify and eliminate papers with content not related to SM, BP, and CB, and articles with content unrelated to the research investigation. The analysis was finally done on 35 papers relevant to the studies.

We used open-access databases, especially EBSCO, Thompson Reuters' WoS, SCOPUS, and Google Scholar, to quickly access high-ranking journals. Also, these databases are reputable and well-known in academia. Previous studies have been done in management and social sciences (Odei et al., 2021; Amoah et al., 2020; Donthu et al., 2020); however, the novelty of this investigation contributes to the effects of social media on brand perception and consumer behavior from the SLT and CDT perspective.

4 CONCLUSION

This study aimed to investigate the effects of social media on brand perception and consumer behavior using social learning theory and cognitive dissonance theory. The literature review highlighted the significant impact of social media on brand perception and consumer behavior and the research gaps and limitations in the existing studies. The proposed theoretical framework included social learning theory and cognitive dissonance theory to explain the relationship between social media, brand perception, and consumer behavior. The literature review and document analysis helped deduce the prepositions, which summarize the conceptual framework.

4.1 Implications

This study has several implications for the marketing and advertising industry. First, it will contribute to the existing literature on the effects of social media on brand perception and consumer behavior, providing further evidence to support the use of social learning theory and cognitive dissonance theory in explaining these phenomena. Second, it will provide insights into the relationship between social media, brand perception, and consumer behavior, which will help marketers understand how to effectively use social media to promote their brands.

4.2 Future research directions

Despite the significant contributions of this study, there are still some avenues for future research. First, future studies can focus on exploring the impact of specific social media platforms on brand perception and consumer behavior. Second, researchers can investigate the moderating effects of individual and cultural differences on the relationship between social media, brand perception, and consumer behavior. Finally, future studies can explore the impact of social media on other marketing outcomes, such as purchase intention and brand loyalty.

4.3 Limitation of study

The findings of this study may be limited in terms of generalizability due to the databases used and the limited period within which the study was conducted. It is recommended that further studies be performed with other corroborated sources. The study's results might not apply to all industries, brands, or consumer groups. Again, since empirical data do not back the study, the generalization of the findings must be done with caution.

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THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN FINANCIAL REPORTING: A VOSVIEWER & RSTUDIO ANALYSIS

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Abstract

Considering the advantages that can accrue to academics, industry, and governments from applying artificial intelligence, the concept has received considerable attention in academic research. Owing to this, the study explored the relationship among the documents of artificial intelligence in financial reporting. The study conducted a bibliometric analysis of 19 business, management, and accounting publications. Data collection and refining were collected from the Scopus database, and only accounting journals based on the 2021 ABS journal ranking were selected. The data was analyzed using both VOSviewer and Bibliometrix (RStudio). The study found that artificial intelligence in financial reporting has grown unsteady since 2009. The study's most prominent author is Perols J. Auditing is the most prominent source, and the country with the most publications is the US. The most trending and driving theme of the research area is machine learning.

Keywords: *Artificial Intelligence, Machine Learning, Financial Reporting, VOSviewer, bibliometrix (RStudio)*

1   INTRODUCTION

Academics, industry, and governments have given artificial intelligence much consideration. Machine learning, natural language processing, deep learning, and other cutting-edge technologies are all included in the definition of artificial intelligence, a digital computer or intelligent machine's capacity to carry out human intelligence activities(Estep et al., 2023). Artificial intelligence can improve financial reporting quality for businesses in complex and ambiguous financial reporting situations (Estep et al., 2023). Accounting professionals may be able to deliver more accurate financial reporting and improve management performance thanks to AI's data processing skills (Osei-Assibey Bonsu et al., 2023). To support decision-making, AI can automate regular accounting operations, find trends in vast amounts of accounting data, and improve fraud detection and liquidity planning (Kureljusic & Karger, 2023; Leitner-Hanetseder et al., 2021)

Quite a few studies have explored the application of artificial intelligence on financial reporting (McKee, 2009; Papík & Papíková, 2022; Pechlivanidis et al., 2022; Perols, 2011; Petkov, 2020; Roszkowska, 2021) to mention a few. However, none of these studies concentrated on establishing the relationship among the documents on artificial intelligence in financial reporting.

This study's primary goal is to assist academics and researchers in comprehending existing knowledge in the research field and its current connections. This study employs a relational technique for bibliometric studies to achieve this goal. According to Guleria and Kaur (2021), bibliometric analysis is one of the best ways to illustrate the state of science in a research field. The study employed this method to synthesize 19 publications written between 2009 and the middle of 2023. The bibliographic linkages to these studies were examined using the applications of VOSViewer software and Bibliometrix with RStudio to map the study's knowledge base. Various techniques, namely citation analysis, co-citation analysis, co-

authorship analysis, and co-word analysis, were used to distinguish between research field publications.

The following research objectives frame the rest of the study:

1) To obtain an overview of currently available scientific literature on artificial intelligence in financial reporting

2) To identify the most influential authors, co-authors, documents, and sources based on citation score.

3) To determine the most trending topics on artificial intelligence in financial reporting

2   LITERATURE REVIEW

McKee (2009) conducted exploratory research using classification tree algorithms, logistic regression, neural networks, and other meta-learning techniques on publicly available data from US Securities and Exchange Commission filings from 1995 to 2002 to predict all types of financial fraud. Perol (2011) in his study compared the performance of six well-known statistical and machine learning models (logistic regression, support vector machines, artificial neural networks, bagging, C4.5, and stacking in financial statement fraud).

Petkov (2020) presented accounting duties or recordings that can be assigned to artificial intelligence as a starting point for businesses to design and structure their systems to support AI.

Kipp et al. (2020) investigated the effects of financial decisions backed by intelligent agents vs. human agents with varied levels of autonomy. The study concluded that managers make less aggressive financial reporting decisions when using intelligent agents compared to human agents and when using less autonomous agents compared to more autonomous agents.

Ding et al. (2020) demonstrate how machine learning may significantly enhance accounting estimates since most balance sheet and income statement items depend on estimations. Commerford et al. (2022) state that audit companies are investing considerably in artificial intelligence to assess difficult estimates.

Bonsón et al. (2021) investigated the ethical disclosure of artificial intelligence in the annual or sustainability reporting of European listed companies. They discovered that the field is still in its infancy and that fewer than 5% of businesses report on it.

To investigate how emerging technologies can offer remedies to audit-related causes of financial scandals, Roszkowska (2021) discovered that blockchain, internet of things, smart contracts, and artificial intelligence solutions have various functionalities and can efficiently resolve various issues with financial reporting and audit-related issues. According to Osei-Assibey Bonsu et al. (2023), fintech innovations like artificial intelligence and big data can help reduce agency problems in accounting procedures and improve the quality of financial reporting.

Studies like Liu's (2022), van der Heijden (2022), Hunt et al. (2022) show how beneficial artificial intelligence approaches are for dealing with prediction-based research issues in accounting research. To evaluate the prediction power of goodwill and other intangible assets in predicting business profitability, Liu (2022) utilized a deep learning approach. To estimate an organization's industry sector using publicly available financial statement data, van der Heijden (2022) also employed machine learning. Hunt et al. (2022) discovered that machine learning can improve earning prediction and generate abnormal returns. To determine if the

thematic content of financial statement disclosure is progressively informative in predicting purposeful misreporting, Brown et al. (2020) used machine learning.

3 METHODOLOGY

3.1 Data Collection and Validation

Setting up the data set made up the initial stage. The Scopus database was chosen as the study's data source since Lardo et al. (2022) highlight it as the largest database with various paper formats and analysis tools. Thus, a thorough search of Scopus was conducted on June 26, 2023, and data was retrieved on June 28, 2023.

The following keywords were found and chosen for our search to make it more effective: "machine learning" OR "ML" OR "Artificial Intelligence" OR "AI". Prior bibliometric research and literature reviews on artificial intelligence were considered in selecting keywords such as Estep et al. (2023). Then, to respond to the research issues and satisfy the request for papers that advanced business, management, and accounting knowledge, we added "Financial Reporting" OR "Financial Statement." Then, to create a complete and up-to-date data collection, we filtered the core document set using published articles, conference papers, book chapters, and conference reviews.

As a result, we used the research string "machine learning" OR "ML" OR "Artificial Intelligence" OR "ai") AND "Financial Reporting" OR "Financial Statement") in our TITLE-ABS-KEY query. The search returned 365 documents, including book chapters, articles, conference papers, and articles.

We then determined an exclusion standard in the following step. We restricted our search to papers included in Scopus' business, management, and accounting scientific literature subject categories. Additionally, we only considered works that were written in English. This produced 91 papers, which were then reduced to 24 documents by screening and selection using the 2021 ABS journal ranking and removing articles that didn't meet the ABS criterion.

After obtaining the raw data, we conducted an initial analysis, manually sorted the data set using Microsoft Excel, and tested it to eliminate duplicate values.

Finally, the study obtained 19 pertinent scientific documents. Since there hasn't been much research in the field of accounting and auditing, our investigation spans the years 2009 through May 2023.

3.2 Data analysis

The study employed the research approach of Guleria & Kaur (2021) to map the body of knowledge related to the study. The VOSviewer software and Bibliometrix for RStudio examined the bibliographic relationships among the various documents. The relationships among authors, papers, journals, co-citations, and terms were carried out using the VOSviewer. The study also used Bibliometrix for RStudio, which has an integrated biblioshiny with a graphical user interface and innovative plot display.

4 RESULTS

4.1 Annual Scientific Production

Fig. 1 shows that since 2009, the annual scientific output of artificial intelligence in financial reporting has grown unsteadily. With eight articles, 2022 had the most significant yearly scientific production.
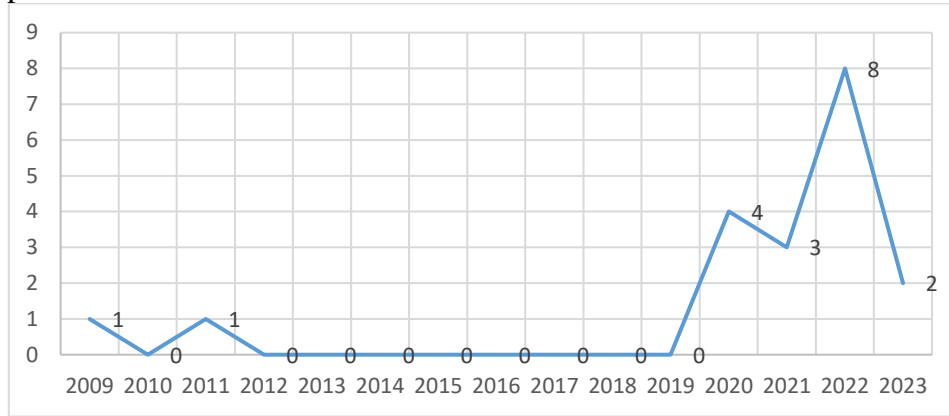
Fig. 1 - Annual Scientific Production. Source: Own Research

4.2 Most Influential Authors

Tab. 1 below shows the most influential authors based on the number of times an author has been cited. The study found out that Perols J. (134 citations) and Albitar K. (59) are the two most influential authors in the field.

Tab. 1 - Most Cited Authors. Source: own research

Element	NP	TC	h_index	g_index	m_index	PY start
PEROLS J	1	134	1	1	0.077	2011
ALBITAR K	1	59	1	1	0.333	2021
GERGED AM	1	59	1	1	0.333	2021
HUSSAINEY K	1	59	1	1	0.333	2021
KIKHIA H	1	59	1	1	0.333	2021
BROWN NC	1	58	1	1	0.25	2020
CROWLEY RM	1	58	1	1	0.25	2020
ELLIOTT WB	1	58	1	1	0.25	2020
DING K	1	46	1	1	0.25	2020
LEV B	1	46	1	1	0.25	2020

4.3 Most Influential Document

In tab. 2, the study used bibliometrix (RStudio) to obtain the most influential documents based on the number of times a document has been cited. According to the findings, Perols (2011) is the most influential document with more than twice the total citations of Albitar et al. (2021).

Tab. 2 - Most Cited Documents. Source: own research

Paper	DOI	Total Citations	TC per Year	Normalized TC
PEROLS J, 2011, AUDITING	10.2308/ajpt-50009	134	10.31	1.00
ALBITAR K, 2021, INT J ACCOUNT INF MANAGE	10.1108/IJAIM-08-2020-0128	59	19.67	2.01
BROWN NC, 2020, J ACCOUNT RES	10.1111/1475-679X.12294	58	14.50	2.00
DING K, 2020, REV ACCOUNT STUD	10.1007/s11142-020-09546-9	46	11.50	1.59
ROSZKOWSKA P, 2021, J ACCOUNT ORGAN CHANGE	10.1108/JAOC-09-2019-0098	18	6.00	0.61
SARGENT CS, 2013, ISSUES ACCOUNT EDUC	10.2308/iace-50456	14	1.27	1.00
COMMERFORD BP, 2022, J ACCOUNT RES	10.1111/1475-679X.12407	13	6.50	2.81
PETKOV R, 2020, J EMERG TECHNOL ACCOUNT	10.2308/jeta-52648	11	2.75	0.38

4.4 Sources

The study used VOSviewer to generate the top ten (10) sources. Citations were the unit of analysis, and the type of analysis was the source. The source selection threshold was based on at least one document and one citation. Tab.3 shows sources with the most citations. According to the findings, Auditing is the source with the greatest number of citations (134), followed by the Journal of Accounting Research (72) and the International Journal of Accounting and Information Management (64).

Tab. 3 - Most Cited Sources. Source: own research

ID	SOURCE	DOCUMENTS	CITATIONS
1	AUDITING	1	134
2	JOURNAL OF ACCOUNTING RESEARCH	3	72
3	INTERNATIONAL JOURNAL OF ACCOUNTING AND INFORMATION MANAGEMENT	2	64
4	REVIEW OF ACCOUNTING STUDIES	2	46
5	JOURNAL OF EMERGING TECHNOLOGIES IN ACCOUNTING	2	19
6	JOURNAL OF ACCOUNTING AND ORGANIZATIONAL CHANGE	1	18
7	INTERNATIONAL JOURNAL OF ACCOUNTING INFORMATION SYSTEMS	3	15
8	ACCOUNTING RESEARCH JOURNAL	2	9
9	ACCOUNTING HORIZONS	2	5
10	BRITISH ACCOUNTING REVIEW	1	1

4.5 Most Productive Countries

Tab. 4 shows ten (10) countries with the most significant number of publications using bibliometrix (RStudio). The result shows that the USA is the top region/country with most publications and its productivity is three times higher than the UK next on the list.

Tab. 4 - Most Productive Regions/Countries. Source: own research

Region	Freq
USA	22
UK	9
SOUTH KOREA	5
ITALY	3
GEORGIA	2
GREECE	2
SLOVAKIA	2
LIBYA	1
POLAND	1
SINGAPORE	1

4.6 Co-Occurrence of Keywords.

The dataset or publications' keyword co-occurrence was generated using the VOSviewer software. Tab. 6 shows the total link strength of the top ten (10) keywords. The threshold for the minimum number of times a keyword must occur was set at 1 out of a total of 75 for 19 publications. Statistics show that 88% of all (n = 75) keywords occurred just once in the publication, 8% appeared twice, and 1.33% appeared three times, five times, and six times, respectively. The most extensive set of connected items comprised 50 with a total link strength of 156.

Tab. 5 - Total Link Strength of the Top Ten Keywords. Source: own research

Keyword	occurrences	total link strength
machine learning	6	26
artificial intelligence	5	19
financial reporting	3	13
fintech	2	11
fraud prediction	2	11
data analytics	2	9
data mining	2	9
earnings prediction	2	9
accounting estimates	2	6
c80	1	9

Fig. 2 also shows a network visualization diagram. The size of its node determines the number of times a keyword occurs. The result of the study shows that "machine learning" is the most occurring keyword in papers relating to application of artificial intelligence in financial reporting. The study also found out that machine learning has a connection or linkage with data analytics and data mining.
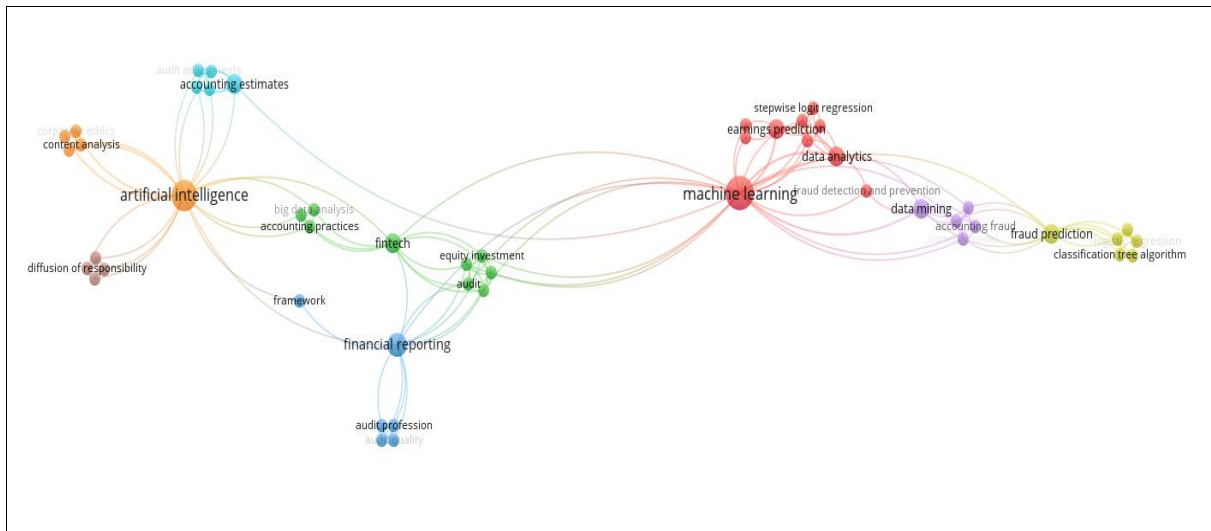
Fig. 2 - Network Visualization. Source: own research

4.7 Thematic Areas

The R Studio Bibliometrix Software was adopted to divide the papers relating into financial reporting into four main quadrants (Q1 to Q4). In Fig. 7, driving themes were determined by the upper right quadrant (Q1), underlying themes by the lower right quadrant (Q4), highly specialized themes by the upper left quadrant (Q2), and emerging or vanishing themes by the lower left quadrant (Q3). The chart shows that machine learning, data analytics, and data mining are the driving themes that relates to papers on the topic. Keywords such as "artificial intelligence," "financial reporting," and "fintech" that found across Q3 and Q4 can be referred to as both emerging and basic themes. Also, the result of the study shows that "accounting estimates" cuts across emerging/declining theme and niche theme.
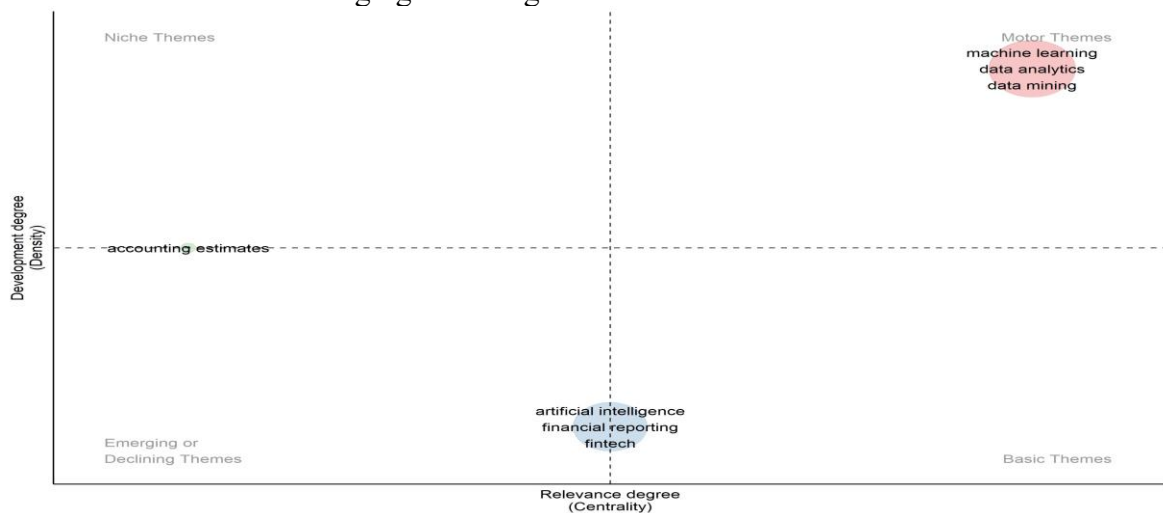
Fig. 6: Thematic Map. Source: Own Research

5 DISCUSSION

The study attempts to increase our understanding of documents relating to artificial intelligence in financial reporting. A bibliometric analysis was carried out using the R-based Bibliometrix software and VOSviewer. Regarding works involving artificial intelligence and financial reporting, the bibliometric studies evaluated the following: prominent authors, documents,

sources, nations, and keywords. The Scopus database was used to retrieve nineteen papers subjected to analysis. The research indicated that the publication of artificial intelligence in financial reporting has been growing in an unsteady manner since 2009. The study's most prominent authors include Perols J. The Journal of Auditing is the most productive source. The two regions/countries with the most publications are the US and the UK.

The topics that seem to be trending in the field includes machine learning, artificial intelligence, financial reporting, fintech, data mining and fraud prediction. Also, the study discovered a strong association between machine learning, data analytics and data mining. According to Aboud & Robinson (2022), machine learning is a data analytic tools to discover and communicate useful information and patterns.

Artificial intelligence can also be said to be a basic and emerging theme in the field of accounting calling for more quantitative and qualitative research to derive the expected benefits associated with it. Machine learning happens to be the driving theme of artificial intelligence in financial reporting of the papers understudy.

6 CONCLUSION

This study adds to earlier qualitative reviews of this field of inquiry. It is intended that the results would inspire and direct accounting academics to improve financial reporting using artificial intelligence and serve as a starting point for the future growth of this study area. Application and development of methods in the research domain will be aided by the reference foundation and reference data of the articles utilized for the analysis.

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THRESHOLD DERIVATION METHODOLOGY FOR DRG SPLITTING CRITERIA

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Abstract

The article discusses the splitting criteria for a healthcare classification system. Criteria are essential to ensure a clinically meaningful way to group the types of patients treated in admitted acute care. This paper aims to define a threshold derivation methodology for Slovak Diagnosis-Related Groups (SK-DRG) splitting criteria, which had been established in the Australian Refined DRG (AR-DRG). Currently, SK-DRG is undergoing further advancement in the field of methodology development. One of the lacking methodologies in SK-DRG is for evaluating the quality of a DRG split and other changes in DRGs. Previously, a set of rules was introduced in the AR-DRG system for this purpose - a splitting criterion with specified thresholds. The composition and number of DRGs in AR-DRG are different than in the SK-DRG system. Therefore, the properties of individual groups have different values, and it is impossible to take thresholds from the methodology currently set by the AR-DRG system. This article achieved derivation of specified splitting criteria thresholds, and a methodological approach for rederivation was set with potentially changing and developing the SK-DRG system.

Keywords: *SK-DRG system, splitting criteria, threshold derivation methodology, DRG system*

1   INTRODUCTION

The paper addresses the current problem of financing hospitals, considering patient diagnoses. It is evident that the patient coming to the hospital not only has the primary diagnosis, based on which he was hospitalized, but also has associated diseases that must be considered in his treatment. In addition, the crucial factors for determining the correct treatment of the patient are also his gender, age and necessary medical interventions. It is the combination of these factors that can significantly influence the way a patient is treated.

In the article, we deal with the economic side of treating patients. More precisely, we are solving how to improve groups for determining the costs of hospitalization of patients in the conditions of the Slovak Republic. Several systems related to patient diagnostics are known in the world. This article follows up on Diagnosis-Related Groups (DRG) systems (Fetter, 1991). DRG systems belong to secondary patient classification systems. Hospital patient care cases are grouped into larger economically and medically consistent groups. DRG system is a tool for patient cost reimbursement in many countries. Currently, the DRG system is generally considered a more effective way of managing healthcare finances than prospective budgets, which predict hospital production based on experience from previous periods and do not consider the different demands of individual patient care (Leister & Stausberg, 2005; Street *et al.*, 2013).

Our article follows the Australian Refined Diagnosis-Related Groups (AR-DRG) system introduced in Australia described by the Australian Consortium for Classification Development (2014). An up-to-date description of the Australian Refined Diagnosis-Related Groups (AR-DRGs) was published by the Independent Hospital Authority (2022). This classification system provides a clinically meaningful way to associate or group the number and type of patients treated in hospital admissions for acute care episodes with the resources needed for treatment.

AR-DRG system groups patients with similar diagnoses and who require similar hospital services.

This paper aims to define a threshold derivation methodology for Slovak Diagnosis Related Groups (SK-DRG) splitting criteria. SK-DRG system is a classification and reimbursement mechanism in which hospitalized patients are classified into DRGs according to the primary diagnosis, performed medical procedures and other clinical and demographic characteristics. Therefore, the DRG system groups hospitalized patients according to their clinical demands and the resources consumed for their treatment. Based on cost data for each patient reported by the hospital and the adequate composition of DRGs, it is possible to predict the cost accurately and qualitatively for a specific patient. Based on the predicted costs and combining other settings of the DRG system, it is possible to accurately predict the adequate reimbursement rate of each patient according to his classification in DRG and the Length of Stay (LOS) in the hospital. This way, a correctly set DRG system contributes to the fair management of healthcare finances.

At present, intensive work is being done on further development and localization of SK-DRG, which also includes the development of a methodology for evaluating the quality of proposed adjustments in DRGs and proposed DRG splits (creation of new DRGs).

Currently, in the AR-DRG, a system of splitting criteria rules with specified thresholds is proposed for evaluating the quality of proposed changes in DRGs. Splitting criteria could also apply to the SK-DRG system. However, the thresholds of splitting criteria used in the AR-DRG system do not apply to the SK-DRG system, as the number and composition of DRGs between the systems are significantly different. Therefore, the research problem is determining the thresholds and splitting criteria localization for use in the SK-DRG system, comparing the determined values and identifying the weaknesses of the proposed methodological approach.

The paper is organized as follows. The next section gives insight into related literature. Section Methodology introduces our proposed methods to derive thresholds of splitting criteria for the SK-DRG system. Section Result presents our findings. Discussion and Conclusion conclude our paper.

2 LITERATURE REVIEW

Many world countries have introduced the Diagnosis-Related Groups system to increase efficiency in hospital funding. A study by Serdén *et al*. (2003) examines the introduction of these systems in Swedish hospitals. Patient-level cost apportioning (PLCA) was analyzed by Vogl (2013) for the English and German DRG system. A recent meta-analysis of studies found that DRG-based payment is a cost-saving mechanism compared to other pre-existing cost-based payments. A reduction in LOS mainly manifests this, although this must be carefully managed so as not to cause higher readmission rates. SK-DRG system is based on the German-DRG system (G-DRG), which both have support mechanisms to avoid an increase in readmissions when two or more causally related patient hospitalizations are merged and only the merged hospitalization is reimbursed (Kaier et al., 2020; Meng et al., 2020).

AR-DRG system uses splitting criteria. The AR-DRG system undergoes regular updating and development, as is evident by Aisbett (2011) and Dimitropoulos *et al*. (2019). The last update was done by the Independent Hospital Authority (2022).

Within SK-DRG system Adjacent DRGs (ADRGs) are recognized, which contain clinically similar DRGs divided by level of resource consumption, with the more complex DRGs being the one with higher resource consumption.

The quality of DRGs can also be measured in indicators, such as average length of stay (LOS) or LOS homogeneity, coefficient of determination R^2 or DRG migration rate. Hughes *et al.* (2018) defined the DRG migration rate as the ratio of patients who migrated from a certain DRG to another DRG. The authors' studies (Averill *et al.*, 1998; Camilleri *et al.*, 2018; Bacchi *et al.*, 2021) demonstrated how R^2 can be used to explain variation in costs explained by DRGs. Authors (Lee et al., 2021; Perdikouri *et al.*, 2023; Wu *et al.*, 2023) found that mean LOS and subsequent homogeneity can indicate the (clinical) homogeneity of DRGs in general. As was written in (Yeramaneni *et al.*, 2023), adjusting for LOS is beneficial when comparing DRGs and acute care in hospitals.

The SK-DRG system lacks a transparent methodology for determining the quality of the DRG split. Therefore, future expansion of the proposed splitting criteria by other indicators could bring a new perspective and approach to changes in the SK-DRG system.

The quality of the proposed change in DRG can be evaluated by monitoring the increase or decrease of splitting criteria. In cases where there is a DRG split (creation of new DRG from existing ADRG), it is necessary to examine the quality of the proposed change and determine whether specific predetermined rules warranted DRG splitting.

3   METHODOLOGY

Independent Hospital Authority (2022) recognized some AR-DRG splitting criteria. We select the following criteria to prepare splitting criteria for SK-DRG system:

- 1A. Minimum Number of Hospitalization Cases in DRG per year

- 1B. Minimum Total Cost of DRG per year

- 1C. Minimum Hospitalization Cases Percentage of the DRG within the ADRG

- 2A. Minimum Absolute Change of mean cost between consecutive DRGs within the ADRG

- 2B. Minimum Relative Change of mean cost between consecutive DRGs within the ADRG

- 3A. Maximum Relative Increase of DRG variation coefficient compared to ADRG.

For splitting criteria calculation, the data about the number of hospitalization cases, total cost, and a mean and standard deviation of cost in DRGs were used, together with the number of hospitalization cases, a mean and standard deviation of cost in ADRGs.

For this article, the cost homogeneity of DRGs is considered through the coefficient of variation (*CV*), which is typically calculated from the mean and standard deviation (Bedeian & Mossholder, 2000) of cost data for specific DRGs (see Equation (1)) or through the coefficient of homogeneity (*CH*), calculated as seen in Equation (2). The same principles apply when calculating homogeneity for ADRGs.

$$CV_{DRG} = \frac{Standard\ deviation\ of\ cost_{DRG}}{Mean\ of\ cost_{DRG}} \tag{1}$$

$$CH_{DRG} = \frac{1}{1 + CV_{DRG}} \tag{2}$$

Now, we focus on applying the criteria in practice, proposing the methodology for deriving thresholds for the SK-DRG system and developing an algorithm for calculating criteria and their thresholds based on the proposed methodology.

In all splitting criteria, we estimate the primary threshold and secondary threshold. The primary threshold is estimated based on criterion importance and percentile distribution. Next, the qualified estimate and the degree of strictness we want to introduce into the system are considered. Therefore, the selection of the primary threshold depends, to a large extent, on the motivations of the system regulators. For this methodological procedure, we select those values of the primary boundary that preserve at least 60 % of the DRGs after applying the given criterion (percentage of remaining DRGs).

The secondary threshold is estimated considering primary thresholds of splitting criteria and their close vicinity, in conjunction with all established primary splitting criteria, resulting in a percentage of remaining DRGs.

We note that only validated data must be used before applying this methodology. The validation process requires controls that omit hospitalization cases with incorrectly calculated cost data. Additionally, outliers must be removed from the training dataset by data trimming methodology described in the calculation of SK-DRG relative weights, which consists of omitting cases whose LOS is lower than the lower limit (LL_{DRG}) (defined by (3) for DRGs where at least 33 % of hospitalization cases has LOS equal to 1 day, and (4) for other DRGs), or higher than upper limit (UL_{DRG}), defined by (5).

$$LL_{DRGJ} = round(max\ (1;\ \frac{mean\ LOS_{DRG}}{3})) \tag{3}$$

$$LL_{DRG} = round(max\ (2;\ \frac{mean\ LOS_{DRG}}{3})) \tag{4}$$

$$UL_{DRG} = round(min\ (\ mean\ LOS_{DRG} + 2 \cdot SD\ LOS_{DRG}\ ;\ mean\ LOS_{DRG} + 17) \tag{5}$$

3.1 1A Minimum Number of Hospitalization Cases in DRG per year

Criterion 1A is defined as a sum of the number of hospitalization cases per year by Equation (6)

$$1A = \sum n_{DRG} \tag{6}$$

A Minimum number of hospitalization cases is significant in the SK-DRG system for successfully calculating cost weights since there are many DRGs with a total number of cases less than 30. To deal with this problem, we propose to modify this criterion for the SK-DRG system, combining it with a minimum level of cost homogeneity for a certain level of a Minimum number of cases, which guarantees higher cost homogeneity for a lower number of cases. We still recommend keeping the lowest possible number of cases greater or equal to 20 since cost weights for DRGs are calculated from the average cost of DRG cases. Therefore, a lower count might not be appropriate. We recommend demanding cost homogeneity level for primary threshold estimation, where CH_{DRG} is greater than 60 % from low-numbered DRGs and greater than 50 % for higher-number DRGs. Next, the list of all potential threshold combinations must be created, and each combination must be evaluated by the number of DRGs that pass specific combinations (number of remaining DRGs). The numbers of remaining DRGs are then converted to percentages. To select the primary threshold for criterion 1A, we recommend choosing combinations with the number of remaining DRGs greater than 60 %.

3.2 1B Minimum Total Cost of DRG per year

This criterion $1B$ is defined as a sum of the total cost of hospitalization cases per year by Equation (7):

$$1B = \sum Cost_{DRG} \tag{7}$$

Establishing a certain minimum level for the Minimum Total Cost of DRG is necessary, but this criterion does not require strict adherence and has lower importance. For setting the threshold, we recommend using the twentieth percentile, which results in more than 75 % of the remaining DRGs.

3.3 1C Minimum Hospitalization Cases percentage of the DRG within the ADRG

Criterion $1C$ is the sum of DRG hospitalization cases to the sum of ADRG hospitalization cases per year by Equation (8).

$$1C = \frac{\sum n_{DRG}}{\sum n_{ADRG}} \tag{8}$$

Establishing a Minimum percentage of hospitalization cases is necessary since there is usually an inverse relationship between DRG resource consumption and the number of cases. We recommend setting the threshold for the twentieth percentile, with the notion that this criterion does not require strict adherence and has lower importance. We have found that this level of criterion results in more than 75 % of the remaining DRGs.

3.4 2A Minimum Absolute Change and 2B Minimum Relative Change of mean cost between consecutive DRGs within the ADRG

Minimum Absolute Change (criterion $2A$) is calculated as a difference between the total cost of DRG with higher resource consumption ($DRGA$) to one DRG lower ($DRGB$) by Equation (9). Minimum Relative Change (criterion $2B$) is calculated as a proportion of the total cost of DRG with higher resource consumption ($DRGA$) to one DRG lower ($DRGB$) by Equation (10).

Since this criterion compares the finite number of DRGs within ADRG, there will always be one-fold lower values of criterion 2 to the number of DRGs. Additionally, this criterion cannot be calculated for ADRGs that consist of only one DRG. These DRGs are not eligible for criterion 2 evaluation.

$$2A = \overline{cost}_{DRGA} - \overline{cost}_{DRGB} \tag{9}$$

$$2B = \frac{\overline{cost}_{DRGA}}{\overline{cost}_{DRGB}} \tag{10}$$

It is necessary to establish Minimum Absolute and Relative change since there should be a direct cost difference between DRGs. Another essential feature is that criteria 2A and 2B must be evaluated simultaneously – for a DRG to pass, it is enough to satisfy either $2A$ or $2B$. Minimum Absolute Change has greater importance in DRGs with lower average total cost and Minimum Relative Change in DRGs with higher average total cost.

Although this criterion does not require strict adherence, it is more important for setting an adequate SK-DRG system. For criterion $2A$, the relevant threshold values examined are from 300 to 2000 €, by the change of 100 €. For criterion $2B$, the relevant threshold values examined are from 1.0 to 2.0, by the change of 0.1.

At present, newly calculated cost weights of the SK-DRG system record an anomaly in the form of higher relative weight for less complex DRG (within specific ADRG) and vice versa. Therefore, we assume that the mean cost of such DRGs will not correspond to the internal ranking resulting from the level of resource consumption. To battle this issue, we recommend ordering the list of average cost of DRGs by their ADRG classification and average cost in descending order before calculating criterion *2*.

Since these criteria complement each other, choosing the primary threshold by computation and evaluating a percentage of remaining DRGs is essential. Firstly, criteria 2*A* and 2*B* need to be calculated from the ordered list of the current SK-DRG system. Secondly, combinations of all relevant thresholds must be created, and some remaining DRGs must evaluate each combination. The remaining DRGs are then converted to percentages, based on the number of DRGs eligible for criterion 2 evaluation. To get the primary thresholds for criterion 2, we recommend assessing the combinations by 3D visualization. The best candidates for thresholds are values where the percentage of remaining DRGs depends on changing values of both criteria. Values where approximately the same amount of the percentage of remaining DRGs is visible, but the change occurs only for one criterion is not a good threshold candidate since only one criterion is responsible for maintaining the same amount of the DRG percentage (see Fig.1). We recommend selecting good candidates by filtering according to the highest percentage of remaining DRGs, with visible change for both criteria.
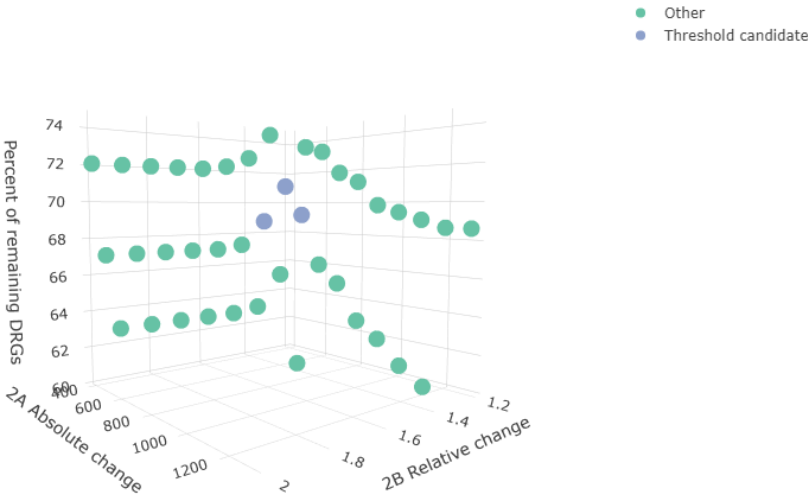
Fig. 1 - Selection of Threshold Combinations for Criterion 2A and 2B. Source: own research

3.5 3A Maximum Relative Increase of DRG Variation Coefficient Compared to ADRG

The relative increase of the variation coefficient (criterion 3*A*) is calculated as a proportion of DRG's variation coefficient to ADRG's variation coefficient (see Equation (11)).

$$3A = \frac{CV_{DRG}}{CV_{ADRG}} \qquad (11)$$

Throughout this criterion, it is possible to consider how the cost homogeneity changes by specifying the classification of hospitalization cases from ADRG to DRG level. Criterion 3A attains the following values: (i) 3*A* greater than 1, in this case, classifying patients into DRG groups, reduced cost homogeneity and therefore constitutes a negative change; (ii) 3*A* equals 1, there was no change in cost homogeneity in DRG compared to ADRG, this result constitutes a neutral change; (iii) 3*A* lower than 1, classifying patients into DRG increased cost homogeneity

– it is possible to consider cost prediction by DRG to be more accurate than by ADRG, and therefore this result constitutes a positive change. It is possible to expect that there will be instances where 3A will reach different values for specific DRGs within ADRG. In such a case, it is necessary to consider the specifics of a combination of results and decide on evaluating change in the context of the entire ADRG. AR-DRG system considers a maximum threshold for criterion 3A value equal to 1.3. Considering unique SK-DRG qualities, we recommend a threshold at a maximum of 1.15 and no lower than the ninetieth percentile. Although this criterion does not require strict adherence, it is more important for setting an adequate SK-DRG system.

3.6 Secondary thresholds for all splitting criteria

We need to compute secondary thresholds for all splitting criteria. This process involves calculating all splitting criteria for the current SK-DRG system from cost data, determining primary thresholds from previously defined recommendations and producing a list of all potential threshold combinations. Each combination of threshold criteria is then evaluated, which results in a percentage of remaining DRGs. We recommend choosing combinations with the highest number of remaining DRGs to select secondary thresholds.

4   RESULTS

We verify our proposed methodology based on the Ministry of Health of Slovakia data. Our training dataset contained validated total cost data and LOS for hospitalization cases. Based on this sample, we determined secondary criteria by evaluating all splitting criteria in conjunction.

We have obtained the highest percentage of remaining DRGs at 47.53 % for the combination of Criterions from 1A to 3A. Individual criteria will acquire the following values at the same time. Criterium 1A acquires values for low-numbered DRGs at 20 to 30 hospitalization cases and CH_{DRG} greater than or equal to 65 %. Higher-numbered DRG is determined when Criterion 1A is greater or equal to 30 hospitalization cases and CH_{DRG} is greater than or equal to 55 %. Criterion 1B, for all DRGs, must have the Sum of Total Cost greater than or equal to 55 000 €. Criterion 1C must have Minimum Hospitalization Cases Percentage greater than or equal to 2.5 %. Criterion 2A assumes a Minimum Absolute Change greater than or equal to 500 €. Minimum Relative Change for Criterium 2B is greater than or equal to 1.3. The last criterion, 3A, assumes the Maximum Relative Increase of CV is less than or equal to 1.1, as is presented in Table 1.

Tab. 1 – Final combination of splitting criteria thresholds. Source: own research

1A	Low-numbered DRGs	Number of Hospitalization Cases	20 - 30
		Coefficient of Homogeneity	≥ 65 %
	Higher numbered DRGs	Number of hospitalization cases	≥ 30
		Coefficient of Homogeneity	≥ 55 %
1B	All DRGs	The sum of Total Cost	≥ 50 000 €
1C		Minimum Hospitalization Cases Percentage	≥ 2.5 %
2A		Minimum Absolute Change	≥ 500 €
2B		Minimum Relative Change	≥ 1.3
3A		Maximum Relative Increase of CV	≤ 1.1

Based on our results, we have found that splitting criteria, as recognized by AR-DRG by the Independent Hospital Authority (2022), are

(i) Criterion 1*A* – DRG requires at least 200 hospitalization cases per year,

(ii) Criterion 1*B* – a DRG requires a minimum total cost of $1 million per year (original sources provide the value in AUD),

(iii) Criterion 1*C* – a DRG requires at least 10 % of hospitalization cases within the ADRG,

(iv) Criterion 2*A* – will fulfilled if the absolute change in mean cost between consecutive DRGs will be at least $3,700 (original sources provide the value in AUD) or according to criterion 2*B* – the relative change in mean cost between consecutive DRGs should be at least two times and

(v) Criterion 3*A* – the Maximum relative increase of *CV* of DRG relative to ADRG is less than 1.3.

5   DISCUSSION

This paper deals with selected splitting criteria for evaluating the quality of the newly created or changed DRGs. These criteria were selected for their direct influence on the correct setting of DRGs. The most critical consequence of well-composed DRGs is adequate financing of institutional healthcare, which is beneficial for Slovak healthcare system overall. This paper applies the methodological procedure for threshold derivation to the SK-DRG system. However, it can be a potential benefit for DRG systems in other countries interested in using splitting criteria to describe and evaluate changes in their own DRG system. Currently, information in the international scientific literature on this exact topic does not exist or is limited.

When comparing thresholds of AR-DRG splitting criteria with thresholds derived for the SK-DRG system, it is necessary to evaluate their differences. The AR-DRG system V11.0 consists of 801 DRGs, whereas the SK-DRG system of the same year consists of 1189 DRGs. This distinction may be the cause for many of the differences between the thresholds, considering that some DRGs in the Slovak system have a more specific algorithm, filled with more specific cases with higher resource consumption and therefore, 35 % of the SK-DRG groups contain less than 30 hospitalization cases per year. Our results also affect Criterion 1*B* - Total Sum of Cost and Criterion 1*C* - Minimum Hospitalisation Cases Percentage for these DRGs since the number of hospitalization cases is limited. Additionally, Criterion 2 – Minimum Absolute or Relative Change is further affected by these differences, considering that a higher number of DRGs results in lower differences among mean costs of DRGs. Criterion 3*A* – Maximum Relative Increase of *CV* has a threshold set to less than 1.3, meaning that the *CV* of DRGs can be reduced by 30 % compared to the ADRG. The limit recommended for the Slovak system is a maximum of 1.1, which guarantees a Maximum reduction of *CV* by 10 %. This value seems acceptable for the specificities of the SK-DRG system.

AR-DRG system also considers other criteria, i.e. 1*E* Minimum percentage of ADRG hospitalization cases in DRG with lower resource consumption, for splits based on LOS or 4*A* Minimum increase in reduction in deviance from the best-performing partition with one less DRG. For threshold derivation for these criteria, it is necessary to calculate these for each DRG using the methodology described above. The threshold derivation is complicated due to the absence of an automated methodology for creating new DRG splits, which makes it nearly impossible for criterion 4*A* to be calculated reliably. To derive the threshold for criterion 1*E*, an analysis of splits based on LOS will be necessary. We assume that as the accuracy of the reported data increases, the derived threshold values will also change. Therefore, it is essential

to review the derived thresholds in the future and refine the resulting thresholds to reflect the SK-DRG system's particularities accurately.

6 CONCLUSION

DRG system is an effective tool for patient cost prediction. Extensive work is being done on refining and further localizing the SK-DRG system. Among the main steps in the further development of any DRG system is the development of methodologies, i.e. the development of a methodology for evaluating the quality of a DRG split or changes in the algorithm of an existing DRG. Splitting criteria are an essential part of the further development of the SK-DRG system. For this purpose, the threshold derivation methodology for splitting criteria was developed and applied, in which we derived suitable thresholds for each criterion by evaluating the interaction of the criteria. By implementing the threshold derivation methodology, we found threshold values suitable for splitting criteria in SK-DRG system. The derived thresholds are not absolute but are meant to guide when making decisions and considering introducing new changes to the DRG system. The methodology proposed in this paper is the main contribution of this article.

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PERCEPTION OF CIRCULAR ECONOMY AMONG HIGH SCHOOL STUDENTS: AN UNEXPLORED PERSPECTIVE

Roman Buchtele, Petra Plachtova

Abstract

Achieving carbon neutrality and the application of the circular economy is the main objective of the European Green Deal. This concept emphasizes the transitions from a linear model to one that promotes resource efficiency and waste reduction to achieve sustainability. The question is how the circular economy as a concept is perceived by high school students. There is a lack of such research in scholarly discourse. The aim is to find out the perception of high school students of the sub-elements of the circular economy. The method was based on a quantitative approach – a questionnaire survey. The questionnaire survey was carried out at a high school in the South Bohemian region with a general focus. A total of 75 questionnaires were used. The results complemented students' perceptions of the circular economy in terms of knowledge, concerns, willingness and behaviour. An important finding was that a larger proportion of students had not encountered the concepts, while the knowledge of the concepts among the remaining students had no statistically significant relationship with the other variables. Correlation analysis showed that the strongest influence is the highest educational attainment of parents.

Keywords: circular economy, high school students, perception, questionnaire

1   INTRODUCTION

The transition to a circular economy is considered very important in the European Union given major strategic documents. In Closing the loop - An EU action plan for the Circular Economy, the circular economy is seen as a major contribution to the EU's efforts to develop a sustainable, low-carbon and competitive resource-efficient economy (European Commission, 2015). In other words, it is about achieving the general objective – sustainable development, which was defined in 1987 (World Commission on Environment and Development, 1987). In addition to environmental and social aspects, it is also about achieving a competitive advantage in an economic context (European Commission, 2015). In the European Green Deal, the European Union set out to achieve carbon neutrality by 2050 through the application of the circular economy. "Achieving a climate neutral and circular economy requires the full mobilisation of industry. It takes 25 years – a generation – to transform an industrial sector and all the value chains" (European Commission, 2019).

According to European Parliament (2023), the circular economy is described mainly as a model of production and consumption that differs from the conventional neoclassical one in this basic feature. It involves sharing, renting, reusing, repairing, refurbishing and recycling materials or products for as long as possible. The circular economy also responds to current global challenges, such as climate change and the associated increase in pollution, waste and biodiversity loss (Ellen MacArthur Foundation, n. d.). The circular economy, together with the green economy and the bioeconomy, are considered the main global concepts towards sustainable development (D`Amato et al., 2017).

Differences in the perception of the circular economy by different interest groups are found. Administrators' perceptions are primarily focused on economic growth and promoting job creation. On the other side are researchers and economists whose perception is based on eco-

expectations of environmental improvement. Researchers are also characterized by a holistic approach, while economists and administrators prefer a bottom-up approach (Langen et al., 2021). Consumer behaviour is also often discussed with the circular economy. Vidal-Ayuso et al. (2023) state that the post-purchase phase, under which use, recycling and upcycling fall, is the crucial phase. It was found that there are still research gaps in this area. All these research focuses may be preceded by the perception of the concept by students, who in the future will represent both stakeholders in their professional lives, but also consumers.

Section 2.2.4 of the European Green Deal presents the premise that schools and educational institutions in general represent the key to preparing the young generation for the planned transition towards a circular economy and carbon neutrality (European Commission, 2019). For this reason, the focus of the present paper is a survey at the level of high school students in the context of the circular economy. The aim is to find out the perception of high school students of the sub-elements of the circular economy.

The paper is structured as follows. The literature review summarizes selected empirical outputs that have students as their subjects and their perceptions of the circular economy in the context of education. The results chapter describes the perception of the circular economy by the students at the selected high school, followed by a correlation analysis, where the influence of socio-demographic indicators and knowledge of the concepts of "sustainable development" and "circular economy" is verified.

2   LITERATURE REVIEW

The teaching of circular economy among students should follow the basic principles as stated in Kirchherr &, Piscicelli (2019). Within the research with undergraduate students, they found that interactivity, non-dogmatism, and reciprocity as well as constructive alignment and problem-based learning are the basic principles that should underpin the teaching of circular economy.

In research by Korsunova et al. (2021), the subjects were Finnish high school students aged 15-20. It was found that high school students strongly associate circular economy with waste sorting, recycling, and in particular the re-sale/purchase of used products. Study Owojori et al. (2022) examined the knowledge of university students in the context of the circular economy. The main focus was on solid waste management. Here, it was found that students have insufficient knowledge. However, a positive finding was discovered, namely that students have a willingness to participate in a recycling project. Some form of economic incentive was found to be an important factor in participation in these recycling projects. Venugopal & Kour (2021) also examined the extent to which the circular economy discourse has impacted Indian engineering students. It was found that only a third of the respondents were familiar with the concept. Keramitsoglou et al. (2023) dealt with aspects of teaching the concepts of circular economy and sustainability. Their research dealt with secondary school education and a case study of a virtual enterprise applying a circular model of food waste management was used. This approach can help in the development of various soft skills, group creativity, experiential learning and problem-solving in a real context. Learning concepts like the circular economy is associated with high ambiguity among students. Combining practice with theory is an effective way to increase awareness of these concepts. A final finding was that students need time and repetition to consolidate these abstract concepts, which are then translated into their beliefs. The important role in teaching the concept of circular economy is also underlined by the study by Kopnina (2018). Student projects at universities allow students to assess the strengths and weaknesses of the concept and students are already confronted with a number of practical and theoretical challenges during their studies.

Moving to the general level of environmental education, Suárez-Perales et al. (2021) point out that a relationship can be observed between environmental education and the pro-environmental behaviour of students. However, this relationship is indirect as it passes through the knowledge-concern-willingness model. Environmental knowledge then triggers interest, later willingness, and finally direct participation in pro-environmental actions. However, a critical fact in this regard is that, based on a number of studies (e.g. Sánchez-Carracedo et al., 2021; Takala & Korhonen-Yrjänheikki, 2019), education for sustainable development, under which the issue of the circular economy falls, is insufficient even at the university level of education. However, overall, the discourse on sustainable development is having an impact on university students (Buchtele & Lapka 2022).

At the secondary level, the teaching of sustainable development and environmental issues is based on a collaborative approach between natural and social sciences in the context of cross-cutting themes, where sustainable development falls. Teachers from different disciplines need to emphasise different but complementary dimensions of teaching and perspectives on education for sustainable development. In this educational process, the individual identity-making of students is essential to make environmental knowledge relevant for everyday use (Sund & Gericke, 2020).

3   METHODOLOGY

The aim is to find out the perception of high school students of the sub-elements of the circular economy.

Within the Czech education system, the implementation of the circular economy in education is still at an early stage, and this research mainly describes the initial situation and how students perceive the sub-elements of the circular economy and whether this is reflected in their pro-environmental behaviour. Based on the literature review, the following research questions were identified. The first research question is based on the impact of the discourse of sustainable development and the related concept of circular economy on students in the context of knowledge (e.g. Owojori et al., 2022; Buchtele & Lapka, 2022). The subsequent research questions are based on the study Suárez-Perales et al. (2021). The last research questions are based on verifying a statistically significant relationship between the variables.

Do students have knowledge about climate change in the context of the circular economy?

Are students concerned about the negative phenomena associated with climate change in the context of a circular economy?

Are students willing to accept concessions in their consumption behaviour in favour of maintaining climate stability in the context of a circular economy?

Do students exhibit the pro-environmental behaviours necessary for a circular economy?

Is there an influence of socio-demographic indicators on knowledge, concern, willingness and behaviour towards a circular economy?

Is there an influence of knowledge of the concepts of "sustainable development" and "circular economy" on knowledge, concern, willingness and behaviour towards a circular economy?

The used methods are based on quantitative research at the level of students of a selected general high school located in the South Bohemian region. The selected high school is located in a town with a population of less than 10,000 inhabitants. The town lies in a specific landscape shaped by the fishing tradition. Due to this fact, the students are close to the cultural landscape.

The subject of the analysis is a pilot survey, which falls under a questionnaire survey that has been conducted since the spring of 2023 among secondary school students mainly in the South Bohemian region. The questionnaire includes topics that fall within the field of environmental education and environmental knowledge to pro-environmental behaviour. Methodologically, there is a continuity with the research done by Suárez-Perales et al. (2021), which defined the process from knowledge to behaviour. The questionnaire survey includes a section on the circular economy, which is the focus of this paper and the pilot survey.

The questionnaire was distributed online. A total of 75 questionnaires were collected for the pilot survey and selected after data filtering. The gender distribution within the sample is as follows: 60% women and 40% men. A total of 40% of respondents reported being in a rural area and 60% in an urban area. The age of the respondents ranges from 14 to 19 years.

Parental education was also an important characteristic of the sample. A total of 48% of the students reported that their mother had a university degree. High school education is represented by 37.3%. On the other hand, a total of 33.3% of the respondents report that their fathers have a university education. High school education is represented here similarly to that of mothers, i.e. 40%. Significant here is Vocational secondary school which is represented by 20%. The remaining frequencies are primary education and don't know responses.

In addition to identification questions and basic socio-demographic characteristics, the questionnaire included the following groups of questions:

Discourse on circular economy and sustainable development

Have you ever come across the term "sustainable development"?

Have you ever come across the term "circular economy"?

Knowledge of the basic principles of the circular economy

Do you think it is possible to produce everyday objects in such a way that they can be broken down into raw materials and reused at the end of their useful life?

Do you think that waste is being sufficiently sorted and recycled in the Czech Republic?

Concern about the negative phenomena that the circular economy is supposed to solve

What is your position on the ever-dwindling oil or coal reserves?

Are you concerned about the amount of plastic pollution on the planet?

Willingness to apply the principles of the circular economy

Imagine a situation where, for example, you are shopping for new clothes. Are you willing to pay more money for a piece of clothing that you know is made of recycled material?

Would you be willing to return PET bottles to the store?

Behaviour towards the circular economy

Do you separate waste at home?

Do you take into account the fact that the goods are made of recycled material when you buy them?

The last four categories are based on Suárez-Perales et al. (2021) and their breakdown that runs from knowledge to behaviour.

The contingency table is used to find the relationships between variables through the crosstabs procedure in IBM SPSS Statistics, where statistical significance is verified through the chi-square test. For the interpretation of the results, the so-called adjusted residuals (ar) will be used

as follows. If the null hypothesis that the two variables are independent holds, then ar=0. If ar > 1.96, this means that the number of cases is significantly greater than would be expected if the null hypothesis were true (IBM, 2020). In this section, the following null hypotheses were tested: "Sociodemographic indicators do not influence knowledge, interest, willingness and behaviour in the field of circular economy."; "Knowledge of the terms 'sustainable development' and 'circular economy' does not influence knowledge, concern, willingness and behaviour towards a circular economy."

4 RESULTS

The first part of the analysis of the results deals with descriptive statistics, frequency analysis. This is followed by correlation analysis through the crosstabs procedure, where the statistical significance of the relationships is verified through the chi-square test.

4.1 Discourse on circular economy and sustainable development

First, it was necessary to find out whether the respondents had encountered the concept of sustainable development, which is the basis for the concept of circular economy. As such, sustainable development is a fundamental alternative development concept (World Commission on Environment and Development, 1987) that provides the basis for environmental education itself.

Figure 1 shows that most students, i.e. 47%, have never encountered the concept. Only 17% have encountered the concept and are further interested in it. A total of 21% of the students are familiar with the concept but have not taken a closer interest in it. And 12% of the students did not understand the concept.
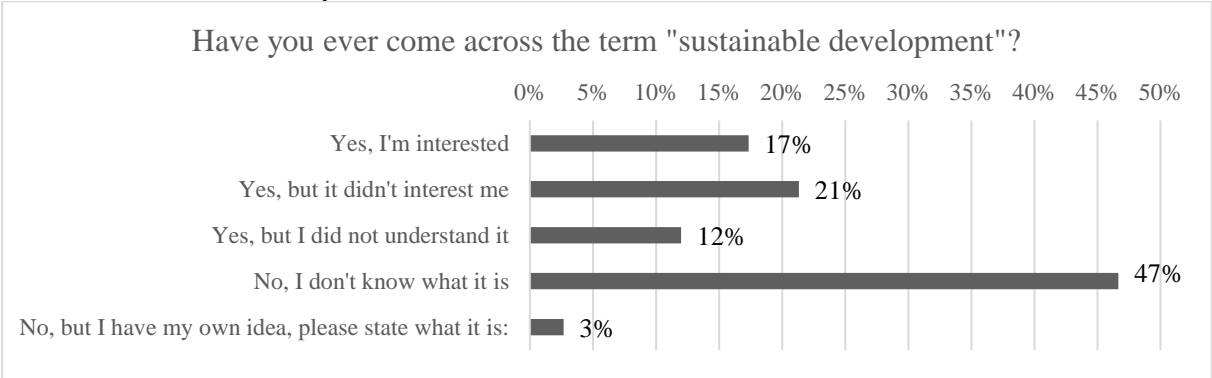
Fig. 1 – Have you ever come across the term "sustainable development"? Source: own research

The concept of sustainable development is followed by the concept of circular economy. Given this fact, the response frequencies are similar for the circular economy. A total of 44% of students do not know what the concept is. Only 12% know the concept and are more interested in it. The frequency of 28% is interesting for the answer where students have encountered the concept but are not more interested in it. Only 13% have encountered the concept but do not understand it (see Figure 2).
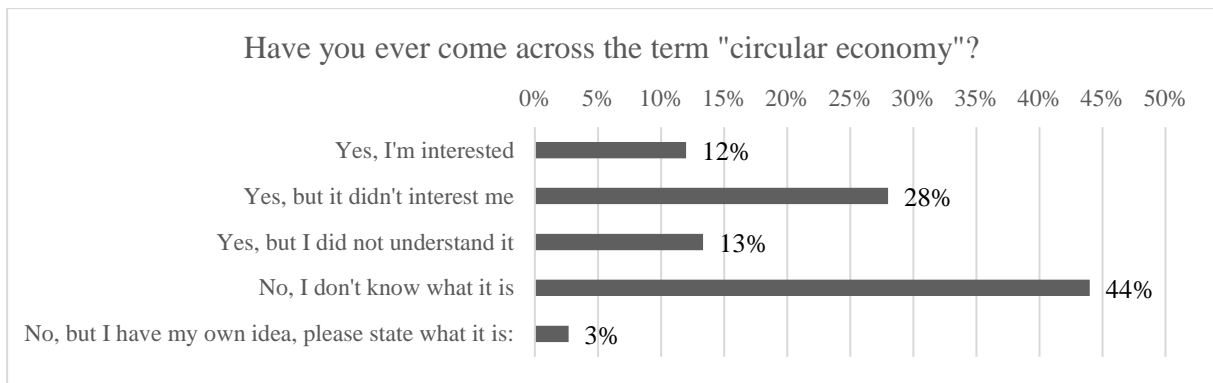
Fig. 2 – Have you ever come across the term "circular economy"? Source: own research

4.2 Knowledge of basic principles of circular economy

The next part of the questionnaire dealt with knowledge of the basic principles of the circular economy, where the reality under investigation was greatly simplified. Circularity itself is based on the principle of breaking down products into raw materials that can be further used in production. A total of 21% of respondents state that it is possible to produce products that can be subsequently broken down into sub-materials. The highest frequency, 71%, is for the answer where respondents agree, but there is a limitation to only selected products. Only 1% disagree and 7% of respondents say they do not know (see Figure 3).
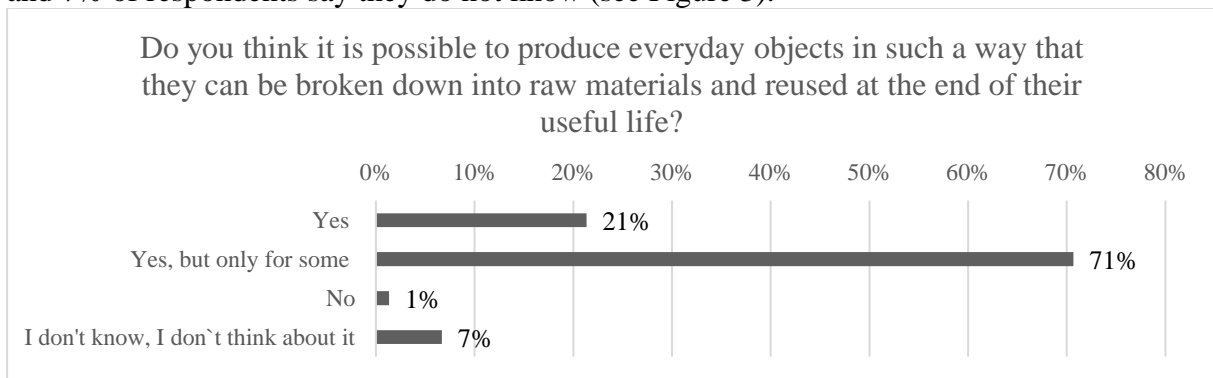
Fig. 3 – Do you think it is possible to produce everyday objects in such a way that they can be broken down into raw materials and reused at the end of their useful life? Source: own research

Another important feature of the circular economy is the management and subsequent recycling of waste. In the Czech Republic, as of 2020, a total of 71% of the population reported that they consistently separate their waste (Samosebou, 2021). Recycling rates are also high. For paper it is 91%, for glass 85%. For plastic, the value is lower, i.e. 46% (EKO-KOM, 2022). A total of 15% of respondents believe that sufficient waste is sorted and then recycled. Most respondents, 41%, state that waste is sufficiently sorted but less recycled. A total of 35% of respondents are of the opinion that waste is neither sufficiently sorted nor recycled. Only 8% of respondents do not know (see Figure 4).
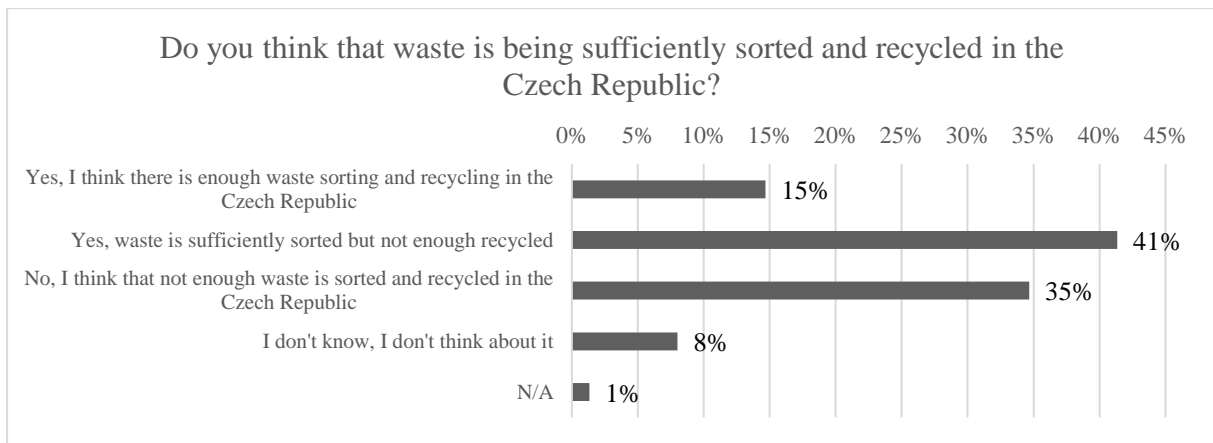
Fig. 4 – Do you think that waste is being sufficiently sorted and recycled in the Czech Republic? Source: own research

4.3 Concern about the negative phenomena that the circular economy is supposed to solve

An important finding is how students feel about ever-shrinking oil or coal reserves. Most, 56%, of the students answer that we should try to make items from recycled materials and depend as little as possible on mining. A total of 24% of students believe that other new materials will be found. Only 8% of the respondents see a way out in technological advances. A total of 12% of respondents said they did not know (see Figure 5).
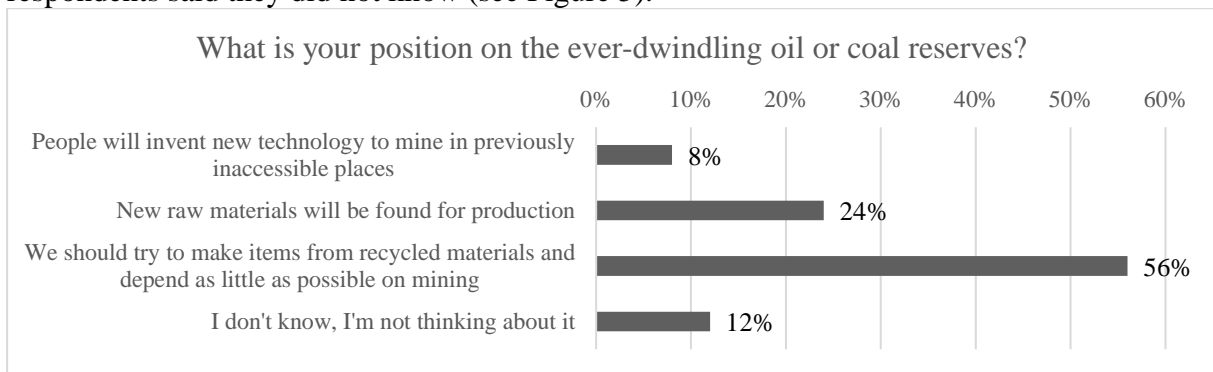
Fig. 5 – What is your position on the ever-dwindling oil or coal reserves? Source: own research

Plastic waste pollution is a very pressing global problem. Figure 6 shows the attitude of students towards this problem. A total of 65% of the respondents indicate that they are concerned about this problem, i.e. the answer is "yes". A more moderate answer of "rather yes" was chosen by 28%. Only 4% of the students state that they do not know and the frequency of the answer "rather no" is 3%.
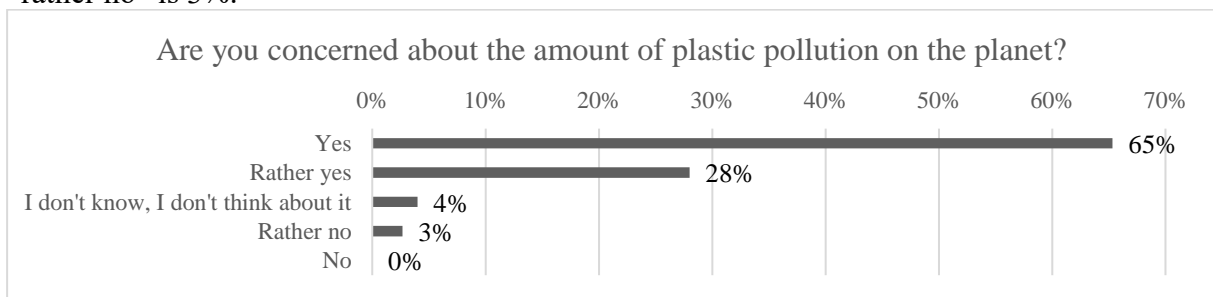
Fig. 6 – Are you concerned about the amount of plastic pollution on the planet? Source: own research

4.4 Willingness to apply the principles of the circular economy

Another part of the questions focuses on the willingness to apply the principles of the circular economy in everyday life. When buying goods, it is already becoming common to have the choice to buy a product that is made from recycled materials. The clothing industry is a good example. Figure 7 shows that it cannot be directly stated that students are significantly more likely to buy such products. Agreed responses have a frequency of 17% for the answer "yes" and 20% for the answer "rather yes". Conversely, disagree responses have a frequency of 11% for the answer "no" and 25% for the answer "rather no". A neutral answer was chosen by 27% of the students and it is the answer with the highest frequency.
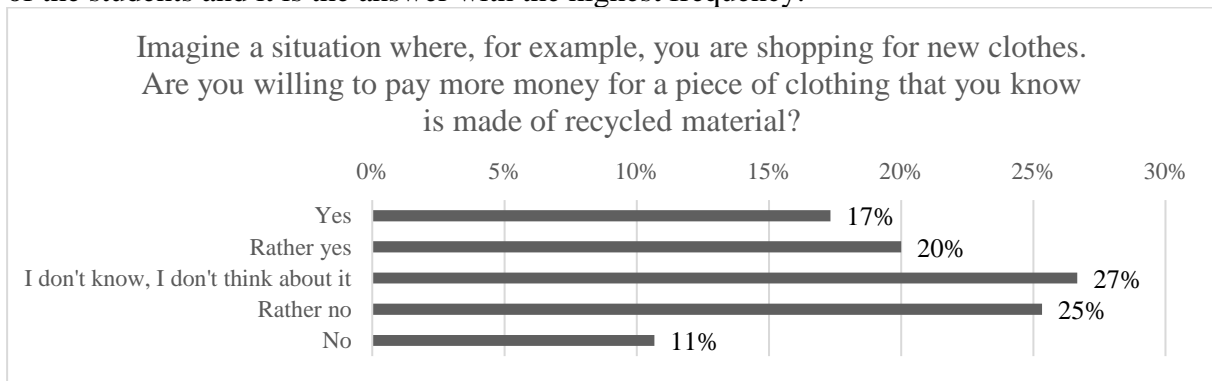
Fig. 7 – Imagine a situation where, for example, you are shopping for new clothes. Are you willing to pay more money for a piece of clothing that you know is made of recycled material? Source: own research

The second situation, and more common, is the willingness to return backed-up PET bottles. There has long been a public debate about backup and inspiration can be drawn from neighbouring countries. Here, the answers of the respondents are already strongly in favour of a supportive position. A total of 68% of respondents chose the answer "yes". A more moderate answer "rather yes" chose 21% of respondents. The neutral answer has a frequency of 7%. Disagree responses have a percentage frequency of 3% (rather no) and 1% (no) (see Figure 8).
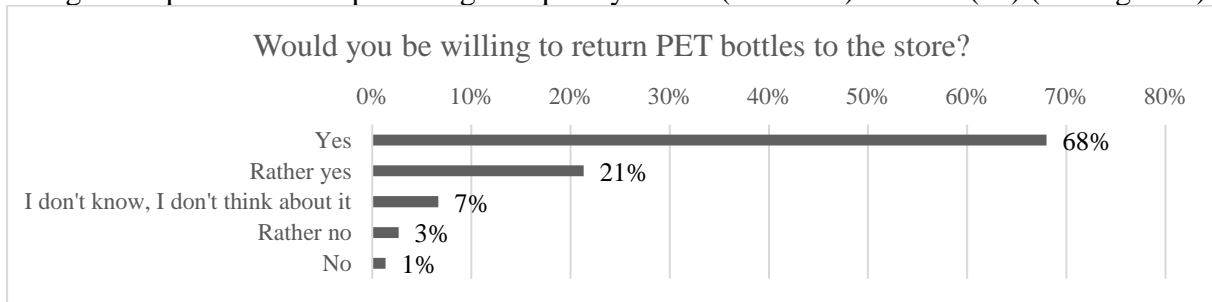
Fig. 8 – Would you be willing to return PET bottles to the store? Source: own research

4.5 Behaviour towards the circular economy

The last group of questions looks at actual behaviour which could be described as being in line with the circular economy. The first question deals with household waste management. The frequency of responses shows that there is a prevalence of agreement when asked whether the respondent sorts waste at home. Figure 9 shows that a total of 69% chose "yes". The more moderate answer "rather yes" has a frequency of 19%. A neutral answer was chosen by 4% of respondents. For the disagree responses, the frequencies are 5% (rather no) and 3% (no).
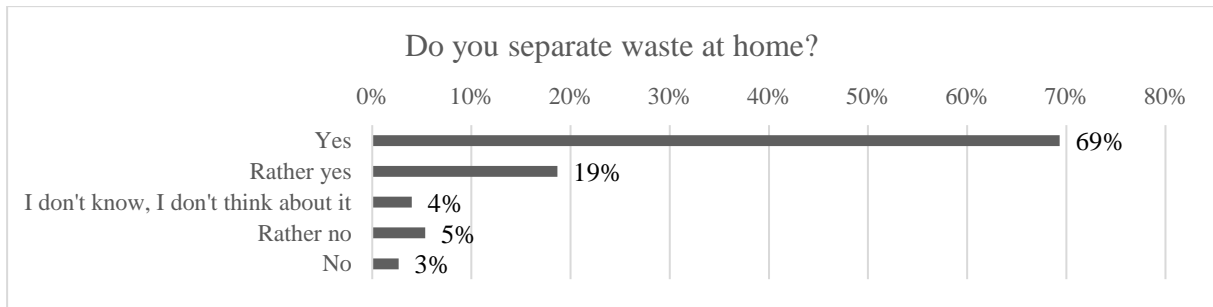
Fig. 9 – Do you separate waste at home? Source: own research

When asked whether they take into account the fact that the goods are made of recycled material when making purchases, the answers are unbalanced. Agreeing responses have frequencies of 8% (yes) and 25% (rather yes). A total of 28% of respondents chose a neutral answer. The answer "rather no" was chosen by 27% of respondents and the answer "no" was chosen by 12% of respondents (see Figure 10).
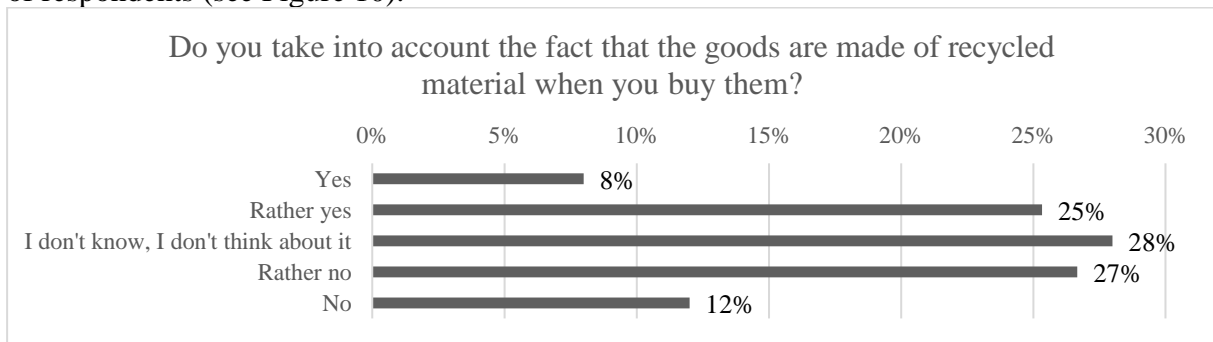
Fig. 10 – Do you take into account the fact that the goods are made of recycled material when you buy them?

Source: own research

4.6 What impact do socio-demographic characteristics and knowledge of the concepts of "sustainable development" and "circular economy" have on knowledge, concern, willingness and behaviour towards a circular economy?

IBM SPSS Statistics and the crosstabs procedure were used to test for statistically significant relationships. First, knowledge of concepts (sustainable development or circular economy) and sociodemographic variables were analysed to see if there was a statistically significant relationship between them. Based on the chi-square test at the 0.05 level of significance, it was found that there was no statistically significant relationship between the variables.

The next stage of the correlation analysis was to determine whether there was a statistically significant relationship between exposure to sustainable development or circular economy concepts and the other variables. Only one statistically significant relationship was confirmed. Students who have been exposed to and are interested in sustainable development are also disproportionately more likely to report that they are willing to pay more money to purchase clothing made from recycled materials (ar = 2.2, p-value = 0.036).

Correlation analysis of socio-demographic variables with other observed variables follows. In one case, a statistically significant relationship was confirmed between whether a student lives in a rural or urban area and buying behaviour in the context of recycled materials. Students who live in rural areas are disproportionately more likely to report that when making purchases, they are more likely to consider that the item is made from recycled material (ar = 2.4, p-value = 0.054).

According to the correlation analysis, the most significant influence on the observed variables is the educational attainment of students' parents. Students whose father's highest educational attainment is in vocational secondary school are disproportionately more likely to indicate that everyday objects cannot be manufactured so that they can be broken down into raw materials and reused at the end of their useful life (ar = 2.0, p-value = 0.000). Students whose mother's highest educational attainment is primary school are disproportionately more likely to indicate that finding new raw materials for production will solve the thinning of oil or coal reserves (ar = 2.6, p-value = 0.004). Students whose father has college degree are also disproportionately more likely to indicate that finding new raw materials for production will solve the thinning of oil or coal reserves (ar = 2.9, p-value = 0.006).

5 DISCUSSION & CONCLUSION

The European Green Deal identifies educational institutions as key to preparing the younger generation for the transition to a circular economy and carbon-neutral economy (European Commission, 2019). For this reason, the aim of the present paper was to focus on students' perceptions of the circular economy. Overall, there is not much interest in the concepts of circular economy and sustainable development among high school students, although almost half of the respondents have encountered the concepts. Such a result was to be expected given the fact that, according to the current discourse, sustainable development is not properly implemented even at the university level among European universities (e.g. Sánchez-Carracedo et al., 2021; Takala & Korhonen-Yrjänheikki, 2019), taking into account that sustainable development is the main paradigm of the circular economy (D`Amato et al., 2017).

Regarding knowledge of the general principles of the circular economy, most students assess the situation regarding waste sorting and recycling as such that can still be improved. Such a finding may be consistent, for example, with other possible uses of plastic waste outside of energy purposes (e.g. EKO-KOM, 2022). An important finding is that the students state that it is possible to produce products of daily use in accordance with the principles of the circular economy.

Related to this is the concern about the negative phenomena the circular economy should solve. Plastic waste, which is the most discussed, is negatively perceived by students. This is also related to their attitude towards dwindling fossil fuel reserves in favour of production based on recycling.

Furthermore, it was found that students are willing to participate in the system of returnable PET bottles. Another frequently discussed issue is clothing made from recycled materials and the willingness to pay more money for environmental reasons. In this case, such willingness among students cannot be confirmed.

For the part dealing with specific behaviour towards the circular economy, it was found that most students confirm that they sort waste at home. This is consistent with the conclusions of Samosebou (2021). On the contrary, for the next step, which is already connected with recycling and production from recycled materials, it cannot be confirmed that students consider this fact when purchasing products. Finally, the correlation analysis drew some basic relationships between the variables. In particular, a strong relationship was found between the variables and parents' education.

The results of this investigation can supplement outputs that deal with students' perception of the circular economy (e. g. Korsunova et al., 2021; Owojori et al., 2022; Venugopal & Kour, 2021), especially at the secondary school level, which is not so common in the current scientific discourse. The presented research is limited by its focus on only one selected high school, which

limits the greater generalization of the results. For further research, it is necessary to extend the research to other educational institutions and make comparisons across educational levels.

Acknowledgement

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TOOLS OF MARKETING COMMUNICATION AND THEIR IMPACT ON THE CONSUMER BEHAVIOR OF GENERATION Z

Matúš Cagala, Dagmar Babčanová

Abstract

This article focuses on the consumer behaviour of Generation Z and the impact of various marketing communication tools on this behaviour. Currently, Generation Z represents the upcoming generation that will become the dominant force in the market in the near future. This generation is beginning to influence the market with their decision-making, so it is essential for every company to understand the specific characteristics and preferences of this generation. The article offers a deeper understanding of how marketing communications influence consumer behaviour among members of Generation Z. The results and findings in the article could be helpful for marketing managers in creating strategies targeting Generation Z. This information could help them tailor marketing campaigns to better match preferences and values of this generation. In the theoretical introduction of the article, we define Generation Z and characterize marketing communication. As part of the analysis, surveys conducted within the Gen Z Report Findings, Dolloite and Consumer trends reports. program were examined. Subsequently, we created 4 research questions that we answered using a questionnaire survey. In conclusion, based on the results, we recommend Slovak companies to utilize marketing communication tools that have the most influence on this generation. The aim of this article is to define which marketing communication tools influence the consumer behaviour of Generation Z and to provide recommendations for an effective marketing communication mix.

Keywords: *marketing, marketing communication mix, Generation Z, consumer behaviour*

1 INTRODUCTION

Generation Z, a young and dynamic group of individuals born between 1996 and 2010, is quickly emerging as a significant player in the market and represents the future of consumerism. With their growing purchasing power and unique preferences, they are influencing the business landscape and prompting the need to reassess and adapt marketing strategies. This article focuses on examining the consumer behaviour of Generation Z and the impact of various marketing communication tools on their decision-making process. In the initial part of the article, we delve into a theoretical description of Generation Z and define the concepts of communication and marketing communication. We analyse the findings of relevant surveys conducted under the Gen Z Report Findings, Dolloite programs and Consumer trends reports, which allow us to identify specific characteristics and preferences of this generation. Furthermore, we conducted our own questionnaire survey aimed at exploring the influence of marketing communication tools on the consumer behaviour of Generation Z. The objective of this article is to define which marketing communication tools have the most significant impact on the consumer behaviour of Generation Z and recommend the utilization of an effective marketing communication mix for Slovak businesses. These recommendations are intended to assist businesses in capturing the attention and loyalty of this generation, which is constantly engaged with digital media and innovations. By deepening our understanding of Generation Z and identifying the most effective marketing communication tools, we are confident that this article will provide valuable insights for industrial companies seeking to attract and retain the loyalty of this growing generation of consumers.

2   LITERATURE REVIEW

Marketing communication

Marketing communication refers to the means by which companies attempt to inform and persuade consumers and remind them - directly or indirectly - of the products and services they sell. In a sense, it represents the "voice" of the company and serves as a tool for engaging in dialogue and building relationships with consumers. On one hand, it involves informing and familiarizing consumers with the quality, value, benefits, and uses of products and services. On the other hand, it entails the ability to listen, receive consumer demands, and respond to them (Kotler, Keller, 2015). Marketing communication is the process of exchanging information, creating relationships and a network of connections between the company and subjects of the market environment (Adamska, 2020). The development of marketing communication as a specific system can be traced back to the sales concept, where marketing communication is used to influence consumer demand for products they do not typically purchase (Hanuláková, 2021). By utilizing marketing communication, companies can associate their products with other people, places, events, brands, experiences, emotions, and things. Marketing communication can contribute to brand value by ingraining it in the minds of consumers and shaping its image (Zatwarnicka-Madura, 2022). Marketing communication in the last dozen years is developing faster and more intensively, in a significantly noticeable way for both customers and businesses than it was decades before. Huge changes that are observed in the field of mobile technology development, new communication channels and tools as well as their content and methods of delivery to the market (Adamska, 2020). Through marketing communication, businesses and other organizations achieve their marketing goals. In today's highly competitive markets, marketing communication is an essential part of the vast majority of commercial and non-commercial entities. In practice, this means that businesses seek potential customers to buy their goods and services using persuasive communication. Likewise, governments and non-profit organizations use marketing communications to discourage harmful behaviour, such as smoking, but also to promote beneficial behaviour, such as fundraising. Political parties also use marketing communications to reach potential voters and win their votes (Kotler, Armstrong, 2019).

Marketing communication currently encompasses a wide array of methods and techniques that can be utilized for message dissemination. This is largely attributed to the advancements in mass communication and information technologies. Therefore, we recognize that it is not possible to categorize them according to clear-cut criteria (Rajčák, Rajčáková, 2012).

Tools of marketing communication

The essence of marketing communication is influencing consumer buying behaviour through the means of the marketing communication mix. These tools can be referred to as marketing communication tools. It is important to emphasize that in theory and practice, there are several classifications of marketing communication tools. Such classifications are usually based on the author's theoretical knowledge or practical experience. It is often mentioned in the marketing literature that the correct use of marketing communication tools is becoming a modern goal of every organization. It is believed that the consumer is motivated by an organization that satisfies his needs, that satisfies marketing communication tools that create consumer trust, dedication, and satisfaction, all of which promote consumer loyalty to a product, service or brand (Kovanoviene, 2021).

Based on the literature from various authors, it can be said that dividing marketing communication tools into specific groups or categories is ineffective and impractical. This is because most authors agree that emerging marketing communication tools are built upon

elements of six fundamental tools, which include the following (Kotler, Keller 2015), (Jakubíková, 2013), (Kita, 2017), (Hanuláková, 2021), (Zatwarnicka-Madura, 2022), (Adamska, 2020), (Kovanoviene, 2021):

1. Advertising - is a communication discipline through which marketing information can be effectively communicated to mass target segments. It can inform, persuade, and effectively remind the target audience of marketing messages. Advertising represents the "flagship" of marketing communication, although its weight within the communication mix has been decreasing in recent times.

2. Sales Promotion - is characterized as a set of offers that stimulate immediate purchase. It includes a wide range of means, tools, or techniques designed to motivate sales personnel and retailers as intermediaries in the sales process, as well as to encourage consumer purchases.

3. Public Relations - We understand it as a dialogue between companies and key stakeholder groups that determine the success or failure of a company. These key stakeholder groups can help a company achieve its goals, but they can also undermine those goals. Typical groups that companies collaborate with include activists, local communities, investors, donors, employees, potential employees, partners, suppliers, government and legislative institutions, key opinion leaders, and, of course, consumers. Lastly, journalists also play a role as they influence all of the aforementioned groups.

4. Direct Marketing - It has become part of the communication mix in response to the market environment where there is a shift away from mass marketing communication with consumers to more targeted and personalized communication. As the name suggests, it involves the use of direct communication methods with selected individual consumers. The goal is to establish direct contact with the target audience, elicit an immediate response, and begin building relationships with consumers.

5. Personal Selling - It is defined as the personal contact between a salesperson and a consumer with the aim of successfully concluding a transaction. It is a tool of direct communication. The goals of personal selling include customer prospecting, customer communication, information gathering, and product placement. Personal selling can be carried out through direct contact between the salesperson and the customer, over the phone, or through personalized services.

6. Event Marketing - We understand it as the staging, planning, and organization of experiences within corporate communication. These experiences aim to evoke psychological and emotional stimuli through the arrangement of various events that promote the company's image and its products.

Based on the provided information, we have created Table 1, which presents activities typical for the aforementioned marketing communication tools.

Tab. 1 - Basic Marketing Communication Tools. Source: (Kotler, Keller 2015), (Jakubíková, 2013), (Kita, 2017), (Hanuláková, 2021), (Zatwarnicka-Madura, 2022), (Adamska, 2020), (Kovanoviene, 2021)

Advertising	Newspapers and Magazines	Television and radio commercials	Promotional materials, Flyers, Billboards
Sales Promotion	Discounts, Bonuses, Gifts	Samples, Contests	Coupons and multipacks
Public Relations	Annual Reports	Press conferences and seminars	Charitable activities
Personal Selling	Product Presentations and Business Meetings	Participation in exhibitions and trade shows	Customer service after product purchase
Direct Marketing	Teleshopping, Telemarketing	Newsletters	Product catalogues
Event Marketing	Cultural and Sports Events	Product and service presentations	Festivals, Excursions, Corporate parties

Due to the development of the internet and social media, various new marketing communication tools have emerged. Given this fact, we will not cover all of the new marketing communication tools in this article. Instead, we will focus on the following five tools of marketing communication (Kotler, Keller, 2015), (Kita, 2017), (Rajčák, Rajčáková, 2012), (Přikrilová, 2019), (Zatwarnicka-Madura, 2022), (Adamska, 2020), (Kovanoviene, 2021):

1. Digital marketing - the term "digital" refers to the nature of the medium rather than specific characteristics of the marketing itself. Digital marketing encompasses any marketing message and its elements that can be seen, heard, or even felt or touched through new media channels such as mobile devices, tablets, computers, television, virtual reality, and more.

2. Social media marketing - can be defined as a virtual space for people to meet, communicate, and engage with each other, connected through friendships or other forms of shared interests, hobbies, or self-expression. Social media platforms are one of the most preferred communication tools. Social networks can serve various purposes, including informational and communicative (focused on general communication and sharing), professional (oriented towards professional matters and issues), as well as educational or interest-based networks.

3. Product placement - is the intentional and paid placement of a product directly within media or audiovisual content, where it is presented either directly or indirectly as part of a scene that the viewer perceives as a natural part of the program and pays attention to. The most typical medium through which companies promote their brands through product placement is in films and TV series. Additionally, products or even entire companies can be featured in radio shows, theatrical plays, books, computer games, music videos, and song lyrics. Among the companies that most frequently utilize product placement are automakers, mobile phone and electronics manufacturers, producers of alcoholic and non-alcoholic beverages, clothing manufacturers, and others.

4. Mobile marketing - can be broadly defined as the use of mobile technologies to achieve marketing goals. With the exception of a few tools such as SMS and MMS, it is based on the existence of the internet. Its main characteristic is mobility, which brings several implications for the field of marketing communication. Mobile phone technologies are currently one of the most rapidly developing media. The mobile phone, for at least the past decade, is no longer a device solely used for making calls and sending text messages, but it offers a wide range of uses in many areas. It is the most popular technical communication device worldwide.

5. Guerrilla marketing - primarily refers to an unconventional way of addressing customers. It is used when a company is not adequately prepared to engage in direct competition. It works with psychology and involves creating a simple presentation of a product in the market while attracting the attention and interest of the media. It is based on original ideas, creative execution of the concept, and the subsequent use of unconventional media for presentation. Originally, it was mainly used by smaller companies, but today it is successfully implemented by large and wealthy companies as well. Modern guerrilla marketing relies on sensation and originality.

Based on the information provided, we have created Table 2, where we describe the activities that are typical for the aforementioned emerging marketing communication tools.

Tab. 2 - "New" Marketing Communication Tools. Source: (Kotler, Keller 2015), (Jakubíková, 2013), (Kita, 2017), (Hanuláková, 2021), (Zatwarnicka-Madura, 2022), (Adamska, 2020), (Kovanoviene, 2021)

Digital marketing	Company product websites	Email marketing	Video and photo sharing platforms (YouTube)
Social media marketing	Facebook, Instagram, Tik Tok, Twitter	Influencers, blogs	Viral marketing
Mobile marketing	Mobile phone search and online shopping	QR codes	Mobile app stores
Product placement	Product placement in movies or TV series,	Product placement in video games	Product placement in TV shows, cinema, theatre, music videos
Guerrilla marketing	Public space product or service images	Promoting a product or brand on car bodies	Graffiti

Currently, marketing is developing in connection with new technologies. Above all, these are digital technologies that enable new ways of informing, supporting and influencing customers. Along with this development, new trends in marketing communication are emerging. These trends include: (Zatwarnicka-Madura, 2022), (Adamska, 2020), (Kovanoviene, 2021), (Butkouskaya, 2020):

- Content marketing and storytelling: Focusing on creating valuable content that appeals to the target group and creates emotional attachment.

- Video Marketing: Live videos, social media videos, vlogs and animated videos are often used to share information and engage audiences.

- Interactive content: Interactive elements such as quizzes, contests, polls, and questionnaires allow you to engage your audience and increase participation and engagement.

- Personalization and segmentation: With advanced analytics tools, brands can better understand their customers' preferences and behaviours. This enables the creation of personalized content and targeted marketing.

- Influencer marketing: Working with social media personalities and influencers can help brands reach their target audience in a more authentic way.

- Sustainability and social responsibility: Customers are increasingly focused on brands that show an interest in sustainability and are actively involved in socially beneficial initiatives.

- Chatbots and artificial intelligence: Automated communication using chatbots makes it possible to improve customer support and provide quick answers to questions.

- Micro-moments: These are moments when customers are looking for quick answers to questions via mobile devices.

- Voice search content: With the advent of voice assistants, the way customers search for information is also changing.

Characteristics of generation Z

Generation Z includes individuals born from approximately 1995 to 2010. Unlike previous generations, Gen Z aren't good listeners and have limited interpersonal skills. The preferred method of communication is via the Internet and social networks. Members of Generation Z can often be found in places where an Internet connection is available (Roth-Cohen, 2022). This generation differs from other generations in the area of interpersonal relations and skills. Members of Generation Z have problems with interpersonal skills and communication with other individuals. They are known as the "silent" generation because they prefer communication technology. The Internet is a matter of course for them, and they consider platforms such as Google, Facebook, and Instagram to be their home. They can have many acquaintances in cyberspace without ever meeting someone in person. This quiet demeanor and lack of face-to-face meetings can hinder the formation of relationships (Bejtkovský, 2016) (Agárdi, 2022). Generation Z has different consumer behavior compared to previous generations. Here are some special aspects regarding their consumer behavior in Slovakia (Smolka 2019), (Zatwarnicka-Madura, 2022) (Bejtkovský, 2016), (Duffet, 2017):

- Online shopping: Generation Z is comfortable and online shopping allows for quick and convenient purchases. Online shopping and mobile apps are a common way of shopping.

- The influence of reviews and social media: Members of this generation often turn to reviews and recommendations on social networks before making a purchase when making a purchase decision.

- Seeking experiences: Generation Z often prefers purchases that are connected to an experience. They prefer to invest in high-quality and unique products and services that bring them emotions and experiences.

- Finding value for money: People from generation Z are very well informed in the field of finances. Therefore, they often compare prices and look for the best value for their money.

- Promoting sustainability: Generation Z is environmentally oriented and prefers brands and products that are ecologically sustainable and environmentally responsible.

- Individualism and personalization: Members of this generation appreciate personalized offers and products that reflect their individual identity and interests.

- Diversity and inclusivity: They tend to support brands and companies that espouse the values of equality, diversity and inclusivity.

- Mobile Payments: They are comfortable with mobile payments and new payment methods such as digital wallets and payment apps.

Growing up with the Internet, smartphones, and social media, most generation Z prefer online shopping to physical store visits. Smartphone use is common for them, with up to 95 % owning or regularly using smartphones and 45 % reporting spending more than 10 hours online per day. This generation was also formed during the economic recession, so they try to look for cheap products and discounts. They have high expectations of value for money and often wait for

discounts and special offers. Their strong social networks, such as Instagram, Snapchat and TikTok, influence their purchasing decisions. They prefer products from brands that share their values and engage in beneficial social activities (Twenge, 2023). Generation Z prefers quality over quantity and is willing to pay a higher price for a higher quality product that meets their needs and lasts longer. They like to research products and brands before making a purchase to make sure they are choosing the best. They support small and local businesses because they prefer authentic experiences and shopping from independent brands. They realize that their purchases affect the local economy, so they try to shop responsibly (Roth-Cohen, 2022).

3 METHODOLOGY

This post deals with the use of marketing communication tools for generation Z. The goal is to create a marketing communication mix that will take into account all the preferences and behaviour of this generation. When creating the research questions, we analysed surveys that have already been conducted in this area. We analysed Gen Z Report Finding (2022), Consumer Trends Report (2022) and Doloitte (2022). More than 1,000 respondents from all generations currently active in the market took part in the Consumer trends report (2022) survey. Conducted in 44 countries, the Doloitte survey (2022) had more than 44,000 respondents from Generations Y and Z. The Gen Z Report Finding (2022) survey had 150,000 respondents from all generations. The survey was conducted in 10 countries of the world. These surveys focused on the overall characteristics and consumer behaviour of generations of consumers.

Different generations have different preferences in terms of communication and purchasing behaviour. According to the Consumer trends report (2022), the Baby Boomers generation prefers face-to-face meetings and telephone communication, while Generation Z prefers communication via social networks and e-mails. In the area of social media, there was also a Gen Z Report Finding (2022) survey, which showed that up to 91 % of respondents use at least one social network and up to 51 % use a social network constantly. The research also shows that up to 90 % of Generation Z consumers perceive advertising on social networks, while only 29 % perceive it on television. For example, if a company develops a new product that is aimed at younger generations, it should consider its presentation on social networks and the use of influencers who are popular among generations Y and Z. Because the results of the surveys Doloitte (2022) and Consumer Trends (2022) show, that up to 79 % of respondents from these generations are influenced by an influencer when making a purchase decision, and 21% are influenced by basic marketing communication tools. The Consumer Trends Report (2022) states that 50 % of Gen Z respondents, 41% of Gen Y respondents, 35 % of Gen X respondents and 25 % of Baby Boomers respondents believe that businesses should have social responsibility. They should try to solve the problems associated with this issue and prioritize these businesses when making purchasing decisions.

As part of our research, we used a questionnaire survey on the website vyplnto.cz to collect data. The collected data was processed using the MS Excel program by Microsoft. The questionnaire consisted of 14 questions, including dichotomous, semi-closed-ended, and ranking hierarchy questions (respondents were to create a ranking according to their own preferences). The survey was conducted from April 9, 2023, to June 16, 2023. During this period, we approached 250 respondents with different economic and social statuses, including employees, unemployed individuals, entrepreneurs, and students. The response rate of the questionnaire was satisfactory as we obtained responses from 204 respondents. However, we had to exclude 20 responses that did not meet the age criteria. The distribution of respondents based on gender was 55 % male (102 respondents) and 45 % female (82 respondents). Descriptive statistical tools were used to evaluate the results.

Based on the theory and analysis of surveys in this area, we formulated 4 research questions:

Research Question 1: Is sales promotion the most motivating tool for Gen Z to purchase products among traditional tools?

Research Question 2: Is social media marketing for Gen Z the most motivating product purchase tool among modern tools?

Research Question 3: Which social network does Generation Z prefer?

Research question 4: What communication method does Generation Z prefer?

4   RESULTS

The next section of the article is dedicated to the results and analysis of the questionnaire survey responses. In total, 184 questionnaires were analysed and processed. The research sample consisted of 55 % men (102 respondents) and 45 % women (82 respondents), as shown in Figure 1.
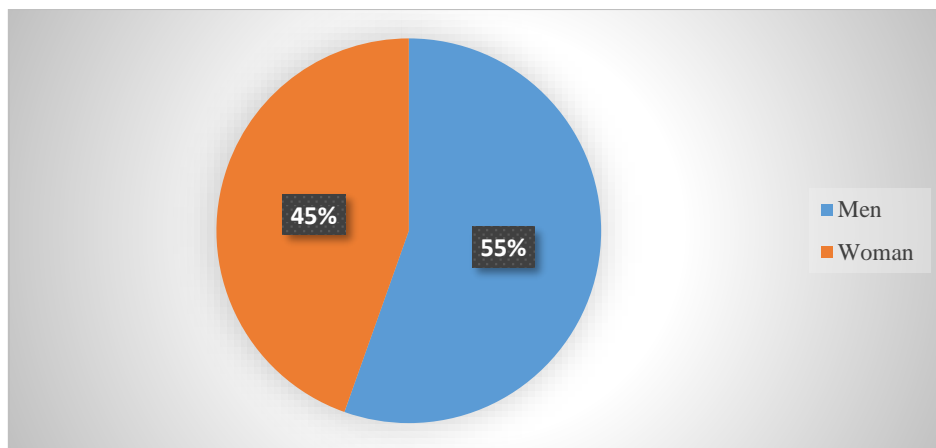
Fig. 1 - Gender of Respondents. Source: Own research

Research Question 1: Is sales promotion the most motivating tool for Gen Z to purchase products among traditional tools?

As part of the study, we investigated which marketing communication tools can influence consumer behavior and customer decision-making. Figure 2 shows that:

- advertisement marked the 19,02 % of respondents,
- sales support was indicated by 61,41 % of respondents,
- personal selling was indicated by 7,60 % of respondents,
- event marketing was indicated by 6,52 % of respondents,
- relations with the public were indicated by 3,26 % of respondents,
- direct marketing was indicated by 2,17 % of respondents.

For generation Z, the most motivating traditional tool of marketing communication is sales promotion, as it was indicated by 61,41 % of respondents. This result points out that for this generation, discounts, premiums, gifts, samples, contests, coupons are important in purchasing decisions. These are all different financial and non-financial benefits offered by sellers.
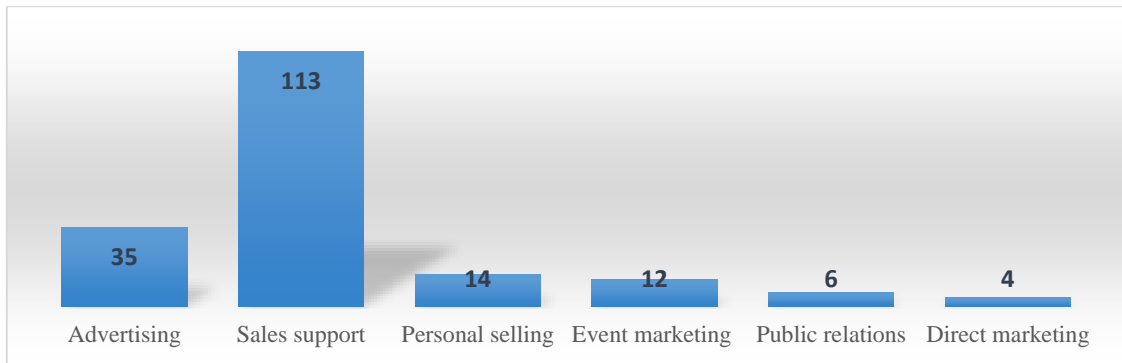
Fig. 2 - Basic Marketing Communication Tools Source: own research

Research Question 2: Is social media marketing for Gen Z the most motivating product purchase tool among modern tools?

Another area that we investigated were the so-called "new" marketing communication tools and their impact on Generation Z. Figure 3 shows that:

- Social media marketing was indicated by 50 % of respondents,

- Digital marketing was indicated by 25 % of respondents,

- Mobile marketing was indicated by 10,86 % of respondents,

- Product placement was indicated by 9,78 % of respondents,

- Guerrilla marketing was indicated by 4,34 % of respondents.

For Generation Z, the most motivating modern marketing communication tool is social media marketing, as 50 % of respondents indicated it. This is primarily due to the fact that this generation grew up during the period of greatest development of this communication tool. Therefore, this generation prefers the virtual environment and the associated social network marketing.
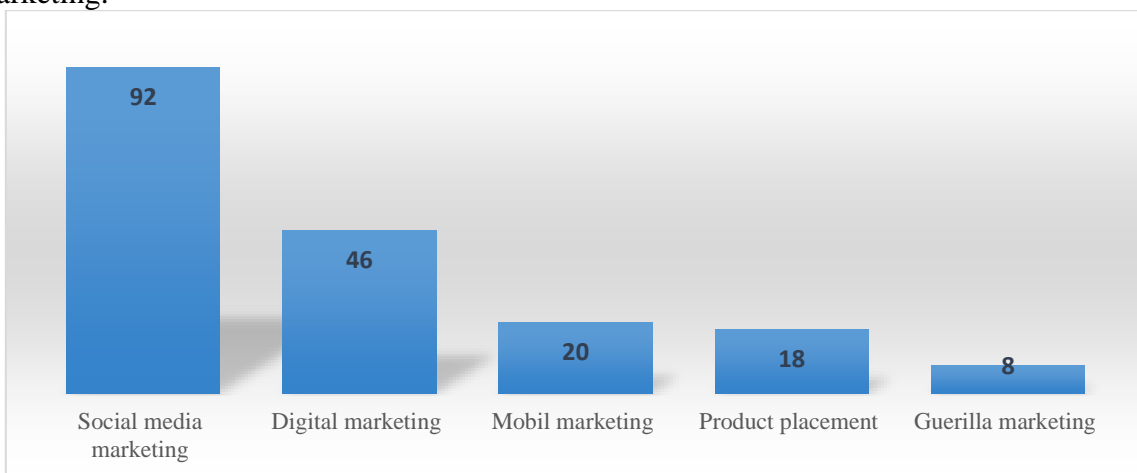
Fig. 3 - "New" Marketing Communication Tools. Source: own research

100

Research Question 3: Which social network does Generation Z prefer?

In the following part, we focused on which social networks are preferred by customers from generation Z. This information is very important from a marketing point of view, because it is necessary to know which social network the customers on whom we want to focus activities visit the most. Figure 4 shows that:

- Facebook was marked by 23,91 % of respondents,

- Instagram was marked by 59,78 % of respondents,

- Tik Tok marked 5,43 % of respondents,

- Twitter was indicated by 3,26 % of respondents,

- Snapchat was marked by 3,26 % of respondents,

- YouTube was marked by 2,17 % of respondents,

- Non-compliance was indicated by 1,08 % of respondents,

- Telegram was marked by 1,08 % of respondents.

For Generation Z, the most preferred social network is Instagram. This option was marked by 59,78 % of respondents. The second most common answer was Facebook, which was indicated by 23,91 % of respondents. This result reflects that Generation Z needs specific functions on the Instagram social network for communication and information sharing.
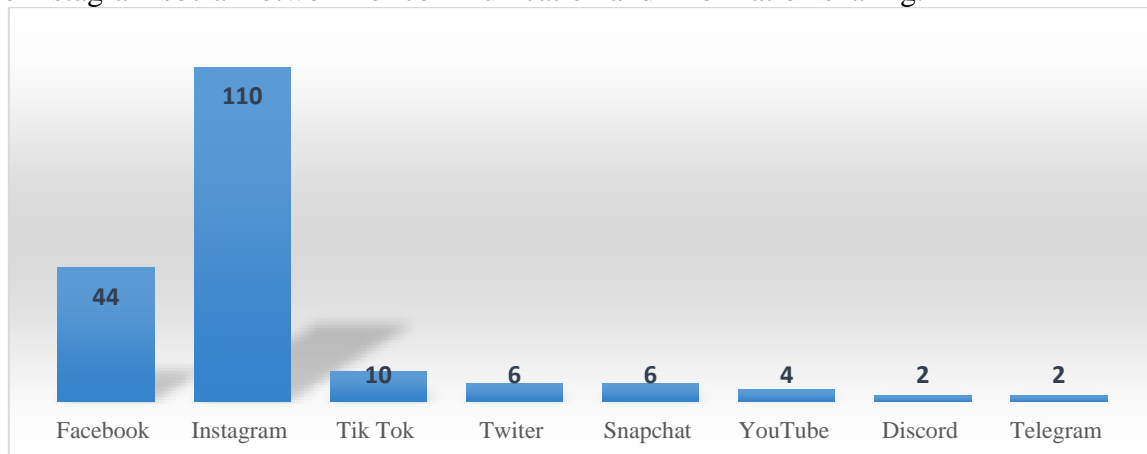
Fig. 4 - Social media. Source: own research

Research question 4: What communication method does Generation Z prefer?

In the last part, we focused on how or what method of communication respondents from generation Z prefer when finding out information about a product. Figure 5 shows that:

- 33, 69 % of respondents would visit the enterprise.

- 50 % of respondents would write an email to the company.

- 16, 30 % of respondents would call the company.

For Generation Z, writing an email is the most preferred way of communication. This option marked 50 % respondents. From the above results, we can say that this generation prefers

methods of communication where they do not have to come into contact with other people. This finding is very interesting from a marketing point of view, because it eliminates some marketing communication tools that are based on face to face communication.
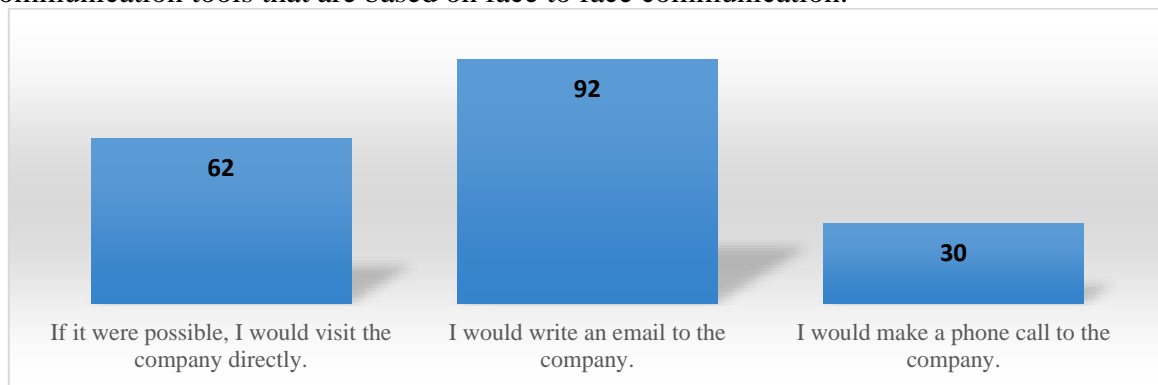
Fig. 5 - Modes of Communication. Source: own research

5 DISCUSSION

In this post, we presented and analysed the results of our research focused on the preferences of marketing communication tools among people belonging to generation Z. Based on the data obtained, we identified several basic trends and characteristics that influence the consumer behaviour of this generation. The most important findings are that 61,41 % of respondents are most motivated by sales support to buy a product. Here is an interesting finding that traditional tools still have the ability to influence this digital generation to a great extent. Our results show that Generation Z shows an interest in various financial and non-financial benefits when purchasing. This conclusion supports our recommendation to focus on combining these basic tools with new forms of marketing. A significant finding from our analysis is that Generation Z is closely connected to modern forms of marketing, especially social media marketing, which motivates up to 50 % of respondents to purchase a product. These tools are more meaningful to her because of the technological advancements that happened in her younger years. The social network Instagram is the most preferred social network for generation Z. We also found that it is typical for generation Z to prefer communication that does not require physical contact. Up to 66, 30 % of respondents chose this option. Current technologies make it possible to communicate even at a distance, and this generation uses this possibility. This aspect has important implications for marketing activities, as they should adapt to this preference. Our analysis shows that these modern forms of marketing have the greatest impact on this generation, with social networks such as Instagram being of particular importance. The benefits of this paper mainly lie in a better understanding of Generation Z. It allows a better understanding of the preferences, values and behaviour of Generation Z in the context of marketing communication. Another benefit is the optimization of marketing campaigns. Based on the findings, it is possible to create marketing campaigns that will correspond to the preferences and habits of Generation Z. In this way, you can improve the effectiveness of your campaigns and increase the engagement of this target group. The limitations of this paper are primarily that we focus only on generation Z. This means that the findings are only applicable to this generation. Another limitation may be data accuracy. Obtaining reliable data on behaviour and preferences can be challenging. Next, there are rapidly changing trends. The preferences and behaviour of Generation Z can change rapidly due to technological and social developments. In the further development of this research, we would focus on a comparison between the single-cast generations currently operating on the market. Another possible direction of this research could be to focus on long-term research. If you tracked changes in

Gen Z preferences and behaviour over time, you could uncover long-term trends and influences on consumer culture. We can also focus only on specific marketing communication tools and track their impact. This contribution is an initial step towards further research in this area. Therefore, we realize that there are several directions where we can direct this research.

6   CONCLUSION

In this paper, we explored the preferences of marketing communication tools among a unique group of consumers - people from Generation Z. Our analysis clearly shows that Generation Z shows considerable interest in various marketing communication tools that influence their consumer behaviour. We found that "traditional" communication methods such as sales promotion and advertising still have a significant impact on their decision-making process. An interesting finding is that they prefer sales promotion to general promotion through advertising channels. This result is probably due to the current difficult financial situation. Our study further reveals that it is extremely important for Gen Z to use modern marketing tools such as social media, digital marketing, and mobile marketing. These technological advancements, which were created while this generation was growing up, are closely related to their lifestyles and preferences. Their comfortable and intuitive use of these tools is unmistakable evidence of this connection. Our analysis further confirms that Generation Z spends a significant part of their day online, especially on social networks, with Instagram standing out as their preferred platform. This generation is looking for communication and mutual connection without the need for physical contact, which is facilitated by modern technology and the possibilities associated with it. In Table 3, we provide an overview of the marketing communication tools that are suitable for Generation Z. This overview is based on the theory and analysis carried out in this paper. He considers the goals set in this post and formulated hypotheses to be met and answered.

Tab. 3 - Proposed Marketing Communication Mix for Generation Z. Sources: own research and (Kotler, Keller 2015), (Jakubíková, 2013), (Kita, 2017), (Hanuláková, 2021), (Zatwarnicka-Madura, 2022), (Adamska, 2020), (Kovanoviene, 2021)

Communication Tool	Reason
Sales Promotion	Generation Z is influenced by financial and non-financial incentives for various products and services.
Advertising	A portion of Generation Z is still receptive to and pays attention to advertising.
Social Media Marketing	Social media platforms have evolved alongside Generation Z, creating a strong connection between them.
Digital Marketing	Generation Z seeks information about products they want to purchase on websites.
Mobile Marketing	Mobile marketing is ideal for bridging social media and Generation Z.

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DIFFERENCES IN PERCEPTION AND PURCHASING OF GREEN PRODUCTS ACROSS GENERATIONS: A SURVEY OF SLOVAK CUSTOMER PREFERENCES

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Abstract

In the framework of this article, the approach to the issue of organic production and its perception among different generations of Slovak customers is presented by means of a survey. The uniqueness of this study lies in identifying and understanding the differences in opinions and purchasing tendencies among Baby Boomers, Gen X, Gen Y and Gen Z. Using a questionnaire survey, perceptions and preferences regarding eco-friendly, environmental, and green products are analysed. The main objective of the paper is to assess potential differences in awareness of environmental product and service labels among these generations and to examine potential correlations between generations and preferences for selected environmental labels. The survey results are then analysed with regard to their relevance to the marketing and manufacturing sector. These findings are of strategic importance as they reveal specific preference patterns and purchasing tendencies across generations. This approach appears to be essential for the effective implementation of organic production and promotion of organic products. The survey results confirm the variable perception of organic initiatives and products across generations, which could positively influence the shaping of strategies and targeted marketing campaigns. Indeed, each generation requires an individualised approach in this area.

Keywords: *green production, green product, circular economy, green marketing, customer generations*

1 INTRODUCTION

Currently, we are witnessing a continuous growth in the trend of green production, which is synonymous with environmentally sustainable manufacturing. This trend is undoubtedly driven by worsening climatic conditions, which compel companies to increasingly focus on the environmental aspects of their production. Sustainable economy, based on three pillars - profit, people, and planet, becomes a key factor for success in today's competitive market environment. Of course, it is essential for companies to generate profit, which represents a fundamental goal and an important indicator of success. However, in today's world, it is equally important to consider the societal impacts of companies' manufacturing activities. Social responsibility and ethical aspects have become a focal point of interest not only for consumers but also for companies themselves. Therefore, it is crucial for every company to seek a balance between production, its impact on the environment, and profit generation. The aim of this article is to present the perception of green production and green products across different customer generations. It is important to understand how each generation perceives and approaches green/ecological manufacturing, as this information holds significant value for companies in their marketing activities, in addition to compliance with legislative requirements and engagement with the environmental sphere, among others. In the following sections of the article, we will identify and analyse the attitudes of consumers from different generations towards green production and green products. We will employ a quantitative method and questionnaire survey to gain a comprehensive view of this issue. In the concluding part of the article, we will interpret the survey results, which will provide us with valuable information for accurately identifying the target generation and their preferences.

2   LITERATURE REVIEW

Green production

Production, as the process of converting inputs into valuable outputs, plays a key role in economic activity. This complex transformation involves material and intangible factors, including raw materials and production plans. The result is a tangible product or service that satisfies human needs and wants (CarbonCollective, 2023). Within this production, a more desirable element is simultaneously created: the green product. These products are designed, manufactured and distributed with environmental and sustainability in mind. Compared to conventional products, they emphasize the minimization of environmental impact, nature conservation and sustainable development (Oboloo, 2023). This approach is a correlate of the trend of green manufacturing, which is gaining importance. Green manufacturing, also referred to as green industry, refers to businesses that apply environmentally friendly practices, thereby promoting sustainable development and producing eco-friendly products (Valiauga, 2021). Green manufacturing, encompassing the entire process of creation, from the beginning to the final product, respects the ecological aspect. It aims to minimize the environmental impact. This is achieved by implementing zero-waste technologies, reducing waste generation and ensuring optimal conditions for workers. Green manufacturing thus becomes a tool to achieve the goals of the green economy (Von Roy, 2020). Green manufacturing is dominated by the concept of a green economy that is low carbon, resource efficient and ensures social inclusion. Within this framework, employment and income growth is supported by public and private investment in activities and infrastructure aimed at reducing carbon emissions and pollution. This prevents the loss of biodiversity and ecosystem services (UNEP, 2023). It is essential to view the issue of green production within the broader context of sustainability, which encompasses environmental, social and economic pillars. In this context, the key factor is to create a positive economic outcome without negatively impacting the environment (RMIT University, 2017). However, the practical implementation of these principles often depends on education and support at all levels. Findings of the results of EU environmental policies in Slovakia reveal a lack of environmental awareness among citizens, with limited knowledge about the circular economy (Cséfalvayová et al., 2017). The Ministry of the Environment of the Slovak Republic (2017) highlights the necessity of a change of mindset and approach in all spheres of society, for a successful transition to a circular economy. Overall, it is evident that green production and green products are of key importance for sustainability-oriented economic development. Their success requires the integration of environmental principles into business and individual decisions.

Voluntary instruments of environmental policy

Voluntary instruments of environmental policy play an important role in the transition from a linear economy to a circular one. These tools enable the implementation of a systemic approach to addressing environmental issues and continuously improving the overall behaviour of organizations. The application of tools such as management systems, environmental product labelling, and green public procurement is crucial in influencing the transition to a circular economy based on resource efficiency, eco-innovation, and low-carbon technologies (www.enviroportal.sk, 2023). According to a group of authors from the Department of Environmental Management and the Basel Convention in Bratislava, *"Voluntary instruments of environmental policy create space for innovation, enhance the competitiveness of market entities, and declare their responsible business approach towards the environment. They help conscious consumers make decisions in favour of 'green' products and services, which also contributes to environmental protection"* (Cséfalvayová et al., 2017). According to § 52, paragraph 4 of the Civil Code, a consumer is considered a natural person - non-entrepreneur,

who does not act within the scope of their business activities, employment, or profession. This includes every citizen who purchases products or services for personal consumption (www.podnikajte.sk, 2023). Within the framework mentioned above, consumers can choose in favor of "green" products and services, based on the tools that fall under environmental policy.

EMAS is one of several tools addressing specific issues. The focus of the EMAS scheme is to contribute to the continuous improvement of a company's environmental performance through the establishment and implementation of environmental management. Companies achieve this through various evaluations of their performance under this scheme, providing information on environmental behaviour, engaging in open dialogues with the public and other stakeholders, actively involving employees, and ensuring appropriate professional training. Additionally, EMAS enables companies to comply with environmental legislation, which is verified by an impartial, independent, and objective environmental verification body (www.hekolix.sk, 2023). EMAS is described briefly by EMAS itself as follows: *"The scheme for Environmental Management and Audit is a voluntary tool of the European Union created for organizations to assess, manage, and improve their environmental performance"* (Schéma pre environmentálne manažérstvo a audit, 2023).

Another tool of environmental policy is Green Public Procurement (GPP). GPP is implemented through the incorporation of environmental characteristics in the public procurement process, utilizing voluntary approaches such as environmental labelling of products, with the aim of strengthening the environmental dimension in public procurement and also incorporating the EMAS scheme (www.gpp.sazp.sk, 2023). In general terms, public procurement refers to a set of rules and procedures established by law that cover the awarding of contracts, concessions, and design competitions (www.podnikam.sk, 2023). In public procurement, emphasis is placed on cost savings using funds from the state budget (www.slovensko.sk, 2023).

The Eco-label is a labelling that identifies the environmental preferences of a product or service based on an assessment of its life cycle, from production and operation to maintenance and disposal. This type of environmental labelling is awarded by an independent third party that seeks certification. Participation in the environmental labelling scheme is voluntary.

The environmentally friendly product label and EU Eco-label and fall under this issue and serve as a tool for European consumers to differentiate environmentally friendlier products (www.globalecolabelling.net, 2023). **The Eco-label** was established in 1992 within the European Union. It is a type I ISO 14024 certified label, aimed at promoting products that have a lower impact on the environment. This label is recognized throughout Europe and is awarded to products and services that meet stringent environmental standards (www.ahrs.sk, 2023). The selection and promotion of products with the EU Eco-label contribute significantly to the major environmental challenges of our time, as identified in the "European Green Deal," such as achieving climate neutrality by 2050, transitioning to a circular economy, and achieving the ambition of zero pollution and non-toxic environments. By participating in the EU Eco-label scheme or showcasing the label, stakeholders can also contribute to relevant initiatives of the European Commission, such as the "Commitment to Sustainable Consumption" (Directorate-General for Environment, 2023). The following table illustrates the implementation of the Eco-label by companies' entities in specific EU countries as of September 2022.

Tab. 4 – Licences and products per country, Source: own research

Products				Licences			
Spain	18107	Lithuania	474	Italy	374	Estonia	22
Italy	12204	Norway	191	Germany	364	Greece	20
Germany	10426	Slovenia	121	Spain	338	Croatia	20
France	9869	Ireland	113	France	330	Norway	16
Sweden	6208	Bulgaria	96	Austria	218	Finland	15
Portugal	5894	Romania	93	Denmark	87	Ireland	11
Czech Rep	5179	Hungary	92	Netherlands	86	Lithuania	10
Greece	4057	Cyprus	84	Belgium	64	Bulgaria	9
Denmark	3311	Latvia	79	Poland	56	Latvia	5
Belgium	3155	Croatia	43	Slovenia	50	Malta	5
Poland	2139	Luxembourg	8	Sweden	47	Luxembourg	4
Netherlan	1807	Malta	5	Romania	40	Cyprus	3
Finland	1754	Iceland	0	Hungary	26	Iceland	0
Estonia	1116	**Slovak Republic**	**0**	Portugal	26	**Slovak Republic**	**0**
Austria	860			Czech Republic	24		

In Slovakia, since 1996, the Environmental Friendly Product label has been used as a voluntary tool of environmental policy for environmental protection. This label is owned by the Ministry of the Environment of the Slovak Republic and has a public law nature. Products with this label are tested for the presence of heavy metals and substances harmful to health, the impact of the product's production on water and air pollution, damage to the ozone layer, and the origin of the raw materials used in the product (Majerník, 2012). The following graph displays the number of products authorized to use the national environmental label *"Environmentally Friendly Product"* and the European environmental label *"EU Ecolabel"* in Slovakia, where a declining trend is visible.
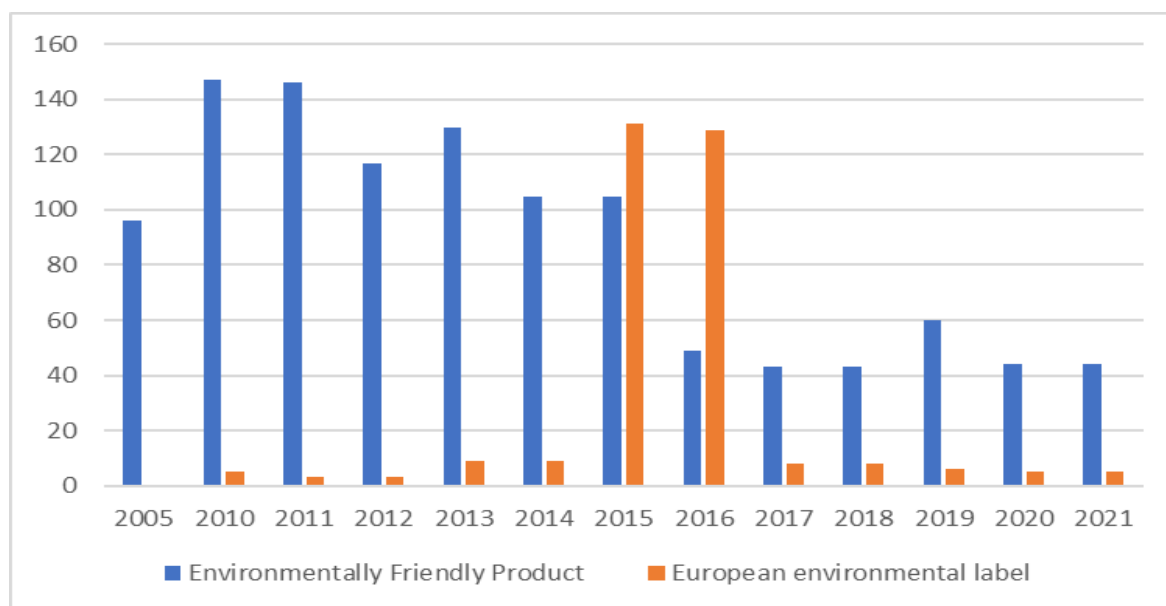
Fig. 1 – The number of products authorized to use environmental labels. Source: Enviroportal, 2023

Green marketing

To promote green products and services, it is essential to apply an appropriate form of marketing that adequately presents these characteristics. This form of marketing is called green marketing. Green marketing is a marketing strategy that aims to promote and sell environmentally sustainable, green and environmentally friendly products and services. It aims to spread awareness among consumers about environmental issues and offer them eco-friendly alternatives that contribute to environmental protection (Peattie, S., & Peattie, K., 2003).

Generational theory and individual customer generations

The topic of generations represents one of the key themes in contemporary marketing. Different sources may cite different names and time constraints for each generation, as there is no consensus in defining the time intervals of each generation type (Smolka, 2019).

Tab. 5 – Generations of customers. Source: own research

Generation name	Time limitation
Baby boomers	1946 – 1960
Generation X	1961 – 1980
Generation Y	1981 – 1995
Generation Z	1996 – 2012

Based on our professional perspective, we have provided a categorization of relevant generational types as shown in the table above. We considered this categorization to be the most appropriate for the topic of our contribution, as we are addressing customers from generations that are currently active in the market and possess purchasing power.

Baby boomers

Baby boomers represent the oldest generation currently on the market. They often emerge as loyal customers looking for valuable products and services that match their needs and preferences. They prefer quality and durable products that last a long time and are willing to pay a premium price for them. They are used to shopping in person in brick-and-mortar stores, but they are gradually adapting to modern technology and are also ordering more and more products or services online as a result of the COVID-19 pandemic (Saberini, 2021). It is important to consider their needs and preferences when designing marketing strategies. They like to be informed about the products and services they buy and place a high value on personal recommendations and reviews. They often show loyalty to certain brands and stores that they know and trust (Wiliams, Page, 2011).

Generation X

Generation X grew up during the economic recession of the early 1980s and 1990s, which caused higher divorce rates and economic and social insecurity throughout their lifetimes (Lissitsa, 2021). This generation was the first to be influenced by technology, which had a significant impact on promotion and communication. This was reflected in their openness to both traditional and modern modes of communication. Nevertheless, Generation X is not easily influenced and considers modern trends and what the product will provide them when purchasing products. It is important for companies to clearly define the reasons why consumers of this generation should buy their products (Smolka, 2019). Generation X prefers practical design and lower price. They are guided by their own common sense when making purchases and place great importance on experiences and recommendations from friends and acquaintances (Berg and Behrer, 2012). Generation X needs to purchase products and services

that are important to their household and children as they make up a large share of the parental market (Williams and Page, 2011).

Generation Y

Generation Y grew up in a period of economic growth, accelerated technological development, including the introduction of the Internet, social media, and globalization, which had an impact on lifestyles. Generation Y is perceived as confident and optimistic. Technology and social interaction play an important role in their lifestyle, as do hobbies, friendships and civic activities. Generation Y is often referred to as the Internet generation. Whether it is social networking or job opportunities, or searching for information, jobs, schools, products or services, members of Generation Y will use their all available technology to get more information (Bejtkovský, J, 2018). For this generation, the brands or symbols of their preferred businesses also play a very important role. This generation is also more responsive to green aspects of products along with energy efficient features of products and services. This forces businesses to focus more on green production and products for this generation. Innovative products with the possibility of enhanced features are a requirement of this generation. When it comes to pricing, they do not hesitate to search the internet for competitors' prices, but they are most likely to opt for a product that carries their preferred brand name. Generation Y shop frequently and expect a certain prestige to be associated with their chosen product. This prestige may be linked to, for example, the environmental aspects of production (Williams, Page, 2011).

Generation Z

As Generation Z is the first generation born in the digital world, opportunities such as virtual life are very much open to them. This generation is heavily engaged in the online and virtual space, interacting with businesses that offer their favourite brands and having access to more information than any other generation. This generation may feel disinterest in advertisements conveying facts and product features (Roth-Cohen, 2022). Since this generation is not yet strictly profiled in relation to customer preferences, it is not easy to grasp their buying behavior. Products that are not online do not exist for them (Smolka, 2019). When it comes to products for Generation Z, the highest spending for this generation is associated with the areas of music and fashion, cosmetics and video games. This generation also largely influences food purchases and overall food choices within the family. Which again represents a significant space for green manufacturing businesses. This generation represents the first generation that can gather information and then analyse it virtually independently without teachers or parents. This generation is most influenced by new media and the power that comes with new technology (Williams, Page, 2011).

3 METHODOLOGY

The aim of the research is to highlight the different consumer behaviours and differences in general among customer generations. When formulating the main objective of the article, we took into account the current ecological and social situation in which we all live. Primarily, it is about encouraging companies to produce eco-friendly/green products, which often leads to increased production costs. Therefore, it is important for companies to know which customer groups are willing to purchase these eco-friendly/green products despite the higher price. In this contribution, we present the results obtained through a questionnaire survey conducted from April 4, 2023, to May 25, 2023.

The distribution of the questionnaire was carried out using online forms on the website www.vyplnto.cz. Microsoft's MS Excel program was used for processing the results. The research sample consisted of students, employed individuals, retirees, employed retirees, and

self-employed/entrepreneurs. All customer generations were evenly represented in the questionnaire. The questionnaire consisted of 15 questions, including 2 open-ended questions, 2 semi-closed questions, and 11 closed-ended questions. We approached 385 respondents, and we received 222 completed questionnaires, representing a response rate of 57.7 %. We consider this response rate to be very successful. Regarding the distribution of respondents based on gender, it can be stated that the survey had a representation of 52 % men (116 respondents) and 48 % women (106 respondents). The participation of individual generational groups is displayed in Figure 2.
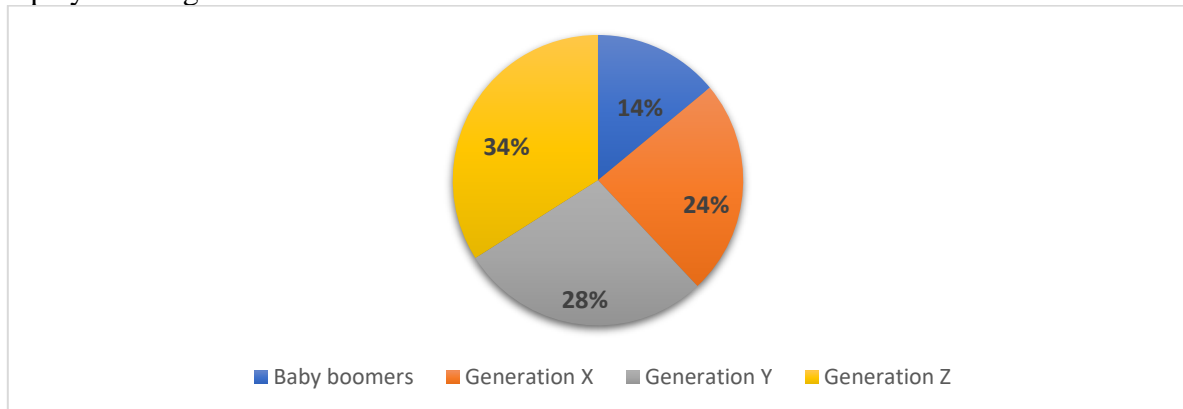
Fig. 2 – Generational structure of the questionnaire. Source: own research

The largest percentage representation in the survey, accounting for 34 %, was held by Generation Z, which corresponded to 76 respondents. Generation Y followed with 28 % of the total participants, which equated to 62 respondents. In third place was Generation X, with a 24 % share of the overall number, accounting for 54 respondents. The last position belonged to the Baby Boomer generation, with a representation of 14 %, equivalent to 30 respondents. From Figure 2, it is clear that different generations with varying preferences operate in the market. Therefore, it is important to identify their distinct attitudes and requirements towards the product itself and tailor the procurement process and marketing activities accordingly.

From the questionnaire survey, we analyzed the following questions:

1. Are you familiar with voluntary environmental policy instruments (eco-labels)?
2. Have you come across the labels associated with green products?
3. Does the green (ecological) labelling of a product influence your purchasing decisions?
4. Can the price of a green product influence your purchase?

4   RESULTS

The following part of the article is devoted to the results of the processing of the answers from the questionnaire survey.

The first question focused on the knowledge/awareness of "voluntary environmental policy instruments ". Respondents were asked to answer whether they were familiar with eco-labels or voluntary environmental policy instruments. The next step was to establish hypotheses. Hypothesis setting is an important step in the process of scientific and research thinking. Therefore, we set the null hypothesis:

H0 - *There is no difference in awareness of environmental labels between different generations. Younger generations, such as Millennials and Generation Z, are unlikely to be more informed and aware of environmental product labels than older generations, such as Baby Boomers.*

The given hypothesis assumes that there is no relationship between generations and awareness of environmental product labels. If it is found that there is a statistically significant difference between generations, the second hypothesis could be accepted. The specific hypothesis is:

H1 - *There is a difference in awareness of environmental product labels between different generations. Younger generations, such as Millennials and Generation Z, are likely to be more informed and aware of environmental product labels than older generations, such as Baby Boomers.*

We used a statistical analysis software called Python with the SciPy library to analyse the information gathered by the questionnaire survey. We performed ANOVA test in the software. The ANOVA test told us whether there was a statistically significant difference between at least one pair of generations in terms of awareness of environmental product labels. We set a significance level of $\alpha = 0.05$ before conducting the test. Figure 3 shows the calculation of the ANOVA test.

```
from scipy.stats import f_oneway
# Dáta o povedomí o environmentálnych označeniach
baby_boomers = [18, 12]
generacia_x = [23, 31]
generacia_y = [24, 38]
generacia_z = [44, 32]
# Výpočet ANOVA
f_statistic, p_value = f_oneway(baby_boomers, generacia_x, generacia_y, generacia_z)
# Úroveň významnosti
alpha = 0.05
# Zobrazenie výsledkov
print("F-statistika:", f_statistic)
print("P-hodnota:", p_value)
if p_value < alpha:
    print("Existuje štatisticky významný rozdiel medzi aspoň jedným párom generácií.")
else:
    print("Nenašiel sa štatisticky významný rozdiel medzi generáciami.")
```

Fig. 3 – Calculation of ANOVA-test in SciPy library. Source: own research

After running the program, the ANOVA test was calculated, and the result was that: "No statistically significant difference was found between the generations. The result of the test can be seen in Figure 4.

```
In [1]: runfile('C:/Users/Tiamorg/.spyder-py3/temp.py', wdir='C:/Users/Tiamorg/.spyder-py3')
F-statistika: 3.378787878787879
P-hodnota: 0.13511164799959266
Nenašiel sa štatisticky významný rozdiel medzi generáciami.
```

Fig. 4 – ANOVA-test result. Source: own research

Following the above finding, we reject the alternative hypothesis **H1** and accept the null hypothesis **H0.**

The second question we included in the analysis had the following wording, "Have you encountered the following labels?" Respondents were given a choice of well-known green product labels that are used globally. We further analysed the data. We set the following hypotheses**:**

Null hypothesis (H0): *There is no dependence between generations and preferences.*

The null hypothesis states that there is no statistically significant dependence between different generations and preferences within our data.

Alternative Hypothesis (H1): *There is a dependence between generations and preferences.*

Conversely, the alternative hypothesis posits that there is a statistically significant dependence between generations and preferences. This would suggest that the differences found are likely more than chance and indicate that there is some relationship or tendency between these variables.

We applied the chi-squared test to analyse the data. The test given will give us information on whether there is a statistically significant relationship between generations and preferences. The above test was performed in Python software in the SciPy library. Figure 5 shows the result of the chi-squared test.

```
In [1]: runfile('C:/Users/Tiamorg/Desktop/untitled1.py', wdir='C:/Users/Tiamorg/Desktop')
Chi-square hodnota: 36.248484085704234
p-hodnota: 0.020500616212414217
Stupne voľnosti: 21
Očakávané frekvencie:
 [[ 8.          6.53333333  4.4         3.33333333  2.          0.8
   0.66666667  0.26666667]
 [14.76923077 12.06153846  8.12307692  6.15384615  3.69230769  1.47692308
   1.23076923  0.49230769]
 [16.61538462 13.56923077  9.13846154  6.92307692  4.15384615  1.66153846
   1.38461538  0.55384615]
 [20.61538462 16.83589744 11.33846154  8.58974359  5.15384615  2.06153846
   1.71794872  0.68717949]]
```

Fig. 5 – Result of chi-squared test. Source: own research

The results of the chi-squared test are as follows:

Chi-square value: 36.248484085704234;

p-value: 0.020500616212414217;

Degrees of freedom: 21;

Expected frequencies: (shown in matrix);

Given the p-value of **0.0205** (which is lower than the typical significance level of **0.05**), we can reject the null hypothesis of independence of generations and preferences. That is, there is a statistically significant dependence between generations and preferences.

In Table 3, we have compiled all the responses to the second question. As we can see, there are again some differences observed between the generations. **The Baby Boomer generation** most commonly responded that they are not familiar with any of the given labels, representing as much as 47 % of the responses. The second most common answer was the label "Environmentally Friendly Product," which is specific to Slovak products, chosen by 20 % of the respondents. **Generation X,** similarly, to the Baby Boomer generation, most commonly responded that they are not familiar with any of the given labels, with 42 % of the respondents selecting this answer. The second most common answer for this generation was the "Bio logo EU" label. In contrast to the previous two generations, **Generation Y** most commonly responded that they are familiar with the "Bio logo EU," representing 29 % of the respondents. The second most common answer was the "Fairtrade" logo, which was selected by 26 % of the respondents. **Generation Z**, like Generation Y, most commonly responded that they are familiar with the "Bio logo EU," with a representation of 28 % of the respondents. The second most common answer was the "Fairtrade" logo, with neither of the options being selected by 18 % of the respondents from this generation. **Generation Z** is the only generation whose respondents selected all of the options, **indicating that this generation has the highest knowledge of environmental product labels.**

Tab. 3 – Awareness level of voluntary instruments of environmental policy. Source: own research

		Baby B.	Generation X	Generation Y	Generation Z
		%	%	%	%
neither of these		47%	42%	26%	18%
Organic farming		13%	25%	29%	28%
Fairtrade		0%	13%	26%	18%
Environmentally friendly product		20%	8%	11%	13%
Ecolabel		13%	8%	4%	9%
UTZ - certified		0%	0%	4%	6%
EMAS		7%	0%	0%	6%
GPP		0%	4%	0%	2%
Total		100%	100%	100%	100%

The knowledge of consumers' responses regarding the influence of green labelling on their purchasing decisions can help companies better understand their customers, adapt their production and marketing strategies, and create products that better meet their sustainability and environmental needs and preferences. For these reasons, we also asked respondents the following question: *"Does the green (ecological) labelling of a product influence your purchasing decisions?"*
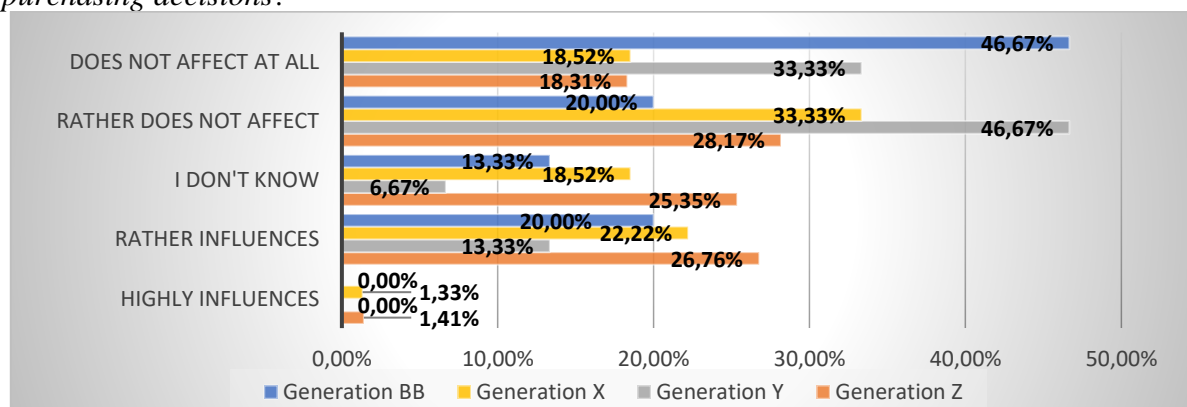
Fig. 6 – Influence of eco-labelling on consumer purchasing decisions. Source: own research

The results indicate that Generation X and Generation Z show the greatest interest in ecological and green products and overall environmental issues. Generation Z exhibits the highest percentage (26.76 %) stating that the ecological labelling of a product has an influence on their purchasing decisions. However, this percentage is still relatively low, highlighting the need to stimulate and increase interest in these products. In contrast, Generation Y and Baby Boomers show less interest in environmental issues. Baby Boomers, in particular, are the least influenced, with 46.76 % of respondents in this age group stating that the ecological labelling of a product does not influence their purchasing decisions at all. These findings reveal differences in interest

and perception of ecological labelling among different generations. Focusing on engaging and motivating Generation X and Generation Z could have a positive impact on raising awareness and preference for green products within these groups. On the other hand, it is important to consider the specific needs and preferences of Generation Y and Baby Boomers and develop approaches and strategies that align with their preferences and values.

The last question we analysed from the questionnaire was: *"Can the price influence your purchase of a green product?"* Respondents had multiple answer options to choose from, which are displayed in Figure 7.
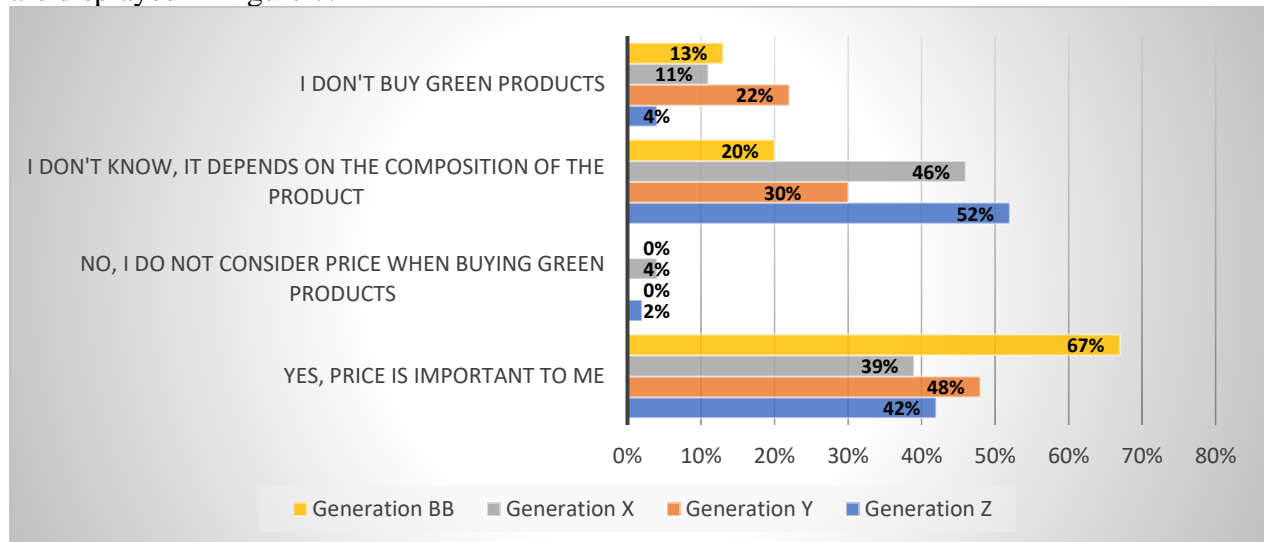
Fig. 7 – Can the price influence your decision to purchase a green product? Source: own research

For all generations of respondents, **price** is very important when purchasing green products and it influences their purchasing decisions. Specifically, this is especially true for the Baby Boomer generation, with 64 % of respondents choosing this answer. The remaining three generations have approximately the same percentage of responses.

In the second answer, where we asked respondents if they do not **consider the price when buying green products**, only Generation X and Generation Z had representation, and even that in negligible amounts. In the third question, we can see that Generation Z is the most interested in the **composition of products**, with 52 % of respondents choosing this answer. The second generation most interested in product composition is Generation X, with 46 % of respondents from this generation selecting this option. The oldest generation, Baby Boomers, shows the least interest in product composition, with price being the most important factor for them. By analysing the last answer, we found that Generation Y **purchases the fewest green products.** The remaining generations have approximately the same representation in this answer.

5   DISCUSSION AND CONCLUSION

In our research, we focused on the analysis of the results of a questionnaire survey that addressed the different perceptions of green products among different generations of consumers and their preferences towards green production. Based on our findings, we uncovered interesting trends and differences between these generations.

Our analysis showed that Generations X and Y show a significantly higher level of awareness of the term "green product" compared to baby boomers and Generation Z. Our analysis also showed that **113** respondents had awareness of environmental labels for products and services,

while **109** respondents were not aware of these labels. This suggests that half of respondents across all generations are not familiar with this issue.

As part of our analysis, we also used an ANOVA test to test two hypotheses. The first null hypothesis **(H0)** asserted that there is no difference in awareness of environmental labels between different generations. We accepted this hypothesis for younger generations, such as Millennials and Generation Z, who are not likely to have significantly higher awareness of environmental labels than older generations, such as Baby Boomers. Our second hypothesis **(H1)** was rejected, concluding that there are no significant differences in awareness of environmental labels across generations.

Given the business opportunities, we have identified that businesses incorporating green features into their production should pay particular attention to Generation Z. This generation shows a high interest in ecology and is actively engaged in this field, but at the same time has limited knowledge about green production and green products.

The second question dealt with the knowledge of different labels for green products. Our hypothesis **H0** asserted that there is no dependence between generations and preferences, which means that there is no statistically significant relationship between different generations and preferences in our data. Our alternative hypothesis **(H1)** claimed the opposite.

Based on the results of the chi-squared test, we concluded that a p-value of **0.0205** (lower than the commonly used significance level of **0.05**) allows us to reject the null hypothesis of independence between generations and preferences. That is, there is a statistically significant relationship between generations and preferences. This result points us to the need for in-depth further research.

The second question addressed the knowledge of various green product labels. Once again, we observed differences between generations. Among Baby Boomer respondents, the prevailing response was that they were unfamiliar with any of the mentioned labels. However, they were familiar with the "Environmentally Friendly Product" label. This label was created in Slovakia and has been awarded to Slovak companies since 1996 based on the national environmental policy scheme. This finding suggests that when targeting Baby Boomers, businesse companies should focus on obtaining this label for their products. For Generation X, the most common response was also unfamiliarity with the labels. Generation Y most frequently indicated familiarity with the "Bio logo EU." This means that if companies want to appeal to Generation Y, they should focus their efforts on obtaining this logo. **Generation Z exhibited the highest knowledge of environmental labels**, as they selected all the options. In this question, we can see that the effort to label products with various logos and other environmental marks does not have as significant an impact as expected. This is because in each generation, there is a considerable percentage of respondents who are unfamiliar with any of the mentioned labels.

Based on the obtained results from the questionnaire survey, we can conclude that **price is a very important factor for all generations of respondents when purchasing green products, and it influences their purchasing decisions.** An significant trend is that the oldest generation, **Baby boomers, attaches the highest importance to prices**, as confirmed by 64 % of respondents from this generation. This means that the efforts of companies to target this generation should not primarily focus on eco-labelling of products. Instead, companies should strive to produce environmentally friendly yet affordable products. In the next answer regarding interest in the **composition of products, we found that the generation Z shows the highest level of interest,** specifically 52 % of respondents from this generation. The second most interested generation is Generation X, with 46 % of respondents expressing their interest in product composition. This means that for these generations, price does not play such a significant role, and companies could capitalize on promoting their eco-friendly production and

the composition of their products. On the other hand, the oldest generation, Baby boomers, shows the least interest in product composition, indicating that price is their priority when making purchases. From the analysis of the last answer, we found that **generation Y purchases the fewest green products**. The other generations, Generation X, Generation Z, and Baby boomers had approximately the same percentage representation in this type of response.

Overall, it is evident that there are differences in consumer behaviour and preferences among different generations of customers. **Price is generally an important factor in the purchase of green products for all generations, but the interest in product composition and the actual purchase of green products vary among generations.** In conclusion, green production is a key factor for industrial companies. Understanding the preferences and expectations of customers from different generations is crucial for the success of companies that strive to adapt to green production and sustainable development. Our survey has provided new and interesting insights on this topic, and we believe it will help companies better understand their customers' demands and effectively steer their marketing strategies.

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HOW USER EXPERIENCE AFFECTS PERCEIVED VALUE OF STREAMING PLATFORMS: A QUANTITATIVE INVESTIGATION OF NETFLIX

Mariami Denosashvili

Abstract

Nowadays, the global video streaming market is one of the most popular and discussed media markets. In the streaming industry, several leading platforms offer customers an extensive library of movies, series, original content, documentaries, TV shows, anime, and many more. Due to growing competition, consumers changing subscription plans, switching to other services, or having multiple subscriptions, the need to study perceived value is important. By evaluating the perceived value, streaming platforms can discover their weaknesses and strengths, increase customer loyalty and reduce the probability of switching to other subscription services. The presented article focuses on determining whether the user experience (UX) influences customers' perceived values when subscribed to one or another streaming platform. The paper aims to determine factors influencing the perceived value of the leading streaming platform Netflix. From the point of view of methodology, the quantitative research was conducted based on the modified Peter Morville's honeycomb model. The questionnaire was carried-out web-based survey following a convenience (non-probability) sampling procedure. The target respondents were people with experience using Netflix's streaming service, mainly Gen Z and Millennials. After data collection, a total of 146 samples were analyzed to measure proposed hypotheses. The results prove that usefulness, usability, findability, credibility, and desirability positively affect the perceived value of Netflix. Therefore, SVoD services should concentrate on monitoring and excelling their services, continuously measuring and improving the perception of value to maintain their position in the market.

Keywords: perceived value, user experience, streaming industry, streaming platforms, Netflix

1 INTRODUCTION

In recent years the competitive landscape of the television industry has been changing due to fast-advancing internet technology and the increasing popularity of online subscription video-on-demand (SVoD) platforms. More and more consumers are following the trend of cord-cutting: canceling their pay TV (cable/satellite) to subscribe to online streaming services offering an extensive library of content (Noh, 2020). Based on prior studies, convenience, preference, flexibility, and cost-benefit of using platforms may also lead to cord-cutting (Cha, 2013; Massad, 2018; Park, 2019). Video streaming platforms like Netflix, Amazon Prime, Disney+, and Hulu are the go-to medium for entertainment providing users with a premium viewing experience without paying expensive cable prices (Mulla, 2022).

During the lockdown caused by COVID-19, the demand for video streaming platforms has grown (Mulla, 2022; Hyun Yoon & Ku Kim, 2023), and new companies have decided to enter the market, causing competition escalation (Martínez-Sánchez et al., 2021; Palomba, 2022; McKenzie et al., 2023). For example, In Q1of 2022, Netflix, the first ever SVoD service to launch, reported its first decline in subscriber count while Amazon prime video, HBO Max, Hulu, Disney+, and Apple TV+ were expanding their subscription base. To defend its position in the market and entice new subscribers, Netflix had to launch a cheaper ad-supported tier.

(Iqbal, 2023). Furthermore, unlike other digital streaming platforms, big companies like Amazon, Apple, and Disney have a greater competitive advantage as they can spend and invest more money while gaining revenue from their main industries (Zhou et al., 2023). Consequently, the importance to evaluate why customers are switching to competitors and what factors affect the perceived value of existing and potential customers is crucial for the players of the global video streaming segment.

One of the factors that might influence what users value in streaming platforms can be User Experience (UX). User experience has become a key factor in determining market success, requiring businesses to consider elements other than product improvement and pricing strategies (Rose et al., 2011). Particularly, e-business companies need a better understanding of how to apply UX techniques to reach success (Insley & Nunan, 2014).

The research aims to clarify the relationship between perceived value and the facets of user experience (UX) based on the modified honeycomb model. This study attempted to provide evidence that in the case of video streaming platforms, UX plays an important role and affects the perceived value of the subscribers.

The article contributes to the mainly theoretical literature on perceived value and user experience in the subscription video-on-demand (SVoD) context. It highlights the impact of experiential elements, such as usefulness, usability, findability, credibility, and desirability, on customers' perceived value. Furthermore, the findings have valuable practical implications. Companies can improve their offerings, user engagement tactics, adapt marketing communications to emphasize their competitive advantages, increase customer satisfaction and loyalty, and reduce the probability of switching to other subscription services.

The article is organized as follows. After the introduction section, the paper presents the theoretical background and hypotheses development. Then, the author represents the research methodology and results. Finally, the paper ends with a discussion and conclusion.

2 LITERATURE REVIEW

2.1 SVoD services

Subscription video-on-demand (SVoD) is a form of internet-based television acting as a gateway/portal that allows users to access television content. Subscribers can choose from two types of SVoD services: the first alternative offers them access to the traditional channel or network's existing library, whereas the second type focuses on providing exclusive content, original series, and programming that can satisfy the needs of different customers (Wayne, 2017). Examples of the second type of SVoD services include the most popular video streaming platforms like Netflix, Amazon Prime Video, Hulu, Disney +, HBO Max& Discovery+, Apple TV, and Peacock.

The global streaming video industry is highly competitive as there are not only the abovementioned big players but also new entrants competing for subscribers and dominance in the market. To survive the fierce competition, streaming app managers should provide customers with a clear message about how their platforms offer differing consumption values and reflect the self-identity of the customers (Oyedele &Simpson, 2018).

2.2 Perceived value

The concept of „perceived value" emerged as the defining business issue of the 1990s and has continued to receive extensive research interest (Sánchez-Fernández & Iniesta-Bonillo, 2007). Despite various attempts, researchers still have not agreed on the definition, dimensions,

and measurement of perceived value (Sánchez-Fernández & Iniesta-Bonillo, 2007) as they take Uni-dimensional or Multi-dimensional approach to the concept:

- Uni-dimensional perspective can be defined as a simple, traditional approach representing perceived value based on economic theory and cognitive psychology (e.g. Monroe, 1979,1990; Zeithaml,1988).

- Multi-dimensional perspective can be defined as a complex approach providing holistic representations based on consumer-behavior psychology (e.g. Parasuraman, 1997; Holbrook, 1994,1999; Williams and Soutar, 2000).

The following study takes a Multi-dimensional approach to the concept of perceived value. The author believes that perceived value is subjective, and potentially many factors like brand reputation, emotional benefits, price, design, quality of content, accessibility, etc. can highly influence it.

By defining and being aware of customers' perceived value, companies can better predict their purchase behavior and achieve sustainable competitive advantage (Chen& Dubinsky, 2003; Bolton & Drew, 1991; Parasuraman, 1997; Zeithaml, 1988). Furthermore, researches prove the existence of the moderating effect of the customer perceived value on the relationship between customer satisfaction and customer loyalty (Anderson & Srinivasan, 2003; Chang et al., 2009; Chiu et al., 2005; Dodds et al., 1991). Specifically, Chang et al. (2009) suggest that in the case of e-service, when perceived value is low, even high satisfied customers will have lower customer loyalty than low satisfied customers with high perceived value. Consequently, if a company satisfies the perceived value of its customers, it can increase consumer loyalty by reducing the probability of them moving to another e-business (Anderson & Srinivasan, 2003).

2.3 User Experience (UX)

In recent years User Experience (UX) has been a topic of interest for academics and practitioners (Hsu & Chen, 2018). As various authors have been suggesting different definitions to standardize the term from an industry perspective, the International Organization for Standardization (ISO) defined UX as a "person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service"(Mirnig et al., 2015).

To illustrate the facets of User Experience, Peter Morville introduced the UX Honeycomb. The honeycomb model (figure 1) includes seven facets or quality of the user experience: usefulness, usability, findability, accessibility, credibility, desirability, and value (Morville, 2004)

Fig. 1 - User Experience Honeycomb Source: Semantic Studios (2023)

Within the framework of the research, Accessibility was excluded as SvoD services can be accessed from various devices by customers regardless of age, gender, ethnicity, culture, or other characteristics. As for Valuable, the article focuses on the value of streaming platforms, particularly customers' perceived value. Consequently, reconstructed Peter Morville's honeycomb model consisting of usefulness, usability, findability, credibility, and desirability was used to propose the following hypotheses:

H1: Usefulness positively affects perceived value.

H2: Usability positively affects perceived value.

H3: Findability positively affects perceived value.

H4: Credibility positively affects perceived value.

H5: Desirability positively affects perceived value.

3 METHODOLOGY

This study employed a quantitative research approach to determine factors influencing the perceived value of the leading streaming platform Netflix. The target respondents were people who were using or had an experience using Netflix's streaming service, mainly Gen Z and Millennials.

The distribution of the web-based survey was carried out on social networking platforms (Facebook, Instagram, WhatsApp) and the SurveySwap platform following a convenience (non-probability) sampling strategy. The anonymous questionnaire contained four parts. In the first part, the respondents were asked about their gender, age, education, and employment status. The other parts were focused on determining respondents' perceptions of Netflix using a 5-point Likert scale (1- strongly disagree to 5-strongly agree). The questionnaire statements can be seen in Table 1.

Tab.1 - the questionnaire statements. Source: statements are taken from   Woo, K.H., & In, K.S. (2020).

Factor/Element	Statements	Code
Usefulness	It is useful as much as you pay.	USE 1
	I maintain a subscription continually.	USE 2
	It is easy to subscribe and cancel.	USE 3
Usability	It is convenient to use the content.	USE 4
	There's a substitute subscription service	USE 5
Findability	It is easy to find desiring content.	FND 1
	It can save time for searching content.	FND 2
Credibility	The expertise of the content recommendation service is credible (reliable)	CRD 1
	Monthly payment system is credible (reliable).	CRD 2
	The quality of the content is credible (reliable).	CRD 3
Desirability	The visual element is attractive.	DSR 1
	Brand identity is well expressed.	DSR 2
	The functional element is well-designed.	DSR 3

After data collection, a total of 146 responses were returned. The demographic profile of the respondents is presented in Table 2. The gathered data was exported into Excel and coded to use IBM SPSS statistics software for analyzing and evaluating the proposed hypotheses. To generate the results of this study, descriptive analysis and non-parametrical test (correlation analysis- Spearman Rank Order Correlation) were employed.

Tab.2 - Demographic information of the respondents (n=146). Source: own research

		Frequency	Valid Percent
Gender			
	Male	46	31.5
	Female	100	68.5
Age			
	Gen Z (below 25)	107	73.3
	Millennial (26-41)	39	26.7
Educational level			
	High School	29	19.9
	Some college	24	16.4
	Bachelor	68	46.6
	Master	25	17.1
Employment status			
	Unemployed	5	3.4
	Self-employed	3	2.1
	Employed	25	17.1
	Student	113	77.4

4 RESULTS

To test hypotheses and examine whether there was a relationship between the facets of user experience (**Usefulness, Usability, Findability, Credibility, and Desirability**) **and perceived value**, correlation analysis was conducted. Due to the nature of the data, Spearman Rank Order correlation was used. The results of the correlation analysis in the form of a correlation matrix are presented in Table 3.

Tab. 3- Correlation analysis using Spearman Rank Order Correlation. Source: own research

Factor/Element	Hypotheses	Correlation Coefficient	Significance
Usefulness	USE 1 positively affects VLU 1	.379	.000
	USE 2 positively affects VLU 1	.354	.000
	USE 3 positively affects VLU 2	.394	.000
Usability	USE 4 positively affects VLU 2	.426	.000
	USE 5 does not affect VLU 3	**.208**	**.12**
Findability	FND 1 positively affects VLU 2	.504	.000
	FND 2 positively affects VLU 2	.311	.000
Credibility	CRD 1 positively affects VLU 2	.397	.000
	CRD 2 positively affects VLU 2	.380	.000
	CRD 3 positively affects VLU 2	**.551**	**.000**
Desirability	DSR 1 positively affects VLU 2	.505	.000
	DSR 2 positively affects VLU 2	.373	.000
	DSR 3 positively affects VLU 2	.449	.000

H1: Usefulness positively affects perceived value.

As can be seen in Table 3, **Usefulness** is presented with 3 variables (measures). For these variables, the p-value is smaller than 0,05 meaning we can reject the null hypothesis. It can be said that usefulness positively affects perceived value.

H2: Usability positively affects perceived value.

As can be seen in Table 3, **Usability** is presented with 2 variables (measures). In the case of USE4 (It is convenient to use the content), the p-value is smaller than 0,05 meaning we can reject the null hypothesis. However, for the second variable (USE5) p-value is more than 0,05 meaning this variable does not affect perceived value: the existence of a substitute subscription service has no significant association with perceived value. Despite this, it can be said that usefulness positively affects perceived value.

H3: Findability positively affects perceived value.

As can be seen in Table 3, **Findability** is presented with 2 variables (measures). In both cases (FND1; FND2) strength of the correlation is moderate whereas the p-value is smaller than 0,05 meaning we can reject the null hypothesis. Consequently, findability has a moderate positive effect on perceived value.

H4: Credibility positively affects perceived value.

As can be seen in Table 3, **Credibility** is presented with 3 variables (measures). For CRD1; CRD2 and CRD3, the p-value is smaller than 0,05 meaning we can reject the null hypothesis. It should be noted that the correlation strength for CRD3 (The quality of the content is credible) is strong compared to other variables as a correlation coefficient is more than 0.51. Consequently, Credibility, especially content credibility, has a positive effect on perceived value.

H5: Desirability positively affects perceived value.

As can be seen in Table 3, **Desirability** is presented with 3 variables (measures). For these variables, the p-value is smaller than 0,05 meaning we can reject the null hypothesis. It should be noted that the correlation coefficient for DSR1 (The visual element is attractive.) is higher compared to other variables. Consequently, Attractiveness, especially visual element attractiveness, positively affects perceived value.

5 DISCUSSION

Due to growing competition between platforms, consumers changing subscription plans, switching to other services, or having multiple subscriptions, the need to study perceived value is important. By evaluating the perceived value, streaming platforms can discover their weaknesses and strengths in the eyes of customers. Furthermore, it will help them increase customer engagement, satisfaction, and loyalty and reduce the probability of switching to other subscription services.

Perceived value in digital contexts has been the topic of empirical studies in various fields: freemium services (Hamari et al., 2020), mobile financial services (Karjaluoto et al., 2019), mobile shopping (Shang & Wu, 2017), music streaming services (Guerra & Fernandes, 2019), combining several streaming services (Oyedele & Simpson, 2018), and gamified services (Hsu & Chen, 2018; Hsu et al., 2017). However, there is a lack of previous research in understanding what customers value in streaming platforms, especially in the case of subscription video-on-demand (SvoD) services. Consequently, it was decided to address the research topic from a unique perspective. Specifically, determine whether the user experience (UX) can influence customer perceived value in the example of Netflix.

According to the findings, user experience affects customer value in the case of streaming platforms. Prior research in an online gamification context has also accepted UX as a key precursor of perceived value (Hsu & Chen, 2018; Hsu et al., 2017). Therefore, companies need to recognize the importance of user experience in the competitive online marketplace. Managers should configure the platform for the ease of use and convenience of customers (Hyun Yoon &

Ku Kim, 2023), focus on monitoring and excelling their services, and continuously measure and improve the perception of value to increase the company's overall marketing effectiveness and performance.

The paper has some limitations, and the presented results need to be interpreted with some caution. Firstly, perceived value is subjective, and potentially many other factors like brand reputation, emotional benefits, price, design, quality of content, accessibility, etc. can highly influence it. Secondly, the article covers several number of facets of the user experience (UX) that can affect the perceived value of streaming platforms. Furthermore, there are other big players in the global video streaming market apart from Netflix that could have been studied within the framework of the research. Lastly, important limitations relate to the nature and size of the sample, subsequently affecting methods of data collection and data analysis.

6 CONCLUSION

The presented article focuses on determining whether the user experience (UX) influences customers' perceived values when subscribed to one or another streaming platform. For this purpose, primary quantitative research was conducted targeting Gen Z and Millennials who were using or had an experience using the streaming service Netflix. Based on the analysis of the collected data, we can conclude that the relationship between the **perceived value and** the user experience **exists. Specifically, Usefulness**, **Usability, Findability, Credibility, and Desirability have a positive influence on the perceived value.** The results of this study encourage online streaming platforms to recognize the importance of user experience in the competitive online marketplace. Companies can improve their offerings, user engagement tactics, adapt marketing communications to emphasize their competitive advantages, increase customer satisfaction and loyalty, and reduce the probability of switching to other subscription services.

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MARKETING COMMUNICATION OF THE BUS CARRIER FLIXBUS ON THE SOCIAL NETWORK FACEBOOK

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Abstract

Marketing communication using social media is nowadays an important tool in communicating with stakeholders. This article focuses on the marketing communication of the FlixBus bus carrier on the social network Facebook. The aim of this article is to analyse the marketing communication of the FlixBus bus carrier on the social network Facebook. The paper defines the research question and hypotheses. Subsequently, a qualitative content analysis method is used to analyse the posts published by FlixBus from 1 July 2022 to 30 June 2023 on its Facebook profile and the hypotheses are evaluated.

The results show that the publication of posts within a week and during the year is highly uneven and unbalanced. It is also very notable that in the December period, when most institutions try to make the most of their social networks, FlixBus published only three posts. FlixBus therefore did not fully exploit the potential of Christmas holidays, the end of the year, and the start of the new year to publish posts. The average interaction values are very low in the context of the number of people who like the FlixBus profile. The topic of destinations dominates the posts, followed by the promotion of a FlixBus bus line. FlixBus does not use video content within the posts. Most of the published posts contain emoticons that appropriately complement and make the text more attractive. The administrators of the FlixBus Facebook profile manage to maintain a uniform style of posts.

Keywords: *online marketing, social media marketing, transport, like, comment, share, stakeholder*

1 INTRODUCTION

Marketing communication has evolved significantly with the rise of social media platforms, becoming an essential tool for companies and institutions to engage with their stakeholders. In this context, the present study focuses on the marketing communication strategies used by the FlixBus bus carrier on the popular social networking site Facebook. With its extensive reach and user base, Facebook offers an ideal platform for businesses to interact with customers and promote their brand effectively.

Effective marketing communication is crucial for bus carriers like FlixBus, as it allows them to connect with existing and potential customers, provide information about their services, and build brand loyalty. By leveraging social media platforms such as Facebook, FlixBus can tap into a large audience and establish a direct line of communication. However, understanding the specific strategies and techniques used by FlixBus on Facebook is essential to assess their effectiveness and identify areas for improvement.

This article has the following standard structure: Chapter 2 – Literature Review, Chapter 3 – Methodology, Chapter 4 – Results, Chapter 5 – Discussion, and Chapter 6 – Conclusion.

2 LITERATURE REVIEW

The chapter is divided into two sub-chapters: sub-chapter 2.1 – FlixBus-specific business model, and sub-chapter 2.2 – Marketing communication on social networks in the passenger transport sector on the Czech market.

2.1 FlixBus-specific business model

The long-distance bus industry has traditionally been slow to develop and relatively resistant to change (Grimaldi et al., 2017). From its very beginning, FlixBus rests on the increasing capabilities of digital business models (Gaggero et al., 2019). The first European countries to liberalise the bus market were the United Kingdom, Sweden and Norway, but France, Italy, and Germany, for example, waited to liberalise the market (Grimaldi et al., 2017). Experience in the United Kingdom shows that larger groups, particularly Flixbus and Megabus, have a significant advantage over smaller operators when entering the market (Reynolds and White, 2022). The German government deregulated the long-distance bus market in 2013 and subsequently 13 carriers entered the market (Barz et al., 2021). In 2016, the largest operator, Flixbus, acquired its main rival, Postbus (de Haas et al., 2022). Interestingly, five years later (in 2018), FlixBus occupied 90% of the German bus market and expanded in Europe, Asia, and the USA (The Economist, 2018).

This dramatic growth of the company is attributed to a specific business model in which FlixBus is licensed as a bus company but owns only one bus, which it does not operate (Barz et al., 2021). Instead, it hires bus companies to provide its own livery in company colours; these companies then employ drivers and own their own buses, as well as being responsible for the day-to-day operation of the routes, and FlixBus can focus on permitting, network planning, marketing, pricing, quality management, and customer service (Barz et al., 2021; Belcastro et al., 2018). FlixBus uses a web-based sales strategy in which customers book their bus journeys with their mobile phone application or on the web page of the company; in this framework, Flixbus can instantaneously track the evolution of sales and can adjust fares over time (Gaggero et al., 2019). Branda et al. (2020) conclude that FlixBus, due to its relatively low costs, use of advanced booking platforms and booking options, and personalized travel itineraries, has been able to offer benefit to passengers compared to airlines and trains in recent years.

2.2 Marketing communication on social networks in the passenger transport sector on the Czech market

The topic of marketing communication in general and social media marketing communication in particular is very topical today and is being addressed by many scholars and practitioners. Correia, Medina, Romo and Contreras-Espinosa (2014) point out the positive factors of social media communication. In particular, they highlight the interactivity, the detection of customer needs, the adjustment of supply, transmission of content without geographical boundaries, and the ease of implementation of viral marketing campaigns. Pauwels, Demirci, Yildirimb and Srinivasan (2016) examined the effect of brand familiarity on the choice of online and offline marketing and the synergy of the chosen media. For unfamiliar brands, they recommend a combination of online and offline marketing, while familiar brands may make better use of online marketing.

The advent of social networks offers yet another set of communication channels, which can add a brand to integrated marketing communication strategies (Klepek and Starzyczna, 2018). Facebook increases the effectiveness of Internet advertising (Shen et al., 2016). Kuo and Chen (2023) have concluded that the more interactive brand marketing activities are on its Facebook

fan page, the higher the perceived experience, and in addition, perceived experience positively affects brand fan page attachment.

Yang and Anwar (2016) point out that it has always been important to find out consumers' views when gathering information. They add that it is social networks, which are becoming increasingly accessible and popular, that offer great potential in this sense. According to their opinion, people are interested in sharing information with others, which new technologies allow them to do. Winer (2009) mentions that some companies even set up their own social networks to enable their customers to communicate with each other or encourage customers to create advertisements for the company through social networks. This is the so-called customer generated media. The research by Klepek and Starzyczná (2018) shows that the content created by the consumers themselves is very important. They found that consumers not only use Facebook to search for brand information provided by the profile administrator, but they are also interested in other consumers' comments and the administrator's reactions. At the same time, this creates a community that connects not only the brand and the consumer, but also consumers with each other. The research has also confirmed that consumers prefer brands that interact with them regularly.

Swani and Milne (2017) talk about the difficulty of marketing services and the importance of word of mouth. When offering services, they believe, attention must be paid to social media content that supports brand popularity. Pelletier and Horky (2015) found that for service-based brands, Facebook significantly helps brand connectedness. They recommend that managers of such brands focus on personalising the messages on this social network to further enhance the sense of connectedness.

However, almost no attention is paid to the issue of marketing communication using social networks in the passenger transport market in the Czech Republic. Because this market has been liberalised and is competitive, it has opened up a significant space for the use of marketing communication in relation to customers (passengers), but also to other stakeholders. The issue has been addressed in recent years by Chocholáč and Becková (2020) and by Chocholáč et al. (2022). Chocholáč and Becková (2020) analysed social media marketing communication (using the Facebook social network) of selected railway passenger transport companies in 2019. This study focused on Czech Railways, RegioJet and Leo Express.

Subsequently, Chocholáč et al. (2022) analysed Facebook marketing communication of Czech Railways, RegioJet and Leo Express in 2020 and compared the results with the 2019 study (Chocholáč and Becková, 2020). This comparative study allowed us to compare marketing communication of the railway carriers in the period before the SARS-CoV-2 epidemic and during the SARS-CoV-2 epidemic.

Due to the absence of any study that focused on Facebook marketing communication on the bus transport market in the Czech Republic, a following paper aim was set. The aim of this article is to analyse the marketing communication of the FlixBus bus carrier on the social network Facebook. FlixBus was chosen because it operates in the Czech market and offers more than 3,000 destinations in 39 countries (FlixBus, 2023a).

3 METHODOLOGY

We use standard scientific methodology in this article (Fig. 1). In the first step, we defined the research question and established the hypotheses. In the second step, we conducted a qualitative content analysis of the FlixBus Facebook profile. Finally, in the third step, we processed the results of the analysis, evaluated hypotheses, and drew conclusions.

The *research question* was set as follows: How does FlixBus use Facebook marketing communication? Subsequently, related hypotheses were established:

- *Hypothesis 1:* FlixBus publishes posts on Facebook regularly in the context of days (the distribution of published posts is evenly distributed on each day of the week).

- *Hypothesis 2:* FlixBus publishes posts on Facebook regularly in the context of year (the distribution of published posts is even throughout the year and there is no more than 5 days between two posts).

- *Hypothesis 3:* The average number of likes for FlixBus posts published on Facebook is more than 100.

- *Hypothesis 4:* FlixBus uses elements of destination marketing in its Facebook posts.
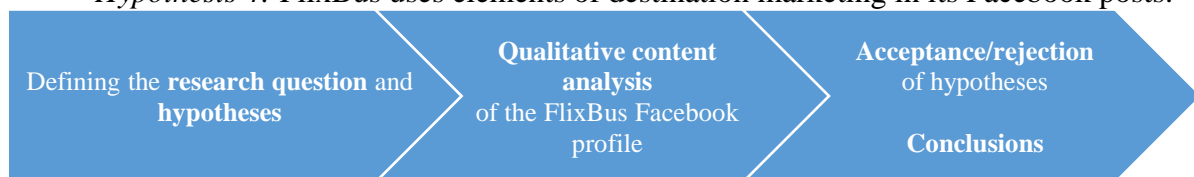
Fig. 1 – Processing methodology. Source: authors

A qualitative content analysis method was used in the analysis of the FlixBus Facebook profile. Qualitative content analysis is a research method used to derive reliable and valid conclusions from texts or other meaningful materials within their respective contexts of use (Krippendorff, 2003). According to Kibiswa (2019), qualitative content analysis can be conducted through either an inductive or a deductive approach. The inductive approach, also known as the indirect approach, involves researchers identifying themes from the data they have collected as a starting point for their research. However, the deductive approach, also referred to as the direct approach, involves researchers who derive themes from existing theories to establish the framework that guides their research (Kibiswa, 2019).

According to the study of Chocholáč and Becková (2020), our attention on the FlixBus Facebook profile was focused on:

- the number of followers,

- the total number of posts,

- the frequency of posts,

- the total number of likes,

- the total number of comments and shares,

- the average number of likes, comments, and shares,

- the content of the posts.

The results of the analysis are presented in Chapter 4.

4   RESULTS

We performed the analysis using the scientific method of qualitative content analysis of the FlixBus Facebook profile in the period from 1 July 2022 to 30 June 2023, which is a period of twelve consecutive months. The profile of the FlixBus bus carrier was analysed in the Czech version on the social network Facebook (FlixBus, 2023b). The analysis was carried out in June 2023. Three researchers independently assessed each identified Facebook post (particularly in

terms of content and categorisation). Subsequently, the results of the researchers were aggregated.

The chapter is divided into subchapters as follows: subchapter 4.1 – Frequency of posts and their distribution, subchapter 4.2 – Interaction of posts, and subchapter 4.3 – Content of posts.

4.1 Frequency of posts and their distribution

The FlixBus Facebook profile is liked by 2,678,707 people (FlixBus, 2023b). In the period from 1 July 2022 to 30 June 2023, FlixBus published 52 posts on its Facebook profile, which corresponds to an average of one post per calendar week. The posts were published on different days of the week (Fig. 2).
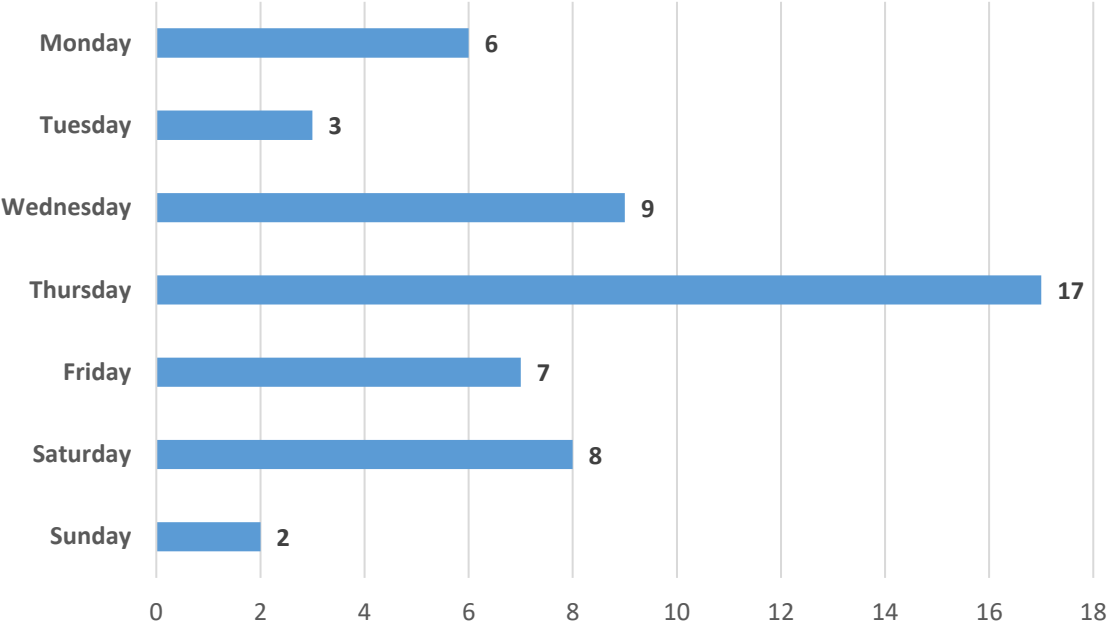
Fig. 2 – Distribution of published posts by days of the week. Source: authors based on FlixBus (2023b)

Most of the posts were published on Thursdays (17 posts in total). On Wednesdays, a total of 9 posts were published, on Saturdays (a total of 8 posts), on Fridays a total of 7 posts, on Mondays a total of 6 posts, and on Tuesdays a total of 3 posts. The fewest posts for the whole year were published on Sundays (2 posts in total).

Evaluation of *Hypothesis 1*: 'FlixBus publishes posts on Facebook regularly in the context of days (the distribution of published posts is evenly distributed on each day of the week)'. Based on Fig. 2, we can state that the publication of posts within a week is highly unbalanced and uneven. If we were to remove the weekend (Saturdays and Sundays) from the analysis, then the weekday post-publishing would still be highly unbalanced and uneven. Conclusion: *Hypothesis 1* is rejected.

The publication of individual posts on Facebook is very irregular. The minimum time between the publication of two consecutive posts was identified as one day. This situation occurred a total of four times in the period analysed. These were posts published on 31 August 2022 and 1 September 2022, 14 September 2022 and 15 September 2022, 26 January 2023 and 27 January 2023, 3 May 2023 and 4 May 2023. The maximum time between the publication of two consecutive posts was identified as 20 days. This situation occurred once in the period analysed. This was the publication of posts between 3 March 2023 and 23 March 2023. In terms of working with social networks, this is an extremely long period between publishing posts,

which can also lead to a loss of followers. The average time between publishing two consecutive posts on the Facebook social network is 7 days, and the median was established at 6 days.

Fig. 3 shows a histogram of the time between the publication of two consecutive posts by the bus operator FlixBus on Facebook. The histogram shows that the publishing time between two posts was the highest (24 times) between 1 and 6 days inclusive. Fifteen times the publishing time between two posts ranged from 7 to 10 days inclusive, eight times the publishing time between two posts ranged from 11 to 15 days inclusive, and three times the publishing time between two posts ranged from 16 to 20 days inclusive.
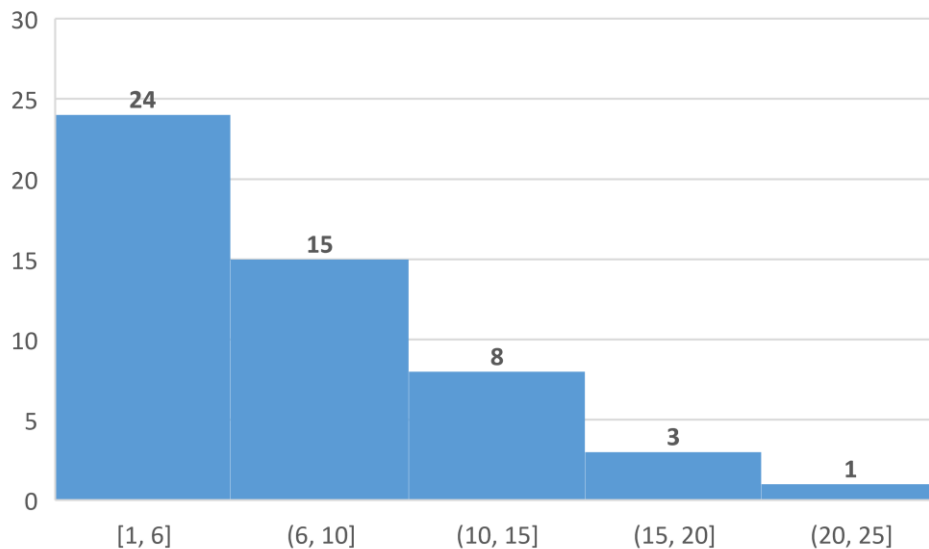
Fig. 3 – Histogram of the time between the publication of two posts. Source: authors based on FlixBus (2023b)

Evaluation of *Hypothesis 2*: 'FlixBus publishes posts on Facebook regularly in the context of year (the distribution of published posts is even throughout the year and there is no more than 5 days between two posts)'. Based on Fig. 3, we can state that FlixBus does not publish posts on Facebook regularly in the context of year, because the maximum time between the publications of two consecutive posts was identified as 20 days; the average time between publishing two consecutive posts in social network Facebook is 7 days; and the median was set at 6 days. Conclusion: *Hypothesis 2* is rejected.

It is also very curious that in the December period, when most institutions try to make the most of their social networks and engage their fans, FlixBus published only three posts, two of which were published in early December (1 December 2022 and 6 December 2022) and the last post published in 2022 was published on 17 December 2022. FlixBus therefore did not fully exploit the potential of the Christmas holidays and the end of the year. At the same time, FlixBus did not even exploit the potential of the start of the new year, as the first post in 2023 was only published on 5 January 2023.

4.2 Interaction of posts

The analysis of interaction of posts was conducted in terms of likes, comments, and shares. Tab. 1 presents the results of the analysis of all 52 published posts. Tab. 1 shows that the analysed FlixBus posts received a total of 1,530 likes, 624 comments, and 77 shares. Each post had an average of 29.42 likes, 12.00 comments, and 1.48 shares. The average interaction values (likes, comments, shares) are very low in the context of the number of people liking the FlixBus profile. Some of the posts were not liked, commented on, or shared even once.

Tab. 1 – Overview of the interaction of the analysed posts. Source: authors based on FlixBus (2023b)

52 posts	Likes	Comments	Shares
Total	1 530	624	77
Average	29.42	12.00	1.48
Maximum	580	67	25
Median	15	8	2
Minimum	0	0	0

The post published on 1 September 2022 received the most likes and shares (Fig. 4). This post received 580 likes and 25 shares. This post reported that a baby boy was born on board a FlixBus bus on 17 August 2022. The mother was travelling from Paris to Warsaw and went into labour shortly before arriving at the Poznan bus station (FlixBus, 2023b). The situation was extremely dynamic, but thanks to the quick reaction and support of drivers and passengers, everything went smoothly (FlixBus, 2023b). The mother and baby boy were picked up at the station by an ambulance and safely transported to the hospital (FlixBus, 2023b). The baby boy received free FlixBus rides from FlixBus until his 18th birthday (FlixBus, 2023b).

Fig. 4 – Post with the most likes and shares. Source: authors based on FlixBus (2023b)

The post with the most comments was published on 1 June 2023 (Fig. 5). This post has received a total of 67 comments. The post informed about the upcoming summer and new summer connections to Croatia (Pula, Split, Rijeka, Dubrovnik, Zadar).
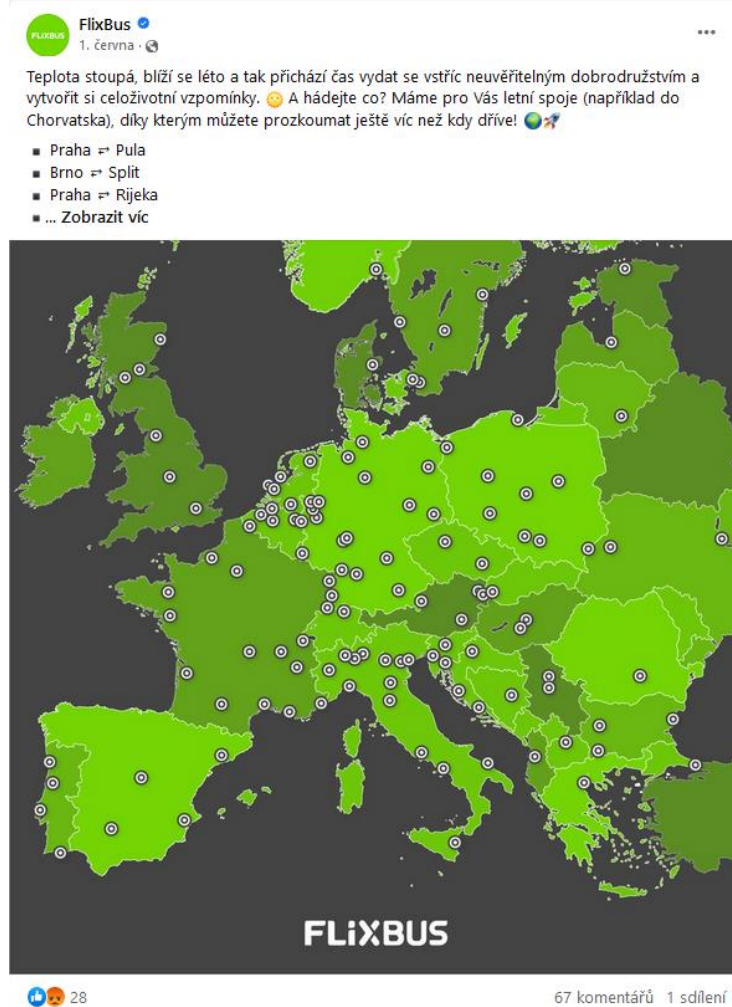
Fig. 5 – Post with the most comments. Source: authors based on FlixBus (2023b)

The median number of likes is 15, the median number of comments is 8, and the median number of shares is 2. Evaluation of *Hypothesis 3:* 'The average number of likes for FlixBus posts published on Facebook is more than 100'. Based on the results of the analysis presented in Tab. 1, we can conclude that the average number of likes for FlixBus posts published on Facebook is 29.42, which is less than 100. Conclusion: *Hypothesis 3* is rejected.

4.3 Content of posts

The post-content analysis was performed using the qualitative content analysis method described in Chapter 3 – Methodology. The results of the analysis are presented in Fig. 6. Because some of the posts contained multiple significant topics, the sum of the values in Fig. 6 does not correspond to the total number of posts analysed.

A total of 23 times the topic of destinations or destination marketing was identified, where FlixBus attracts to a specific destination and its attractions together with its own bus line. Promotion of a specific existing FlixBus bus line or preparation or launch of a new FlixBus bus line was recorded 22 times. This topic was very often identified in posts that promote destinations or together with a destination marketing application. Other significant themes were

events and collaboration (each theme was identified 13 times). Since FlixBus cooperates with many partners and institutions and is also a partner of various events, it also promotes them on its Facebook profile. Another important theme is sustainability, which is also one of the goals of the company, and FlixBus uses its green corporate colours to communicate this theme. This theme has been identified in Facebook marketing communications a total of 9 times. The last major themes, identified 8 times each, were the celebration of significant days and the promotion of discounts. Other topics that were identified only once were categorized as other. The following topics were identified three times: advent, FlixBus app, travel, and statistics.
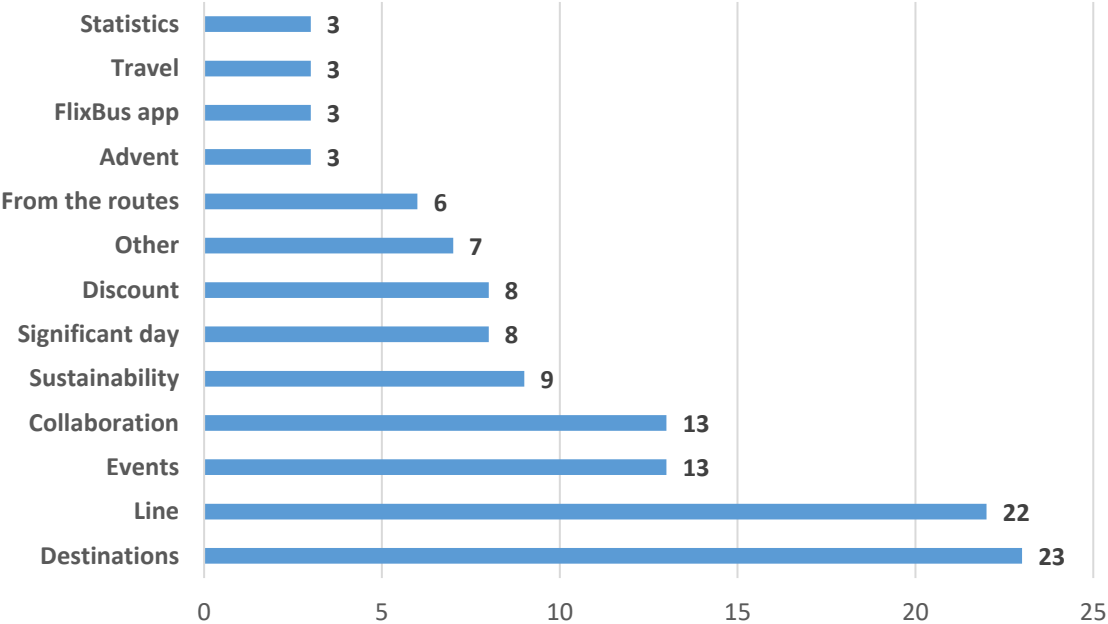
Fig. 6 – Topics of the posts analysed. Source: authors based on FlixBus (2023b)

Evaluation of *Hypothesis 4:* 'FlixBus uses elements of destination marketing in its Facebook posts'. Based on the results of the analysis presented in Fig. 6, we can conclude that FlixBus uses elements of destination marketing in its Facebook posts, because the topic of destination marketing was identified 23 times in the Facebook posts of FlixBus. Conclusion: *Hypothesis 4* is accepted.

The results of the analysis also showed that FlixBus does not use video content within posts. A total of 51 posts of the 52 published posts contained only images. Video content was identified in a single post published on 1 April 2023. Most of the published posts contain emoticons that complement and make the text more attractive.

On the positive side, the Facebook profile does not contain many service/operational posts or posts that could be perceived negatively by followers (e.g., information about cancellations, line cancellations, delays). Another positive is the fact that in case of a relevant negative comment, the profile administrators try to actively address the situation as quickly as possible and request additional information (detailed description of the problem, line information, connection information, reservation number, etc.). Overall, we can say that the administrators of the FlixBus Facebook profile manage to maintain a uniform style of posts.

5 DISCUSSION

Since only Chocholáč and Becková (2020) and Chocholáč et al. (2022) deal with the issue of marketing communication on social networks in the passenger transport sector in the Czech market, the possibilities for a more extensive discussion are very limited.

However, some facts are obvious. Although FlixBus has incomparably more people liking its profile (2,678,707 people), the interactions are many times lower compared to rail carriers operating on the Czech market. The rail carriers had much less people liking their profile ranging from 81,559 to 103,201 fans but managed to get many more interactions (Chocholáč et al. (2022). The average number of likes for the Czech Railways post is 691.5 (Chocholáč et al., 2022). In contrast, FlixBus has an average of 29.42 likes. Railway carriers also achieve significantly higher average values in terms of the average number of shares and comments. Rail carriers are also making more use of video content in their Facebook marketing communications and publishing many more posts, which are also more regularly spread throughout the week and year. For example, Czech Railways published 264 posts in 2020, RegioJet published 189 posts, and Leo Express published 138 posts. In contrast, FlixBus published only 52 posts in the analysed year. On the other hand, rail carriers are not as flexible as the FlixBus Facebook profile administrators in proactively responding to comments under individual posts.

This scientific article has the following limitations. The article analysed the marketing communication of FlixBus only on Facebook, although FlixBus is also active on other social networks (Instagram, etc.). On the other hand, the article focused only on the FlixBus social network. Another limitation is that only posts that were visible on the FlixBus profile at the time of the analysis were analysed. However, based on empirical experience, FlixBus does not delete published posts and work with short-term posts, so the results of the analysis are relevant.

6 CONCLUSION

The issue of marketing communication on Facebook is a hot topic not only in the bus transport segment. Social networks, in general, are an important communication tool with stakeholders. Social networking helps to build and maintain relationship with customers and is an important tool in the context of informing, influencing, reminding, and persuading customers.

The aim of this article was to analyse the marketing communication of the bus carrier FlixBus on the social network Facebook. The *research question* was established as follows: How does FlixBus use marketing communication on Facebook? The hypotheses were then established and evaluated. *Hypothesis 1:* FlixBus publishes posts on Facebook regularly in the context of days (the distribution of published posts is evenly distributed on each day of the week). *Hypothesis 1* was rejected. *Hypothesis 2:* FlixBus publishes posts on Facebook regularly in the context of year (the distribution of published posts is even throughout the year and there is no more than 5 days between two posts). *Hypothesis 2* was rejected. *Hypothesis 3:* The average number of likes for FlixBus posts published on Facebook is more than 100. *Hypothesis 3* was rejected. *Hypothesis 4:* FlixBus uses elements of destination marketing in its Facebook posts. *Hypothesis 4* was accepted.

Based on this article, potential future research steps were identified. The first potential research area is the perception and response of the audience. It would be useful to investigate how the target audience of FlixBus perceives and responds to marketing communication efforts on Facebook. This research can involve surveys, focus groups, or sentiment analysis to understand how customers interpret FlixBus messages, engage with the brand, and make purchasing decisions based on the information provided. The second potential research area is

a comparative analysis with competitors, i.e., comparing the FlixBus marketing communication approach on Facebook with that of its competitors. By examining how FlixBus differentiates itself and its strategies from other bus carriers within the same industry, researchers can gain insights into the effectiveness of the FlixBus Facebook marketing efforts and identify potential areas for improvement. The third potential research area is cross-platform integration. Examine how FlixBus integrates its marketing communication efforts on Facebook with other social media platforms and offline channels. Understanding how FlixBus maintains consistency and synergy across various touchpoints can provide valuable insights into the overall marketing communication strategy and its impact on customer perceptions and brand loyalty.

Acknowledgement

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AN INTEGRATIVE LITERATURE REVIEW OF THE SERVANT LEADERSHIP AND CORPORATE SOCIAL RESPONSIBILITY

Ghulam Kalsoom, Roman Zámečník

Abstract

Over the past decade, servant leadership (SL) and corporate social responsibility (CSR) research remains fragmented in the literature. Hence, there is need to conduct systematic literature review to get better understanding on this topic. To fill this void, author conducted review on servant leadership with CSR based on 25 articles and their journals ranked in Chartered Association of Business Schools (CABS) list. For access the secondary data, authors used Web of Science database for selection of articles. This review offers theoretical framework based on antecedents, mediators and outcomes in relation with servant leadership and CSR to meet the multi-stakeholder needs for achieving business excellence and take care of society. More importantly, this review also provides a way forward for early-career scholars to examine and address new research questions on this emerging fields.

Keywords*: Servant leadership, Corporate social responsibility, Integrative literature review, antecedents, outcomes, Chartered association of business schools (CABS)*

1 INTRODUCTION

Business, economics and management scholars have taken notice of servant leadership and corporate social responsibility in recent years (Christensen et al., 2014) as well as for practitioners. A servant leader is one who places a premium on the growth and success of their group or community (Greenleaf, 1970). King Frederick the Great of Prussia may have been one of the earliest examples of a self-aware servant leader. The phrase "first servant of the state" was one he used often to describe himself (Blanning, 2015). Nearly a third of Fortune magazine's list of the 100 best firms to work for in the United States exhibit or promote traits characteristic of servant leadership (Levering & Moskowitz, 2005; Pekerti & Sendjaya, 2010).

Servant leadership is new leadership style which fulfil followers needs by considering the industry dynamics and changes nowadays (Kauppila et al., 2022). Previous research mainly explored the organizational citizenship behaviours with servant leadership (Newman et al., 2017). However, another study examined individual performance with SL (Chiniara & Bentein, 2016). Similarly, Scholars of CSR field examined how to determine the influence of CSR on bottom line results (Peloza, 2009). Also, another review shows how CSR can create value for stakeholders (Peloza & Shang, 2011).

Importantly, the debate of SL and CSR remains fragmented due to less importance on societal aspect from businesses. For this reason, this review makes the following value-added contributions to fields of servant leadership and CSR. First, this review provides a theoretical framework as guideline to several stakeholders for achieving business excellence. Second, this review adds body of knowledge on methodological perspective by revealing most of research conducted on survey method. Hence, there is avenue for future scholars to conduct qualitative research for scientific development. Finally, this review provides new research questions to be address for betterment of science and society.

2   LITERATURE REVIEW

A previous research on the role of leaders implementing socially responsible firm behaviours (Christensen et al., 2014). Authors explored antecedents to socially responsible actions at individual level of analysis. Importantly, they integrated two streams of fields leadership and CSR as to provide better understanding how leaders implement CSR in the firms. Furthermore, authors examined trait theories, behavioural theories with CSR, shared and distributed leadership with corporate social irresponsibility (CSir). Their review provides future research direction to investigate new moral leadership styles such as servant, ethical and responsible leadership by implementing CSR at micro-level.

A prior study on CSR and servant leadership examined customer value co-creation (Luu, 2019b). They conducted this research in software industry in Vietnam context and they collected data from 873 employees and customers. Their findings revealed CSR has positive role in value co-creation through servant leadership. Their research is novel in sense because they provided dual perceptions from employees and customers in service industry. Their research suggested to examine manufacturing industry by deploying their model.

A study on resonsible leadrship and corporate social performance from 25 business leadership based on qualitative (Pless et al., 2012). Their research conducted content analysis on interviews and speeches from business leaders and entrepreneurs. They found that four leaderhip orientations such as *idealist, integrator, traditional economist and opportunity seeker*. They also found leadership characteristic, stakeholder relations and strategic focus considered as an important for achieving corporate social performance. Furthermore, they revealed leaders are so concerned about social responsibility by doing business because society is also an important pillar of our universe. We must take care about it. Importantly, their research demonstrated responsible leadership affect both firm and societal level outcomes. Their research suggested research leadership research is needed at the individual level for actual CSR implementation.

A recent study on servant leadership and CSR used upper echelons and organisational identification theories (Broch et al., 2020). Their main purpose was to achieve innovation through servant leadership and CSR. They collected data from 285 firms and 570 responses from HR managers and general managers. Their research shows servant leaders foster innovation and implement CSR intiatives at the organization by empowerment, courage, stewardship and development of their followers. Their research suggested servant leaderhip may be explore in other cultural contexts such as power distance environment.

A systematic literature on CSR (Aguinis & Glavas, 2012). Their review analyzed 558 articles and 102 books and book chapters. Their comprehensive review provided framework on individual, institutional and organizational levels on CSR. Their review found relationship among CSR with several important variables. Their review provided future direction to explore CSR at micro-level perspective which is under-researched in the existing literature. The employee perception is important to better understanding of CSR implementation.

A previous study on stakeholder pressure with CSR implementation (Helmig et al., 2016). They conducted research in industrial firms in Switzerland. They used institutional, environmental contingency, stakeholder and resource dependence theories. Their research revealed stakeholder pressure pushes firms to achieve market performance through mediation mechanism of CSR implementation. Their study also used potential moderator as a market dynamism. A prior research on CSR in developing country context (Jamali & Mirshak, 2007). They conducted research in banking industry of Lebanon. They employed qualitative method and conducted interviews from managers. They suggest to further examine the role of CSR in developing country context.

3 METHODOLOGY

Authors conducted an integrative literature search servant leadership and CSR studies (Denyer & Tranfield, 2009). Author focused on the 4 key journals and 5 other relevant journals. Author selected total 9 journals and all these selected journals were ranked in ABS list: 4*, 4, 3 respectively (Podsakoff et al., 2008). *Academy of Management Annals, Journal of Management, Academy of Management Perspectives, Leadership Quarterly, Journal of Business Ethics, Personnel Psychology, Public Management Review, Tourism Management, European Journal of Work and Organizational Psychology.* This reflects author used only high-quality journals of leadership and CSR fields. Authors conducted a search "servant leadership", "corporate social responsibility" by using Web of Science database. This review found 44 articles in first search on Web of Science and second search found 38 articles and after following inclusion criteria comprised Language: English, Field: Management, Year: 2005-2023. Journals ranked in Chartered Association of Business Schools (CABS) also known as ABS Journal list. Author used only 25 articles for data analysis after following inclusion criteria.

Tab. 1 – Process of Data Collection. Source: own research

44	• **Step 1** (Main topic searched (title, abstract, keywords) *"Servant Leadership" "CSR"* on Web of Science Database: Social Sciences Citation Index Only)
38	• **Step 2** (Query Limited to ABS ranked journals)
25	• **Step 3** (Final Database for Analysis from Management Field)

4 RESULTS

The trend analysis revealed studies published from 2005 to 2023. Scholars from leadership and CSR fields took interest from 2018 with 3 studies and it rapidly rose in 2019 with 7 studies. Considering the positive role of servant leadership and CSR which focuses on needs of multiple stakeholders. Similarly, studies increased in 2021 approximately more than 9. From the practical perspective, servant leadership and CSR are relatively new fields of research as companies understood the goals and needs of all stakeholders such as customers, employees, top management, communities, state and legal institutions.
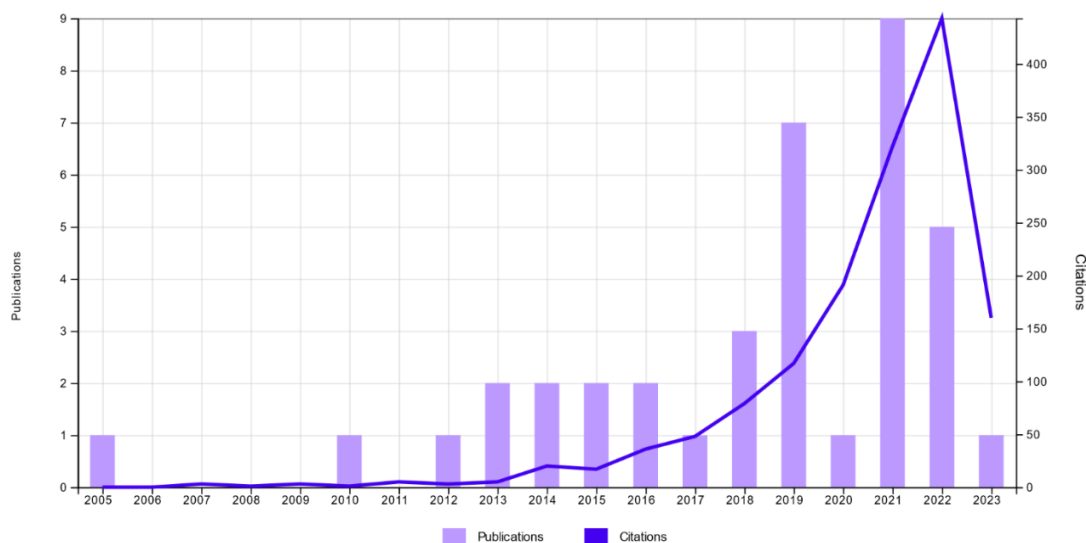
Fig. 1 – Number of publicatons and citations. Source: own research

Tab. 2 – Sample of Studies on Servant Leadership and CSR. Source: own research

Author/Year	Aim	Citation	ABS Ranked Journals
(Lemoine et al., 2019)	Moral leadership approaches to fulfil multi-stakeholder needs for CSR	177	Academy of Management Annals (ABS:4*)
(Christensen et al., 2014)	The role of leaders on CSR implementation	152	Academy of Management Perspectives (ABS:4)
(Liao et al., 2021)	Servant-Leadership Behaviours with CSR	28	Journal of Management (ABS:4*)
(Kauppila et al., 2022)	Servant Leadership on Employee Outcomes	12	Journal of Management (ABS:4*)
(Peterson et al., 2012)	CEOs and Firm Performance through Servant Leadership	197	Personnel Psychology (ABS:4*)
(Lemoine & Blum, 2021)	Gender role with Servant Leadership	16	Personnel Psychology (ABS:4*)
(Fischer & Sitkin, 2023)	Positive and dark sides of leadership styles	8	Academy of Management Annals (ABS:4*)
(Liden et al., 2008)	Multidimensional Scale Development on Servant Leadership	737	Leadership Quarterly (ABS:4)
(Shim et al.)	Servant Leadership on Workgroup Innovative Behaviours	2	Public Management Review (ABS:4)
(F. Y. Li et al., 2021)	Servant Leadership and Service Innovation	12	Tourism Management (ABS:4)
(Sendjaya & Cooper, 2011)	Servant Leadership Behaviour Scale Development	36	European Journal of Work and Organizational Psychology (ABS:3)
(Donia et al., 2016)	Servant Leadership and Employee Outcomes	45	European Journal of Work and Organizational Psychology (ABS:3)

Tab. 3 – Definitions of Servant Leadership and CSR. Source: own research

Construct	Definitions	Reference
Servant Leadership	The servant-leader is servant first... the care that the servant provides is where you can tell the difference - first to ensure that the most pressing needs of others are being met... are the people being helped develop?	(Greenleaf, 1970)
	It is the belief of the servant leader that "his or her moral responsibility extends not only to the success of the organization, but also to the success of his or her subordinates, the organization's customers, and other organizational stakeholders."	(Ehrhart, 2004)
Corporate Social Responsibility	Four kinds of corporate social responsibilities: economic, legal, ethical, and discretionary.	(Carroll, 1979)
	CSR refers to corporate behaviour that ostensibly serves a higher social purpose than the pursuit of profit or compliance with the law.	(McWilliams & Siegel, 2001)

Tab. 4 – Prominent Scholars in the field of Servant Leadership. Source: own research

Author/Year	Publication Reference	Citations	Summary of Research
Robert Liden (h-index 54) University of Illinois Chicago, USA	(Liden et al., 2014)	416	Servant leaders boost employees to achieve performance at the workplace.
	(Liden et al., 2015)	229	Developed the valid scale for assessing servant leadership at global level.
Julia Hoch (h-index 13) California State University Northridge, USA	(Hoch et al., 2018)	443	Examined the effectiveness of authentic leadership, ethical leadership, and servant leadership using a meta-analysis.
Kathleen Bentein (h-index 17) University of Quebec Montreal, Canada	(Chiniara & Bentein, 2016)	213	Shed light on psychological process to enhance individual performance through engagement of servant leadership.
Alexander Newman (h-index 43) Deakin University, Australia	(Newman et al., 2017)	199	Through LMX, empowerment, and a proactive attitude, servant leadership improves citizenship behaviour in the workplace.
Allan Lee (h-index 16) University of Exeter, UK	(Lee et al., 2020)	109	Conducted meta-analysis on 130 studies on servant leadership.
Tuan Luu (h-index 14) Swinburne University of Technology, Australia	(Luu, 2019a)	70	Investigated environmentally -specific servant leadership on employee OCBE through pro-environmental behaviours
Osman M Karatepe (h-index 49) Eastern Mediterranean University, Turkey	(Karatepe et al., 2020)	68	Servant leadership enhance innovation and innovative behaviours at workplace.
	(Kaya & Karatepe, 2020)	73	
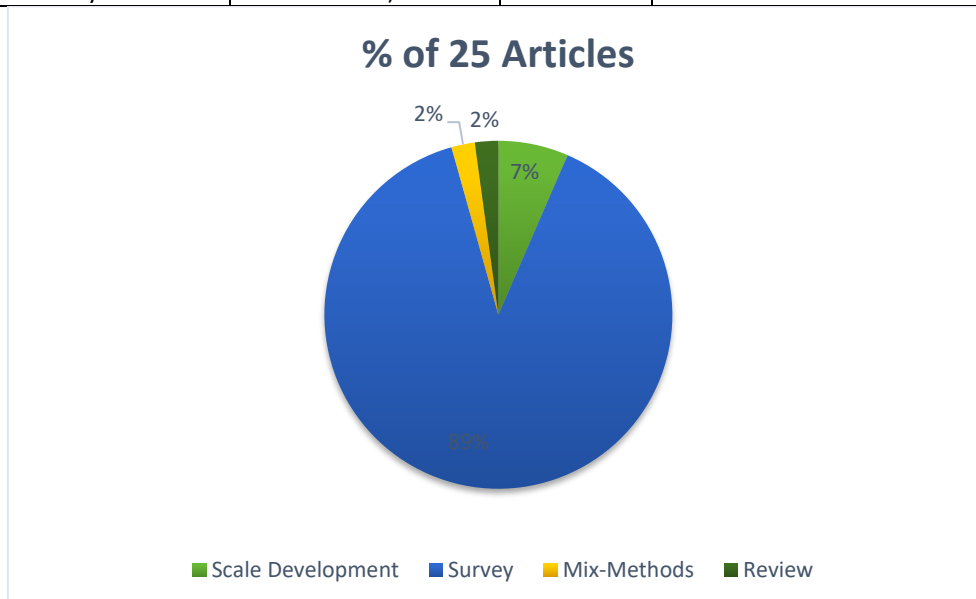
Fig. 2 – Servant Leadership Studies Method-Wise. Source: own research

Tab. 5 – Theories used by Sample Studies. Source: own research

Authors	Theories Used
(Kauppila et al., 2022)	Social learning theory
(Li et al., 2018)	Broaden-and-build theory
(Ye et al., 2019)	Conservation of resources
(Song et al., 2022)	Self-enhancement theory
(Peterson et al., 2012)	Upper echelons theory
(Pircher Verdorfer, 2019)	Leader categorization theory
(Ng, 2022)	Social exchange theory
(Nauman et al., 2022)	Self-determination theory
(Lemoine & Blum, 2021)	Gender role congruity theory and social learning theory
(Bavik et al., 2017)	Social learning theory
(Haq et al., 2022)	Social exchange theory
(F. Li et al., 2021)	Social learning theory
(Khan et al., 2022)	Self-determination theory
(Donia et al., 2016)	Implicit leadership theory
(Yang et al., 2020)	Social identity theory
(McCune Stein et al., 2020)	Implicit leadership theory
Wang et al., 2021)	Contingency theory
(Yang et al., 2018)	Regulatory focus theory
(Rivkin et al., 2014)	Organizational fit theory and social identity theory
(Duff, 2013)	Team coaching theory
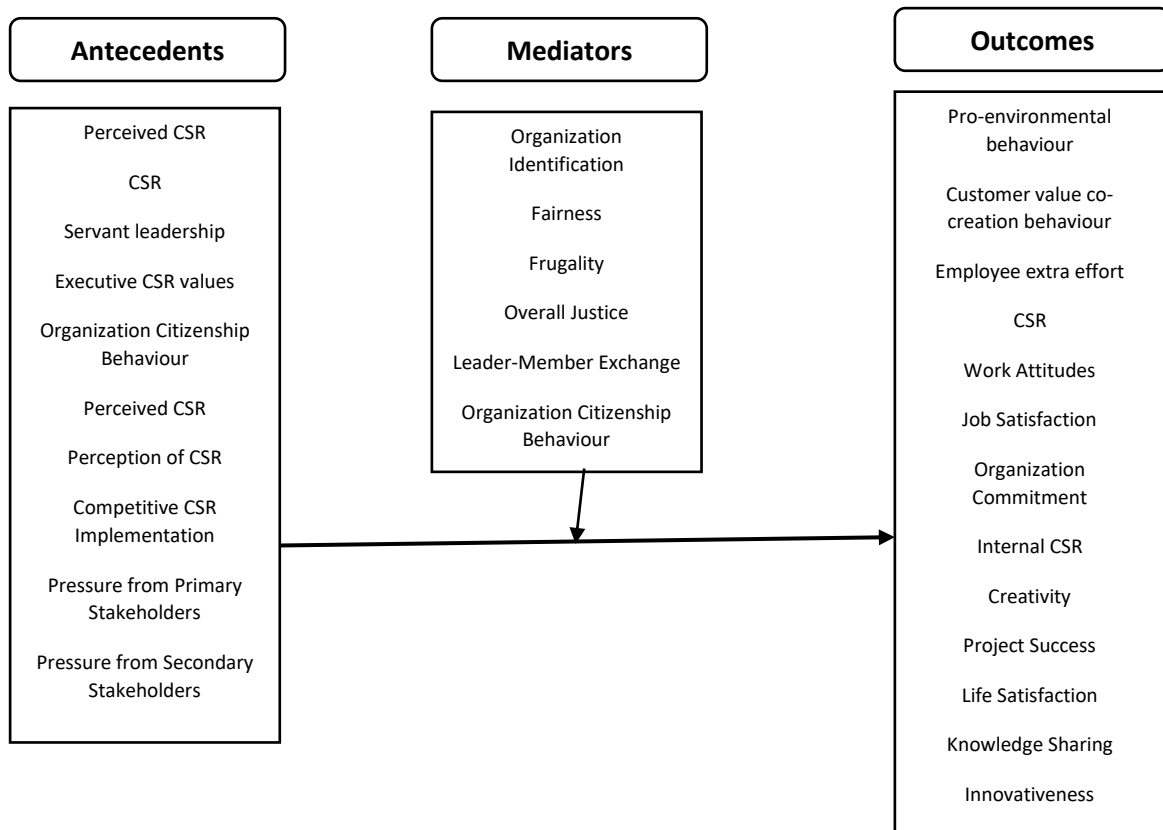
Fig. 3 – Theoretical Framework on Antecedents and Outcomes of Servant Leadership and CSR. Source: own research

5   DISCUSSION AND CONCLUSION

This review presents a theoretical framework on antecedents and outcomes of servant leadership and CSR. This review assessed 25 articles published in high-quality journals ranked in ABS list. This comprehensive assessment found most of studies used only survey method. This review also revealed servant leadership and CSR mainly focused on fulfilling multi-stakeholder needs such as employees, customers, government, suppliers, public and media. This review suggests business must consider not only profit but also try work for society and law. More importantly, this review provided an important question for future researchers to address them.

A previous review by Eva et al., (2019) on servant leadership delineate the theoretical and nomological framework of servant leadership by examining its antecedents, results, moderators, and mediators. Similarly, our work is aligned with their research, we generated antecedents, mediators and outcomes on SL-CSR. In this way, our research provides fresh perspective on servant leadership and CSR.

Likewise, a previous revealed socially responsible behaviours are crucial for businesses to implement CSR (Christensen et al., 2014). Their research suggested to explore moral leadership styles. In this way, our review contributes to body of knowledge by highlighting the role of new leadership style in the form of servant leadership.

6 WAY FORWARD

This review provides a fresh avenue for future researchers to address a new aspect in the servant leadership and CSR fields. The table 6. revealed a way forward.

Tab. 6 – A Way Forward on Servant Leadership and CSR. Source: own research

Studies	A Way Forward
(Christensen et al., 2014; Lemoine et al., 2019)	Explore new forms of leadership styles such as servant, ethical and responsible leadership with social responsibility. Examine moral leadership approaches such as servant, ethical and authentic leadership in implementing CSR.
(Aguinis & Glavas, 2012)	To examine the role of micro-foundations of CSR at micro-level as to get employee perception specifically in the service industry. To use potential mediators such as human capital, institutional pressure and firm capabilities in relation with servant leadership and CSR implementation.
(Helmig et al., 2016)	To investigate the role of unions, customers and general public and stakeholder attributes such as power, legitimacy with CSR. Further research on ethical codes and their impact on CSR implementation.
(Lythreatis et al., 2021)	Further research on ethical codes and their impact on CSR implementation. Explore other non-middle eastern contexts such as South Asia and Europe for research on servant leadership with organizational identification.
(Van Dierendonck, 2011)	Future scholars may develop a multidimensional measure of Servant leadership. To conduct experimental studies on servant leadership.

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IMMERSIVE EDUCATION OF UNIVERSITY STUDENTS USING AUGMENTED, VIRTUAL AND MIXED REALITY

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Abstract

The paper deals with the possibilities of using augmented, virtual, and mixed reality simulators in the education of students in the field of integrated safety and in the context of the ongoing fourth industrial revolution and the needs of student education through innovative technology. At the same time, it points to the conducted research, which determined the attitudes of the participants towards the immersive training aimed at fighting different classes of fires using a virtual portable fire extinguisher. The application of virtual reality (VR) technologies as a substitute or supplement to traditional teaching methods is a relevant topic both for universities educating students and researchers, as well as for companies specialized for the organization of training courses for employees. On a sample of 31 respondents, experiential education was used to examine both the effectiveness and reality of extinguishing various classes of fires indoors and outdoors using a virtual fire extinguisher, as well as the usability of new technology for the needs of immersive education compared to traditional forms of education. Respondents in the questionnaire survey positively assessed the usability, realism, effectiveness, and benefits of such experiential training. The low level of the sense of presence within VR immersion can be attributed to the absence of other technical peripherals e.g., a thermal vest, which would also bring the feeling of indoor heat to the participants of the training in the event of a fire. At the same time, symptoms of the onset of simulator sickness were investigated, but none of the respondents experienced it during or after the experiential training.

Keywords: augmented reality immersive education, mixed reality, students, virtual reality

1   INTRODUCTION

The fourth industrial revolution, known as Industry 4.0, has already begun to determine the direction in which the world economy will continue. Industry 4.0 already finds its application in all sectors of the economy. In business practice, there is the involvement of elements of the Internet of Things (IoT), the Internet of Services (IoS), or, for example, work with large amounts of data, i.e., Big data (Republiková únia zamestnávateľov, 2017). In accordance with the application of the elements of Industry 4.0 across the branches of the national economy, the requirements for qualifications, knowledge and skills of employees are also gradually changing. In connection with the above-mentioned transformation of the labor market, in the future, new requirements will be placed on the workforce in new business conditions. We can assume that it is necessary to be educated in the field of information and communication technologies, data analysis, the ability to work with modern technologies, but there are also increasing demands on employees and entrepreneurs in the field of so-called soft skills, such as analytical thinking, active learning, the ability to solve complex problems, creativity, leadership (Slovak Business Agency, 2022). The transition to a form of industry that will be based on digital technologies requires a big change. Especially when the fifth industrial revolution, i.e., Industry 5.0, is already knocking on our door. It is Industry 5.0 that has its roots in the concept of Industry 4.0, but the original concept of Industry 4.0 focused less on the principles of social justice and sustainability, but more on digitalization with the aim of increasing the efficiency and flexibility of production (European Commission et al., 2021). The Industry 5.0 concept provides a different focus, emphasizes the importance of research and innovation to support industry in its

long-term service to humanity, and respects the boundaries of our planet (European Commission et al., 2020). A necessary prerequisite for successfully managing these industrial revolutions is to have a sufficient number of qualified, educated and skilled employees available. Colleges and universities must join this challenge as part of the education of their students, so that they are ready to meet the demands of employers in terms of the employability of graduates on the labor market. The concept of Education 4.0 should also contribute to this goal. Colleges and universities in Slovakia are trying to ensure that students have access to new digital technologies, which will help them first to learn in the questioned field and later also enable an easier transition to working life, where they will already be familiar with these technologies and will be able to use them in practice.

The technological progress in connection with virtual reality is among the most progressive, not only from the point of view of its application in the gaming industry, but its potential is also transformed into the fields of education and training. Virtual reality, augmented reality and mixed reality offer great potential and benefits in education and training (Kaplan et al., 2021).

The use of new technologies such as augmented, virtual, mixed or eXtended reality started primarily in the military (e.g. fighter pilot training), the game and entertainment industry, but also penetrated, for example, the engineering and automotive industries (designs of production lines, machines, shared repairs and maintenance), construction industry (e.g. architecture), design (product designs), trade and services (presentation of goods and services). The great boom in the use of these innovative technologies is in the field of education and training, especially in the field of military and health training, in the field of industry (employee training), but it also finds its application in the education of pupils and students at all types of schools or training and service training crisis intervention. Among the advantages of using eXtended reality in education is the fact that it allows pupils or students to experience interactions and activities that would not be possible in reality, and also to understand the concepts of problematic phenomena based on their presentation using visual and virtual experiences (Liu et al., 2017).

Its use in the field of fire engineering, which remains somewhat behind the above-mentioned areas despite the increased number of fires, floods and disasters in the world, is the subject of this contribution. In the following post, we will clarify the possibilities of using augmented reality devices in the preparation of university students in the field of integrated safety not only at the Faculty of Materials Science and Technology of Slovak University of Technology located in Trnava (hereinafter referred to as "MTF STU Trnava").

2   LITERATURE REVIEW

2.1 Definitions

Augmented Reality (AR) – is a label used for a pre-real image of the world supplemented by computer-generated objects. It is a representation of reality (for example, a building captured by a camera in a mobile phone) and the subsequent addition of digital elements, for example, information about the given object (Farshid et al., 2018)(t2i, 2021).

Virtual reality (VR) – a highly immersive experience simulation of an artificially generated environment and scenarios using screens or special glasses. In the most advanced versions, in addition to sounds, it can contain tactile sensations and mechanical feedback thanks to special interactive ergonomic devices. In contrast to augmented reality, which adds artificial elements to the real ones, in virtual reality the stimuli of the real world are completely replaced by artificial ones (Farshid et al., 2018)

Mixed reality (MR) – is a combination of the real and virtual world with the aim of creating new environments and visualizations where physical and digital objects coexist and interact in real time. Mixed reality does not take place exclusively in the physical or virtual world but is a hybrid of augmented reality and virtual reality (Farshid et al., 2018)

eXtended reality (XR) – represents the use of virtual reality (VR), augmented reality (AR) and mixed reality (MR). Their mutual combination gives the possibility to adapt the experience and impression of the user according to the ideas and requirements of the manufacturer. In practice, glasses are used, similar to sunglasses, which have the ability to measure the room around you and then insert an immersive object into the space. You are thus in your reality, but you can interact with objects that are projected into the environment. The term XR simply refers to all technologies including VR, AR and MR (Farshid et al., 2018)

XR training is a purposefully designed, immersive learning experience that uses appropriate technology. These technologies engage and support employees in acquiring the knowledge and skills needed to manage behaviors that impact specific business outcomes that are consistent with organizational goals (Palmas & Klinker, 2020).

A purpose-designed instructional methodology aims to motivate an individual to learn and support learning processes that result in a specific learning outcome or the intentional use of gamification principles, elements, mechanics, and interactions in learning design for motivational purposes (Palmas & Klinker, 2020).

An immersive learning experience describes an experience provided by a learning application based on some degree of real or virtual immersion that allows an individual to acquire new knowledge or skills. Its effectiveness is influenced by its design characteristics and limited by the technology that characterizes the training domain (stationary extension - e.g., training on a personal computer; mobile extension - e.g. training on a mobile phone, tablet, smartphone, etc., AR, MR, VR), in which the training application is located. The individual actively interacts with technology and learning content (Palmas & Klinker, 2020).

2.2 Application of VR, AR and MR s in the field of integrated safety

From the point of view of controlling VR or MR devices, during practical education we most often encounter haptic controllers, or it is possible to control them without haptic controllers, only by hand (see Fig.1).

Fig. 2 - VR headset with controllers (left), a VR headset that allows hand control, and HoloLens 2 glasses for using hand-controlled MR. Source: own research

Thanks to increasing computer performance and especially the development of VR headsets on the market, VR simulators allow their users to immerse themselves in an increasingly immersive environment, where any interaction with the real environment is lost and the trained person is fully drawn into the realistic designed action in the virtual environment. A firefighter

training simulator (see Fig. 2) that provides an immersive virtual reality environment combines with a patented haptic feedback system, a virtual self-contained breathing apparatus and heated firefighter personal protective vest to provide a unique training experience that has not yet been replicated (Nahavandi et al., 2019). It includes a wide and ever-expanding range of different virtual fire scenarios in industrial, administrative, medical, transport, laboratory and logistics environments, which allow, not only firefighters, to learn the correct procedures for extinguishing various fires in indoor and outdoor environments.

Fig. 3 - Use of the simulator for firefighter training and selection from used scenarios. (Photo: Veronika Kvorková). Source: own research

For the education of students in the field of crisis management, the use of AR appears to be the most appropriate. It can reliably visualize various crisis situations, e.g., leakage of a hazardous substance with a subsequent fire or explosion directly in the classroom. The data of a hazardous substance spread in the object of a real or fictitious company, or even outside it, can be plotted on a real map (topographic, satellite, orthophoto map, etc.) using geographic information systems. All the necessary information about individual activities at the scene of a crisis situation, as well as the necessary emergency documentation or information about the danger of a leaked chemical substance, are presented to both the trainee student and the crisis staff worker using AR.

Educational activities for students take place under the supervision of a lecturer/instructor, who, based on the decisions of the training student, changes the situation at the scene of the accident and its immediate surroundings in real time. An educational program called "XVR", on which simulations of management and intervention of emergency response services and Integrated rescue system (IRS) components can be performed in an AR and VR environment, in various types of emergencies, e.g. explosion, fire, traffic accident, response to a leak with a dangerous substance, natural disaster (e.g. flood), etc., is therefore a highly variable program and it is possible to manage the response on a tactical, operational and strategic level (Fig. 3).

Fig. 4 - The AR simulator in use with accessories (left) and the simulation of the procedure for solving a bus traffic accident. Source: own research

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MR technology was used within the FightARs project, which was designed to improve situational analysis and dynamic decision-making for crisis managers and components of the Integrated Rescue System using an immersive environment. The aim of the project of the consortium, also composed of representatives of the Faculty of Safety Engineering of the University of Žilina, is to create the most realistic scenarios possible, which are carried out by the first responders in real time and space as part of the intervention activity during the liquidation of extraordinary events or are economically expensive for the implementation of practical training.

In individual scenarios using the HoloLens 2 glasses, the trained persons find themselves e.g. in the event of a traffic accident of an electric car with a truck transporting a dangerous substance. They must take measures to prevent both the leakage of the dangerous substance and the subsequent contamination of the environment, as well as the occurrence of a fire, safely secure the vehicle against movement, choose a safe procedure to free the person with the help of the injured person or with OR code, which they find on the injured person inside the vehicle, use a safe procedure to ensure the provision of pre-medical first aid, etc. (Fig. 4).

Fig. 5 - Solving a motor vehicle accident with a tanker truck transporting a hazardous chemical substance on the FightARs under development (right) using HoloLens 2 (middle) and simulating the use of an extrication device to extricate an injured person (right) from a motor vehicle. Source: Microsoft, 2023

3 METHODOLOGY

Training in VR allows the participant to gain more knowledge and better prepare him for a real situation than traditional training (lecturer's explanation, use of video and literature).

The following tools were used as part of the research task:

- descriptive and qualitative research,

- occasional (available) selection of respondents,

- data collection in the form of a questionnaire, using dichotomous closed questions, polytomous closed questions with the possibility of choosing one or several variants and open free questions,

- a record of the observation of the training participant in the VR during and after its completion.

Research questions (RQ) and research sub-questions (RSQ) were chosen according to the objectives of the research as follows:

RQ 1 Is VR PFE training comparable to real firefighting?

RSQ 1 Are the virtual scenarios of different types of fire (A, B, C, D and F) realistic?

RSQ 2: Are firefighting techniques using PHP realistic?

RSQ 3: Do we really get the right habits in a few minutes?

RSQ 4: Is VR training safe?

RSQ 5: Is training in VR less expensive?

RSQ 6: Is VR training more environmentally friendly?

RQ 2 How do you (respondents) evaluate training using VR compared to traditional training?

RQ 3 Did you (respondents) experience any simulator sickness symptoms while you were training?

3.1 Research respondents

The research project was carried out on the MTF STU and in the training room at the fire station of the Regional Directorate of the Fire and Rescue Service in Trnava in April 2022. Its participants were selected students of the Private Secondary Vocational Polytechnic School DSA in Trnava in the four-year study field Mechanics of fire engineering, and students of the MTF STU from bachelor's, engineering and doctoral studies in the field of Integrated Safety, teaching staff of MTF STU and technical and economic staff of MTF STU. The total number of trainees was 31, including 19 males, 12 females. All 31 participants took part in this VR training for the first time. Thus, it is assumed that early-stage subjective evaluation can provide insightful feedback from trainees on what can be improved in VR training, how the realism and effectiveness of VR training can be increased to further increase its usability. In short, it was investigated how training in VR is perceived by its participants and what can contribute to the acceptance, seriousness, evaluation and effectiveness of education through VR training facilities.

3.2 Immersive technology

For the purpose of the training and the correct technique of extinguishing various classes of fires through VR, a portable fire extinguisher (hereinafter referred to as "PFE") VR trainer system, developed by DEAKIN University in Melbourne was used. This system includes a Pico Neo 2 headset and a dummy fire extinguisher, equipped with a safety lever valve and a hose (Fig. 6a). The lever valve and the hose were equipped with wireless sensors that enable the activation of the fire extinguisher and extinguishing the fire using a virtual PFE or a water stream from a virtual hose device.
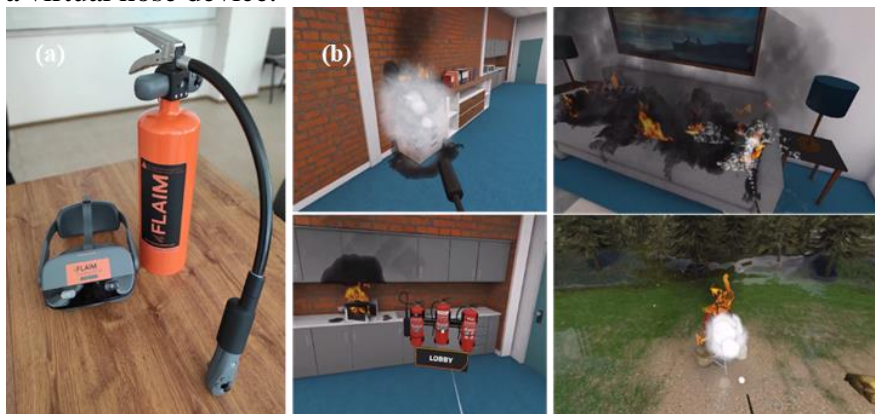
Fig. 6 (a) – VR - PFE simulator including headset; (b) some scenarios used in the research

(photo: Veronika Kvorková). Source: own research

The headset is equipped with software that communicates wirelessly with the hardware, while this software contained not only individual training scenarios (Fig. 6b), but also instructions on

how to use PFE (the so-called PASS technique) and a clear table of suitability for using certain PFE, which are available in the subject training scenarios.

There were 8 categories of different environments available for the participants (administration, education, energy, catering facilities, healthcare, exterior, residential buildings and transport), for which one to nine scenarios were developed (40 scenarios in total). Each scenario contained virtual scenes that consisted of colourful static 3D objects with realistic size and shape, e.g., safety signs, fire-fighting equipment, and other equipment (furniture, electrical equipment and appliances, etc.). The scene included dynamically simulated flames and smoke and various fire equipment - PFE, which, after selection, was activated and controlled by the trainee. In some scenarios, a water stream from a hose reel was also available to extinguish the fire (e.g. in the case of a pallet fire in the warehouse) or a fire blanket (e.g. in the case of a fire in the kitchen), as well as the activation of an electric fire alarm by pressing the fire alarm button (e.g. in the fire of a printer in a large-scale office), or activation of a local gas extinguishing device (e.g. in the event of a fire in a food truck). The scene was simultaneously transferred to an external display device (monitor, TV, projector). After putting on the headset, each training participant set his safe perimeter (min. 1.5 m of free space) with the controller (located on the hose of the PFE).

When the participant reached the border of the perimeter, a grid was displayed in his virtual image, and after crossing this safe perimeter (grid), the virtual image was automatically switched to the real image. The training participant was able to move safely, and these movements included e.g., turning the person (to find the PFE station, push-button fire alarm, hose device, fire blanket, escape exit and fire source), moving with the PFE to the source of the fire, lifting, moving the PFE and directing the hose to the source of the fire. A virtual 1.5 kg PFE was also available when extinguishing a fire in different means of transport (e.g., a fire in a helicopter), where the trainee had to use a different body position and choose the correct extinguishing technique different from the usual type of PFE (Fig. 7).

Fig. 7 – Different ways of virtual PFE handling and displaying the resolved crisis situation

(photo: Veronika Kvorková). Source: own research

The training participant could thus safely immerse himself in the virtual environment without the risk of injury or damage to a nearby object or the training device itself by hitting a nearby object. The dummy pressure vessel of the virtual PFE was hollow and, if necessary, could be filled with water or sand to the standard filling of the PFE in use. After the initial briefing by the lecturer, regarding the control of the relevant training equipment and the PASS technique, the training participant tried 6 to 8 scenarios, with different classes of fires and in different environments, which he solved independently. Feedback messages corresponding to the participants' actions indicated success or failure in extinguishing the fire at the end of each

scenario in the form of a summary table. The requirements for successful completion were to gain awareness of the given scenario, i.e. evaluating the situation, quickly noticing the fire, announcing the fire with a push-button fire alarm or evacuating a person in the vicinity of the fire, choosing the most effective PFE, correctly activating the PFE and extinguishing techniques, namely focusing on the fire using a suitable body position, spraying the extinguishing agent and moving the hose accordingly, so that the fire was extinguished in time. The training room was chosen according to the location of the training, whether it was a classroom, cultural room, office, hall, etc., while a safe space without obstacles around the trained person (min. 4 m^2) had to be ensured. One participant dealt with the situation and put out the virtual fire with a virtual PFE, while the rest could watch on the monitor or projection screen how he dealt with the scenario. The duration of the training was approximately 6 to 8 minutes for an individual participant, but the total length of the training varied depending on the number of participants in each group and mainly the feedback from the participants who filled out the questionnaires after the training.

4   RESULTS AND DISCUSSION

The research project was introduced to the training participants before the implementation of each of the training sessions. Anonymous questionnaires were distributed to the training participants immediately after the training. The participants, if interested, voluntarily and independently filled out the questionnaire, which they left on the table. After the training, the researchers collected the questionnaires to ensure anonymity and voluntary participation. The questionnaire was updated version compared to the one used in the comparative research conducted in Sweden (Saghafian et al., 2020).

The research was aimed at reliably ascertaining the attitudes of the participants towards the VR training, and instead of open questions with free comments, multiple choice polytomous closed questions with the possibility of choosing one variant or several variants, dichotomous closed questions (choice yes - no or male - female) were used) and the open question was left exclusively for commenting on the VR training in terms of the knowledge of the participants for its improvement or criticism. Answers to multiple-choice polytomous closed questions with the possibility of choosing only one variant were categorized as "positive", rather positive if the participant's experience from the training represented only a positive experience, as "rather negative" and "negative" when it represented only a negative experience, and if the training participant could not express himself subjectively or objectively (not participating in real firefighting using PFE, etc.), the answer was categorized as "I can't express myself".

In terms of assessing the suitability of a VR training facility, setting research questions, choosing research methods, topics and sub-topics, presented research was based on the research of colleagues from the Norwegian University of Science and Technology (NTNU) in Trondheim from 2020, who focused on the evaluation of VR training in crisis situations for employees in the petrol and gas industry (Saghafian et al., 2020).

4.1 Quantitative overwiew of the results

A total of 31 participants filled in the questionnaire.

A quantitative overview of the results is presented in Tab. 1. An explanation of what can be understood from these numbers is provided next.

Tab. 1 – Quantitative overview of the results. Source: own research

	Number of responses	Yes [%]	No [%]	Positive [%]	Rather positive [%]	I can't express myself [%]	Rather negative [%]	Negative [%]
Previous experience with VR	31	67,74	32,26	-	-	-	-	-
Evaluation of training in VR	31	-	-	83,87	12,90	3,23	-	-
Training in VR vs. classical training	31	-	-	45,16	51,61	3,23	-	-
Emotional experience during training in VR	31	-	-	61,29	35,48	3,23	-	-
Experience with simulator sickness	31	35,28	64,72	-	-	-	-	-

4.2 Qualitative analysis of research results

The second part is a qualitative overview of themes that were derived from responses and observations using thematic analysis. It contains a number of sub-themes that the participants unanimously considered to be the benefits of VR training. Sub-topics include the realism of the fire scenario – simulations, learning and improving technique, environment protection (EP), health and safety (OSH), resource efficiency and comfort (Fig. 8).
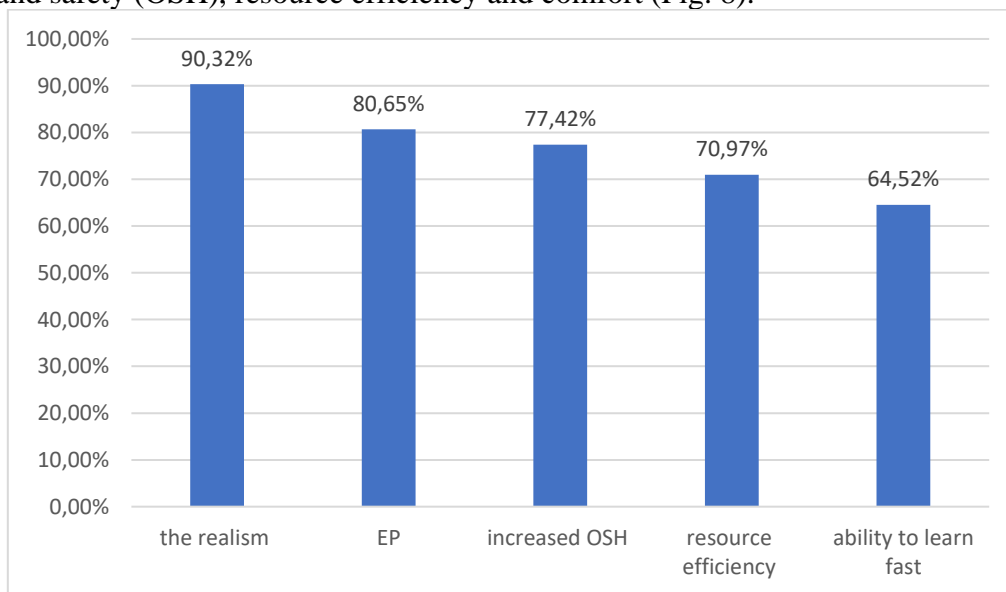
Fig. 8 – Benefits of VR training according to respondents (EP – environmental protection; OSH – occupational safety and health). Source: own research

4.3 Realism of VR Training

The topic of the realism of VR training is one of the most prominent topics of VR training. It concerns the questions that shaped the participants' perception of realism and what would make the training realistic from their point of view. In questionnaires as well as personal interviews with researchers, the respondents pointed out the very good realism of the training in VR and positively evaluated this training with traditional training and real use of PFE. In contrast, the majority of comments in the Norwegian research indicated that the level of realism was a concern, including comments stating that VR was "artificial" and "not real enough", while also

finding participants who believed that the VR experience was " just as good' and 'very similar' to the real experience. This reflects differences between participants in their perception of realism in VR. However, both studies used different types of VR training devices. For the purpose of our research, we had a borrowed VR simulator that did not contain a thermal vest connected to the software, so the training participants were deprived of the experience of radiant heat. This fact was most often mentioned as a shortcoming in the VR training in the research questionnaire.

Realism was also assessed through the lens of the technical characteristics of the virtual PFE compared to the real PFE and the steps that should be taken to extinguish the fire. Even here, when pulling the fuse and pressing the lever valve, the participant did not feel the pressure of the extinguishing agent released from the PFE as in the Norwegian experiment, but this fact did not play a significant role in training of extinguishing techniques and the use of PFE. It should be emphasized, however, that the goal of employee training is first and foremost training (PASS) of extinguishing techniques for different classes of fires (A, B, C, D and F). From the point of view of observing the progress of a virtual modelled 3D fire in individual scenarios and real fires during video demonstrations of firefighting training using PHP, no significant differences were detected. Fire dynamics and fire phases correspond to real time and are faithfully represented in a 3D virtual environment. The realism of individual fire scenarios was the decisive fact. It should be emphasized, however, that the main goal of employee training is training of extinguishing techniques (PASS) for different classes of fires (A, B, C, D and F). Comparing the course of a virtual modelled 3D fire in individual VR scenarios and real fires during video demonstrations of firefighting training using PFE, no significant differences were detected. The dynamics and the phases of the fire reliably and realistically correspond to a real conditions.

Another subtopic was visual quality and distance perception. The respondents did not have any reservations about the graphics quality. However, many of them drew attention to the importance of supplementing other scenarios and, with the development of digital technologies, outlined that the graphics will be as close as possible to reality. There were also no negative comments in terms of the perception of distances, but a few respondents said that they were hindered by limited movement and would welcome freer movement outside the set safe perimeter.

4.4 Benefits of VR training

The sub-themes of learning and improving of technique (firefighting skill) reflected the benefit of VR training as an excellent supplementary learning experience and were described in comments as 'quick learning' and 'repeatable training' even in the event of failure. They found it to be a good way to adopt the firefighting techniques without harm to health and the stress or initial fear involved. When we go through the individual scenarios of different classes of fires, we quickly learn to use PFE correctly in a few minutes, we learn the proper PASS technique, and active participation in the VR environment really helps to have the most realistic experience possible compared to passively watching presentations at fire protection trainings. The added value is a number of different faithful virtual training environments from administration, logistics, healthcare, transport, catering facilities, and households to various industries. In our research, similar to the research in Norway, it was found that repeating scenarios from different industries, without any costs, was useful and helped the participants to become familiar with different situations other than those related to firefighting. Undoubtedly, by participating in this type of training, the participants also improved their skills, as they controlled PFE with real elements and not just virtual controllers.

4.5 Safety and health protection during VR Training

The subtopic regarding safety and health protection during VR training has already been mentioned several times. VR software works with high-speed frame rates that eliminate simulator sickness. Using virtual reality headsets represents, according to Stanney et al. health problems including motion sickness, eye strain, and headaches and is unsuitable for students with epilepsy. Even considering the very short time spent on individual scenarios lasting an average of 41 seconds, no significant nausea or visual fatigue was noted when using VR, as was observed with other VR simulators in other research tasks (Stanney et al., 2020). Since the real fire is not used, the risk of intoxication, burns and the resulting damage to health or damage to property and environment is excluded. The safe perimeter, which each participant secures and confirms in the settings before the training, sufficiently protects him from hitting objects in his vicinity. VR training participants felt safe, secure and in control thanks to zero exposure to pollutants in the air and the aforementioned dangers, which they subsequently perceived as a safer way of training.

4.6 Environmental safety

The sub-topic of environmental safety was the predominant sub-topic mentioned as a clear advantage of using VR in education. The ability to learn more without harming the environment, without high emissions of combustion products and excessive radiant heat was an obvious advantage. The sub-theme of resource efficiency and convenience is related to the advantage of repeating scenarios without consuming too many resources. VR has been noted to be "better than theory" for learning firefighting tactics and stress management as one learns to "cope with stress" in VR. From the point of view of the costs of implementing the training in question in a VR environment, the initial cost of purchasing a VR trainer is around 7,500 EUR without VAT, including software updates, but considering the lifespan of the device in question (minimum 5-year guarantee), training in a VR environment is also possible considering the number of trainees participants and used virtual PFEs of various types and different classes of fires, much less expensive than classic training with real PFEs (need for real PFEs of various types, need for flammable substances to simulate a fire and a safe, non-flammable container, need for a larger transport vehicle, etc.).

4.7 VR training as additional training to traditional training

Similar to the Norwegian experiment (Saghafian et al., 2020), the majority of respondents from Slovakia believed that VR training cannot replace traditional training. However, it can be useful supplemental training to improve skills. The reason why the respondents identified it as a suitable supplement was mainly that it was not perceived as realistic enough, because it lacked the elements of the reaction of radiant heat, smoke and flame, also in connection with the change in ventilation conditions, and especially the feeling of a certain danger. This theme is therefore connected with the theme of realism. Nevertheless, the participants of the training unanimously commented on how this technology could be a successful part of the future, which points to the awareness of new trends in the field of digitalization of the industry as well. Thus, the use of VR is a good addition, but trainees in hazardous workplaces may need additional training with real fire extinguishers to put out real fires, as has been shown in other studies with larger numbers of participants (Lovreglio et al., 2021).

5 CONCLUSION

The education of students and employees is a very important and critical concern of any company. VR has proven to be highly effective in the safety education of students and

employees, not only from the point of view of better memorization of safety procedures, manuals or perception of danger and the resulting risk in the workplace. Through VR devices, participants in educational activities are trained for real security scenarios in a way that is accessible, scalable and safe. It allows them to experience various situations in immersive scenarios without having to be physically present. The advent of virtual reality has opened up a number of opportunities in the field of education, such as various employer and professional training, which apply to a whole range of manufacturing and non-manufacturing sectors, from administration, industry, and maintenance to healthcare and education without exception. It also means that none of the employees has to sit through a tedious and uninspiring educational lesson to get familiar with safety regulations or to deal with emergency situations and practice the necessary skills. Training through VR is thus much better etched in the participant's memory thanks to the personal experience of the participant, and it is assumed that the acquired information or knowledge from the training will be correctly used in practice (Capasso et al., 2022). This kind of training is also much more attractive through the personal involvement of each of the participants than classic training connected with a passive showing of video films or reading text. These claims are supported by recent research from China (Lei et al., 2022), where participants who experienced emotional arousal performed better in learning than participants who did not. This finding also suggests the effectiveness of VR in inducing emotions and promoting learning. In terms of future research, attention should be paid to between-group research comparing the effect of traditional (non-experiential) training and virtual reality-based training to better or more effectively assess the benefits of immersive VR.

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ADDITIONAL REMUNERATION METHODOLOGY IN SK-DRG

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Abstract

The paper aims to define the methodology for creating additional remuneration in the Slovak Diagnoses Related Groups (SK-DRG) system to treat heterogeneous groups. Hospitalization data from 2022 were used with the Ministry of Health of Slovak Republic (MoH). Due to recommendations of MoH, 21 existing additional remunerations were chosen for testing. Clinical and cost hospitalization data of all cases within DRG groups where existing additional remunerations were used. Hospitalizations with additional remuneration were divided into two subcategories within every DRG group due to the content of the additional remuneration (with procedure or without). We suggested nine different parameters to be analyzed. One of the parameters, the mean difference of costs of subcategories across DRGs, was suggested to be used as the price of additional remuneration in case other parameters allow the creation of new additional remuneration. Results showed that parameters can identify situations where a solution for heterogeneity is needed and if the creation of additional remuneration is suitable. Consultations with hospitals and MoH showed problems with data creation in hospitals, especially with cost data for hospitalizations. The main problems were found in allocating direct costs for hospitalization cases. Consequently, we cannot directly compare with other researchers' findings, as this represents the inaugural investigation into SK-DRG's additional remunerations problematics. Our work is a pioneering contribution to the field, laying the foundation for future research and potential comparative analyses as more studies emerge.

Keywords: *hospitalization costs, cost heterogeneity, additional remunerations, DRG system*

1   INTRODUCTION

The article contributes to developing Diagnoses Related Groups (DRG) systems. DRG systems and their development are of great interest. The core idea of DRG is to group hospitalizations based on clinical and cost similarities for lump sum payment calculations. Originally, hospitalizations were grouped due to the patient's primary diagnosis, which led to the name Diagnoses Related Groups (DRG). The clustering process usually considers multiple cost-driving parameters. Choosing a manageable number of groups means there will inevitably be cost heterogeneities between groups. Treating these inconsistencies is possible on various levels. Vogl (2013) improved patient-level costing in the English and German DRG systems. The studies (Aragón et al., 2022; Samuel et al., 2016; Zhang & Sun, 2021) show that correctly setting DRG leads to resource savings. The popularity of DRGs stems from the ability to predict the cost of hospitalization, leading to increased efficiency in the use of resources (Fetter, 1991; Leister & Stausberg, 2005). Systems need regular updates because of progress in medicine and market development (Sanderson, 1993). Different ways of treating the heterogeneity of groups are used in the praxis.

This paper considers treating additional remunerations that may be found in DRG systems. The German, French, and Slovak DRG systems allow modifying additional remunerations. Therefore, our paper aims to develop a suitable methodology for creating new additional remunerations in the SK-DRG system.

The paper is organized as follows. This introduction provides an overview of the context and significance of the topic under investigation. The literature review is presented in the next

section. Section Methodology describes an overview of the German and French approaches to the issue of additional remuneration. The paper then introduces our approach to the issue by describing the methodology we have developed, followed by the results obtained by applying the described methodology. Section 4 presents our results, which are discussed in section 5. Section Conclusion concludes our findings.

2 LITERATURE REVIEW

There are several types of DRG systems in the world. Usually, the additional rewards sometimes carry some discrepancies in those with a group size of less than 1,500. Additional rewards can be found in German, Swiss and Slovak systems. More groups in the system mean greater granularity of hospitalizations, and mostly, these systems solve heterogeneity by dividing DRGs into several groups, as is the case, for example, in the Dutch or Czech systems, as mentioned in the articles the authors Busse(1993), Klein-Hitpaß & Scheller-Kreinsen (2015).

A group count below 1500 is considered adequate and manageable (Klein-Hitpaß & Scheller-Kreinsen, 2015); therefore, additional remunerations arise. Due to several reasons and other calculations, it is crucial to set a limit for the budget spent on additional remunerations. The limit should not be strict but rather informative to help the administrator decide if there are more requests for additional remunerations. As Quentin *et al.* (2022) wrote, additional remunerations make up about 5% of the hospital healthcare budget in the German DRG. In French DRG, this limit is about 3.5%.

Both German and French DRG systems use additional remunerations as a tool for group homogeneity improvement. However, the methodologies are not publicly available, not even upon request.

Overall, numerous studies by the authors (Ayub et al., 2019; Blaschke et al., 2018; Boston et al., 2005; Schultz et al., 2021; Vogl, 2012) compare the homogeneity improvement of DRG groups using additional remunerations. While these efforts have contributed to our understanding of the additional remuneration problem, to the author's knowledge, there is no available literature on methodology development. Next, the importance of additional remunerations as a tool for group homogeneity improvement in German and French DRG systems is evaluated. The Institute for the Hospital Remuneration System (InEK) prepares yearly updates for the DRG system in Germany. German DRG system shows high homogeneity due to the Coefficient of determination that fluctuates around 85% (Geissler et al., 2015). Homogeneity increased by about 13% between 2004 and 2006. During this period, additional remunerations were introduced in the German DRG system. The Coefficient of determination for the year 2004 version of the German DRG was calculated as 70%, and for the year 2006 version as 83% (Kiefer & Stausberg, 2010).

InEK prepares a list of changes for the new version of the DRG system and presents planned changes for next year, usually at the end of September, to stakeholders. German DRG system can be purchased by country authority, and several countries decided to adapt the system in their conditions. This way, the system reached, for example, Switzerland, Malta, Greece, and Slovakia. The system is divided into several parts purchased separately and, therefore, parts of trade secret.

In the cases of the French DRG system, the Technical Agency holds the administration of this French DRG system for Information on Hospitalizations (ATIH). French DRG groups patients with different types of algorithms compared to German DRG (Baier et al., 2019). However, the system uses additional remunerations to improve homogeneity (Or, 2014).

DRG-relevant documents are updated every year. Updated versions of the Definition manual and Catalogue of lump sums are publicly available. The process of their creation, however, is not published. Therefore, we decided to prepare our methodology for solving the mentioned problems for the needs of the SK-DRG system.

3 DATA AND METHODOLOGY

We start with data description. Hospitalization data are collected by the administrator of the Slovak DRG system (SK-DRG). Data are updated yearly.

The highest level of data structure is the distinction of two types – clinical and economic data. Clinical data include information on the patient's demographic background combined with a description of the hospitalization: primary diagnosis, secondary diagnoses, procedures (with date and location), length of stay (LOS), type of admission (was it elective or necessary to save a life?), age, sex.

The economic part of the data allows the administrator to see a detailed picture of how resources were used during the hospitalization, not just the final sum of all costs. For this purpose, a cost matrix was created and adjusted to the needs of all stakeholders of the DRG system. The calculation manual is a document the administrator maintains, which defines how the costs should be dissolved into the matrix. Matrix and its structure are described in the text below.

Due to our interest, a combination of clinical and economic data is needed, as the performance of procedures may cause higher costs. In many cases, the procedure may not vary in terms of what is done and how it is done, but what is used (e.g. more expensive materials or medicaments) to accomplish the treatment. Procedures should usually be reasonable cost drivers (Kaier et al., 2020). In some situations, however, observations show that the same procedure can cause variable hospitalization costs. Several reasons may be hidden in the background:

1. Different prices for the same material for hospitals,
2. Different materials used for the procedure,
3. Different quantity of materials used,
4. Different cost allocation,
5. Evidence of materials in hospitals, etc.

Therefore, when looking for inconsistencies and heterogeneity in costs and their solutions with additional remunerations, procedures may serve as markers to look for a group of hospitalizations with the possibility of higher costs caused by specific procedures.

The cost matrix offers detailed insight into hospitalization. Rows in this matrix describe the Sum of Cost Centres (SCC):

1. General care unit,
2. Intensive care unit,
3. Surgery unit,
4. Anesthesia unit,
5. Labor unit,
6. Cardiology unit,
7. Radiology unit,

8. Laboratories,

9. Others.

Columns in the cost matrix describe types of costs (Sum of Cost Types - *SCT*) in cost centres:

1. Physicians,

2. Nurses,

3. Other medical staff,

4. Medicaments,

   a. Common costs,

   b. Direct costs,

5. Implants,

6. Medical materials

   a. Common costs,

   b. Direct costs,

7. Medical infrastructure,

8. Non-medical infrastructure.

For illustration, a combination of *SCC* row 3 and *SCT* column 1 shows resources spent by the hospital on physician's wages during operation time (procedures). Cost allocation to the matrix is determined by law by document Calculation manual. The decision on whether the solution with additional remuneration was correct was made with three possible answers. Answer yes was given if results support adding additional remuneration, maybe if further analysis is needed, and no if the solution would worsen the homogeneity of DRGs.

Our proposed methodology focuses on possible parameters to consider during impact assessment. Parameters should objectively evaluate if adding additional remuneration is a suitable solution for heterogeneity found in groups of hospitalizations (DRGs).

For quick insight into cost homogeneity in DRG, two coefficients are used. Coefficient of variation (*CV_DRG*), see eq. (1), and Coefficient of homogeneity (*CH_DRG*), see eq. (2). The Coefficient of variance considers the mean of group costs and their standard deviation (Bedeian & Mossholder, 2000).

$$CV_{DRG} = \frac{Standard\ deviation\ of\ cost_{DRG}}{Mean\ of\ cost_{DRG}} \tag{1}$$

The homogeneity coefficient is usually presented in percentage and varies between 0-100%. We can say that the admissible value for the homogeneity coefficient is 50%, which means that the group's standard deviation is the same as the mean.

$$CH_{DRG} = \left(\frac{1}{1 + CV_{DRG}}\right) * 100 \tag{2}$$

If the value of *CH_DRG* is smaller than 50%, then it should signal that the group's consistency needs to be improved. The model is inefficient in predicting costs and may lead to over- or under-payment of the hospitalizations. DRG administrator should avoid both cases:

- Overpayment of hospitalization leads to excessive resource usage,

- underpayment in the long term causes deterioration of healthcare.

As mentioned above, one (usually last) option for improving consistency is additional remuneration. For this purpose, the administrator must be able to say if the solution will help the system and if the improvement caused by this change is significant enough.

When evaluating possible additional remuneration, we are supposed to look at the following parameters:

1. number of hospitals providing specific procedures (denoted as H),

2. number of cases with the specific procedure (P),

3. fraction of hospitalizations with the procedure and without procedures in each DRG (Fr %),

4. number of DRGs where hospitalizations with procedures occur (N_{DRGs}),

5. cost differences (sum of costs, whole matrix) between hospitalizations with and without procedure in each DRG (ΔC),

6. relative cost differences for hospitalizations with and without procedure (Δc),

7. cost differences in the sum of the 6b column from the matrix (direct material costs of hospitalization) ($\Delta 6b$),

8. change of Coefficient of homogeneity (ΔCH_{DRG}),

9. standardized differences of costs for hospitalizations with and without procedure in each DRG (*stand*. Δc).

Due to the sensibility of the topic to data errors, only validated data were used to bring unbiased results. The validation process consists of many controls that should exclude hospitalizations with incorrectly calculated costs (too low costs for material used, no costs allocated for wages, etc.).

Because additional remunerations usually treat heterogeneity of costs, we decided to subtract costs for all additional remunerations from the sum of costs, except for one that was just analyzed. Identification of other additional remunerations and their prices is due to an official document valid for the SK-DRG system for 2022 (data year) Catalogue of lump sums, yearly issued by the Centre for Classification System (CKS) DRG department of the Ministry of Health of Slovak Republic.

Above, more types of additional remunerations were mentioned – materials, methods, and medicaments. The authors focused on materials due to possible problems in the hospital cost allocation process.

Before further explaining the parameters, it is necessary to remember that additional remuneration should always be considered as the last option for treating heterogeneity of the predictive model – DRGs. This fact is the result of base rate calculation, at least.

We will look at the suggested parameters and explain why authors recommend evaluating them when deciding on additional remunerations in SK-DRG.

Note that parameters should be considered together as a whole. Only some of them are crucial, and not satisfying them, even if all other criteria are satisfied, can lead to the rejection of the request. The evaluation results must be considered with all other changes planned for regular DRG system actualization.

Number of hospitals providing specific procedure

Suppose only one hospital or only a specific type provides the procedure. In that case, heterogeneity may be treated in other ways, such as covering higher cost connected with the procedure provided by adding budget to the hospital's base rate or type of hospital. Another option is to create a DRG split with the condition that can be satisfied in this or another hospital.

Suitable split will prevent wrong hospitalization grouping, and therefore, should allocate resources better.

Number of cases with a specific procedure

Medical progress can cause increased cases of new procedures, and this trend would grow for a few years (e.g. endoscopic cholecystectomy instead of open approach). In the early years, the new procedure should be supported (due to its clinical benefits) and covered as additional remuneration because, initially, only some hospitals will provide a new approach. After a few years, when the procedure spreads out and becomes more common, administrators should count the approach into a lump sum.

Fraction of hospitalizations with the procedure and without procedures in each DRG

The fraction of hospitalizations with the procedure should be especially considered in combination with the following parameter (number of DRGs where the procedure occurs). Suppose there is request to add additional remuneration for procedure that appears mostly in 1 or 2 DRGs, and the fraction is high (above 40-50%). In that case, the DRG split is always a better solution than new additional remuneration.

In case the fraction is high in one DRG but low in others, additional remuneration can be excluded from DRG with a high fraction. This approach is currently used for dialyzes in SK-DRG.

Number of DRGs where hospitalizations with the procedure

The importance of the number of DRGs where the procedure occurs lies in the complexity of change needed to treat the heterogeneity of all participating groups. For example, we can compare stents (intravascular support material to ensure flow through blood vessels) to implants. If we look at all DRGs where intravascular support may be needed or used, we will talk about up to 100 DRGs. It would be too complicated to create splits in each of them because of more expensive new material. The number of cases may be high, and fractions (depending on which DRG) do not cross 30% (in Slovak DRG due to how groups are created), so one can understand why it is good to treat this heterogeneity of groups by adding additional remuneration. Moreover, some hospitalizations need one stent. In other cases, with the same diagnosis and other demographic background, there is a need to use three or many more, and the number of stents used cannot be predicted before the procedure is done.

On the other hand, if there is a request for a hip joint implant, we always know there will be one or a maximum of 2, but this is easily predictable. There are seven DRGs connected to hip joint treatment, but only four group hospitalizations with implants. Therefore, creating a split in these groups is a good idea to increase homogeneity.

Cost differences (sum of costs, whole matrix) between hospitalizations with and without procedure in each DRG

Due to discussions with hospitals, we cannot correctly identify the materials costs even if the cost matrix is used. It is due to problematic allocations and evidence of materials used directly in hospitalization. We can be pretty sure only about the final sum of costs, but not how it is spread around the matrix.

Generally, hospitalizations in each DRG where the procedure occurs are sorted into two main subgroups:

1. The first contains hospitalizations with a procedure that is analyzed,
2. the second without procedure analyzed.

If the procedure causes higher costs than the mean costs in the second subgroup, the mean of costs in the first subgroup must be more significant than the mean costs in the second subgroup. The cost difference is then calculated as:

$$cost\ diff_{DRG} = \overline{cost}_{proc+} - \overline{cost}_{proc-} \tag{3}$$

where $cost\ diff_{DRG}$ denotes the difference between two subgroups, $\overline{cost}_{proc+}$ is mean of a subgroup with the procedure, and $\overline{cost}_{proc-}$ is the mean of the subgroup without procedure. This cost difference is calculated in each DRG where the procedure occurs, and the mean value of differences in DRGs is used.

Relative cost differences for hospitalizations with and without procedure

As the previous parameter described, relative cost difference shows the difference in mean costs of the same subgroups, but as a relative number. Relative cost difference shows how often one subgroup is more expensive than the other. The relative cost difference is calculated as:

$$rel\ cost\ diff_{DRG} = \frac{\overline{cost}_{proc+} - \overline{cost}_{proc-}}{\overline{cost}_{proc-}} \tag{4}$$

We normalize the difference by subgroup without procedure because this subgroup is considered to have regular, predictable costs, while the subgroup with the procedure is considered to have higher costs. The parameter can be shown in percentage if equation (4) is multiplied by 100. The mean value of relative differences across DRGs is used.

Cost differences in the sum of SCT 6b from matrix (medical material direct cost)

The authors developed this parameter before the described parameter (Δ6b). Only the discussion with hospitals caused that it is not considered because of data quality.

In detail, it is calculated the same way as the cost difference of the sum of costs. The only difference is that we compare only the sum of SCT 6b from the cost matrix.

Theoretically, this approach would lead to more sensitive results because it would not be biased by different LOS, wages across hospitals, etc. The data quality, however, nowadays does not allow authors to use the matrix in such detail.

Change of Coefficient of homogeneity

The Coefficient of homogeneity is calculated for each DRG before all other calculations. After the cost difference for the two subgroups is calculated, this difference is subtracted from each hospitalization with the procedure. If the procedure causes higher costs, in which positive numbers can be seen in cost difference, subtracting this value should get two subgroups closer together, reducing standard deviation. Therefore, the Coefficient of homogeneity calculated after this process must improve. Change of Coefficient of homogeneity is calculated as:

$$\Delta CH = CH_{after} - CH_{before} \tag{5}$$

We subtract the Coefficient of homogeneity with value from before calculations from the one after calculation because we expect the Coefficient to improve. The difference in Coefficient of homogeneity is calculated in each DRG, and the mean value is used. When the difference of coefficients of homogeneity is negative, additional remuneration is not reasonable.

Standardized difference of costs for hospitalizations with and without procedure in each DRG

In many cases, we can find more clinically related hospitalizations in one DRG with different manifestations of syndromes and, therefore, different cost consumption. Practically, administrators must think about situations when there is a minimal number of hospitalizations in the first subgroup compared to the second subgroup in DRG.

Thus, the authors suggest standardizing counts in both groups to the same level and approaching problematic costs when a standardized number of hospitalizations can show relevant differences, which may otherwise be lost in data noise.

The idea comes from comparing two variables with different scales, often used in data science. Since we are scaling the variables to the same level, the method is usually called rescaling of variables. We may rescale any two variables to be able to compare them with the following:

$$Y = \left(\frac{X - X_{min}}{X_{range}} \right) * n, \tag{5}$$

where Y is the adjusted variable, X is the original variable to which scale we want to adjust other, X_{min} is the minimum value of an original variable, X_{range} is the difference between the maximum and minimum value of the original variable, and n is the upper limit of the rescaled variable.

4   RESULTS

Tab. 1 - Evaluation of parameters with the preliminary result of adding additional remuneration to the Catalogue of lump sums. Source: own processed

CODE	H	P	Fr %	DRGs	ΔC	Δc	Δ6b	ΔCH %	Stand. Δc	RESULT
5l41011	1	2	3,80	1	14 186,34	148	- 8 340,97	1,93	14 186,34	maybe
5l41012	1	2	3,80	1	17 496,83	185	- 3 336,63	2,74	17 496,83	maybe
5l41013	1	1	1,54	1	22 470,30	238	- 7 869,52	2,85	22 470,30	maybe
5l41022	1	3	4,62	1	16 950,70	180	3 760,17	4,40	16 950,70	yes
5l41023	1	2	3,80	1	15 940,49	167	- 8 628,51	2,33	15 940,49	maybe
5l41033	1	1	1,54	1	12 765,37	136	- 7 871,78	1,81	12 765,37	maybe
8r4303x	2	5	0,16	2	3 011,18	78	- 5 567,95	0,40	3 391,66	yes
8r4304b	5	9	0,43	3	3 480,52	80	- 4 462,09	2,35	2 934,92	yes
8r43244	1	1	0,09	1	27 027,08	631	- 8 857,68	2,80	27 027,08	maybe
8r30948	1	11	1,50	2	7 473,74	87	- 9 807,87	0,93	9 933,49	yes
8r3094a	3	4	0,18	3	5 410,28	119	- 6 309,95	2,61	3 154,94	yes
8r3094b	3	5	1,19	4	5 892,25	69	- 6 103,30	1,58	4 803,77	yes
8r3094d	1	2	0,13	1	6 316,73	140	- 6 293,80	1,46	6 316,73	maybe
8r4396e	3	3	0,68	3	10 641,96	244	- 9 422,42	2,53	12 728,73	yes

5a31142	4	50	17,84	5	26 722,54	715	23 210,07	1,11	28 292,91	maybe
5a31152	2	2	0,56	1	21 956,90	429	20 440,45	0,85	21 956,90	maybe
5a50t13	2	5	10,40	2	10 732,15	304	1 768,44	8,31	10 831,49	yes
5a31011	2	3	5,52	2	16 468,49	398	4 857,66	3,75	15 277,50	yes
5s2250a	2	2	0,53	2	1 298,26	43	- 155,58	-2,12	1 616,08	no
5t6502	4	7	2,79	4	3 438,33	49	- 2 291,33	0,05	5 380,92	yes
5o920x	1	3	0,55	1	5 123,94	144	- 1 000,08	0,05	5 123,94	yes

Train data (data year = 2022) provided by the CKS DRG department of the Ministry of Health of Slovak Republic contained 21 procedures identified as additional remunerations due to the Catalogue of lump sums 2022. The parameters described were evaluated for each of them. Results are summarized in Table 1. Results showed that 11 of them may be considered suitable solutions to heterogeneity based on a combination of parameters immediately. The following nine results show the need for further analysis, and 1 worsens the homogeneity of DRGs and, thus, should be excluded from the Catalogue of lump sums. Parameter Δ6b was excluded from the decision due to data quality but is presented in Table 1.

The difference between the calculated and official prices in the Catalogue of lump sums was evaluated for each additional remuneration and expressed as a percentage of the official price. The median difference is 11%, with a standard deviation of 58%.
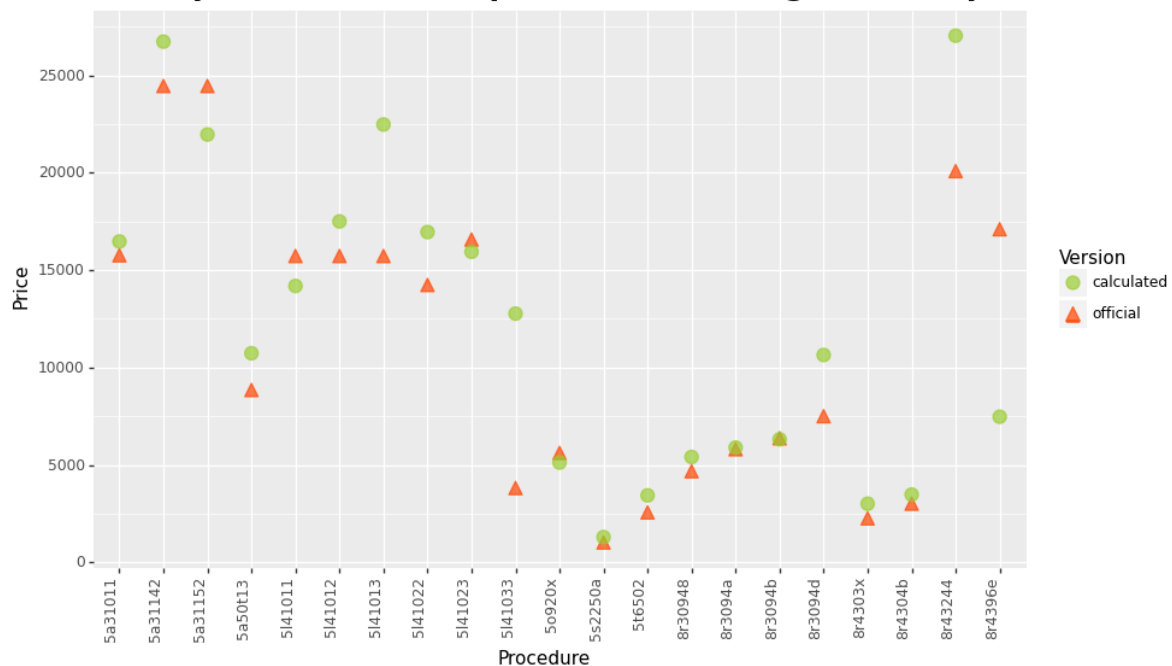
Fig. 2 – Comparison of official price and calculated price (Δc) due to subgroups differences. Source: own research

Figure 1 shows the difference between the official price of additional charges from the Catalogue of Lump Sums 2022 and the calculated mean difference of costs for two subgroups of each DRG where the procedure occurs.

5 DISCUSSION

It is essential to mention the absence of comparable results from other authors in this specific area. Results using the methodology suggested by the article were compared with the current price of additional remunerations in the Catalogue of lump sums for 2022. While direct comparisons with existing results are unavailable due to a lack of methodologies shared by system administrators, our findings underscore the significance of further exploring. Introducing a novel methodology offers a fresh perspective on additional remuneration problems in SK-DRG.

Results show that suggested parameters can identify cases where treating heterogeneity by additional remuneration is suitable.

In addition to the calculated price, we can evaluate that the calculation is relatively accurate even though the whole sum of costs was used for hospitalizations. We can expect improvement with higher data quality and using the Δ6b parameter.

Other reasons may cause differences between the two prices:

1. Since creating additional remunerations in SK-DRG (2018), prices were not updated due to market price development,

2. frequency variance of additional remunerations used within hospitalizations (using two stents instead of 1)

3. inaccuracies caused by data quality.

Our research provides a foundation for future investigations, inviting researchers to delve deeper into additional remuneration topics. Moreover, the absence of prior results for direct comparison highlights the untapped potential in treating group heterogeneity of DRG systems, leaving room for further exploration and validation of our methodology.

6 CONCLUSION

In this article, our primary objective was to define and present a novel methodology for deciding on additional remunerations in the SK-DRG system. Through a comprehensive exploration of cost data across hospitalizations with 21 additional remunerations, we have established a robust framework addressing the challenges inherent to group heterogeneity. Our methodology, characterized by nine parameters, has been designed with the aim of appropriate decision processes on additional remunerations.

The authors proved suggested parameters could help identify and decide which situation suits adding additional remuneration. Attention was paid to the quality of data, where much improvement by hospitals is needed. Once the quality of cost matrix content is satisfying enough, detailed analyses can be conducted to improve the decision process to maintain additional remunerations.

Data contained 21 existing SK-DRG additional remunerations. In nine cases, methodology suggested further analyses, which implies room for further explorations and methodology development.

In conclusion, the administrator should be able to evaluate parameters and other prepared changes and, based on all information, decide on the right solutions. Evaluation of change should prove that the suggested change improves SK-DRG by improving the homogeneity of costs across DRGs. Thus, the whole model predicts the costs of hospitalizations better. The better the prediction, the fairer distribution of resources to hospitals.

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SERIAL POSITION AND EMOTIONALITY IN ADVERTISING SPOTS IN GENERATION Z

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Abstract

Emotionality plays a key role in the success of advertising campaigns, as it helps to understand the target group and its preferences. It is also essential to understand the cognitive processes and behavior of consumers in order to optimize the advertising strategy and the effectiveness of the campaign. The presented contribution is devoted to the analysis of emotionality in an advertising spot placed in an advertising block with other advertising spots and defines the phenomena and effects of priming, reviews through serial position, which arise during viewing and thus affect the memory and decision-making of the consumer. Through the researched findings, the theoretical framework of the investigated issue is supplemented, and on a practical level, based on the results, the company can decide on a possible more effective and better use of marketing communication, the results can also provide potential for improving the strategy for marketing departments, increase the effectiveness of advertisements and better address the target group. Quantitative neuromarketing tools such as Eye-tracker, GSR (galvanic skin resistance) and questionnaire are used as part of the research methods. Subsequently, an analysis of the results is carried out on the functionality of the priming effect, review and in general the serial position effect, which is strengthened in the case of advertising blocks in which there is an emotional advertising spot. The results confirm that emotions such as joy and fear can create stronger memory traces. Emotional advertising in the middle of an advertising block increases the chances of a priming effect and reviews. The research is focused on generation Z and selected territorial areas. The results suggest that emotional content is better remembered and ads with positive emotions have a higher success rate. Limitations are bias from prior experience, sample selection, and investigation in a laboratory setting. The conclusions point to the need for appropriate content and placement of advertising in the block. The research contributes to the understanding of the emotional impact on advertising campaigns and provides a basis for further investigations.

Keywords: Neuromarketing, Emotionality, Advertising, Generation Z.

1   INTRODUCTION

Emotionality as part of advertising content

The emotional effectiveness of advertising is a subject of interest in marketing, neuroscience, psychology, biology and other related fields. Currently, advertising is in many cases focused on emotional appeals, as they can more significantly influence attitudes, attention and decision-making processes. (Henriksen et al., 2022; Mensa & Vargas-Bianchi, 2023; Paula et al., 2022) The investigation of emotional appeals and their consequences in the minds of consumers is crucial for the design and correct progressive decision-making about marketing strategies with regard to advertising campaigns, which will be directly oriented to the target group. (DE-FRUTOS-ARRANZ & López, 2022) A comprehensive investigation brought general conclusions within the framework of emotionality that inducing joy can increase visual attention to the brand name, where, on the other hand, the emotion of fear can induce overall visual attention (Paula et al., 2022). The findings indicate that emotional content that creates a positive or negative emotion in the respondent can affect consumers' attention and their visual

attention differently. Within the framework of psychographic differences, research has found gender differences in emotional responses to advertisements. The differences are in the perception of visual attention and the attitude towards advertising spots. (Boscolo et al., 2020) However, it is important to recognize that each neuromarketing research is unique and brings knowledge about a specific condition and variables affecting consumers. Therefore, results may vary depending on the psychographic differences (e.g. age, gender, culture and individual experience or preferences) of consumers. Examination of the already mentioned and other factors such as the specific type of content is important in further research for understanding consumer behavior and ultimately providing the right advertising spots for specific target groups. A 2023 study by Mensa and Vargas-Bianchi examines the impact of positive and negative appeals that create emotions in brand communication. Negative emotions can leave a negative impact at a time of increased stress factor. Therefore, it is important to take into account all aspects that may affect the consumer. (Mensa & Vargas-Bianchi, 2023) The research is confirmed by the authors in the form of evidence of the effectiveness of the positive impact of marketing campaigns through emotional appeals. (Septianto & Garg, 2021) It also provides new opportunities for business entities, to which these new opportunities can help in the creation of a communication strategy and thus contribute to a progressive approach in the management of the organization (Russo et al., 2022). Concrete links of emotionality in connection with advertising spots were clarified in their research by Bharadwaj et al. (2020) and Scott et al., (2022).

The effect of priming and reviews in the context of advertising content

As part of the research, it is also important to define specific effects that stem from the research of advertising spots, such as the primacy effect, the re-listing effect and the serial position effect. One of the first researchers to define the priming and review effect in advertising were Ohnanian and Cunningham (1987). Another author who followed their research was Wright(1999), who analyzed the priming effect and the recency effect in Macaca mulatta monkeys. He defined that interference in the serial position plays a key role in creating the said effects. The following figure describes the mentioned effects in the context of information retention in memory traces.
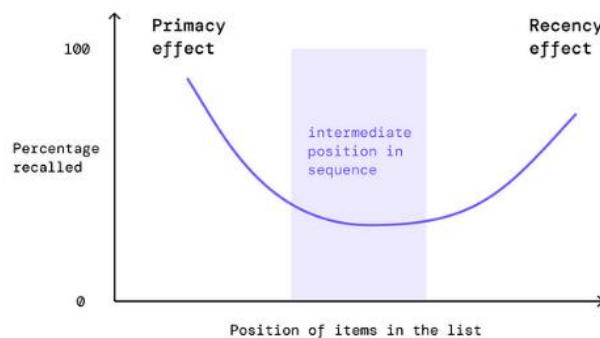
Fig. 1 – Serial position. Source: (Das, 2022)

The serial position effect was investigated in the context of memory and assessed through the examination of route and landmarks. The research showed that landmarks located at the beginning and at the end are ultimately more likely to be remembered and evaluated more positively by respondents as defined by Hilton et al. (2021). Within the framework of the research of the mentioned effects, which originate from the research of advertising spots in the context of the serial position, there are several researches. The serial position effect was investigated in the context of decision-making within the purchasing process. The issue was addressed by the authors Zhu et al. (2021), who defined order in the form of primacy and

recency. According to research, when selling online through a website, the consumer can be influenced precisely by preferring the first option in the form of a priming effect. The same applies to the last option when the effect of recency is applied. The authors (Murphy et al., 2006; Brunel & Nelson, 2003; Forgaš, 2011 and Ohanian & Cunningham, 2012) define other research possibilities through other variables that may have the potential to influence the effect of priming and recency through serial position. This opens up space for the investigation of emotional content, which has the potential to be related to the serial position effect in the context of the priming and review effect.

Summarization of knowledge

Ultimately, it was found that emotional advertising spots placed in an ad block can have a stronger impact on consumers' emotional reactions and thus also the association with memory. Following the investigation, it was found that emotions have the potential to have a specific consequence in the form of a certain influence on consumers. Specifically, emotional appeals in advertising have been found to have potential meaning leading to certain behaviors and defining consumer attitudes. Research has shown that ads that evoke strong emotions are more likely to capture attention, create a lasting impression, and can influence consumer decision-making. From the point of view of the serial position, advertising spots placed at the beginning and at the end of the advertising block may have the potential to be better anchored in the memory. At the same time, advertising spots placed in the middle may have a tendency to be anchored lower in memory. These effects can affect consumers' attention, memory, evaluation and behavioral responses. Research specifically states that the specific effects of the priming effect, recency through serial position may vary depending on the context of the content, the target group of consumers and other factors such as mood, gender, or individual characteristics of the individual, while a research gap was discovered, which is in the possible change of said effects in the context of content with emotional appeals. Therefore, further investigation of these effects and consequences in relation to emotional content is very important. In view of the mentioned research that took place in the past, there is thus room for further investigation of the effect of priming and recency with regard to emotions. The specific addressed question that is asked is whether the emotional content during the advertising block manifests itself in the form of a more optimal effect of the priming and review effect. The relevance of the contribution lies in the theoretical and practical level. At the theoretical level, it consists in the contribution or verification of the mentioned phenomenon of the serial position of the priming and review effect in the context of emotion with respect to the mentioned research, mainly to the theories of communication and media psychology. These are also findings that can directly affect the rationalization and optimization of the allocation of advertising resources on a practical level thanks to a more effective decision and the possibility of choosing the appropriate creative content of the advertisement and placing the advertising spot in a suitable place in the advertising block. Based on theoretical principles, the goal is to map the uniqueness of advertising videos with regard to emotionality as a starting appeal in an advertising spot with the potential of brand recognition and memorability in the context of the priming effect, recency and serial position in the target group of generation Z.

The research topic was defined as: Serial position and emotionality in advertising

Based on the theoretical starting points, the research question and hypothesis emerged:

RQ1: How does the memory retention of viewers differ when viewing an ad sample containing emotional ads compared to a control group without emotional ads?

H1: Advertising spots placed at the beginning and end of a block with emotional advertising will be better preserved in the memory footprint than ads placed at the beginning and end of an ad block without emotional advertising.

2 METHODOLOGY

The research involved a thorough review of primary and secondary sources of information. In the introduction, mainly scientific and professional articles from renowned authors are used as part of professional literature, scientific contributions and articles. The practical part of the contribution contains a quantitative neuromarketing experiment with the help of Eye-tracking tools, GSR (galvanic skin conductivity) and a questionnaire with open questions. Thus, a mixed research design of quantitative and qualitative methods is applied to deliver the best possible results.

Methods used

The commercially available software IMotions was used, allowing the capture of physiological reactions and emotions of the tested person during the presentation of the researched material. The IMotions software used is aimed at capturing and analyzing electrodermal activity, heart rate and eye movement. The main output is the recording and display of data on the emotional engagement and attention of the respondents. As part of the methods used, the analysis of facial expressions (Eye-tracker) was used - the emotional reactions of the participants, by changing the conductivity of the skin (GSR), and then a questionnaire was applied to expand and obtain additional information.

Eye-tracker is a recording of facial expressions that reflects a person's subconscious experience. As a result, we are talking about valence. Emotional valence refers to the intrinsic attraction or aversion to events, objects, or situations. The result can be positive, positive emotions or negative, negative emotions. The range is from 100 to -100. Emotions that are normally perceived as negative, such as anger and fear, have a negative valence, and are evoked negatively by the participant's evaluation. Positive emotions such as joy, which have a positive valence – arise from positive events, objects or situations. Thus, emotional valence provides information on whether the participant is in a positive, neutral or negative mood when watching the studied stimulus. There are certain factors that can affect valence, specifically smiling or lifting your cheeks which can increase the likelihood of positive valence. On the contrary, raising the eyebrows, wrinkling the eyebrows, wrinkling the nose, lifting the upper lip, lifting the corner of the lips, lifting the chin, pressing or lip smacking increases the likelihood of negative valence. 7 basic emotions are subsequently identified after processing, namely anger, contempt, disgust, fear, joy, sadness, surprise. (Ekman, 2007) Another important measure is emotional valence - the intensity of emotions, which are evaluated on the basis of facial expressions, their duration and strength; engagement - the respondent's interest; sentimentality - for determining positive and negative sentiment; neutrality - calm facial expression; attention - whether the respondent follows the projected image and confusion - eye wandering within the presented material.

GSR (Galvanic skin resistance) is an important indicator of basic emotional responses in the context of human behavior studies. It represents the activity of the sympathetic nervous system, which is a response to physical and emotional stimuli in our subconscious. In the case of survival as a result of increased emotional mood, the nervous system will accelerate, the heart rate will increase, the pupils will dilate and the activity of the sweat glands will increase. The results are the average of values measured by GSR during playback and subsequent segmentation into individual parts. The GSR is recorded every second, when as a result the values were averaged for each advertising spot, as a result it is clear at which moment the highest emotional change was manifested in the response of the respondent's body.

The questionnaire was used after the neuromarketing scan, when data were collected on the anchoring of advertising spots (brands) in memory and decision-making. The questionnaire contained 4 questions, specifically:

a) Which advertisement do you think of first? What attracted you to it? (open question) – a question focused on memory or keeping the commercial in mind;

b) Which advertisement do you still remember? What attracted you to it? (open question) – a question focused on memory or keeping the commercial in mind;

c) Which other advertisement do you still remember? What attracted you to it? (open question) – a question focused on memory or keeping the commercial in mind;

d) Which of the advertisements worked with emotionality? Where were emotions used? Which specific emotions were involved? (open question) – a question focused on emotionality or the respondent's decision about emotionality in the advertising spot.

Descriptive, statistical and mathematical procedures were used for the evaluation, which were applied in the evaluation of the questionnaire (average and interpretation) and statistical evaluation (average and interpretation) of the neuromarketing survey through GSR and Eye-tracker.

Validity and reliability

As part of validity, we are talking about the analysis of facial expressions, Eye tracking, its correctness is defined by e.g. authors Kulke et al. (2020), Lewandowska et al. (2022). On the basis of the amount of data collected during the production of the tool, individual emotions and states of the respondent's face, which are compared with the investigated respondent, were statistically derived and continue to be derived over time. Thanks to this, we can define more precise and quantitatively based results. At the start is the system always recalibrated in the same way (distance, gender and other specifics) for each respondent to best measure the required information. The use of facial expression analysis and the GSR method is considered appropriate and effective in neuromarketing research. Relevant advertising spots were also selected to record physiological and emotional reactions. Reliability is supported by repeated testing on a control sample of respondents. The use of galvanic skin resistance (GSR) minimizes random errors and ensures data consistency. Likewise, the research sample is focused on a specific generation Z, the generalization of the results to other groups may therefore be limited and tied to a specific group.

Equipment used

The Eye-tracking method was used for neuromarketing research, where facial expressions are recorded using a camera. The shooting was done by displaying the video on the 22-inch screen. The frequency of the display was 60Hz, which corresponds to common monitor standards. The tilt of the monitor was 0.5-1 degree from the basic position. The distance of the participant from the monitor was 60-70 centimeters. After scanning, the data were analyzed through the IMotions neuromarketing software. The evaluation took place with the help of determining basic emotions and relevant indicators. The HD camera used recorded in Full HD, which means 1080p, which is why it is possible to record facial changes in high quality. The device Shimmer3 GSR+ Unit for measuring galvanic skin resistance was used to measure GSR. After data collection, neuromarketing software IMotions was used for evaluation and analysis.

The course of the experiment

The experiment took place in the neuromarketing laboratory of FMK UCM in Trnava on April 3, 2023 and April 24, 2023. The participant entered a room where the course of the experiment was explained to him and he was instructed on the ethical way of research, he was then seated in a chair that was at a distance of 60 -70 cm from the monitor, or from the respondent's head. Subsequently, the participant was fitted with a measuring accessory in the form of a GSR device on the fingers, where the skin conductivity and pulse of the respondents were taken. Consequently, the calibration of the device was started and then the recording of the respondent was started on a sample of 6 videos, where instructions were played at the beginning and at the end there was a final video with a thank you. Subsequently, the participant went on to fill out the questionnaire, which contained 4 questions. After filling in, the respondent was done with the inquiry.

Subjects of testing

6 spots were placed in the resulting selection of the advertising block. The selection consists of more than 20 commercials, when, as part of the pre-research, the commercials were played to respondents who were from generation Z, followed by an electronic questionnaire, where a question was asked about emotionality and memorization of the commercial. Subsequently, 6 spots were selected that did not show either emotional undertones or correlation with memory and one spot that showed a high emotional mood and also a relationship with remembering in the respondents.

Tab. 1 – Researched advertising spots. Source: own research

Company	Advertising spot	Content
Neutral		
Slovakia Travel	Petra Vlhová	Traveling in Slovakia in winter has its own charm. This is also confirmed by a well-known personality, Petra Vlhová.
Budiš	Hero	You will be a hero with Budiš. Which is confirmed by a highly successful man in an advertising spot.
Philips	Sonic Care	Lots of bright smiles and nice shots of the toothbrush.
Škoda	Filip – control sample	Presentation video with nice shots of the car with a point that you should have a reliable partner on the road.
Pegas	Waves	A popsicle is included with the flight, it is mainly a nice preview video of the summer atmosphere.
Dr. Max	Seniors	Even seniors deserve a good and modern pharmacy where they can be themselves.
Emotional		
Slovenská sporiteľna	Future	A woman gives birth in an ambulance and a man rushes after her, at the beginning one is in tension as to how it will turn out and in the end it's successful and they arrive at the hospital, at the end we see the child.

The research sample

The research sample consisted of 40 respondents between the ages of 19 and 22. The research set was chosen intentionally for Generation Z, as it is an emotionally developing group of consumers, when deepened emotions are observable to a large extent (Liu et al., 2023). The respondents were divided into two homogeneous groups, where 20 respondents formed the test group and 20 respondents formed the control sample. There were 6 men and 14 women in the test group. In the control sample, there were 4 men and 16 women. Due to the balanced investigation, the distribution within gender is even, as the objective of the investigation is focused on the criterion of age or generation Z. In the test set, respondents were played an advertising block of 6 advertising spots, where the fourth emotional advertising spot was replaced in the control group by a spot that did not show the attributes of an emotional spot. The commercials were preceded by an instructional video and at the end of the block of commercials there was a thank you.

3   RESULTS

The following chapter contains the interpretation of the collected data. Within the first assessed sample, the emotional valence was at the level of values above 20, which can be interpreted as a more significant change in the Budiš commercial and the Philips commercial. Despite the highest joy, Budiš was not anchored in the memory compared to the rest on the higher ranks.
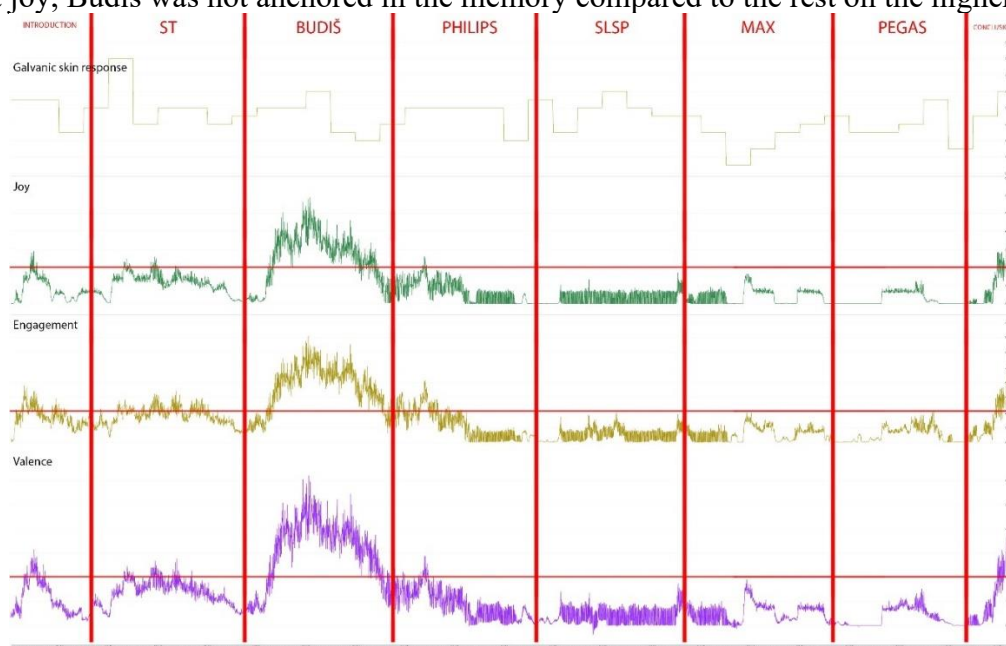
Fig. 2 – Valencia, engagement, GSR and joy. Source: own research

In comparison with the control sample, in the investigated set with emotional advertising, a reduction in facial emotions is visible in the SLSP emotional advertisement. The values in the selected emotional advertisement are at low values. The findings can be interpreted as a deep involvement and concentration of the participants on the video being played. The phenomenon that occurs in this part is called "hidden emotions" or "incongruent facial affect or facial masking". Research shows that another predictor of the success of an advertising spot is engagement and joy. Due to the results, the Budiš spot shows the highest level of engagement and happiness, followed by Philips in both tested samples. The advertising spot Budiš contains an entertaining rendering in its content, which corresponds to a higher degree of joy. In the Philips advertising spot, it may be the occurrence of smiles, where a mirroring effect takes

place, meaning that higher values of joy are shown as a result. The following is a Škoda advertising spot, where are the limit values of joy.
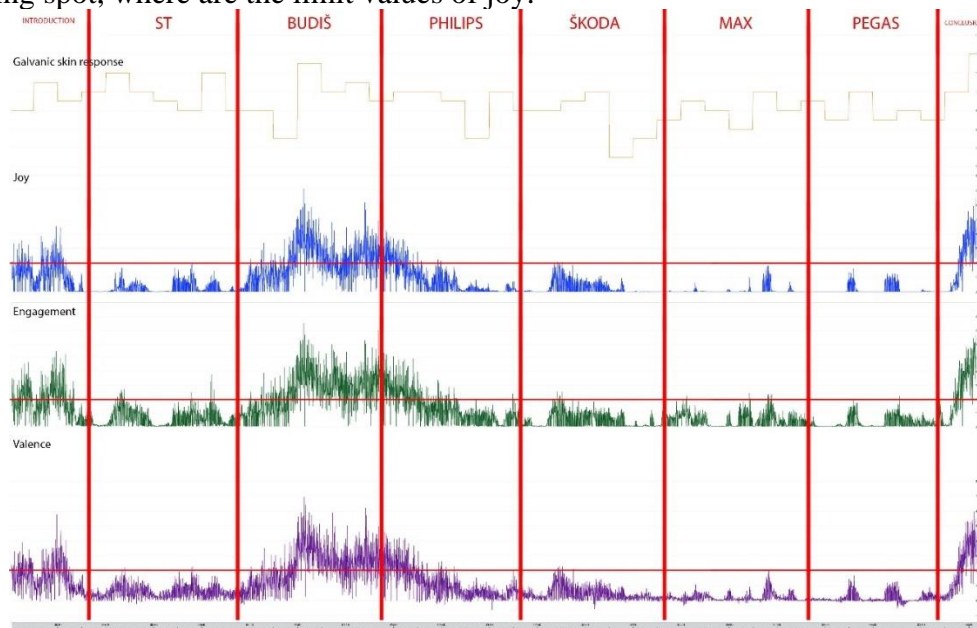
Fig. 3 Valencia, engagement, GSR and joy, control sample. – Source: own research

In connection with the galvanic response of the skin, we can add that during the time period in which there is an emotional advertisement, despite the "hidden emotions" effect, the respondents experienced increased emotional involvement, and the advertising spot is thus in second place in the achieved values. When supplementing the information through the questionnaire with qualitative data, it follows that the respondents stated that they felt fear and then relief from the story of the advertising spot. So, as a result, with regard to the emotions experienced, we can talk about a deeper concentration, which this advertising spot caused. The highest GSR values were measured during the first advertising spot, which may be caused by the initial interest of the respondents and the expectation of what will come within the video in the playing block. A similar growth is observed at the beginning of the block, which is reduced to an average value in the following close associated seconds. In the control sample, a low emotional response to the control advertising spot was confirmed, thus the experiment was verified and the control advertising block was defined correctly.

Tab. 2 – GSR. Source: own research

Examined file			Control sample	
Advertising spot	GSR		Advertising spot	GSR
ST	10,46667		ST	9,684211
Budis	9,066667		Budis	9,470588
Philips	9,0625		Philips	9,0625
SLSP	10		Skoda	7,52
Dr.Max	6,357143		Dr.Max	8,105263
Pegas	7,769231		Pegas	7,73913

In the questionnaire, the first question asks about what the respondents recall first. We thus engage the equipment of the memory track. Within the studied set, ST (advertising spot that was played first) is in first place with number 6, followed by Pegas with number 5 (advertising spot that was played last). Subsequently, Budiš is in third place with the number of 4, and in the next place is Max with the number of 3 and in the last place is SLSP with the number of 2.
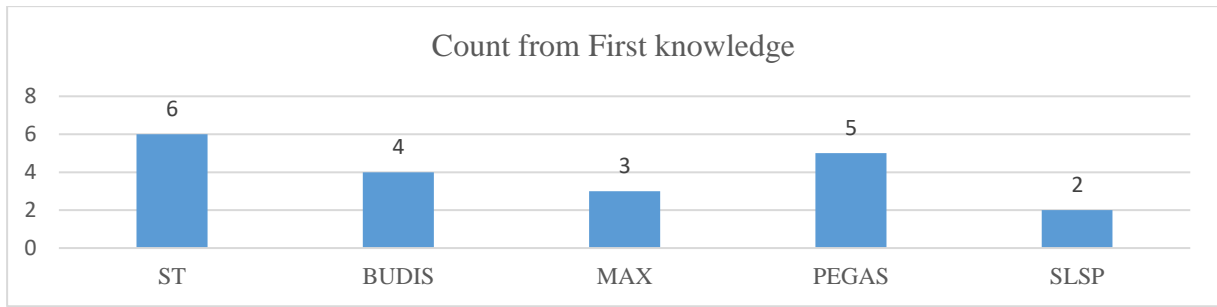
Fig. 4 - First knowledge – Source: own research

Compared to the control sample, the results in the studied set are mainly focused on the first and last advertising spot, where the priming effect and recency effect are observable. Thus, the results suggest a serial position effect.
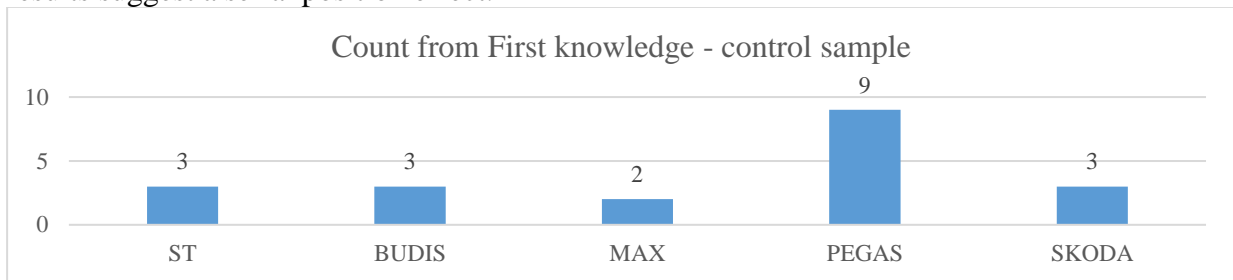
Fig. 5 - First knowledge, control sample – Source: own research

Compared to the control sample, where the priming effect is not confirmed, we exclusively observe the recency effect. Due to the experience of emotion in the studied group, it is obvious that the anchoring in the memory track happened in the first part and subsequently also in the last part of the advertising block, the emotional experience thus led to the capture of the first advertising spot and the last advertising spot. In the control sample, the last presented video was anchored in memory. Thus, during the observation, there was no significant emotional appeal that would focus the attention of the respondent.
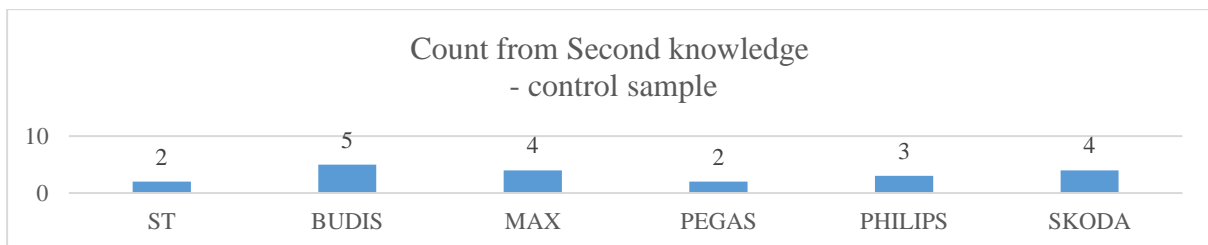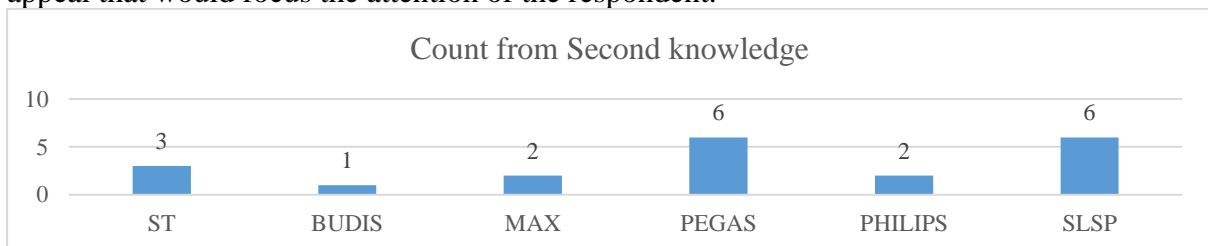
Fig. 6 - Second knowledge and control sample – Source: own research

As part of the second knowledge, the results indicate the equipment of the last spot from the memory track, which leads to the effect of recency, and the same results were achieved by the SLSP emotional spot. This confirms the memory anchoring of the emotional spot. Within the control group, memory anchoring is tied to Budiš, where the highest positive emotions were

achieved in the examined block of advertisements, which were manifested in the change of facial expressions. This confirms the theoretical basis that positive emotions are important for better anchoring within memory traces. Subsequently, there is the advertising spot Dr. Max, which is described as the most powerful one in the control group. The evidence presented suggests that experienced emotions relative to the higher value measured by GSR may allow better anchoring in memory.
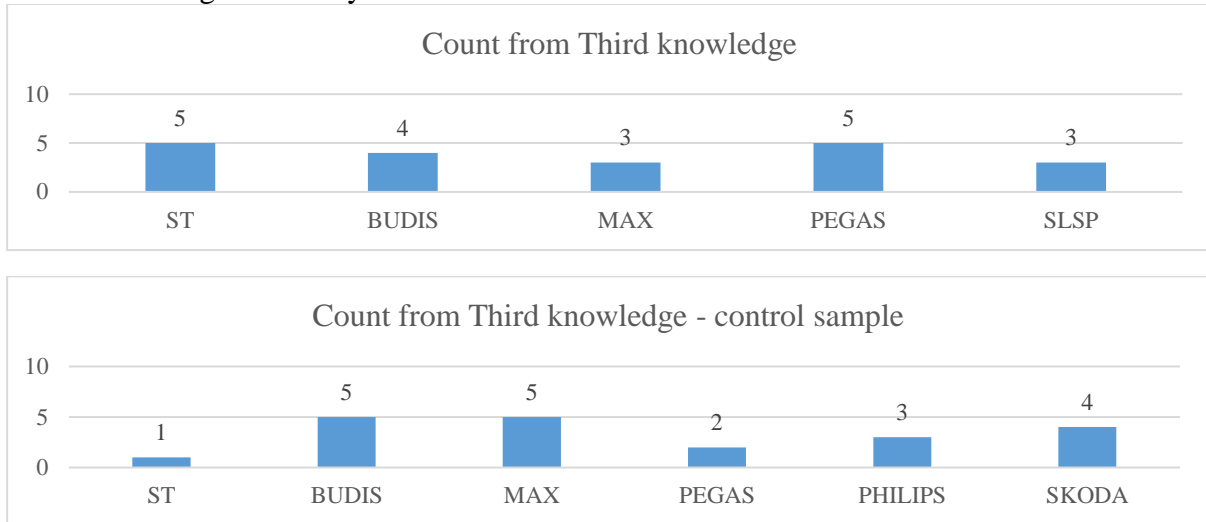
Fig. 7 - Third knowledge and control sample – Source: own research

The third question yielded findings reconfirming the effect of priming and reviews in the studied set with an emotional advertising spot. Within the control sample, the highest frequency is the advertising spot Budiš and the advertising spot Dr. Max, which demonstrated more fundamental values of joy in Eye-tracking of experienced emotions.
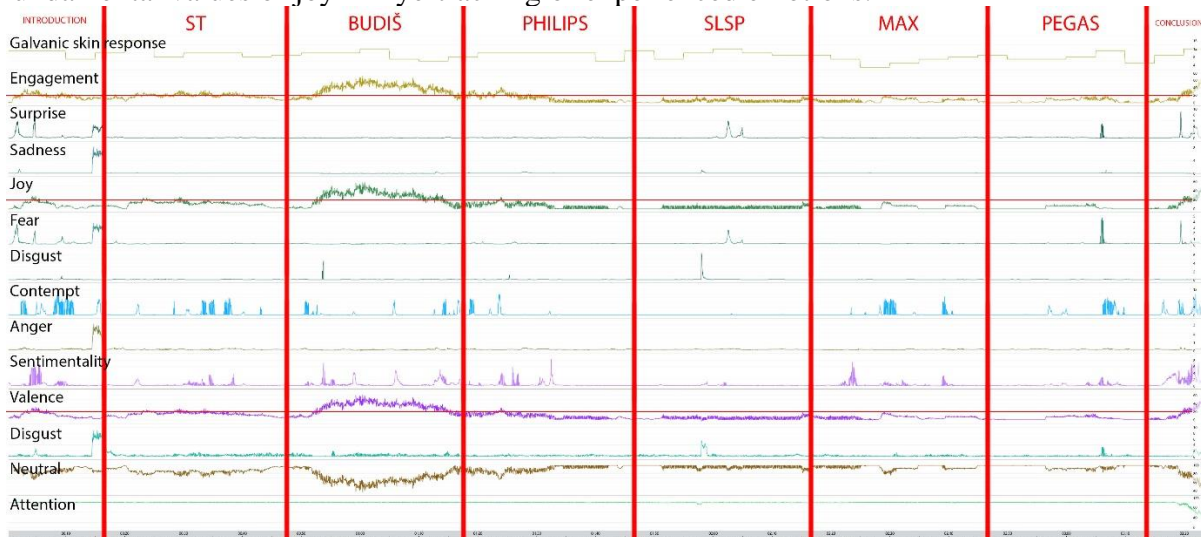
Fig. 8 - Eye-tracker – all emotions of the participant – Source: own research

Fig. 9 - Eye-tracker - all emotions, control sample – Source: own research

The overall results of the investigated basic emotions did not manifest themselves at a significant level, given that they did not reach a threshold value higher than 20. The minimum indicators were manifested in the advertising video of Budiš and Dr. Max, where the joy and valence values were exceeded.

Fig. 10 - Word cloud of the most frequent words – Source: own research

As part of the qualitative data that was collected, a word cloud was evaluated with the help of keyword frequency analysis. Among the most numerous keywords were "nice pictures", "emotions", "sea", "Petra Vlhová", "Childbirth", "Joy", "Funny", "Compassion", "People" and others. After a deeper analysis, it is clear that the biggest factor is beautiful shots and positive emotions. The following are specific indicators of the first advertising spot with the help of the well-known personality Petra Vlhová and the last spot with the help of the indicator "sea". Next, there are emotional spots, the birth of a child and other emotions such as joy and compassion, which fits into the thesis of the best emotions for advertising spots.

The results of the experiment

The results provide an answer to the first research question. Due to the researched priming effect and recency effect, it is possible to confirm based on the results that within the tested video, where the emotional video was in the middle, people remembered the first and the last video as well as the second emotional video. Thanks to this, we confirm the hypothesis as significant. Furthermore, the emotions of joy or initial fear and subsequent relief can create

stronger memory traces when used correctly. An emotional ad in the middle of an ad block increased the chances of showing the effect of priming and reviews. On the contrary, in the control sample, the last video was anchored, which showed the effect of recency. The complex effect of the serial position of the video in the advertising block was thus confirmed. Despite the fact that the first advertising spot (Slovakia Travel) caused a higher emotional response, we are talking about the initial excitement of the respondent, therefore we can take into account the highest level of emotional response for the emotional advertising spot. In conclusion, it is clear that advertisements that show Joy or higher emotionality according to the respondents are better anchored in the memory trace.

4 DISCUSSION AND CONCLUSION

The research brought very important knowledge about the state of the problem in the domestic business environment. For advertisers, not only the frequency of the played spot and its location in the correct time block are important, but also the content page and the place of occurrence with other advertising spots in the block. Specific research that subsequently addressed priming and recency effects in the context of gender and content were evaluated by researchers Brunel and Nelson (2003). Within the findings, the authors define the need for further research, which would be focused on other variables, where there is room for research in relation to emotional content. Likewise, there was no neuromarketing research at the time of the study. It is for this reason that the presented research is a benefit, which fills this gap and thus defines relevant conclusions within the framework of human cognitive processes. In a previous study, link-click priming effects were confirmed through a pair of field experiments, and a review effect was also found, where visitors clicked more on end links in a list relative to website navigation (Murphy et al., 2006). What is needed is the application of emotions, or emotional content into all types of content that the results address. Thanks to this, it is also possible to define when the effect of priming and review is at a higher level, and at this point the question of further research arises, which should be focused on the emotional content in relation to the serial position that was made in the contribution. Considering the results of the investigation, this result is consistent and confirms the results of the investigation. However, another question arises regarding the appropriateness of the content on the web pages with regard to attracting attention through an emotional context. Research by Forgaš (2011) brings the finding that a mood that has a positive charge strengthens the priming effect when creating first impressions; a negative mood eliminates this effect. The mentioned research complements the results, mainly due to the internal attunement, which is more long-term within the mood and shorter-term with a deeper expression within the emotionality. The novelty of the presented research is the addition of the variable "emotion" to the existing researched variables such as mood. Thanks to this finding, it can be concluded that the creation of the right content, placed in a serial position, can influence a person's memory trace and his decision. The research by the authors Bharadwaj et al. (2020) is different. They define different results and there is the fact that the effect of priming and reviews does not affect the effectiveness of advertising or of liking. The present study, by its novelty, adds the fact of a memory trace, which may be more useful than the likeability of advertising. Finding the right balance between the phenomena is important. In conclusion, the results indicate that business entities should pay attention to specific content both emotionally and rationally in relation to the correct timing, or ad placement. A comparative contribution whose results can be reported was defined by Ohanian and Cunningham (2012), who defined the effect of primacy and recency in two formats in service evaluation, sponsor credibility, recall of service evaluation, and probability of service binding. The findings suggest that the order of the ad block, gender, or values can influence the processing of the ad in different situations. An experiment that was set up to confirm whether it disproved the possibility of

effects within the emotional interference of a person when viewing advertising spots and the possibility of using these effects as progressive in deciding on advertising spots and the overall strategy of marketing communication. Research at present or a similar proposal was made by Bigné et al. (2020) who defined the first item effect as the primacy effect and the recency effect as the last. Likewise, from the emotional side, the influencing of memory processes is confirmed by Giovannelli et al. (2022), on the basis of which it is then possible to form judgments and impressions (Nevado & Castillo-Olivares, 2022). Zare and Pearce (2021) confirmed the direct connection with the effects of priming and recency with regard to the involvement of the individual and his motivation to think. Due to emotions, involvement and attention are strengthened, which is confirmed by the research results. We can declare that emotions are an attribute which influences behavior or attention of consumers by inducing the effect of priming and review. It is also important to note that even emotional advertising spots are better integrated into memory traces, this is also confirmed by Czarnecka and Mogaji (2020). Specifically, the emotions were fear and worry, but also ultimately joy, which created a stronger emotional experience and thus a fixation in memory, this is also confirmed by Kadhim (2023), but the specific generation of experienced emotions remains a novelty. Kadhim (2023) adds that these emotions are essential to influence consumer behavior. In conclusion, we confirm the claims of researches that define the first and last items as better to remember (Gicas et al., 2022). The bottom line is that the recency effect depends on short-term memory, while the primacy effect depends on long-term memory. In conclusion, companies should pay attention to the placement of the advertising spot in the advertising block and also to the content, which should ultimately show positive emotions. Within the limits of the research, we can also talk about the distortion of the results from the previous experiences and experiences of the respondents, since they may have come into contact with some spots before the research, they may be anchored in the memory traces better than others, which is caused by the effect of repetition. Also, the selection of the sample can be a limit, since it is a quantitative investigation with a smaller sample of respondents, it is possible to see only a detailed view of the issue without generalizing to the entire population, mainly due to the selection of a specific demographic group and a territorial area that has certain cultural specificities. Another limit could be the possibility of choosing other emotional or rational advertising. It is also possible to consider the laboratory environment as the limit of the investigation, since in the real environment there can be more diverse and extensive disturbances. A fundamental limitation is also in the consideration of the time variable, more time could pass between the playing of the spot and the examination, precisely because of the memory traces, which can be modified by time. An important limitation is also the diversity of the content meaning of advertising spots, the interpretation of respondents can be a subjective and quite unique process, which is different for each person, as there can be a wide range of opinions or preferences that can cause changes in the result within the memory track. The conclusions will serve as an important basis for further research. Further research could focus on comparing other advertising emotional and rational spots with a focus on positive and negative emotions and their effects on memory and perception. Likewise, there is the long-term impact of advertising spots and other factors such as music, text, language, territorial or demographic dispositions.

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DOES A CUSTOMER'S BEHAVIOUR ON THE WEB DETERMINE THEIR LIFETIME VALUE (CLV)?

Daniel Kvíčala, Halina Starzyczná

Abstract

The Czech Republic is one of the countries with the highest number of e-shops per capita, which makes the Czech e-commerce environment very competitive. In order to thrive in the long term, e-shops need to build their marketing strategies on empirical data. This is the only way they can properly understand how customers behave in this market so that they can adapt their activities to their behaviour. They also need to know the value of their customers to know which ones are most financially interesting to them. However, an obstacle to this is the lack of scientific studies that address the issue while working with empirical data. Thus, the aim of this paper is to evaluate the relationship between selected variables describing customers' web behavior and their lifetime value (CLV). For this purpose, the data of a selected e-shop was processed and the relationship between the selected variables and CLV was evaluated using regression analysis. The result shows that the selected variables determine the worthiness of CLV only very weakly. The application of the obtained findings to the whole market is very limited due to the size of the research sample, but the methodology used can be applied to any e-shop, as it works with standardized data that most e-shops automatically collect.

Keywords: e-commerce, customer, customer lifetime value (CLV), e-shop

1   INTRODUCTION

The e-commerce environment offers companies almost unlimited possibilities in reaching customers and presenting their products or services to people around the world. It also provides the chance of continuous communication, interaction with customers, providing information, content and getting real-time feedback. In turn, it creates a space for customers to browse, compare and evaluate offers from companies anywhere in the world and choose the product that best suits their needs. They can do all this in minutes and from the comfort of their own home. Ultimately, then, e-commerce provides rich opportunities for both sides of the transaction, but it also creates a highly competitive environment.

Companies are not only competing with companies near them, but with companies almost all over the world. They also have to be careful about their offer, presentation and communication as they face direct comparison with their competitors.

In order to thrive in this environment, companies need to understand their customers' buying behaviour and needs and adapt their marketing activities accordingly. For this purpose, they need reliable data and they also need to interpret and translate this data into useful insights. The positive fact is that they have an enormous amount of data available for these purposes, which is very easy to monitor and put into practice.

Despite the strong interest of academics and practitioners in this area or in the issue of customer buying behaviour in e-commerce, there are very limited academic publications based on empirical data that would provide firms with a reliable basis for strategic decision making. If we consider the Czech e-commerce market, the amount of such materials is minimal. Thus, the aim of this paper is to evaluate the relationship between selected variables describing customers'

web behavior and their lifetime value (CLV). The baseline is a brief literature search related to the issue under study. Regression analysis was applied to evaluate the data.

2 LITERATURE REVIEW

The literature search introduces the e-commerce market and its specifics, customer buying behaviour on the web and the variables by which this behaviour can be measured. Subsequently, the issue of customer value for the company, customer lifetime value and methods of its evaluation are described. This provides a theoretical basis for the execution of the research.

2.1 E-commerce

Electronic commerce, also known as e-commerce, represents more than a mere method of supporting or improving existing business practices. It signifies a fundamental change in the way business is conducted—a paradigm shift. E-commerce is a disruptive innovation that is revolutionizing the conventional approaches to conducting business (Lee, 2001). The rapid progression of this industry is attributed to its operation on entirely distinct principles and work regulations within the digital economy.

The advancement of e-commerce relies on the utilization of network technology within this domain. The swift evolution of information technology has propelled the ongoing enhancements in e-commerce. Through the Internet, all components of the business development chain have established direct communication, leading to a significant redefinition of business operations (Luo, 2022).

Consequently, e-commerce encompasses the buying and selling of goods and services through the Internet. Businesses establish their online platforms where consumers can explore an assortment of products and services. Once consumers make a selection, they proceed to purchase the desired goods and services using diverse payment methods such as credit cards, debit cards, electronic checks, or PayPal, all facilitated through the website (Rahman, 2018). Subsequently, the businesses dispatch the orders to the consumers' residences. Throughout this process, consumers have the ability to track the progress of their ordered products or services as required. All these transactions and interactions take place in the online realm.

E-commerce enables and streamlines personalized digital production. Through the establishment of diverse databases, businesses can collect and store customer data, engage in real-time communication with customers via the Internet, and stay up-to-date with the latest trends in customer demands (Bhalekar et al., 2014). Once a business acquires user demand information, it can promptly and accurately transmit this information. All aspects of the enterprise, including design, supply, production, and distribution, can swiftly, precisely, and systematically respond to the information received (Kaur a Gupta, 2019). They exhibit agility and responsiveness to market demands, shifting from a general market focus to a customer-centric market orientation. By utilizing computer process simulation technology and adopting concurrent engineering organizational structures, businesses can achieve flexible combinations of products, services, and information, thus significantly expanding their product range (Shahriari et al., 2015). This approach allows for rapid product design, prompt delivery of highly varied products and services, customizable batch sizes, superior performance, and exceptional quality, ultimately leading to increased customer satisfaction (He, 2021).

The business benefits of e-commerce technology have been widely acknowledged. Extensive literature on e-commerce highlights several key advantages, including cost reduction, sales growth, enhanced productivity, streamlined processing time, expanded market reach, and improved customer loyalty (Rahayu and Day, 2017). These advantages are considered pivotal

in driving the popularity of e-commerce among businesses, as evident from the substantial year-on-year growth in e-commerce user adoption.

The scope of Internet marketing is not constrained by the size of a company. Even with limited financial resources, businesses can engage in the global information and trade networks, enabling them to connect with potential customers and bring their products to the market (Hua, 2016). This capability was previously exclusive to large companies with significant financial means. In essence, network marketing has transformed the landscape for small and medium-sized enterprises, allowing them to disseminate and acquire market information to a certain extent, and expanding their marketing opportunities in the process (He, 2021).

2.2 Customer behaviour on the website

Consumer behaviour extends beyond the mere act of purchasing and its outcome; it encompasses a broader spectrum of factors. Consequently, it necessitates not only observation but also thorough study to uncover and comprehend the cognitive processes that occur within the consumer's mind during the purchasing journey (Stimac et al., 2021).

According to Li et al. (2017), the website is defined such e-service quality by online lookers and investigated its factors; and is perhaps one of the important way to communicate with its customers in the online platform (Chen & Dhillon, 2003) especially at the pre-purchase phase.

With the increasing popularity and widespread use of the Internet, new technologies continue to emerge, including the rise of web shops. The emergence of web shops has significantly impacted consumer behavior, as they have become so prevalent that it is no longer possible to study consumer behavior without acknowledging the influence of online shopping, which eliminates the need for physical presence (Stimac et al., 2021).

In order to thrive in the e-market, companies must have a clear understanding of their target customers and tailor their strategies accordingly. While e-commerce providers cannot control the level of experience of their e-customers, they can create websites that offer customization options. By doing so, they can guide e-customers through a shopping experience that builds confidence and trust (Hernandéz et al., 2010).

E-business should communicate essential details to potential e-customers, outlining the features, benefits, and convenience of e-commerce. As Internet technology continues to advance, online marketing undergoes a parallel evolution, resulting in significant transformations in marketing practices and altering some fundamental marketing principles (Otim and Grover, 2006).

In order to gain a deeper understanding of e-consumer behavior, (Amit et al., 2014) have formulated interesting findings and insights:

- Online shopping is gaining popularity among the younger generation due to its perceived comfort, time-saving nature, and convenience.

- Customers increasingly compare prices from various brands in online shopping as compared to physical shopping.

- Security concerns are recognized as a significant barrier to online shopping.

- Online shopping is an emerging trend among the 18-33 age group.

- The majority of online shoppers are employed.

- Easier payment methods and time-saving aspects motivate online shoppers to make purchases.

- Online shopping facilitates product comparison across different online shopping websites.

Similar to traditional offline shopping, online shopping is influenced by different types of consumer personalities that impact the purchasing behavior. According to (Rahman et al., 2018), there are various types of online consumers, including adventurous explorers, fun seekers, shopping enthusiasts, as well as technology skeptics who dislike waiting for products to be shipped.

The subject of e-commerce is various business transactions carried out using the Internet. As mentioned in the introduction of this paper, measuring e-loyalty in an online environment tends to be part of the metrics used in online marketing, which is part of performance marketing (Ahmdan and Khan, 2017). These measurements aim to provide reliable information about customer behaviour and actions and sales revenue (Laudon and Traver, 2007). There are a variety of metrics. Most of them have their specific uses. In practice, this means that each may be applicable to a different situation. Respectively, we need to apply combinations of metrics to monitor customer behaviour.

We can divide the metrics into three groups, customer, e-shop performance and campaign. Customers visit the website to make a purchase. They perform the necessary activities on them. A number of experts are interested in listing the metrics that have their telling value (Ghandour et al., 2011) An important role is played by the website, which should be functional. That is, it should assist conversion, engage and bring the customer back and also evoke his activities with other members of his target group. Therefore, the number of visits to the website (V), the average number of pages viewed per visit (APV) are monitored.

A reliable measure of a site's attractiveness can be "Unique visitors," which measures the number of unique visitors regardless of how many pages they view. Average time spent on site (ATS) has some telling value. The bounce rate (BR) represents the number of users who have not interacted with a website. This metric allows us to track relevant traffic. An indicator of a site's following or even trust can be the metric of "loyalty," which measures the percentage of visitors who return in a year (O'Connor, 2021).

2.3 Customer value

The origins of the interest in estimating and understanding customer value or customer valuation date back to the 1940s, companies began to estimate the value of their average customer (Estrella-Ramón et al., 2017). Later, in the late 1960s, when companies began to use computer technology, the task became more complex and companies tried to predict the long-term value of their customers, although at that time these were only the first attempts at this type of predictive analysis (Petrison et al, 1993). For example, Sevin (1965) proposed a simple method for calculating the profitability of a customer by assigning a functional cost to each customer and subtracting it from each customer's annual revenue, which can be considered a basic method for calculating customer value applicable in marketing research and practice.

Specifically, three phases in the development of customer valuation techniques can be identified (Weir, 2008). The first deals only with customer profitability (CP) analysis (e.g. Mulhern, 1999), the second with customer lifetime value (CLV) analysis (e.g. Pfeifer and Carraway, 2000) and the third with customer equity (CE) analysis (e.g. Blattberg and Deighton, 1996). CP is calculated as the difference between the revenue and costs associated with a customer over a certain period (Pfeifer et al., 2005), CLV is then the net profit or loss to the firm from a customer over the lifetime of that customer's relationship with the firm (Gupta & Lehmann, 2003), and CE is made up of the CLV of all current and potential customers (Zhang et al., 2010). Thus, if a firm wants to address the value of specific customers, the calculation of CLV is an ideal tool

for this purpose. In addition to the value of individual customers, the customer base can be divided into segments and then further worked with.

For example, CLV can be used to decide between new customer acquisition or retention (Lin et al., 2017), a frequently asked question that the author will also address in the dissertation. Furthermore, CLV is also used to determine the market value of a firm or to assess its financial position (Gupta and Zeithaml, 2006, Haenlein et al., 2007, Srinivasan and Hanssens, 2009, Zhang, 2016). CLV, by its properties, provides better insights than conventional financial metrics when a firm has negative cash flow or needs to estimate future revenue or earnings trends (Rust et al., 2004).

At the same time, it should be added that there are only a minimal number of empirical studies in this area of e-commerce (Jašek et al., 2018), which creates a significant potential for expanding scientific knowledge and obtaining unique and very valuable insights. Specifically, the identification of factors that influence CLV in e-commerce environments can be used for both customer evaluation and stimulation through the implementation of selected marketing activities that are associated with these factors.

3 METHODOLOGY

Based on the findings of the literature search, research will be conducted to analyse the relationship between selected variables describing customer behaviour on the web and customer lifetime value (CLV). The metrics describing the behaviour will be:

a) number of visits to the website by the customer (V),

b) average time spent on the website (ATS) and

c) bounce rate (BR).

Customer CLV will then be calculated from customer-generated revenue, average margin and average retention rate.

Regression analysis or multiple regression will be used to analyse the relationship between the selected variables as we are working with multiple independent variables. Regression analysis is a widely employed and dependable statistical technique used to explore relationships between variables. Its user-friendly nature makes it applicable in both academic and business domains (Alexopoulos, 2010).

The analysis will be carried out in Microsoft Excel, a widely used tool in both academic and practical spheres. It is relatively easy to use and there are also a number of tutorials that make the user's work easier. This makes the methodology used easily applicable for further use in both academic and practical fields.

3.1 Data

The data comes from a Czech B2C e-shop focused on clothing sales. It is transactional data that is automatically collected in Google Analytics, which is used globally to analyse the website, customer buying behaviour, performance of online marketing channels and business results. The data therefore describes real customer behaviour on the web.

The sample consists of data from 29,123 customers over a 3-year period. Customers made a total of 30,822 purchases and generated 33,507,756 CZK in sales. The total number of visits to the website is 97 238. The average e-shop margin is 30% and the average retention rate is 4%, which are necessary variables for calculating CLV.

4 RESULTS

At first glance, the results show that the relationship between the selected variables and CLV is very weak, and thus these variables determine the value of CLV only negligibly. The summary results of the regression analysis are available in Table 1.

Tab. 1 – Summary output. Source: own research

Multiple R	0,16
R Square	0,026
Adjusted R Square	0,026
Standard Error	323,97
Observation	29 122

The Multiple R refers to the correlation coefficient, which quantifies the strength of a linear association between two variables. A larger absolute value indicates a stronger relationship between the variables. Thus, a value of 0.16 means that the relationship between the variables is very weak.

R Square represents the coefficient of determination, indicating the quality of the fit. It indicates the proportion of data points that align with the regression line. In our example, the R Square value is 0.026, indicating a very poor fit. This means that only 2.6 % of the dependent variable (CLV) can be explained by the independent variables.

5 DISCUSSION

The presented results indicate that the relationship between the selected variables and CLV is very weak and thus the selected variables cannot reliably predict the evolution of CLV. This means that Number of visits to the website by the customer (V), Average time spent on the website (ATS) and Bounce rate cannot be used as determinants of CLV. Therefore, customer behaviour on the website expressed by these variables cannot indicate its value to the company.

Thus, the claims of authors who consider these metrics reliable and valuable for analysing customer buying behaviour (Ghandour et al., 2011, O,Connor, 2021) cannot be confirmed based on the results. Or rather, not entirely, as these metrics, while they can help a firm to determine how customers behave on the web, cannot be used to estimate the financial value of customers.

Therefore, a high number of visits, a long time on the site or a low immediate abandonment rate does not necessarily mean that the customer will benefit the company financially.

6 CONCLUSION

For academics and practitioners from this research, it follows that analyzing customer behavior on a website, specifically monitoring the number of visits, time spent on the website, and bounce rate, is insufficient for predicting customer value for a company. If academics or businesses aim to identify valuable customers, they must incorporate additional variables. This aligns with (Ghandour et al., 2010) who argue that a reliable analysis of customer purchasing behavior requires the combination of various metrics.

Of the quantitative variables commonly tracked by e-tailers, the model could be supplemented with, for example, the number of purchases or the number of pages visited by the customer (Ghandour et al., 2011, O,Connor, 2021). By extending the model with additional variables, its deterministic power could increase, leading to more reliable insights for firms' strategic decision making, which can be taken as inspiration for further research.

Another direction may be to monitor qualitative metrics such as customer satisfaction or perceived service quality (Hernandez et al., 2010, Li et al., 2017). However, these metrics are not as easily measurable and can be complicated for companies and academics to obtain.

The research also has its limitations, and there are several - the sample size, or the involvement of only one e-shop, significantly reduces the possibility of reliable application and generalizability of conclusions. The number of metrics used is also limited, so customer behaviour on the web is not analysed in a comprehensive way. Also, the nature of the metrics has its limitations as they describe customer behaviour but do not take into account their perception or attitude towards the retailer. At the same time, it is possible that applying the methodology used to another e-shop would yield more reliable results. In fact, for other e-shops, customers' behaviour on the website may determine their CLV to a greater extent.

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THE EUROPEAN UNION'S HYDROGEN POLICY PATHWAYS FOR ECONOMIC DEVELOPMENT

Ilgmārs Lejnieks, Modrīte Pelše

Abstract

The European Union member states import more than half of the required energy from abroad. The Paris Agreement on global climate goals in 2015 and the following EU Green Deal agenda lead to cleaner and more environmentally friendly energy sources. One of the most promising renewable fuels that is capable of replacing fossil fuels in the next few decades is hydrogen.

The aim of the study is to identify the main directions of EU policy concerning green and low-carbon hydrogen applications in the economy. The research provides a comprehensive review of the 16 EU member states hydrogen roadmaps, EU policy planning initiatives regarding the topic, and secondary statistics data related to the hydrogen industry since 2015, with a focus on previous studies concerning the hydrogen agenda.

Discussion on the hydrogen agenda is not only about a new energy source for ensuring carbon-free economic development but also a tool for achieving energy security, which is a milestone for sustainable development in EU member states. For decades, the EU has been dependent on nations in geopolitically critical regions with undemocratic political regimes.

The amount of hydrogen produced in the EU can't ensure the economy's transition from fossil fuels to hydrogen. EU member states have different views on hydrogen supply and primary application patterns. The hydrogen valley concept, pipeline infrastructure, and storage facilities are crucial for local market growth and the transition of the economy towards renewable hydrogen. The EU-supported hydrogen projects are laying the groundwork for scaling up and commercialising this fuel.

Keywords: green hydrogen, hydrogen market, energy security, energy transition, renewables

1 INTRODUCTION

The Paris Agreement on global climate goals in 2015 and the EU Green Deal strategy determine the necessity for cleaner and more nature-friendly energy sources. Hydrogen is one of the most promising renewable energy sources that can be produced in large quantities. Green hydrogen obtained from renewable sources like wind or solar energy, known as green hydrogen, is one of the most likely energy sources to replace fossil fuels in the next few decades. Within this paradigm, the development of new technologies in existing industries and the development of new industries for the utilisation of green hydrogen are on the agenda.

In a political sense, hydrogen is not only a new energy source for ensuring carbon-free economic growth but also a tool for energy security matters. Achieving energy security within the EU is a milestone for sustainable development in its member states. For decades, traditional fossil fuels put the EU in dependence on countries within geopolitically sensitive regions with undemocratic regimes. Only last year did the EU manage to get rid of the politically disruptive influence of natural gas imports from Russia.

The EU hydrogen policy reflects theoretical thought about the government's importance for new industry development within a particular territory. At this moment, European initiatives are providing major support for different low-carbon and green hydrogen-related projects. The existence of these initiatives encourages the EU member states to develop their own vision and

policy planning documents regarding hydrogen utilisation in their local economies, contributing to the energy transition from fossil fuels to low-carbon and carbon-neutral energy sources.

Policymakers and scholars must be aware of different angles within the hydrogen energy utilisation process. This study discusses the EU hydrogen agenda, considering four factors of hydrogen application: hydrogen market development, pathways for hydrogen utilisation in certain countries, hydrogen usage in different sectors of industry and costs, and public and private-funded projects.

The study suggests that policies and initiatives concerning hydrogen are crucial for the EU's energy transition from fossil fuels to renewable energy sources. The object of the study is the EU and its member states policies concerning the hydrogen industry. The subject of this research is the evolution of EU green and low-carbon hydrogen policy patterns, which influence energy security and the sustainability of the economy.

The aim of the research is to determine the main directions of EU policy for green and low-carbon hydrogen utilisation in the EU economy. The specified aim is accompanied by the following tasks: to identify the main security risks associated with the current energy supply framework for the EU, to determine the major distinctions between the hydrogen policy pathways among the EU member states, and to review the EU policy documents and initiatives regarding hydrogen industry development.

2 LITERATURE REVIEW

Despite different positions within economic thought concerning the government's role in economic development in a particular territory, it can be argued that government actions have a major influence on economic processes. The policy agenda of the government can influence a narrow line of agents within the market or initiate fundamental changes in the economy. Defenders of larger government involvement in economic processes emphasise the importance of central government and public administration actions facilitating employment, demand, investments, and other determinants important for economic growth (Keynes, 2018, Myrdal, 1957, Higgins, Savoie, 1988).

Apart from government spending, which is perceived as a major tool for supporting economic growth and regional development (Keynes, 2018, Berger, 2009, Myrdal, 1957), new technologies are the main ingredient for a sustainable economy and preserving high living standards. According to the traditional view, foreign investment inflows into a certain territory are often accompanied by new technologies, expertise, and practises (Wang, Blomstrom, 1992, Gherigi, Voytovych, 2018, Blalock, Gertler, 2008). Unfortunately, government financing can't provide the additional factors mentioned for industry development and productivity growth. Nevertheless, the government can arrange appropriate conditions for a certain business or industry, ensuring new investors contribute to technological and know-how development. For the purpose of economic development, regions need to focus on attracting investment flows as soon as possible in order to get benefits sooner than their neighbouring regions. A public administration must act as an agent who promotes its territory and competes with other agents to attract investments (Myrdal, 1957, Berger, 2009).

One of the most important tasks of the government is to create a long-term vision for a particular sector of the economy or industry for balanced and sustainable development inside the territory. According to this perspective, the development of clear policy directives must be in place in order to contribute to vision realisation (Suurs, Hekkert, et al., 2009). For the purpose of the research, "government" is defined as all levels of public administration, beginning at the EU level and ending with member state municipalities.

A very important aspect of a territory's economic development planning is the 17 sustainable development objectives set by the United Nations in 2015, when the members of the organisation committed to achieving the established goals of the Paris Agreement by 2030, including transmitting the priorities in the legislative and policy planning documents of individual member countries. For example, the seventh aim of the Paris agreement requires a significantly increased share of renewable energy in the global energy mix and encourages investment in clean energy technologies and infrastructure (United Nations, 2015). Of course, hydrogen derived from renewable energy sources such as hydropower, biomass, solar, wind, and other forms of energy should also be included in clean energy. The goals of the Paris Agreement are milestones for the EU and its member states policy planning. All EU budget planning, in one way or another, is linked with sustainable goals (European Commission, 2023, European Council, 2023).

The role of government is obvious in the advancement of the green hydrogen industry. By applying EU Green Deal strategy guidelines, member state institutions provide a stronger foundation and financial motivation for nature-neutral energy use (European Commission, 2023a). EU-founded projects are milestones for starting hydrogen production and application in different areas of the economy (European Commission, 2023b). Furthermore, strategies and roadmaps for hydrogen introduction and usage are essential signs of government inclination regarding this issue.

Apart from sustainable determinants of economic development, ensuring energy security is a key component for economic growth (Le, Nguyen, 2019, Wolde-Rufael, 2005, Acheampong, Opoku, 2023). Energy security is crucial not only for large producing countries with vast industries but, at the same time, for interconnected firms in the EU and other regions. The energy security of a particular region consists of a list of different threats, their impacts, capacities, and characteristics. Three risk groups according to their sources can be identified: technical (infrastructure or transportation failures), human (demand and supply, underinvestment, sabotages, terrorism, political instability, and geopolitical risks), and natural (resource depletion, natural disasters) (Winzer, 2012). This study within EU energy security (European Commission, 2023b) imposes human security risks concerning political instability and geopolitical challenges.

Alongside the novelty of hydrogen as a new potential energy source for further economic development and the global energy transition, a wide range of research papers exist concerning different aspects of hydrogen utilisation in the economy. These studies can be arranged around the four main areas of interest. One area of interest is the establishment of the hydrogen market and changes in the global energy market according to it (Hancock, Wollersheim, 2021, Van de Graaf, Overland, et al., 2020). A large part of the researchers are concerned with countries specialisation in the hydrogen economy, pathways for hydrogen application in specific countries or regions, and perspectives of regional cooperation within the topic (Wetzel, Gils, et al., 2023, Sasanpour, Cao, 2021, Wappler, Unguder, et al., 2022, Griffiths, Sovacool, et al., 2021). Other points of interest are hydrogen application possibilities in different sectors of the industry, integration in the energy sector, and costs related to these processes (French, 2020, Azadnia, McDaid, et al., 2023, Pomaska, Acciaro, 2022, Jansons, Zemite, et al., 2023, Kakoulaki, Kougias, et al., 2021). Finally, there is a focus on taxation practices facilitating green energy application, public financing, and private investments in the hydrogen industry's development (Quarton, Samsatli, 2021, Fazioli, Pantaleone, 2021, Cebolla, Navas, 2019).

3 METHODOLOGY

According to the aim of this research concerning the main directions of EU policy for green and low-carbon hydrogen utilisation in the Union's economy, a comprehensive review of the EU policy planning documents, the Union's member states plans, and statistical data concerning the hydrogen industry since the 2015 Paris Agreement were conducted. The study is designed to serve as a guide for policymakers, field professionals, and scholars in developing new initiatives in the field of the hydrogen-based economy. The differences between EU member states in hydrogen strategies and pathways are indicators that must be taken into consideration, especially when dealing on a regional basis.

Policy pathways are often influenced not only by technological or market circumstances but also by energy security concerns within a particular region or state. Energy security and stable energy flows have been one of the primary concerns of the EU for decades. Securing energy sources is fundamental for further economic growth. For the purpose of context, secondary data describing EU member states and their dependency on energy imports is delivered.

The statistical data of this research describe the period from 2015 until 2022, with some exceptions designed for contextual purposes. The bulk of statistical information was acquired from Eurostat, the World Bank, and the International Energy Agency databases and publications.

Corresponding to the main objective of the study, secondary data on hydrogen production, the market, and EU projects was collected and analysed. The main emphasis in the analyses is inflicted on EU member states policies regarding the hydrogen agenda. The hydrogen strategies of 16 EU member states were analysed to determine the major factors influencing hydrogen policy directions: the primary type of hydrogen to be used in the economy, the hydrogen supply strategy, and the main sector of application. Moreover, the research includes a list of aspects from the four research dimensions described in the literature review, and this framework is applied within analyses of 16 EU member states hydrogen pathways.

Apart from the green hydrogen agenda, which is the main building block of this research, many comprehensive data or policy documents refer to the application of hydrogen in industry in general because hydrogen demand can be satisfied in a conventional or sustainable way. The higher possibility of hydrogen utilisation in industry at the same time provides opportunity for the green hydrogen industry's development as a conventional means of production.

Within the study, the descriptive study method is applied for the analysis of publications, scientific literature, policy planning documents, and normative acts; induction and deduction methods are used to analyse the potential synergy between EU green hydrogen policy initiatives and different economic sectors and industries with hydrogen application capacities; and the graphic method is applied to illustrate main tendencies in the analysis of issues raised in the study.

4 RESULTS

In this part of the research, facts about hydrogen and green hydrogen policy development within the EU are provided. Moreover, background information concerning energy security in the EU and Green Deal aspects of economic development is laid out. Understanding the framework is crucial for finding the right pathways for government policies towards nature-neutral energy sources.

4.1 Energy security background

All 27 Member States of the EU are net importers of energy. In 2015, the energy import dependency rate in the EU was 54.1%, while in 2021 it was 55.5% (Eurostat, 2017, Eurostat, 2023). In 2020, the member states with the highest energy import dependency rate were: Malta (97.5%), Cyprus (93%), Luxemburg (92%), Greece (81.4%), and Belgium (78%) (European Council, 2022). In absolute numbers, the largest importers of energy in 2021 were Germany (18.3% of EU energy imports), the Netherlands (14.3%), Italy (11.8%), France (10.7%), and Spain (9.5%) (Fig. 1).
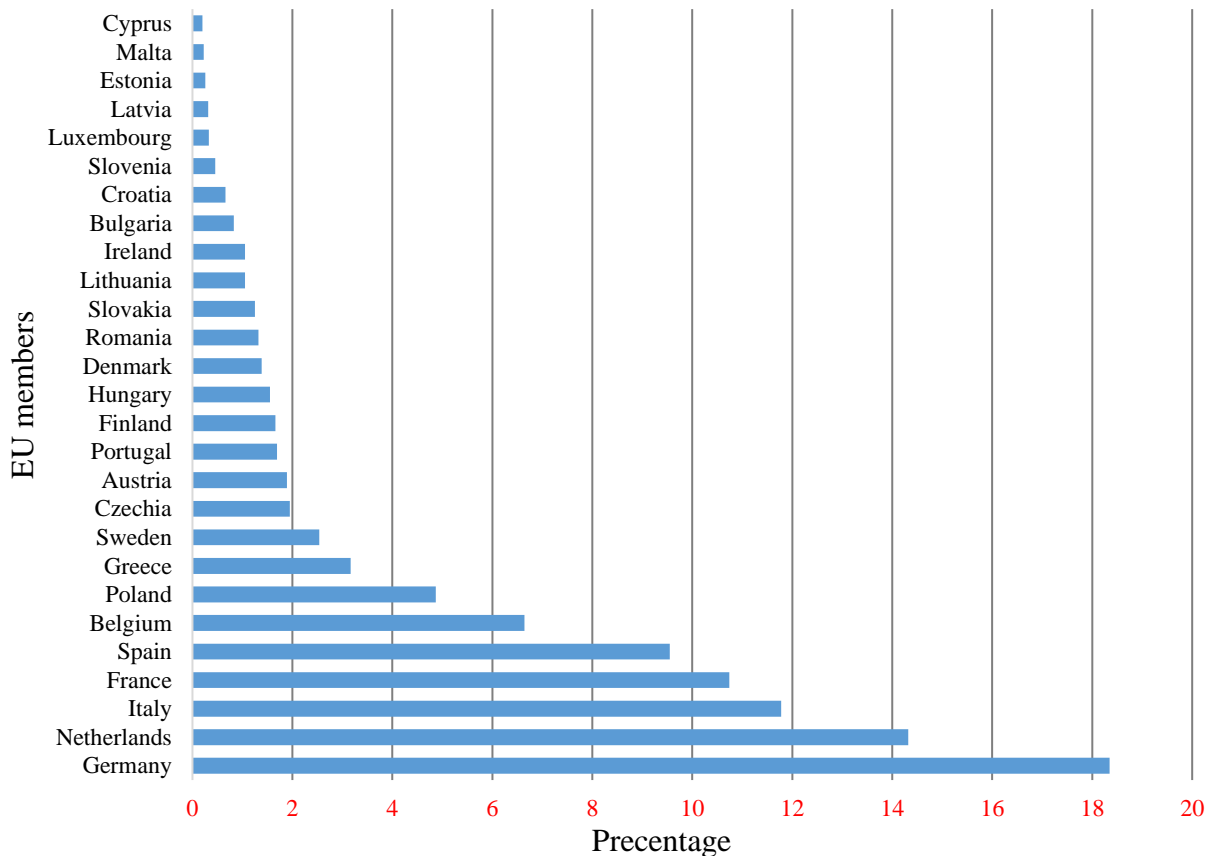
Fig. 1 – EU member states share of EU energy imports in 2021. Source: Eurostat

Natural gas and oil imports are fundamental parts of the EU energy balance. In 2015, natural gas, oil, and petroleum products made up 87.8% of all energy imports for EU members. In 2021, this number was slightly higher at 89.2%. Since 2015, the volume of energy imports to the EU has been stable and only decreased in 2020 and 2021 in light of the COVID-19 pandemic consequences for the demand for oil and petroleum products in the market (Fig. 2).
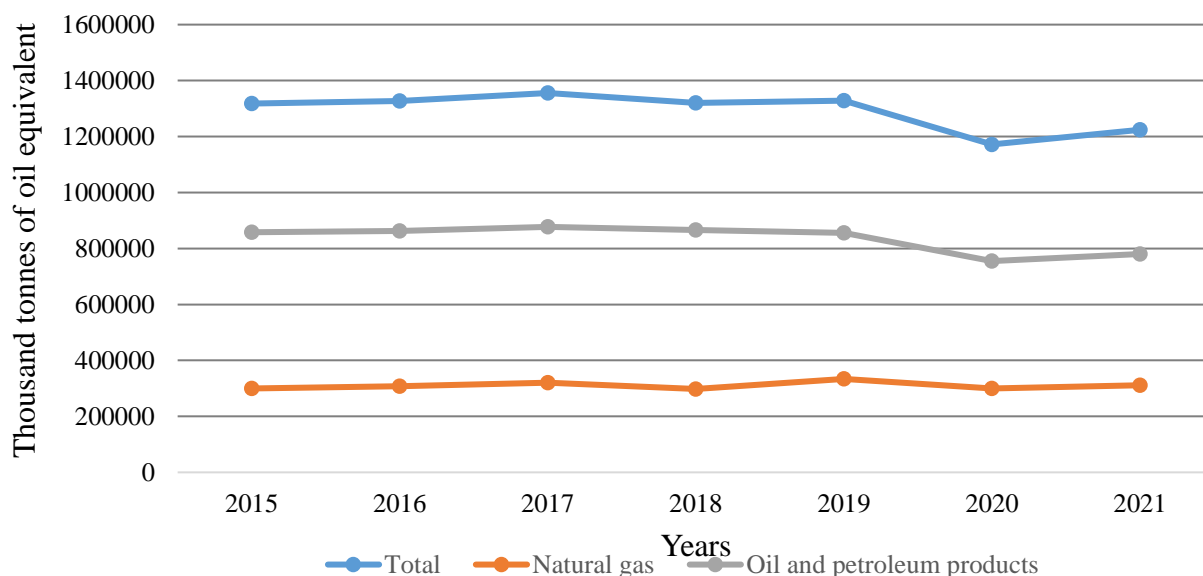
Fig. 2 – Natural gas, oil, and petroleum products in EU energy imports, 2015–2021. Source: Eurostat

As EU energy flows strongly depend on natural gas and oil imports from other countries, the energy security issue is widely represented on the EU policy agenda. Especially concerning diversification of natural gas supply sources and ensuring EU oil stocks in member states (European Commission, 2023c).

Apart from the dependency on fossil fuel imports, the composition of oil and natural gas trade partners must be another matter of concern for EU policymakers. Some of the largest oil and gas importers to the EU are third countries with poor records of civic freedoms and democratic practises. Moreover, these countries are located in geopolitically sensitive regions (Fig. 3). At this moment, some of these states are directly involved in military conflicts: Russia (war in Ukraine), Saudi Arabia (war in Yemen), Libya (civil war, ceasefire since 2020), Nigeria (ongoing numerous insurgencies and separatist movements), Azerbaijan (Nagorno Karabakh crisis), etc. More than 40% of natural gas and around 50% of petroleum oil exports to the EU come from countries within geopolitically unstable regions.
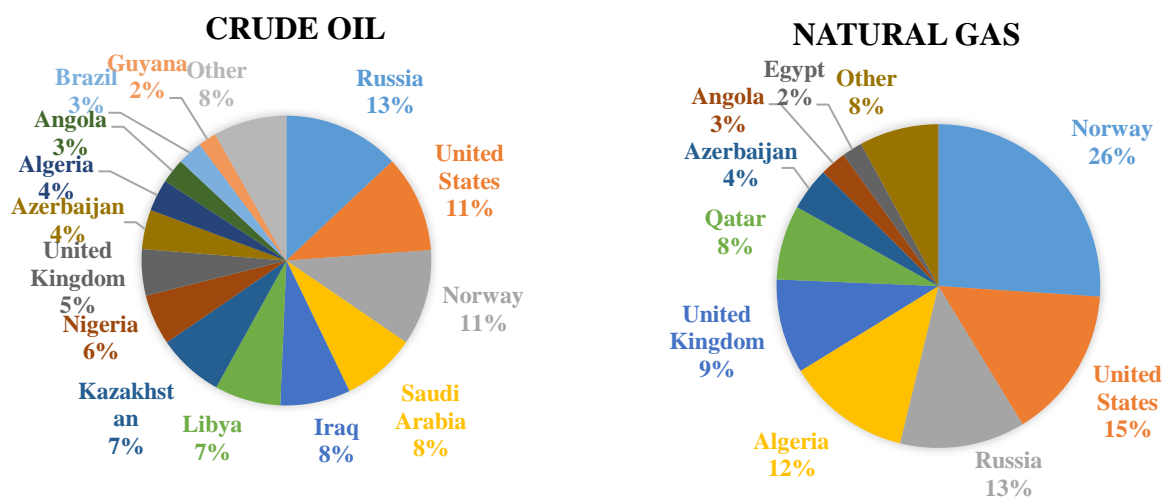
Fig. 3 – Main oil and natural gas exporters to the EU in the fourth quarter of 2022. Source: Eurostat

4.2 The EU member states and the hydrogen agenda

Contrary to fossil fuel providers, today's largest hydrogen exporting countries are states with high political freedom ratings within secured and politically stable regions (Tab. 1). In 2015, hydrogen exports were valued at 136.9 million USD at current prices, but in 2021, the value of exports was 198.2 million USD. Comparing, in 2019, the 6th largest EU trade partner in natural gas, Qatar, exported this commodity to a global market value of 45,1 billion USD (World Bank, 2023). Five of the ten largest hydrogen-exporting countries are EU members, and five are also the largest hydrogen-importing states. EU members have strong positions in the hydrogen market.

Tab. 1 – Largest hydrogen exporters and importers in 2021 in USD at current prices. Source: World Bank

No.	Exporting countries	Value 1000 USD	Importing countries	Value 1000 USD
1	Belgium	63,507.36	United States	57,531.82
2	Canada	57,437.78	Netherlands	52,325.51
3	Netherlands	36,237.43	Singapore	18,179.30
4	United States	10,898.04	Germany	5,906.44
5	Germany	7,140.15	France	4,056.71
6	Malaysia	5,583.44	Mexico	3,641.90
7	France	2,902.99	United Kingdom	3,212.30
8	Poland	2,244.14	Malaysia	2,446.14
9	Singapore	1,816.06	Czech Republic	2,436.37
10	United Kingdom	1,718.55	Ireland	2,276.59

In 2015, global demand for hydrogen was 71,7 million metric tonnes, but in 2021, total global production was 94 million metric tonnes of hydrogen. In 2021, 62% of hydrogen were produced using natural gas. At the same time, water electrolysis accounted for only around 0.1% of global hydrogen output. (International Energy Agency, 2019, International Energy Agency, 2022). In 2020, in the EU, 8.1 million metric tonnes of hydrogen were produced (Fuel Cells and Hydrogen Observatory, 2022).

Within the EU, the situation regarding the distribution and availability of renewable energy sources for green hydrogen production is very different. Some member countries possess large amounts of wind farms for electricity generation (Denmark, the Netherlands, Germany, Belgium, etc.), and at the same time, some of these countries have developed solar energy infrastructure too (the Netherlands, Germany, Denmark, etc.). Moreover, the list of members has notable hydropower capabilities (Sweden, France, Italy, Austria, etc.). It must be mentioned that countries in the centre of Europe, like Czechia and Slovakia, have limited possibilities for wind farms or solar farms according to geographical conditions. In these circumstances, policies concerning renewable resources and their utilisation inside the economy have notable differences between member states. In that way, green hydrogen industry development possibilities and initiatives regarding it have a wide field of side factors or determinants.

For further analysis purposes, EU policy initiatives and member states with hydrogen development strategies are analysed. At the beginning of 2023, 16 of the 27 EU member countries had government-approved hydrogen strategies or roadmaps (the Finnish hydrogen strategy is developed by a nongovernmental organisation with government support). It is important to determine the role of a country in the hydrogen market, the primary ways of applying hydrogen in economic sectors, and the possibilities of green hydrogen production in its own territory (Tab. 2). Countries focusing their strategies on green or clean hydrogen

production or imports. The main difference between both types of hydrogen derives from production processes: while green hydrogen is produced without carbon emissions, clean hydrogen production provides low levels of these gases.

Tab. 2 – Hydrogen production, supply, and primary application according to the hydrogen strategies of EU member countries Source: International Energy Agency, Wappler, Unguder, et al., (2022), and own research

No.	Country	Hydrogen Production Category	Hydrogen Supply Strategy	Primary Sector of Application
1	Austria	Clean	Importer	Industry
2	Belgium	Green	Importer	Transit
3	Croatia	Green	Self-sufficient	Industry
4	Czech Republic	Clean	Importer	Transport
5	Denmark	Green	Exporter	Transport
6	Finland	Green	Exporter	Energy
7	France	Clean	Exporter	Industry
8	Germany	Green	Importer	Industry
9	Hungary	Clean	Self-sufficient	Industry
10	Italy	Green	Importer	Energy
11	Luxembourg	Green	Importer	Transport
12	Netherlands	Clean	Self-sufficient	Industry
13	Poland	Clean	Self-sufficient	Energy
14	Portugal	Green	Importer	Energy
15	Slovakia	Clean	Self-sufficient	Industry
16	Spain	Green	Exporter	Industry

Despite some fluctuations and broad descriptions in the strategies of some EU member states concerning pathways of hydrogen application, only a few primary directions can be examined. Nine of sixteen states concentrate on a green hydrogen pathway in their economies. The high importance is focused on the timeframe when a particular economy will be ready to produce green hydrogen in quantities according to local industry demands. Existing large-scale hydrogen production sites using natural gas or other fossil fuels determine the starting positions for using this produced hydrogen and trying to reach its clean hydrogen type, for example in the Netherlands, Poland, the Czech Republic, and Slovakia. Some states, for example, the Netherlands, underline that it will further transform from clean to green hydrogen from 2030 to 2050 (Wappler, Unguder, et al., 2022).

Seven states recognise the necessity of importing hydrogen from third states or from within the EU; four countries are planning to export hydrogen; and five member states emphasise the production of hydrogen for the local needs of the economy. Some states, like Belgium, the Netherlands, Poland, and Hungary, are planning to become transit hubs for hydrogen flow inside the EU.

The easiest way to maximise hydrogen utilisation in the short term is by applying it to existing industries like refining, mineral fertiliser, steel production, and others. Another scenario is utilising hydrogen in transportation, especially by building hydrogen filling stations and researching ways to apply this gas in large commercial or public transport (trains, buses, trucks, shipping, etc.), to reduce the carbon footprint of the transportation sector. For example, Luxembourg has emphasised the transport role of hydrogen applications. Because of different

application scenarios, it's complicated to determine the primary industry for hydrogen utilisation.

To outline, hydrogen's share in the energy market is incomparable with the amount of fossil fuel traded. According to these circumstances, it's impossible to identify EU countries with a determined hydrogen exporting or importing nature. The availability of renewable power sources for hydrogen production varies strongly between EU countries. The member states hydrogen roadmaps provide different approaches on what hydrogen production category will be primary for the economy, what hydrogen supply strategy can be used, and what is the primary sector of application.

4.3 EU policy on the hydrogen agenda

Since the approval of a European strategic energy technology plan (SET-plan) in 2007, the hydrogen agenda has started getting more attention. The main goals of the SET-Plan are to boost the transition towards a climate-neutral energy system through the development of low-carbon technologies. The development of hydrogen and fuel cell technologies, together with the commercialization of hydrogen fuel cell vehicles, was perceived as a major initiative for the next 10 years. Moreover, the European Industrial Strategy also aims to promote the transition of EU Member States to a climate-neutral economy. One of the priorities of the strategy is the use of green hydrogen in the economy to achieve the objectives of climate neutrality and to diversify energy sources (European Commission, 2023d).

In 2020, the European Commission approved a strategy for the use of hydrogen for a climate-neutral Europe (European Commission, 2023e). The five main areas of action of the strategy are:

- increasing hydrogen production to create a sustainable industrial value chain,

- expanding demand for clean hydrogen from industries and mobility technologies,

- establishing supportive frameworks, well-functioning markets, clear regulations, and

- developed infrastructure,

- promoting research and innovation in clean hydrogen technologies,

- encourage cooperation with third countries and between regions of the EU.

Moreover, the EU hydrogen strategy determined the development of the European Clean Hydrogen Alliance, aimed at promoting the production and use of clean hydrogen, encouraging investment in this area, and achieving a large deployment of hydrogen technologies by 2030. The Alliance represents private and public organisations and companies that are active in areas related to hydrogen research, production, transport, or use. In 2022, The first projects of common European interest received approval from the European Commission, opening more than 10 billion euros in public investment for hydrogen industry development. Moreover, on a regular basis, Alliance is preparing different types of public activities, for example, the European Hydrogen Forum (European Commission, 2023f).

According to the EU hydrogen strategy action plan, 20 action points were implemented in 2022. For example, since 2021, the European Clean Hydrogen Alliance has been developing the project "Pipeline," which facilitates creating integrated European hydrogen value chains and projects with investors for hydrogen production, transmission, and distribution and application possibilities in industry, transport, energy systems, and buildings. "Pipeline" includes over 840 projects (Fig. 4) (hydrogen production – 446; Transmission and distribution – 163; industrial

applications – 172; mobility – 240; buildings – 77; energy sector – 143) (European Commission, 2023g).
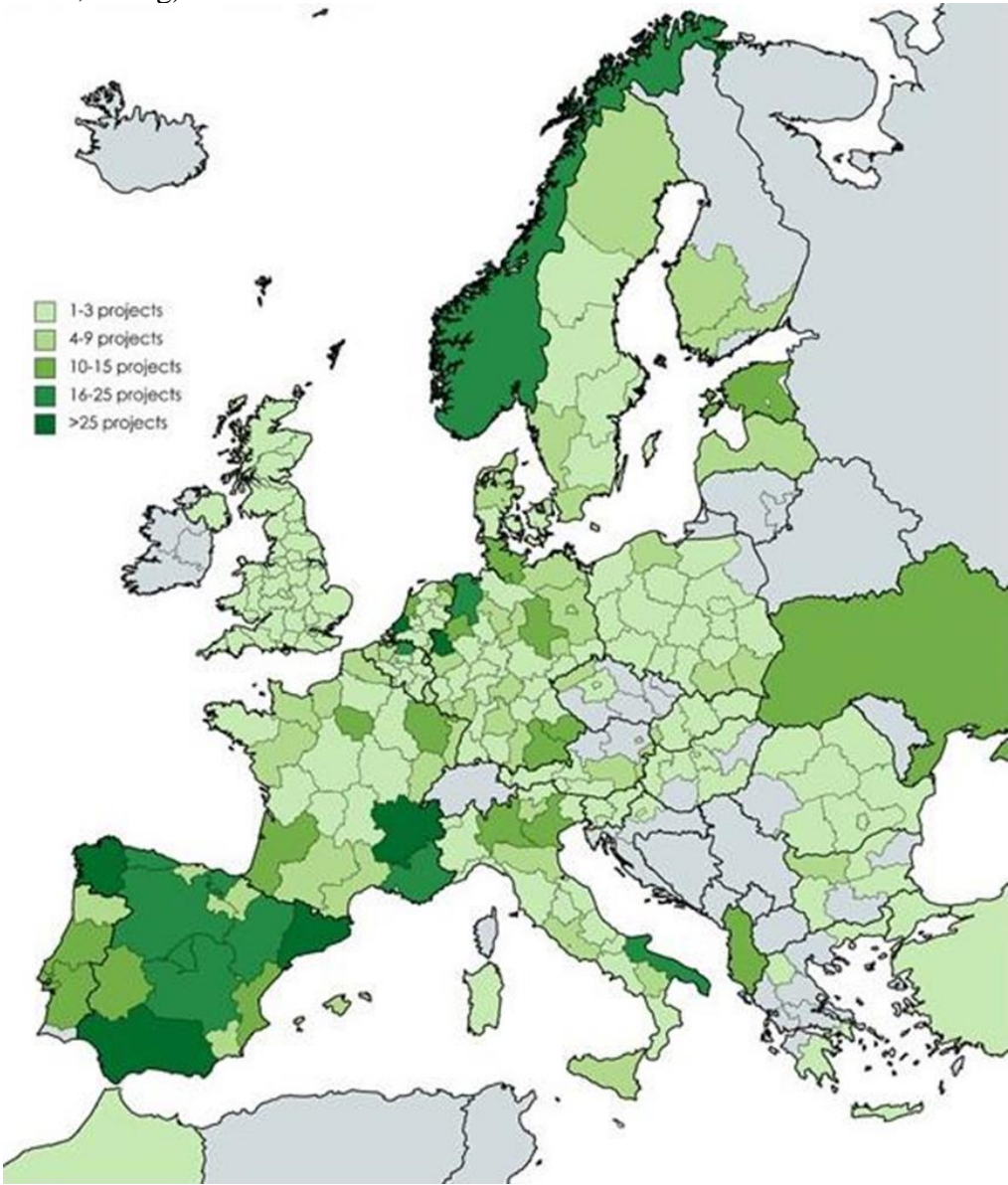
Fig. 4 – Project "Pipeline" location, 2022. Source: European Commission

As the most practical option in light of the EU's long-term objective of achieving climate neutrality, the EU prioritises the facilitation of renewable hydrogen, which is produced mostly from wind and solar energy. To quickly cut emissions from current hydrogen production and support the growth of the market volume, new low-carbon hydrogen production techniques must be put into action in the short and medium term.

The Clean Hydrogen Partnership is established with the participation of the European Commission, the European Hydrogen Association, which brings together EU national hydrogen associations, individual European regions, and industry representatives, and the European Hydrogen Research Alliance, which includes higher education institutions and research institutions involved in research activities in this field. The main objective of the Partnership is to contribute to the implementation of the EU Green Deal and the EU Hydrogen Strategy by optimising the financing of research and innovation processes. The Clean Hydrogen Partnership is the successor of the Fuel Cells and Hydrogen 2 Joint Undertaking that was established in

2008 as a public-private partnership by the European Council. Since 2015, Partnership has supported the realisation of 160 projects within research and development with 111 million euros from the Horizon 2020 and Horizon Europe programmes. Most coordinating organisations from the EU inside these projects were represented: France with 28 projects, Italy with 24, Germany with 22, Spain with 15, Finland with 9, and the Netherlands with 8 (Clean Hydrogen Partnership, 2023).

One more indicator of the EU is the development of Hydrogen valleys - a geographical area in a city, a region, an island, or an industrial cluster where hydrogen applications are combined into an integrated hydrogen ecosystem that consumes a significant volume of hydrogen, facilitating economic development. Within this initiative, the Hydrogen valleys platform is established by the Clean Hydrogen Partnership and other associates to create a global collaboration and platform for all information on large-scale hydrogen projects. At this moment, 82 hydrogen valleys under development in 33 countries are represented on this platform. Germany with 16 and the Netherlands with 7 hydrogen valley projects are leaders in this framework (Clean Hydrogen Partnership, 2023a).

Building a sustainable economy in the EU is a dynamic process that imposes new changes on existing policy initiatives and institutions and creates new ones. The European Commission intends to set up a European Hydrogen Bank, the main objective of which would be to promote private investment in green hydrogen value chains, both in the EU and in third countries, by increasing demand for hydrogen in the EU internal market. Funding for these activities is to be raised from the EU Innovation Fund, which was created to provide financial flows to programmes dedicated to projects for developing technologies with low greenhouse gas emissions. The funding available under the Fund for the period 2020–2030 is around €40 billion. Key project lines: low-carbon technologies in energy-intensive industries; carbon collection and recycling; innovative renewable energy production practises; and energy storage (European Commission, 2023h).

The availability of funding for specific activities in the context of the use of renewable energy resources depends on the priorities identified in the national and regional programmes endorsed by the European Commission. Also, the possibility of financing projects related to the production or use of green hydrogen from the European Regional Development Fund, the Cohesion Fund, and the Recovery Assistance for Cohesion and European Territories lay on the priority activities identified in the national and regional programmes.

To summarise, the EU policy on hydrogen promotes the step-by-step action principle. The first step is reducing greenhouse gas emissions from existing hydrogen production sites by implementing new technologies and practises. Secondly, policy initiatives facilitate production volumes of clean and green hydrogen by promoting demand for hydrogen. The third is establishing a pipeline network for hydrogen transition within the EU to ensure the balanced development of hydrogen-based industries and Hydrogen valleys across its territory. Fourth, by increasing available hydrogen volumes and its means of transportation, a common market for this commodity can be established across the EU and beyond. A unified market can determine an acceptable price for different regions of the EU with different availability levels for renewable energy sources.

5   DISCUSSION

In 2021, the analyses of 25 hydrogen country roadmaps were conducted by Wappler, Ugunder, and their colleagues, reviewing the global green hydrogen market from a green hydrogen demand and electrolyser manufacturing perspective (Wappler, Unguder, et al., 2022). Apart from them, this study focuses solely on EU policy issues regarding hydrogen industry

development and distances itself from the topic of electrolyser capacity analyses because of fundamental differences between EU member states regarding this issue. This study supports Wappler and Ugunder's view that country hydrogen roadmaps include different hydrogen production routes, applications, and implementation speeds, which is why hydrogen demand is hard to predict in the medium and long term. Besides, booth studies support the assumption that many countries will use green hydrogen in the medium and long term in their economies to achieve climate targets.

One of the crucial obstacles for the hydrogen industry is the underdeveloped international hydrogen market. The numbers of global trade for hydrogen are incomparable with the amounts of fossil fuels traded. The developed market for commodities provides an opportunity for a balanced price and leads to a similar position for hydrogen utilisation in different parts of the EU. The absence of an advanced market for this commodity creates a serious obstacle for countries and their industries to significantly speed up the transition from fossil fuels to hydrogen. Apart from the amounts of hydrogen available on the market, great importance must be given to the fact that the hydrogen market is less asymmetric in nature because production of this fuel can be carried out almost everywhere in the world and many countries could become self-sufficient, as pointed out by Van de Graaf and Overland in their research about the geopolitics of the hydrogen market (Van de Graaf, Overland, et al., 2020). The situation in the EU points out that more than half of the 16 EU countries with hydrogen pathways are planning to become self-sufficient or exporters of this fuel. This perspective greatly contributes to energy security for EU members.

At same time, the global hydrogen market and supply chain are limited by technological challenges for hydrogen transportation over long distances and the costs associated with this process. Hydrogen transportation is more expensive than natural gas transportation via pipeline infrastructure. According to estimates for 2021, capital costs per one kilometre were 55 euros per megawatt hour for natural gas, but for hydrogen, it was 94 euros per megawatt hour. At the same time, amortisation costs were more similar: 2 euros per megawatt hour for 1000 km for natural gas and 2,8 euros for hydrogen (DeSantis, James, et al., 2021). Moreover, shipping liquid hydrogen from faraway countries where renewable hydrogen production is cheaper will be more expensive than if the hydrogen were produced locally in the EU, even with the average capacity of renewable sources. Shipping is also almost twice as expensive as importing hydrogen via pipeline infrastructure (Agora Industry, 2022).

The green hydrogen supply chain risk analysis for the European hard-to-abate sectors provided by Azadnia, McDaid, and their co-authors supports the assumption that building a global hydrogen market will require substantial investment in pipeline infrastructure development alongside a variety of technologies that will lead to appropriate storing and transport capacities (Azadnia, McDaid, et al., 2023). Moreover, pipeline infrastructure and storage facilities are crucial for hydrogen valleys over-border nature and flexibility in acquiring necessary resources all seasons of the year, despite climate extremes and peaks and minimums of hydrogen demand from industry or housing.

While importing hydrogen from overseas is not a solution for boosting hydrogen demand in the EU, the development of local hydrogen valleys could facilitate market development at the regional level. Self-sustainable production and utilisation of hydrogen in local transport, manufacturing, housing, and other areas, together with connected pipeline infrastructure between regions within countries and outside, can be beneficial for creating regional markets and facilitating energy security inside the EU.

According EU hydrogen policy initiatives and hydrogen pathways of its member states local production of low-carbon hydrogen in the short and middle term is crucial for distancing from

the dependence of fossil fuels and opening pathways for industry demand for hydrogen. Moreover, countries with a smaller proportion of industry in their economies can prioritise transportation as a major area in the application of renewable energy sources. Major measures must be implemented, including the development of hydrogen storage facilities, fuel station infrastructure, long-term supply chains, and, finally, the commercialization of hydrogen application technologies within the economic sector (Sapnken, Posso, et al., 2023). According to existing conditions, the primary area of utilisation of hydrogen is public transportation.

In the process of expanding the hydrogen industry within the EU, cooperation with the closest neighbouring countries, for example Norway and the United Kingdom, provides additional possibilities for ensuring energy security by combining existing hydrogen industry applications and research and development potentials in this field. Norway is a major oil and natural gas exporter to the EU and a central partner in many hydrogen projects supported by the EU. Neighbouring countries with large renewable energy potential (solar, wind, and hydro) are very important for Europe's energy transition and more independence from fossil fuel supply chains from politically unstable regions.

6 CONCLUSION

The paper highlighted the main directions of green and low-carbon hydrogen utilisation in the EU economy according to EU policies and its 16 member states hydrogen pathways. Within the analyses, the energy security obstacles in the EU were emphasised. The relevance of research is endorsed by a large number of studies in the field of hydrogen's potential application in different industries and its impact on global energy markets and economic growth. EU-encouraged initiatives in the field of low-carbon and green hydrogen projects are building blocks for scaling up this fuel production and commercialising it.

The EU's energy dependence on fossil fuels is staying strong despite the obvious direction towards a sustainable economy, according to the goals of the Paris Agreement. More than half of the necessary energy for EU member states is imported from abroad. The EU imports more than 40% of its natural gas and over 50% of its petroleum oil from nations located in geopolitically unstable regions. Germany, the Netherlands, Italy, and France account for more than 55% of the EU's overall energy imports. Energy flows from politically unstable regions generate fossil fuel dependence for the EU economy and, at the same time, prolong the transition to nature-neutral energy.

Despite hydrogen being perceived as the nearest alternative to fossil fuels, the hydrogen market is underdeveloped, and the amounts traded at the global level are unsatisfactory for the beginning of the energy transition process. The same can be applied to the hydrogen market inside the EU. The global market is influenced by the high costs of pure hydrogen shipment over long distances, while regional transmission of hydrogen is affected by a lack of suitable pipeline infrastructure and storage facilities. The EU concept of Hydrogen valleys, which is designed for the development of the hydrogen ecosystem across Europe and its interconnection, is an important factor for the energy security and independence of the EU member states. The evolution of hydrogen infrastructure is essential for member states with low potential for renewable energy and high dependence on natural gas imports for their economies.

EU member states with government-approved hydrogen strategies or roadmaps have various views on what hydrogen production category will be primary used in the economy, what hydrogen supply strategy can be utilised, and what is the primary sector of application. The research didn't identify any obvious pattern in these criteria. Nevertheless, a common consensus can be established that low carbon hydrogen is used in the first stages of the energy transition process, and after that, a particular member state's economy will be able to produce

or import green hydrogen in volumes corresponding to local industry demand. Within policy roadmaps, the transition from hydrogen with different degrees of carbon emissions to green hydrogen can be identified.

The limitations of the research are connected with the absence of precise secondary data on hydrogen production and consumption levels in the EU. Moreover, data regarding different types of hydrogen is absent or differs significantly regarding sources.

Future research must be focused on more practical issues concerning relevant policy pathways aimed at hydrogen infrastructure development in a particular part of the EU or individual countries. One of the major questions for future studies in this framework is the development of hydrogen valleys and their influence on the economic development of the territories associated with them. Moreover, a question of interest is whether hydrogen valleys can be beneficial for the evaluation of the regional hydrogen market. It can be considered part of a wider perspective in terms of how this fuel, in addition to lowering carbon emissions, contributes to the economy of a particular territory.

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THE ROLE OF SEARCH FREQUENCY ON NOWCASTING OF ECONOMIC AND FINANCIAL VARIABLES: A SYSTEMATIC LITERATURE REVIEW

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Abstract

The purpose of this paper is to provide a systematic review of existing studies about the role of web search frequencies in the prediction of economic and financial variables. The development of communication technologies not only makes search statistics available but also different composite indexes publicly available to be used for forecasting and understanding the trends of different types of variables in interest. The prediction of variables in interest and trend analysis by using available data is important to design optimal policies and understand the behavior of economic and financial activities. 48 papers with different quantitative methods and theoretical frameworks were selected to assess the role of search-based indexes in the prediction of variables. Selected papers are based on secondary data sources. The finding of reviewed papers is that the Google Search Volume Index (GSVI) provides a suitable theoretical basis to nowcast financial and economic variables. All previously conducted studies show that search statistics can reveal the true intentions of people and create a possibility of predicting stock returns, stock prices, stock price volatility, unemployment rate, tourism demand, individual consumption, and other macroeconomic variables. Thus, SVI from Google Trends would play an important role in improving the prediction of variables and nowcast future trends.

Keywords: search frequencies, search volume index, Google Trends, stock returns, unemployment rate

1 INTRODUCTION

The development of information and communication technologies creates new opportunities for researchers and policymakers to carry out real-time assessments of economic and financial variables by offering new sources of information from search engines. In one of the first studies, Choi and Varian (2009) revealed in their empirical assessment that appropriately chosen Google query indexes or web-related data may be used to anticipate different economic and financial activities, including FDI inflows. People search for information online to make economic and financial decisions or look for alternatives. This search data captures human behavior which is useful in decision making and short-term predictions. Furthermore, cross-border activities such as tourism, foreign direct investment, export, and import can also be analyzed which are frequently faced with information barriers. In addition to the mentioned problem, necessary information for low-income developing countries is a big challenge for researchers because of missing data and the non-availability of longer time periods. Therefore, there is a need for applying a specific methodology or approach to be able to include FDI analysis for all countries including low-income developing countries with data limitations. Google's Search Volume Index would be very effective in predicting the volume and magnitude of different types of economic and financial variables for all countries which allows us to look at global evidence rather than limiting the analysis to some group of countries. A frequency of online search query submissions (SVI) provides detailed information about individuals and firms' intentions and interests and gives a possibility to have an economic analysis of countries and business environments. Google Trends provides a tool to collect data about the volume and frequency of searched words in Google search engines which are related to economic and

financial areas. It is possible to collect data by country, theme, and time by using this tool. For instance, search engines might give a possibility of planning investment inflow to the countries by having searched data to predict the interest of foreign companies and investors. Thus, it can be a helpful tool to predict upcoming trends of foreign direct investments for a country which can provide a useful guideline for shaping more effective policies. Thus, this paper is a systematic literature review of papers and studies about the usage of search frequency on the internet for the prediction of financial and economic variables.

Data and Methodology

Relevant papers for literature review have been selected by conducting systematic searches in Jstor, Econlit, Science Direct, Scopus, and Google Scholar. The search of papers is based on relevant keywords, such as "Google Trend", "Web-related data", "search frequency", and "search volume index (SVI)" to identify the most appropriate journal papers, working papers, conference proceedings, book chapters, and official reports by different private and public organizations. Firstly, the main inclusion criteria for papers to be selected for review from the mentioned databases is having one of the keywords mentioned above without having any restrictions on the publication year and variables in interest. The second selection criterion is the publication year of the paper not to be older than 2010. By the fact that statistics about search frequency are available starting from 2004, papers older than 2010 will be limited in terms of sample size. Thirdly, papers that investigated the role of search frequency in stock price, stock index, stock returns, stock volatility, stock riskiness, tourist inflow, consumption level, unemployment rate, capital inflow, investment, and epidemics or pandemics were selected in the final step. Among 211 initially selected papers, only 48 of them used web searches as a determinant of different types of economic and financial variables. Only research papers that used web searches as an independent variable have been kept and provided in the review table.
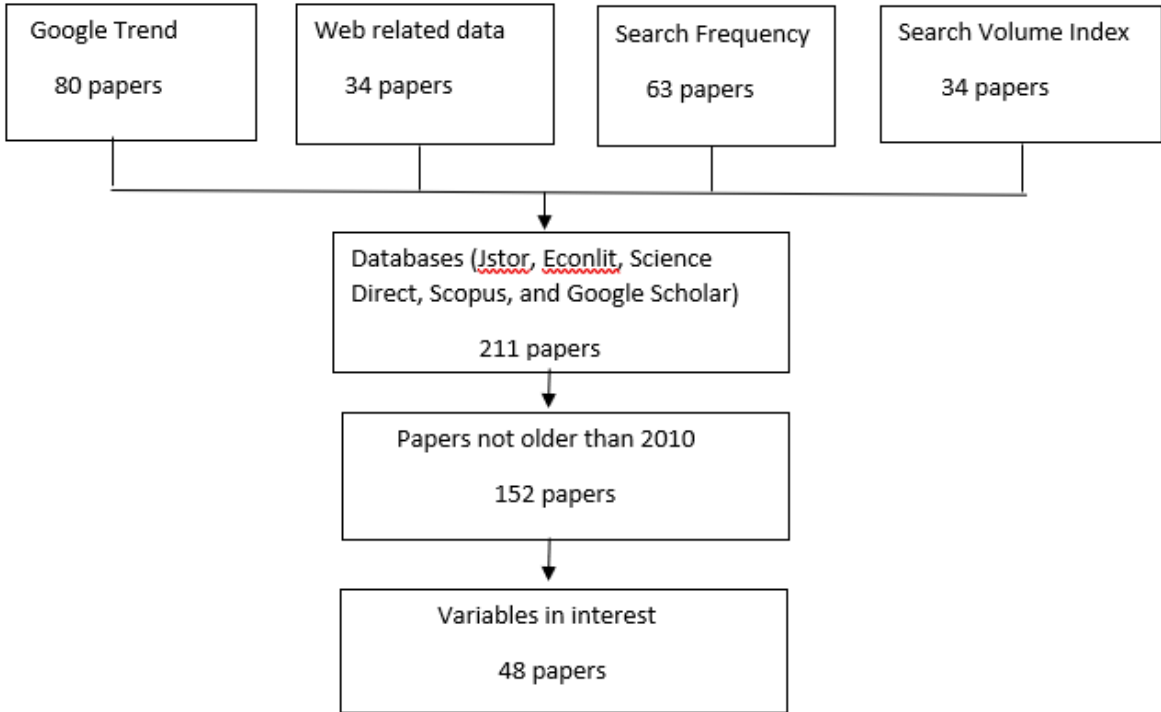
Fig. 1 - The flowchart of the paper selection process. Source: own research.

2 LITERATURE REVIEW

The following table provides brief information about the findings of each paper by using web searches as an independent variable.

Tab. 1- A brief review of selected papers. Source: own research.

Dependent Variable	Author	Country/Industry /Region or City	Methodology	Effect of Web Search Frequencies on the dependent variable (+, - , 0)
Stock Prices/Stock Returns/Stock Index	Fan et al, (2021)	China/Taiwan	Pearson correlation, Augmented Dickey-Fuller (ADF), and Phillips-Peron (PP) test	+
	Salisu et al, (2021)	US/country level	Autoregressive Distributed Lag (ADRL) model	-
	Kropinski and Anholcer (2022)	Poland/country level	Bivariate VAR model (Granger Causality test)	+
	Barber et al, (2022)	US/country level	Ordinary Least Square (OLS) model	-
	Salisu and Vo (2020)	20 countries	Panel Data Forecasting models	-
	Lai et al, (2020)	China/country level	Pooled Ordinary Least Squares (OLS) model	-
	Vighneswara et al, (2019)	India/country level	Fits Quantile Regression (FReg) model	+
	Da et al, (2011)	US /country level	Vector Autoregression (VAR) model	+
	Da et al, (2015)	US/country level	Backward Rolling Regression	+,-
	Wang et al. (2018)	China/country level	Ordinary Least Square (OLS) model	-
	Rao and Srivastava (2012)	Worldwide	Cross- Corr, GCA, Expert Model Mining System (EMMS)	+
	Preis et al. (2013)	US/country level	Kendall's tau rank correlation	-
	Subramaniam and Chakraborty (2021)	US/country level	Ordinary Least Square (OLS) model	-
	Horobet et al, (2022)	United Kingdom	Multifactorial panel data regression model	+
	Adachi et al, (2017)	Japan/country level	Pooled OLS model	+
	Perlin et al, (2017)	USA, UK, AUS, CAN	Vector Autoregressive model	-
	Bijl et al, (2019)	US/country level	Ordinary Least Squares (OLS) model	-
	Lyocsa et al, (2020)	10 countries	Heterogeneous autoregressive (HAR) model	+

Stock Price Riskiness/Stock Price Variation	Fang et al. (2019)	China/country level	Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models	+
	Tomas and Stephan (2011)	US/country level	Vector Autoregressive model (VAR)	+
	Kristoufek (2013)	US/country level	Descriptive Analaysis	_
	Perlin et al, (2017)	USA, UK, AUS, CAN	Vector Autoregressive model	+
Tourist Volume/Hotel Occupancy	Havranek and Zeynalov (2021)	Czech Republic/Prague	The Mixed-Data Sampling forecasting model	+
	Li et al, (2020)	China/Beijing	The Generalized Dynamic Factor model	+
	He et al, (2020)	China/Gulang island	Pearson correlation	+
	Xin et al, (2017)	China/Beijing	Generalized dynamic factor model (GDFM)	+
	Xiankai et al, (2017)	China/Forbidden city	Ordinary Least Squares	+
	Sun et al, (2019)	China/Beijing	KELM models and Pearson correlation	+
	Dergiades et al, (2018)	Cyprus/country level	Vector Autoregression model (VAR)	+
	Antolini and Grassini (2018)	Italy	ARIMA model	**0**
	Siliverstovs and Wochner (2018)	Switzerland/country level	Mincer–Zarnowitz-type regression model	+
	Yuyao et al, (2019)	China/country level	Random Forest model	+
	Onder (2017)	Austria, Vienna Belgium, Barcelona	Autoregressive Distributed Lag Model (ADLM)	
	Hyunyoung and Varian (2009)	China/Hong Kong	Seasonal Autoregressive model and fixed effect model	+
Epidemics/diseases	Kurian et al, (2020)	US/country level	Correlation analysis	+
	Mavragani and Gkillas (2020)	US/country level	Pearson and Kendall rank correlations	+
	Venkatesh and Gandhi (2020)	India/country level	Spearman correlation and lag correlation	+
	Carneiro and Mylonakis (2009)	US/country level	Pearson correlation	+
	Li et al, (2017)	China/Guangzhou	Pearson correlation	+
	Ginsberg et al, (2009)	US/country level	Ordinary Least Squares (OLS)	+
Unemployment rate/benefits	Simionescu (2020)	Romania/country level	Linear mixed-effects models and Maximum Likelihood Estimation as estimation model	+
	Simionescu and Cifuentes-Faura (2022)	Spain/country level	Vector autoregressive Bayesian models and vector error correction models	+

	Askitas and Zimmermann (2009)	Germany/country level	Error-correction model	_
	Vicente et al, (2015)	Spain/country level	ARIMAX models	+
Consumption	Woo and Owen (2019)	US/country level	Ordinary Least Squares (OLS) model	+
	Bleher and Dimpfl (2022)	US and Euro Area	Vector autoregressive models (VARs)	+
Total capital and FDI inflows	Futoshi and Rujun (2018)	Worldwide	OLS	+
	Naveed et al, (2020)	Pakistan/country level	Structural Equation Modeling (SEM)	+

3 RESULTS

The different types of quantitative and theoretical models have been used with a predominance of secondary data. Different secondary data sources have been used both on the cross-sectional and individual observational levels. The review of papers shows that the indicators based on searched data on the web have a positive association with stock prices, and stock returns and improve the predictive power of existing models of risk and volatility of financial derivatives. Most studies in the above find out that this association is statistically significant and provides a reliable prediction of stock returns and prices in the short term. Furthermore, tourist arrivals are also highly correlated with the Google Search Volume Index. More searches about the country or any destinations will be observed with more tourist arrivals in the short term. Thus, indexes that were based on web searches are helpful for nowcasting tourism demand. In addition to financial derivatives and tourism demand, the search volume index also provides an accurate and reliable prediction of the unemployment rate, individual consumptions, real export, capital inflow, epidemics, and other economic and financial variables which are very important for policymakers for predicting upcoming events and economic behaviors.

4 DISCUSSION

As Internet usage is growing, Internet applications or statistics from it can be used in any financial and economic decision-making process. This mega data from the Internet allows researchers to investigate the interests of people and make more reliable forecasting of variables. While a lot of work has been done to prevent information gaps in official data, the data from Google Trends have an enormous possibility to fill information gaps in developing countries. Therefore, the systematic approach to using the data from Google Trends creates new possibilities and opportunities for researchers.

The literature review indicates that the usage of Google Trends is not limited to economic and financial variables. Tourism arrivals and infection rates are highly associated with the search behavior of people and this association is statistically significant. The set of variables that can be analyzed and forecasted by integrating search data into empirical analysis is vast and promising. One of those variables can be FDI inflow to countries where forecasting of it is highly dependent on understanding the behavior of investors. Thus, the data from Google Trends would help researchers better utilize new sources of information in economic analyses, including understanding the complex behavior of investors and making a more appealing investment environment in the country by using predictions from data on search query submission. The investigation of data from Google Trends not only analyzes the current state

of discussed variables but also provides insight into future trends in financial and economic activity.

5   CONCLUSION

This literature review is an effort to review studies that use the internet to resolve the issue of information gaps in policymaking and analysis for low-income developing countries. The strong association of search behavior of people with different economic and financial variables in this review reveals the fact that data from Internet search frequencies improve the ability to monitor and assess current economic and financial activities which is important for developing countries with information shortages. Except for 1 paper, all studies found out a statistically significant association between web search frequency and variables in interest.

In sum, this paper has outlined the influence of web search frequency on different types of variables including the analysis of the magnitude of influence at different time periods. Therefore, the study offers a helpful tool for both scholars and policymakers by summarizing and arranging the variables that are influenced by web search frequency. This review acknowledges researchers with existing methodologies and approaches in different studies. The study offers policymakers not just a summary of the association, but also the possibility of integrating the search behavior of people on the kinds of policy initiatives and narratives that are most likely to be effective.

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THE DETERMINANTS OF BANK PROFITABILITY OF VIETNAMESE COMMERCIAL BANKS

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Abstract

This study delves into the determinants affecting the return rates of commercial joint-stock banks in Vietnam, aiming to quantify the magnitude of their influence on the financial performance of 31 such banks operating in Vietnam during the period spanning from 2010 to 2020. By employing a range of statistical methodologies including Pooled Ordinary Least Squares (OLS), Random Effects Model (REM), Fixed Effects Model (FEM), and Generalized Least Squares (GLS), it assesses the impact these factors have on the profitability of Vietnamese commercial banks. Subsequently, various statistical tests are employed to identify the most appropriate model. The findings of this research highlight the significance of eight variables within the model that exert a substantial impact on the profitability of commercial banks, namely Non-interest income (NONI), Size (SIZE), Foreign ownership (OWN), Operating expenses (OEP), Non-performing loan ratio (NPL), Minimum capital adequacy ratio (CAR), Loan-to-asset ratio (NTLA), and Loan-to-deposit ratio (LDR). It is important to note that these results may diverge from earlier studies due to the distinct regulatory frameworks, governmental policies, and unique characteristics of each business sector within different countries, which serve as explanatory factors for the observed variations.

Keywords: Banking performance, Profitability, ROA, ROE, NIM

1   INTRODUCTION

Economic reforming, strengthening the financial system, market integration, privatization, liberalization, and consolidation have become common trends in emerging economies. The significant changes in banking operations have led to substantial development in scale and quality, particularly with the emergence of domestic and foreign joint-stock commercial banks. Banks play a crucial role in the current country's development by regulating and providing capital to meet economic entities' production and business needs (Ongore and Kusa, 2013). Commercial banks have become macroeconomic regulation tools, assisting the central bank in formulating appropriate financial and monetary policies for each development phase. The banking system now has more favourable conditions to participate in international economic integration, following current trends, but it also faces challenges and competition (Siddiqui và Shoaib, 2011).

According to (San & Heng, n.d.), a weak banking system can lead to a major disaster for any financial system. The financial crisis in 1999, experienced by Asian countries such as Thailand and Indonesia, not only resulted in the collapse of their banking systems but also put pressure on the overall financial system of those countries. Vietnam managed to overcome this crisis by proactively addressing the issues domestically.

Although Vietnam commercial banks have experienced consistent growth over the years, there have been significant impacts during the COVID-19 pandemic. The containment measures and other actions taken to prevent the spread of the disease have significantly impacted the global economy, including countries in the Southeast Asian region in general and Vietnam in particular. The profitability of banks in Vietnam is reflected in the continuous fluctuations of their Return on Assets (ROA), Return hon hequity (ROE), Net Interest Margin (NIM). The

banking sector faces difficulties such as maintaining low-interest rates and slow credit growth due to the weak capital absorption capacity of the economy. In addition, the mechanisms and policies regarding collateral asset management and the regulations concerning land and real estate still have many shortcomings. The corporate bond market negatively affects the quality of banks' assets and poses a risk of bad debt. This leads to limitations in handling collateral assets to address non-performing loans, requiring credit institutions to increase provisions for risk reserves, affecting their profitability. Therefore, analyzing and measuring profitability to evaluate business effectiveness and finding measures to enhance profitability is an extremely important and necessary issue for Vietnamese commercial banks in the current period. Researching the return on investment of banks in Vietnam during this period not only reflects a comprehensive overview of the business efficiency of banks in Vietnam. It also serves as a basis for calculating other quality indicators to assess the complete effectiveness of their production and operations in each operating period.

The structure of this article is designed to provide an overview of the research. Following the introduction, the article will proceed with a detailed analysis of the research methodology, outlining in-depth the statistical models used and the process for selecting the most suitable model. Subsequently, we will present the research findings, with a particular focus on eight significant variables that have been identified in influencing the profitability of commercial banks. Each variable will be scrutinized meticulously to understand its impact. while considering factors like specific regulations, government policies, and industry distinctions across nations.

2 LITERATURE REVIEW

According to (Gul et al., 2011), factors that determine bank profits are often divided into internal and external factors. Some studies are country specific and a small number of them were considered as councils of nations for consideration factor that determines profit. Overall, these studies suggest that Factors that determine bank profitability can be divided into two groups; internal and external factors. These studies clearly show returns on assets (ROA), return on equity (ROE), return on capital employed (ROCE) and net interest margin (NIM) are the dependent variables and consider internal and external factors as independent variables.

The study by (San & Heng, n.d.) investigates the impact of specific bank characteristics and macroeconomic conditions on the financial activities of commercial banks in Malaysia from 2003 to 2009. The study results indicate that ROA is the best measure of profitability. All determining factors specific to banks significantly influence banks' profitability as predicted. However, no evidence was found to support the impact of macroeconomic variables on profitability. On the contrary, the study by (Pasiouras & Kosmidou, 2007) reveals that the profitability of both domestic and foreign banks is influenced not only by specific bank characteristics but also by the financial market structure and macroeconomic conditions. All variables, except concentration in the case of domestic bank profitability, are statistically significant. However, their impact and relationship with profitability may differ for domestic and foreign banks. Abreu and Mendes (2002) found that well-capitalized banks in different European countries experienced lower expected bankruptcy costs, resulting in increased profitability. They also identified a negative correlation between unemployment rates and bank profitability across all regression analyses. Additionally, profitability showed a noteworthy association with inflation rates.

In contrast, the profitability of banks has a positive influence on bank capital in the case of large banks and a negative influence in the case of medium-sized banks, as demonstrated by the study by (Abbas et al., 2019). Similarly, the study by (Dang, n.d.) suggests that owner's capital is

positively correlated with bank profitability while operating costs are inversely related to bank performance. A high proportion of agricultural finance within total finance can positively impact bank profitability. Burki and Niazi (2006) show that larger bank size, higher interest income relative to earning assets, and a greater loans-to-deposit ratio positively affected the estimated efficiency scores. Alaaeddin (2017) found that non-interest income contributed to an increase in the bank's profitability. Furthermore, factors such as bank size, loans, capital adequacy, and operating expenses all had a positive impact on the bank's operational efficiency. Depending on the specific characteristics of each country and government regulations, studies on factors affecting profitability of commercial banks have different results. With a different spatial and temporal approach and previous studies, the study "Factors affecting profitability of Vietnam joint stock commercial banks" was inherited by the author. and select previous research results to re-test and redefine the factors affecting profitability of Vietnamese joint stock commercial banks in the period 2010-2020. From the research results, the researchers hope to provide a more complete picture of the profitability ratio of the joint stock commercial banks, helping the managers of the joint stock commercial banks to improve the profitability ratio for daily banking operations, developing more comprehensively, healthily, and sustainably.

3 METHODOLOGY

3.1 Method

In this research, the author has used a panel data regression model as the main tool for analyzing the research subject. To estimate panel data, three popular models are used in panel data regression methods: Fixed Effect Model (FE), Random Effect Model (RE), and Pooled OLS. Research on bank profitability often involves continuous variables such as interest rates, assets, capital, and many other factors. OLS is a good method for processing continuous data and finding linear relationships between them.The author will use tests to examine the model's shortcomings, such as autocorrelation, multicollinearity, changing errors, and propose ways to address and overcome these limitations. The author used secondary data sources derived from audited consolidated financial reports of commercial banks operating in Vietnam from 2010 to 2020.

3.2 Research hypothesis

The study by Maudos (2017) demonstrates that an increase in the proportion of non-interest income has a significant negative impact on the profitability of retail banks but has a negligible effect on banks with more diversified business operations. This effect is particularly evident during periods of financial crisis when negative fluctuations affect the non-interest activities of banks. The study by Delpachitra and Lester (2013) indicates that non-interest income and revenue diversification reduce profitability and do not improve overall credit risk for banks. Further expansion into non-interest income activities does not benefit the banks. Conversely, there are also studies with positive conclusions for banks. For example, Saunders et al. (2014) research indicates that a higher proportion of non-interest income is associated with increased profitability and reduced risk for banks. The study by Lee et al. (2014) on the impact of non-interest income on the profitability and risk of 967 Asian banks showed that non-interest activities result in lower risk but do not contribute to increased profitability for banks. Based on previous research, this study has the hypothesis that:

H1: Non-interest income has a positive impact on profitability.

The economies of scale and scope theory suggest that large banks have cost advantages over smaller ones, allowing them to generate more profits. Increasing scale helps large banks significantly improve profitability (Berger & Humphrey, 1997). However, small banks can broadly leverage their ability to attract retail deposits, compensating for the lack of economies of scale. Therefore, scope economies can fully offset the disadvantages of not having scale economies, leading to improved financial efficiency (Miller & Noulas, 1997). Based on previous research, this study has the hypothesis that:

H2: The size of a bank has a positive effect on profitability.

The study by Haque & Brown (2017) shows that foreign ownership does not significantly impact the operational efficiency of commercial banks. In Vietnam, recent research on ownership structure's impact on commercial banks' operational efficiency has also attracted the attention of some authors. On the other hand, the author did not find any significance in any of the indicators for the foreign ownership variable. Cuong's (2014) study reveals a positive impact of the foreign ownership ratio on the profitability of companies with state ownership below 51%, while it indicates a negative impact on the profitability of companies with state ownership of 51% or higher.

H3: Foreign ownership impact positively on profitability.

The study by Minh and Cành (2015) shows that the ratio of operating costs to operating income is used to evaluate the operational efficiency of banks. The higher the operational efficiency of banks, as reflected by the lower operating costs to operating income ratio, the higher the profitability and the increase in profitability. The study by Setiawan and Hermanto (2017) indicates that when banks increase salary and benefits for employees under different conditions, it stimulates the employee's motivation and enhances the bank's operational efficiency, increasing profitability.

H4: There is a negative impact of operating costs on the profitability

The study by Gadzo et al. (2019) found a negative relationship between credit risk (represented by the non-performing loan ratio and the capital adequacy ratio) and the return on equity (ROE) and net interest margin (NIM) of banks in Ghana.

H5: The capital adequacy ratio has a positive impact on profitability.

The study by Alshtti (2015) shows that the non-performing loan to total loan ratio positively impacts the profitability of banks. The study by Serwadda (2018) found that the return on assets (ROA) of commercial banks is negatively affected by non-performing loans.

H6: The non-performing loan ratio impact negatively on profitability.

The study by Mohsin Jadah et al. (2020) demonstrates that the variable of the loan-to-total-assets ratio impacts the profitability rate, particularly in the current period for developing countries, including Vietnam.

Hypothesis 7: There is a positive relationship between loan-to-total assets ratio and profitability ratio

The research by (Gul et al., 2011) studies the profitability rate of commercial banks is represented by ROE (Return on Equity) and ROA (Return on Assets). The findings reveal that NIM (Net Interest Margin), operating expenses to operating income ratio, CAR (Capital Adequacy Ratio), and LDR (Loan-Deposit Ratio) have a positive impact on the profitability rate of commercial banks.

H8: Loan-to-deposit ratio has a positive impact on the profitability.

3.3 Research model

The author utilized secondary data from the most reliable sources, such as audited financial reports, of 31 commercial banks operating in Vietnam from 2010-2020. The variables used in the model are inherited from the study by Lee et al. (2014), and the author supplemented additional factors such as capital adequacy ratio (CAR) and non-performing loan ratio (NPL). The form of the model is as follows:

$$ROE_{it} = \alpha + \beta_1 NONI_{it} + \beta_2 SIZE_{it} + \beta_3 OWN_{it} + \beta_4 OEP_{it} + \beta_5 CAR_{it} + \beta_6 NPL_{it} + \beta_7 NTLA_{it} + \beta_8 LDR_{it} + \varepsilon \tag{1}$$

$$ROA_{it} = \alpha + \beta_1 NONI_{it} + \beta_2 SIZE_{it} + \beta_3 OWN_{it} + \beta_4 OEP_{it} + \beta_5 CAR_{it} + \beta_6 NPL_{it} + \beta_7 NTLA_{it} + \beta_8 LDR_{it} + \varepsilon \tag{2}$$

$$NIM_{it} = \alpha + \beta_1 NONI_{it} + \beta_2 SIZE_{it} + \beta_3 OWN_{it} + \beta_4 OEP_{it} + \beta_5 CAR_{it} + \beta_6 NPL_{it} + \beta_7 NTLA_{it} + \beta_8 LDR_{it} + \varepsilon \tag{3}$$

In which: α: constant"; ε: error

Tab. 1 – Summary of variables in the model. Source: Conducted by the authors

Definition	Acronym	Calculation
A. Dependent variable		
Return on assets	ROA	Net Income/ Total Assets
Return on equity	ROE	Net Income/Total Equity
Net Interest Margin	NIM	Net Interest Income / Average Interest-Earning Assets
B. Independent variable		
Non-interest income	NONI	Non-interest income/Total revenue
Scale of the bank	Size	Logarit of the total assets of the bank.
Ownership	Own	Percentage of foreign ownership.
Operating costs.	OEP	Operating expenses/Total revenue
Minimum capital adequacy ratio	CAR	(Private capital + Tier II capital)/(Assets + adjusted for risk) * 100%
Bad debt ratio	NPL	Total Bad Debt/Total Outstanding Debt
Loan-to-total assets ratio	NTLA	Total debt/Total assets
Loan to total deposit ratio	LDR	Total outstanding balance / Total deposit

4 RESULTS

Tab. 2 – Descriptive statistics. Source: Conducted by the authors

Variables	No. of observation	Average	Deviation	Min	Max
ROE	341	0.090217	0.0824637	-0.5633	0.2957
ROA	341	0.008012	0.0080011	-0.0599	0.0557
NIM	341	0.029180	0.0150896	-0.0199	0.0943
OWN	341	0.633431	0.4825755	0	1
CAR	341	0.08824	0.0790322	0	0.42
NTLA	341	0.5351762	0.1580625	0	0.8006
LDR	341	0.8936636	0.6174547	0	10.4128
NPL	341	0.0105155	0.0090847	0	0.0518
OEP	341	0.7788047	4.648254	0	86.3024
SIZE	341	0.09	0.436766	0	0.26
NONI	341	0.312346	1.162456	-5.99	16.19

Tab.2 presents descriptive statistics. Descriptive statistics measure the profitability of banks and the determining factors of bank profitability. The average ROA of Vietnamese commercial banks is 0.008012. The ROA values range from -0.0599 to 0.0557, with a low standard deviation of 0.0080011, indicating relatively stable bank profitability. The ROE values range from -0.5633 to 0.2957, with a higher standard deviation of 0.082463. The NIM values range from -0.0199 to 0.0943, with a higher standard deviation of 0.0150896. The independent variables have higher standard deviations.

Tab. 3 – Regression to ROE. Source: Conducted by the authors

	POOLED OLS	FEM	REM	FGLS
Independent variable	Regression coefficient	Regression coefficient	Regression coefficient	Regression coefficient
β_0	0.0246* (1.77)	0.412* (1.96)	0.0258 (1.51)	0.0306** (2.56)
OWN	0.0404***	0.0110	0.0344***	0.0457***

	POOLED OLS	FEM	REM	FGLS
Independent variable	Regression coefficient	Regression coefficient	Regression coefficient	Regression coefficient
	(5.41)	(0.47)	(2.63)	(5.61)
CAR	0.200***	0.0669	0.0962**	0.0739***
	(4.17)	(1.53)	(2.24)	(2.85)
NTLA	0.108***	0.0796***	0.0894***	0.0753***
	(4.42)	(3.18)	(3.74)	(3.60)
LDR	0.0128	0.0201***	0.0188***	0.00805
	(1.52)	(2.75)	(2.58)	(1.50)
NPL	-2.168***	-1.476***	-1.609***	-0.822***
	(-5.42)	(-4.15)	(-4.57)	(-3.88)
OEP	-0.00771***	-0.00814***	-0.00804***	-0.00716***
	(-10.07)	(-12.60)	(-12.46)	(-16.86)
SIZE	-0.183**	-0.00136	-0.0645	-0.0783
	(-2.07)	(-0.14)	(-0.71)	(-1.06)
NONI	-0.00602	-0.00455	-0.00479	-0.00144
	(-1.40)	(-1.28)	(-1.34)	(-0.60)
R-sq	0.402	0.419		

Notes:The z-statistics are shown in square brackets. ***, ** and * represent the 1%, 5%, and 10% significance levels, respectively.

The results of the OLS regression method show that there are 6 variables that have an impact on ROE: OWN, CAR, NTLA, NPL, OEP, SIZE with varying levels of significance ranging from 1% to 10%.

The results of the Fixed Effects Model (FEM) regression show that there are 4 variables that have an impact on ROE: NTLA, LDR, NPL, OEP with varying levels of significance ranging from 1% to 10%. The results of the Random Effects Model (REM) regression show that 6 variables have an impact on ROE: OWN, CAR, NTLA, LDR, NPL, OEP, with varying levels

of significance ranging from 1% to 10%. The study utilizes panel data and conducts regression using Random Effects and Fixed Effects. The author performs the Hausman test (1978) to determine the most appropriate method. Based on a significance level of 5%, Prob > chi2 = 0.0329 < 5%. Therefore, we reject the null hypothesis (H0), the FEM model: Fixed Effects. Thus, the REM method is chosen as the appropriate model for the research data.

The Fixed Generalized Least Squares (FGLS) regression shows that 5 variables have an impact on ROE: OWN, CAR, NTLA, NPL, OEP, with varying levels of significance ranging from 1% to 10%. The variables OWN, CAR, and NTLA have a positive relationship with ROE with a significance level of 1%. On the other hand, the variables NPL and OEP have a negative relationship with ROE with a significance level of 1%. However, the variables LDR, SIZE, and NONI are found to be correlated with ROE but do not have statistical significance.

Tab. 4 – Regression to ROA. Source: Conducted by the authors

	POOLED OLS	FEM	REM	FGLS
Independent variable	Regression coefficient	Regression coefficient	Regression coefficient	Regression coefficient
β_0	-0.000397 (-0.31)	0.000264 (0.12)	-0.000460 (-0.30)	0.00203* (1.72)
OWN	0.00334*** (4.85)	0.00219 (0.93)	0.00328*** (3.04)	0.00349*** (5.09)
CAR	0.0150*** (3.40)	0.00519 (1.18)	0.00854** (2.00)	0.00642** (2.37)
NTLA	0.00368 (1.63)	0.00129 (0.51)	0.00230 (0.98)	0.000332 (0.18)
LDR	0.000936 (1.20)	0.00164** (2.23)	0.00143** (1.96)	0.000606 (1.19)
NPL	-0.201*** (-5.45)	-0.143*** (-3.99)	-0.162*** (-4.60)	-0.0907*** (-4.18)
OEP	-0.000814*** (-11.53)	-0.000832*** (-12.75)	-0.000825*** (-12.72)	-0.000742*** (-12.61)
SIZE	0.0559***	0.0664***	0.0619***	0.0486***

	POOLED OLS	FEM	REM	FGLS
Independent variable	Regression coefficient	Regression coefficient	Regression coefficient	Regression coefficient
	(6.86)	(6.82)	(7.00)	(6.34)
NONI	-0.000399 (-1.01)	-0.000286 (-0.79)	-0.000321 (-0.89)	-0.000129 (-0.56)
R-sq	0.460	0.476		

Notes:The z-statistics are shown in square brackets. ***, ** and * represent the 1%, 5%, and 10% significance levels, respectively.

The results of the Fixed Generalized Least Squares (FGLS) regression show that there are 5 variables that have an impact on ROA: OWN, CAR, NPL, OEP, SIZE, with varying levels of significance ranging from 1% to 10%. The variables OWN, SIZE, and CAR have a positive relationship with ROA with significance levels of 1%, 1%, and 5%, respectively. On the other hand, the variables NPL and OEP have a negative relationship with ROA with a significance level of 1%. However, the variables NTAL, LDR, and NONI are found to be correlated with ROA but do not have statistical significance.

Tab. 5 – Regression to NIM. Source: Conducted by the authors

	POOLED OLS	FEM	REM	FGLS
Independent variables	Regression coefficient	Regression coefficient	Regression coefficient	Regression coefficient
β_0	-0.000926 (-0.38)	-0.000524 (-0.16)	-0.000824 (-0.29)	0.00393* (1.88)
OWN	0.00744*** (5.64)	0.00731** (2.00)	0.00752*** (3.35)	0.00780*** (6.50)
CAR	0.0272*** (3.21)	0.00474 (0.69)	0.00819 (1.19)	0.00647 (1.47)
NTLA	0.0266*** (6.13)	0.0234*** (5.96)	0.0241*** (6.29)	0.0155*** (4.20)

POOLED OLS		FEM	REM	FGLS
Independent variables	Regression coefficient	Regression coefficient	Regression coefficient	Regression coefficient
LDR	-0.000104 (-0.07)	0.00188 (1.64)	0.00158 (1.36)	0.00297* (1.84)
NPL	-0.252*** (-3.56)	-0.167*** (-2.99)	-0.179*** (-3.19)	-0.0544*** (-1.35)
OEP	-0.000388*** (-2.87)	-0.000345*** (-3.40)	-0.000348*** (-3.38)	-0.000210** (-2.11)
SIZE	0.138*** (8.82)	0.143*** (9.42)	0.142*** (9.66)	0.113*** (9.33)
NONI	-0.00186** (-2.45)	-0.00129** (-2.30)	-0.00136** (-2.39)	-0.00250*** (-3.25)
R-sq	0.442	0.421		

Notes:The z-statistics are shown in square brackets. ***, ** and * represent the 1%, 5%, and 10% significance levels, respectively.

The results of the Fixed Generalized Least Squares (FGLS) regression show that there are 6 variables that have an impact on NIM: OWN, NTLA, LDR, OEP, SIZE, NONI, with varying levels of significance ranging from 1% to 10%. The variables OWN, NTLA, SIZE, and LDR have a positive relationship with NIM with significance levels of 1%, 1%, 1%, and 10%, respectively. On the other hand, the variables OEP and NONI have a negative relationship with NIM, with significance levels of 5% and 1%, respectively. However, the variables CAR and NPL are found to be correlated with NIM but do not have statistical significance.

5 DISCUSSION

The variable "Ownership by foreign investors (OWN)" indicates that Commercial Banks with foreign personnel in their leadership positively impact both ROA, ROE, and NIM. This aligns with the hypothesis put forward.

The variable "Minimum capital adequacy ratio (CAR)" shows that an increase in the minimum capital adequacy ratio positively impacts both ROA and ROE. This aligns with the hypothesis put forward when other factors remain constant. If CAR increases by 1%, ROE increases by 7.3%, and ROA increases by 0.6%. A high capital adequacy ratio and efficient capital utilization often lead to sustainable profit growth for commercial banks. Particularly, demonstrating a

strong financial structure helps banks access low-cost funding from abroad through international bond issuance and borrowing from global financial institutions.

The variable "Credit-to-Asset Ratio (NTLA)" has a positive impact on the Net Interest Margin (NIM) of banks, indicating that as the credit scale increases, the NIM also increases. This conclusion aligns with previous studies such as (Hamid Mohsin Jadah et al., 2020), (Iannotta, 2007).

The variable "Loan-to-Deposit Ratio (LDR)" has a positive impact on the Net Interest Margin (NIM). This is consistent with the hypothesis being proposed. These results are supported in the study conducted by (Mohammad Sofie Abdul Hasan et al., 2020).

The variable "Non-Performing Loan Ratio (NPL)" has a negative impact on ROA, ROE, and NIM. This is consistent with the hypothesis. When other factors remain constant if NPL increases by 1%, ROE decreases by 0.82%, ROA decreases by 9%, and NIM decreases by 5.4%.

The variable "Operating Expense Ratio (OEP)" has a negative impact on ROA, ROE, and NIM. This is consistent with the hypothesis. When other factors remain constant if OEP increases by 1%, ROE decreases by 0.71%, ROA decreases by 0.74%, and NIM decreases by 0.21%.

The variable "Size" (SIZE), measured by the Total Assets ratio, positively impacts ROA and NIM. This is consistent with the hypothesis. The research conducted by (Andi Ruslan et al.,2019) also haved similar results.

The variable "Non-Interest Income" (NONI) shows a negative impact on the Net Interest Margin (NIM) of commercial banks, contrary to the hypothesis. These results align with the research of Maudos (2017).

6   CONCLUSION

The research study was conducted on a sample of 31 joint-stock commercial banks from 2010 to 2020 in Vietnam. The study utilized various econometric methods such as OLS (Ordinary Least Squares), FEM (Fixed Effects Model), REM (Random Effects Model), and FGLS (Feasible Generalized Least Squares) to examine the hypotheses regarding the impact of eight factors on the profitability of these joint-stock commercial banks in Vietnam.

The results obtained from the analysis indicate that eight variables have statistically significant effects on the profitability of these banks. These variables include Non-Interest Income (NONI).

 Size (SIZE), Foreign Ownership (OWN), Operating Expenses (OEP), Non-Performing Loans Ratio (NPL), Capital Adequacy Ratio (CAR), Loan-to-Asset Ratio (NTLA), and Loan-to-Deposit Ratio (LDR).

The Return on Equity (ROE) has a positive relationship with Foreign Ownership (OWN), Loan-to-Asset Ratio (NTLA), Loan-to-Deposit Ratio (LDR), and Capital Adequacy Ratio (CAR). In contrast, it negatively relates to Non-Performing Loans Ratio (NPL) and Operating Expenses (OEP). These results indicate that an increase in loan growth, accompanied by a rise in non-performing loans, can lead to higher profitability for joint-stock commercial banks in Vietnam. Having foreign personnel in the leadership team also contributes positively to enhancing the ROE.

However, the requirement for a higher capital adequacy ratio positively impacts these banks' profitability, particularly considering that the credit growth of joint-stock commercial banks in

Vietnam is subject to approval from the State Bank of Vietnam (SBV) corresponding to the achieved capital adequacy ratio.

The Return on Assets (ROA) has a positive relationship with the Capital Adequacy Ratio (CAR), Size (SIZE), and Foreign Ownership (OWN), while it has a negative relationship with Operating Expenses (OEP) and Non-Performing Loans Ratio (NPL). The results indicate that commercial banks can increase their profitability by leveraging advantages such as size and the expertise of foreign personnel. A higher capital adequacy ratio positively impacts the ROA, suggesting that implementing proactive capital restructuring and adopting suitable strategies in line with the bank's situation can optimize the capital structure. This, in turn, allows for higher credit growth approvals from the State Bank of Vietnam (SBV) and increases bank profitability.

Net Interest Margin (NIM) has a positive relationship with Size, Foreign Ownership (OWN), Loan-to-Asset Ratio (NTLA), Loan-to-Deposit Ratio (LDR), and a negative relationship with Non-Interest Income (NONI), Operating Expenses (OEP), and Non-Performing Loan Ratio (NPL). It has a similar meaning to Return on Assets (ROA). Except for Loan-to-Asset Ratio (NTLA) and Loan-to-Deposit Ratio (LDR), which have a positive impact on NIM, this indicates that banks maintaining a high loan-to-asset ratio while having stable funding sources, growth along with loan balances will result in a higher net interest margin (NIM) for the bank.

Based on the research findings, the author recommends the following implications and policies:

The government should continue to implement coherent measures suitable for the reality of Vietnam and international norms to restructure credit institutions.

The government needs to implement consistent and effective macroeconomic stabilization measures, creating an environment and incentives for economic development. The central bank should proactively and flexibly manage monetary policy tools.

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UNDERSTANDING CASH HOLDING DETERMINANTS IN THE CONSTRUCTION INDUSTRY: INSIGHTS FROM LISTED COMPANIES IN VIETNAM

Le Ngoc Thuy Trang

Abstract

The analysis uses information from 153 businesses in the construction sector that were listed between 2010 and 2020 on the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX). The study investigates the variables influencing cash holdings in Vietnamese construction firms using OLS, FEM, REM, and FGLS methodologies. According to the study's findings, macroeconomic issues have less of an impact on a company's cash holding ratio than internal ones. Particularly, business size has an adverse relationship with cash holdings since capital raising for large organizations is frequently simpler than for small companies. The company's cash is mostly used for ongoing operations, including making loan payments, paying employees' wages, buying supplies, etc. However, keeping cash at a low level might quickly result in a loss of liquidity, especially in some unique economic circumstances, if the firm relies on a huge scale without taking the holding ratio into account. Additionally, there is a strong positive correlation between profitability and the cash holding ratio that significantly affects this ratio. Construction businesses frequently use retained earnings from one period to fund their current activities. In order to increase the caliber of their work, construction businesses might invest in new projects, train skilled labor, and purchase tools and equipment. Overall, this study provides important insights into cash holdings in Vietnam's construction industry, with an emphasis on internal factors and macroeconomic conditions in maintaining financial stability and industry growth.

JEL Classification: G30, G32

Keywords: Cash Holdings, construction companies, macroeconomic factors, Vietnam

1 INTRODUCTION

Companies have historically paid extra attention to cash and also focused on the topic of cash holdings (Akben-Selcuk & Sener, 2020). Lessons from the failure of Lehman Brothers, one of the largest investment banks in the US, which went bankrupt after having problems with not having enough cash to cover large debts, or General Motors (GM), which met financial hardship and insufficient cash to pay employees and cover debts. All have demonstrated how crucial decisions about the company's cash holdings, or cash management, are from a financial standpoint (Ye, 2018). He also believes that cash holding companies can perform well in speculation and hedging activities while also addressing the requirements of regular operations and trade activities.

According to Ozkan & Ozkan (2004), transaction costs, other financial limitations, the asymmetry of knowledge between enterprises and outside investors (Myers & Majluf, 1984), and expensive agency issues including underinvestment and asset substitution are the main reasons why external financing is more expensive (Jensen & Meckling, 1976; Myers, 1977). As a result, managers seeking to lower the costs of external borrowing in volatile capital markets may find it prudent to retain a sufficient amount of internal financial flexibility. Senior management may make wasteful acquisitions and invest in inefficient projects to seek personal

gain. Moreover, the impact of competition in the market also shows that firms are also increasing the amount of money at the company (Zhang & Zhou, 2022). However, holding too little cash will also affect enterprises' ability to pay debts immediately or arrange spending for investments (Wu et al., 2012).

Vietnam's construction market has experienced growth in recent years, driven by increased demand from domestic and foreign enterprises, FDI, and public demand. This has led to increased completion of projects in infrastructure areas like railways, highways, urban transport systems, social housing, apartment buildings, residential houses, and commercial centers. However, businesses face challenges such as tightening real estate credit, fierce competition, and unpredictable raw material prices (e.g., oil price uncertainty) (Zhang et al., 2020). The importance of cash in the construction industry is crucial, as companies must balance the need for materials, equipment, and labor costs to advance to the next phase.

With the aim of understanding the factors that affect the cash holdings of Construction companies in Vietnam, the study will take samples from 153 Construction companies during the period from 2010 to 2020. Elucidates the question of factors affecting cash holdings in construction companies in Vietnam as well as the extent of their influence. This study hopes to contribute insight into cash holdings in the construction industry listed on the stock exchange in Vietnam. It focuses on the factors that influence the cash-holding decisions of companies in this industry, helping to better understand how businesses build, manage, and use their financial resources. Moreover, the research results help companies better understand the important factors that they need to consider when making decisions about cash holdings, thereby optimizing financial management and enhancing efficiency in business.

The paper proceeds as follows: Section 2 presents some relevant theories and a research overview, followed by data and methodology in Section 3. The results and discussion presented in Section 4. Section 6 is the conclusion and limitation.

2 LITERATURE REVIEW

Previous research has made significant contributions to understanding the determinants influencing corporate cash holdings. Ferreira & Vilela (2004) investigated the drivers of corporate cash holdings over the period 1987–2000 using a sample of 400 enterprises from 12 countries in the Economic and Monetary Union (EMU). Their findings reveal that cash balances are inversely connected to leverage and business size. Additionally, businesses hold less cash in countries with strict investor protection and centralized ownership, demonstrating the importance of agency costs in determining cash levels.

In the euro area, Saddour (2006) realized that when businesses are riskier, they hold more cash, and when they are more leveraged, they hold less. Growing companies keep more cash on hand than established companies, and cash balances and firm size have a negative association. Between 1994 and 2004, Chen & Mahajan (2010) looked at corporate liquidity in 15 European Union (EU) and 31 non-EU countries. They discovered that the adoption of the Euro and the establishment of the EMU reduced corporate liquidity in the EU. Converted to the single currency of the EU, cash and debt are more interchangeable inside the bloc, and factors related to corporate governance, such as low stock ownership, are crucial in determining a company's liquidity. Al-Najjar (2013) analyzed samples of non-financial firms from 2002-2008, finding that leverage, profitability, and firm size significantly impact cash holdings for both developed and emerging market firms. Industry and institutions are the main reasons for the difference in cash holding decisions. Emerging market companies in countries with high equity protection tend to hold more cash due to weak capital markets.

The Asian region has many studies on cash holdings, with Afza & Adnan (2007) showing a negative correlation between leverage value and cash holdings in non-financial firms in Pakistan. Megginson & Wei (2010) find that large profits and high growth opportunities lead to more cash holdings in Chinese private firms, while debt is negatively correlated with cash holdings. These findings highlight the importance of understanding cash holdings across different industries and sectors. In addition, Wu et al. (2012) studied the impact of trade credit and the ability of banks to finance companies in traditional industries in China. They collected data from 13,229 observations from 1,626 companies between 1999 and 2009. The authors found that firms in the region that were more likely to receive bank financing tended to hold less cash and view trade credits as a larger reserve for cash. Furthermore. Nisasmara & Musdholifah (2016) studied data from companies in the real estate industry listed on the Indonesian stock exchange. Research results show that financially controlled companies tend to invest more cash and spend available cash faster. As a result, poor corporate governance has consequences for cash management. This causes weak corporate governance managers to have smaller cash reserves. Meanwhile, the research by Simanjuntak & Wahyudi (2017) with 77 Indonesian construction and real estate companies from 2009 to 2015 showed that profitability and firm size positively impact cash holdings. Large construction firms have an advantage in attracting government demand for projects, while working capital negatively affects cash holdings. Construction projects often have long payback periods, resulting in a high debt structure, while cash is mainly used to finance short-term liabilities. Financial leverage and investment opportunities do not affect cash holdings. In addition, Qin et al. (2020) are taking data from companies listed on the Shanghai and Shenzhen stock exchanges (China) in the period 2014–2020. The study's findings are as follows: Under the influence of the pandemic, businesses strengthened their cash reserves to counteract systemic risks. When COVID-19 emerged, there was a significant shift in the market's supply and demand dynamics for listed firms. The supply chain companies' production processes were entirely disrupted at the same moment, which caused a fall in revenue and cash flow. The only method to raise cash holdings is through short-term lending because the intrinsic capital flow model is challenging to maintain. The epidemic demonstrates cash dynamics. Banks and other financial organizations have sensibly lowered credit limits for lenders during the pandemic. Businesses have limited access to and capacity for borrowing, which limits how much cash they can accumulate. Additionally, the fall in goodwill during the pandemic period prevented businesses from increasing their cash holdings. Additionally, Silvy (2021) employs a sample of 56 companies in the building and real estate industries that were listed on the Indonesian stock exchange between 2017 and 2019. The findings indicate that firm size and profitability have no bearing on cash holdings. The research findings demonstrate that net working capital and financial leverage have a beneficial impact on the capacity to hold cash, while the construction industry has a high requirement for working capital to maintain effective operations for projects. In Vietnam, Tran Minh et al. (2022) examined the non-linear relationship between financial leverage and cash holdings of 513 companies in the period 2007–2019. The authors found that financial leverage is negative for cash holdings at low levels, but the relationship is positive at high levels of financial leverage. Companies with low financial leverage should tend to hold less cash and issue debt because adding debt to adjust investments and operations can maximize firm value. In the meantime, Trinh & Thuy Mai (2016) claimed that the backdrop of financial restrictions had an impact on policies on cash holding and working capital investment. The study's findings raise questions about why people keep cash and how financial limitations affect how much working capital is spent in the real estate industry.

In the US, Bates et al. (2009) found that increasing cash holdings in US firms leads to a decrease in financial leverage and borrowing. Companies with negative or non-negative income have higher percentages of cash holdings, but companies with negative earnings are more than three

times more likely to hold cash. The main reason for this increase is decreased capital expenditure. Hardin III et al. (2009) indicated that cash holdings in real estate investment trusts (REITs) are inversely related to financial leverage and directly related to growth prospects. Additionally, cash holdings are negatively correlated with access to credit. Kim et al. (2011) showed that restaurant companies with strong investment possibilities typically maintain more cash, while businesses with high capital costs typically maintain less cash. Transactional and hedging reasons also play a significant role in understanding cash holdings in the restaurant industry.

3 METHODOLOGY

3.1 Data

Research data is taken from 153 construction companies listed on the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX) in the period 2010–2020, so the number of observations obtained would be 1,683 observations. The research paper will include one dependent variable and eight independent variables (including micro and macro factors). Five microfactors will collect data from annual reports of companies or from some websites such as finance.vietstock.vn, cophieu68.vn, etc. As for the three macrofactors, they will be collected on the website of the General Statistics Office of Vietnam. All data will be collected between 2010 and 2020.

3.2 Hypothesis

Firm size (SIZE):

The Trade-Off Theory suggests that firm size negatively impacts cash holdings due to access to low-cost funding sources. Harris & Raviv (1990) found a negative relationship between business size and knowledge asymmetry, leading to large organizations limiting cash accumulation to avoid investing in ineffective projects. Ferreira & Vilela (2004) found a negative correlation between cash holdings and firm size, while Bigelli & Sánchez-Vidal (2012) showed a negative link between business size and cash holdings in the private sector. Pecking order theory predicts a favorable correlation between business size and cash holdings, as large organizations often outperform smaller ones, requiring more capital. The author concludes that a company's size negatively impacts its cash holding ratio.

Hypothesis H1: Firm size has a negative effect on cash holdings.

Company profit (PROF):

According to the trade-off theory, profitability and cash holdings have a negative connection. Bates et al. (2009) discovered a negative link between profitability and cash holding because productive enterprises will have sufficient cash flow to avoid the problem of wasteful investments (Kim et al., 1998; Ozkan & Ozkan, 2004). According to Ferreira & Vilela (2004), retaining cash has a beneficial influence on profitability in EMU countries. Almeida et al. (2004) discovered the same conclusion for financially limited enterprises.

Hypothesis H2: Profit has an positive effect on cash holdings.

Capital expenditure (CAPEX):

The pecking order theory predicts a negative relationship between capital expenditures and cash holdings. Because capital expenditure obviously directly reduces the company's cash flow. In contrast, the Expectation Trade-Off Theory has a positive influence on both indicators because enterprises with large capital expenditures will hoard cash as a hedge against capital-related

transaction costs and opportunity costs of limited financial resources. According to Bates et al. (2009), the cost of capital can boost borrowing ability and therefore lower the demand for cash since the cost of capital helps acquire assets that can be used as collateral for debts. Song & Lee (2012) discovered a negative link between capital spending and cash holdings in enterprises after the Asian financial crisis. Opler et al. (1999) discovered that cash holdings grew relative to the cost of capital.

Hypothesis H3: Capital expenditure has a negative effect on cash holdings.

Financial leverage (LEV):

Ozkan & Ozkan (2004) contend that debt can replace cash holdings because debt lowers moral hazard, in line with the trade-off hypothesis. Opler et al. (1999) assert that enterprises employ surplus cash either to pay off debt or to keep amassing cash, which is consistent with pecking order theory. Even though businesses could have a debt objective, the pecking order hypothesis governs how money is expended. Ferreira & Vilela (2004) claim that the trade-off theory can also predict a positive relationship between financial leverage and cash holdings since leverage increases the risk of bankruptcy and businesses store more cash to lessen the risk of financial hardship. According to Ferreira & Vilela (2004), debt raises the possibility of a firm's insolvency; hence, companies would keep more cash on hand to hedge against this risk.

Hypothesis H4: Financial leverage has an neagtive effect on the firm's cash holding ratio.

Net working capital (NWC):

According to Opler et al. (1999), the pecking order hypothesis predicts no relationship between net working capital and cash holdings. Because cash may be easily converted to cash, the trade-off hypothesis predicts a negative relationship between cash holdings and net working capital. As a result, when liquid assets are replaced, the amount of cash kept may drop. According to Bates et al. (2009) , Ferreira & Vilela (2004) and Opler et al. (1999), net working capital and cash holdings have a negative influence. After the Asian financial crisis, Song & Lee (2012) discovered a significant negative association between cash holdings and net working capital in enterprises. According to Bigelli & Sánchez-Vidal (2012), the bigger a private firm's net working capital, the less cash it holds. Based on the research findings, the author argues that net working capital will have a negative impact on a company's cash holding ratio.

Hypothesis H5: Net working capital is negatively related to cash holdings.

Economic growth (GDP):

Research by Orlova (2020), based on data from 48 countries, suggests that higher GDP is associated with higher volatility in cash reserves. Chen & Mahajan(2010) argue that the positive effect of GDP growth makes businesses want to hold more cash when expanding the economy, which also helps them have enough internal funding for profitable investment. Research results by Abushammala & Sulaiman (2014) suggest that companies holding large amounts of cash are suitable for developed economies.

Hypothesis H6: Economic growth has a positive effect on cash holdings.

Inflation Rate (INF):

Orlova (2020) emphasizes that high inflation in stock markets with limited development results in lower cash holdings. As inflation rises, businesses in developed nations tend to hold more cash. Wang et al. (2014) think that the declining purchasing power of monetary assets is the reason why corporate cash holdings decline as inflation increases. According to Chen & Mahajan (2010), higher inflation lowers the purchasing power of money, which causes businesses to hold less cash and invest more in real assets. Anand et al. (2018) claim that

businesses will probably invest in both short- and long-term deposits in the face of inflation and rising interest rates.

Hypothesis H7: Inflation has a negative effect on cash holdings

Oil price change (OILC):

Anand et al. (2018), based on 1,718 companies listed on stock exchanges in India, have shown that changes in oil prices have a positive effect on cash holdings.

Hypothesis H8: Changes in oil prices have a positive effect on cash holdings.

3.3 Methodology

The method of Ordinary Least Square (OLS)

Regression is a statistical method for investigating the connection between a dependent variable and various independent variables. Basically, depending on the number of independent variables, it is divided into two types: Linear Regression and Multivariable Linear Regression (Dempster et al., 1977). In this study, it claims to involve seven factors, so it has the nature of multivariable linear regression. This is because OLS frequently performs on timeline and cross-sectional data for a variety of units over time and does not measure individually. Therefore, it will ignore the heterogeneity and implicitly assume that the coefficients of the individuals are the same. Also, it can limit the error or variance terms as well as the correlation between variables.

The Fixed Effects Model (FEM) and The Random Effects Model (REM)

The Fixed Effects model, also known as Minimal Dummy Variable Regression, examines the difference in the intercepts for each group through the use of a separate dummy variable for each group. On the other hand, the Random Effects model is also called the Error component model. Therefore, the Random Effects model will determine bias errors for groups or times and assume that there is no correlation between heterogeneity and any set of Regressors. By using the Random Effects model, the estimated number of parameters will be rejected. However, when the individual Random effects correspond to the Regression variables, the estimates will be inconsistent (Greene, 2007).

Hausman Test

In fact, in order to choose the right Fixed Effects model or Random Effects model for the research framework, researchers often use the Hausman test. Hausman's (1978) model can help determine the theoretical and statistical basis for the selection of Effect models by testing the H0 hypothesis. If the P_value is greater than 0.05, then we accept H0, which means it is suitable to use the Random Effects model, and vice versa.

Testing for multicollinearity

If multicollinearity occurs in the Regression model, it will make the results inaccurate. Therefore, to make sure that there is no multicollinearity between the independent variables in the model, it is necessary to conduct VIF (Variance Inflation Factor) tests. If VIF is greater than 10, there will be multicollinearity. Gujarati (2004) mentioned that, if the model has multicollinearity, it will reduce the variables, transform the variables, or use new data to avoid multicollinearity.

Testing the Heteroskedasticity

The uniformity of variance in residuals is one of the key assumptions of OLS Regression. If the Regression model is a perfect fit, then there is no pattern for the residuals on the scatter plot of

the residuals and the predicted value. If the variance of the residuals is no longer constant or there is a change in the variance of the residuals, this phenomenon is also known as variable variance. If the P value is > 0.05, the hypothesis is accepted, which means that the model does not have heteroskedasticity.

Research model

This study inherits from the models of Opler et al. (1999). The formula is as follows:

$$CASH_{i,t} = \alpha + \beta_1 SIZE_{i,t} + \beta_2 PROF_{i,t} + \beta_3 CAPEX_{i,t} + \beta_4 LEV_{i,t} + \beta_5 NWC_{i,t} + \beta_6 GDP_{i,t} + \beta_7 INF_{i,t} + \beta_8 OILC_{i,t} + \varepsilon_{i,t} \tag{1}$$

In which, α: Constant; ε: Error; dependent variable: Cash holdings (CASH); Independent variables: SIZE, PROF, CAPEX, LEV, GDP, INF, and OILC (For the details, see Appendix 1).

4   RESULTS

4.1   Descriptive statistics of the variables in the model

Tab. 1 - Descriptive statistics of variables. Source: own research

Variable	Observations	Mean	Standard dev.	Minimum	Maximum
CASH	1,683	0.0754	0.0839	0.0001	0.7682
SIZE	1,683	27.1274	1.4425	20.7202	31.0869
PROF	1,683	0.0542	0.0798	-0.5436	0.6675
CAPEX	1,683	0.1335	0.8640	-0.4196	21.8751
LEV	1,683	0.5877	0.2092	0.0113	0.9481
NWC	1,683	0.1268	0.2003	-0.7102	0.9466
GDP	1,683	0.0598	0.0116	0.0291	0.0708
INF	1,683	0.0596	0.0471	0.0060	0.1813
OILC	1,683	0.0060	0.2801	-0.4826	0.5241

According to the results from Table 4.1, we see that the average CASH ratio of 153 companies in the Construction industry in the sample is 7.5%, with a standard deviation of 8.39%. The CASH ratio has the smallest value of 0.1% and the maximum value of 76.82%. Thus, it can be seen that the ratio of cash holdings to total assets between companies in the construction industry has a high difference.

The Construction industry has an average asset size of 27.12, with a minimum of 20.72 and a maximum of 31.12. The Return on Total Assets (PROF) ratio has a mean of 5.42% and a standard deviation of 7.98%. The average return on total assets in the industry is 5%, which is appropriate for the research sample. Capital expenditure (CAPEX) varies widely, with a high risk level of 86.4%, indicating some companies are not effectively using their assets for revenue generation. Financial leverage (LEV) in the construction industry is high, with an average of over 50% and a risk ratio of 20.92%. The use of debt in operations is large, almost equal to the total assets, which increases the risk of insolvency. Net Working Capital (NWC) has an average value of 12.68% and a risk ratio of 20.03%, with a minimum value of -71.02% and a maximum value of 94.66%. This indicates that some companies may face pressure from short-term debt when they cannot balance their capital, leading to difficulties when debts come due.

GDP has a mean of 5.98% with a standard deviation of 1.16%, with a minimum value of 2.91% in 2020 and a maximum value of 7.08% in 2018. The inflation rate (INF) has a mean of 5.96% with a standard deviation of 4.71%, fluctuating between 6% and 18.13% per year. Between 2018 and 2020, the inflation rate will remain stable at 6%–7%, allowing companies to control costs and increase efficiency. The oil price change (OILC) has an average value of 0.6% and a risk ratio of 28.01%, making it difficult for companies, particularly construction companies, to control costs during contract signings. This can negatively impact the bottom line and potentially lead to unprofitable businesses.

4.2 Correlation matrix

Tab. 2 - Correlation matrix between variables. Source: own research

	CASH	SIZE	PROF	CAPEX	LEV	NWC	GDP	INF	OILC
CASH	1.0000								
SIZE	-0.1912	1.0000							
PROF	0.2201	-0.0868	1.0000						
CAPEX	-0.0292	-0.0641	-0.1298	1.0000					
LEV	-0.2226	0.431	-0.3927	-0.0316	1.0000				
NWC	0.1388	-0.3077	0.1577	0.0154	-0.4009	1.0000			
GDP	0.0531	-0.014	0.0887	-0.0388	-0.0103	0.0094	1.0000		
INF	-0.0161	-0.0614	0.0373	0.0118	0.1028	-0.0168	-0.011	1.0000	
OILC	-0.0207	0.0099	0.0525	-0.0232	-0.0026	0.0141	0.2331	0.3457	1.0000

To test the phenomenon of autocorrelation in econometrics, the Durbin-Watson criterion is often used: if the correlation coefficients are less than 0.8, there will be no autocorrelation. The results in Table 4.2 show that among the variables, there is a low correlation coefficient. Therefore, the model does not exhibit autocorrelation. Besides, after checking the variance exaggeration factor (VIF) in the following table 4.3, the average VIF value is only 1.24, so there is no multicollinearity between the variables in the model. According to Gujarati (2003), if the VIF coefficient is 10, there is no multicollinearity between the variables in the research model.

4.3 Multicollinearity test

Tab. 3 - Test for multicollinearity between variables. Source: own research

Variable	VIF	1/VIF
LEV	1.64	0.609545
SIZE	1.3	0.767781
PROF	1.24	0.803506
NWC	1.22	0.816489
CAPEX	1.03	0.971882
GDP	1.08	0.92706
INF	1.19	0.837957
OILC	1.22	0.819424
Mean VIF	1.24	

The results in Table 4.3 show that all variables: LEV, SIZE, PROF, NWC, CAPEX, GDP, INF, and OILC all have VIF values < 10. According to research by Wooldrige (2002), when the value of the coefficients is If VIF is greater than 10, multicollinearity will occur. Therefore, no multicollinearity occurs, and the author uses all the variables for the regression model.

Besides, the author used the Hausman test to choose the appropriate model, and the results were: Prob > chi2 = 0.1417 > 5%, so H0 is accepted (H0 is the REM: Random Effect model). Therefore, choosing the REM method is the model that fits the research data. Then, to ensure that there are no defects in the selected model or that if there are defects, there will be an alternative method, the author has conducted a test of variance and autocorrelation. The results show that the REM model carries both defects. Due to the existence of variable variance and autocorrelation, the author uses the FGLS method to overcome this phenomenon in his model.

4.4 Research results

Tab. 4 - Research results. Source: own research

	OLS	FEM	REM	FGLS
Independent variable	Regression coefficient			
β_0	0.269***	0.434***	0.348***	0.197***
SIZE	-0.00746***	-0.0127***	-0.00979***	-0.00521***
PROF	0.173***	0.0751**	0.0988***	0.136***
CAPEX	-0.00179	-0.00019	-0.00045	-0.000625
LEV	-0.0347***	-0.0663***	-0.0584***	-0.0208**
NWC	0.0163	0.00958	0.0101	0.0118*
GDP	0.312*	0.358**	0.352**	0.0718
INF	-0.0127	-0.00462	-0.00295	0.0227
OILC	-0.0111	-0.0101	-0.0107*	-0.00544*
R-sq	0.089	0.055		

*, **, *** The symbols are significant at the 1%, 5%, and 10% significance levels, respectively.

The results of the research model for the dependent variable CASH have the following equation:

$$\text{CASH}_{i,t} = 0.1974 - 0.0052 \times \text{SIZE}_{i,t} + 0.1362 \times \text{PROF}_{i,t} - 0.0208 \times \text{LEV}_{i,t}$$
$$+ 0.0117 \times \text{NWC}_{i,t} - 0.0054 \times \text{OILC}_{i,t} + \varepsilon_{i,t}$$

(2)

Regression results by the FGLS method show that there are 5 variables affecting CASH, namely SIZE, PROF, LEV, NWC, and OILC, with different significance levels from 1% to 10%. The SIZE variable is inversely proportional to the CASH variable at the 1% significance level. The PROF variable is directly proportional to the CASH variable at the 1% significance level. The LEV variable is inversely proportional to the CASH variable at the 5% level of significance. The NWC variable is proportional to the CASH variable at the 10% significance level. The OILC variable is inversely proportional to the CASH variable at the 10% significance level. And variables CAPEX, GDP, and INF correlate with variable CASH but are not statistically significant.

5 DISCUSSION

Cash holdings are inversely related to Firm Size. When using the FGLS model, the SIZE variable has a 1% significance level with the CASH variable. The model shows that an increase in SIZE by 1 unit will cause the cash holding ratio to decrease by 0.0052 units, which shows that firm size affects cash holdings but not too much. The results are similar to those of Bigelli & Sánchez-Vidal (2012) and Ferri & Jones (1979). This result proves that the article is on the right track compared to the original prediction: the larger the construction companies, the less cash they hold. Because larger companies will have more advantages in terms of capital mobilization, they can use capital mobilization methods such as loans to finance purchases of

materials, pay wages, etc., and that amount will be recovered after each acceptance of the project.

Cash holdings are moving in the same direction as Company profits. When using the FGLS model, the PROF variable has a 1% significance level with the CASH variable. Besides, FROF has a significant impact on the company's cash holding ratio. Specifically, an increase in FROF by 1 unit (in the event that other independent variables are unchanged) will make the cash holding ratio increase by 0.136 units. The results are similar to those of Almeida et al. (2004) and Ferreira & Vilela (2004). Construction companies tend to finance their operations with retained earnings for the next period. Because companies in the construction industry often carry out many projects in a row, retaining profits will help the company advance payments for labor, materials, machinery, and equipment.

Cash holding is the opposite of financial leverage at the 5% significance level. Research results are consistent with the author's expectations and similar to those of Kim et al. (2011). Aware of the difficulties that the company may face in the future when seeking funding for investment needs and with the aim of preventing a possible default, companies will prefer holding cash over using financial leverage.

Cash holdings have a positive effect on Net Working Capital at the 10% significance level. Research results are different from the author's expectations and go against previous studies. Due to the characteristics of the Construction industry's low inventory, costs mainly come from labor costs, the rental of equipment and machinery, and interest payments, which will be paid by the investor each month. During the project acceptance period, the company often increases its cash holdings when the number of construction projects increases to be able to advance major expenses, and vice versa.

Cash holdings are inversely related to Oil Price changes at the 10% significance level. An increase in oil prices leads to a decrease in GDP (Anand et al., 2018), which shows that oil prices have an indirect impact on cash holdings. When the price of oil increases, enterprises in the construction industry need to pay more for transportation and fuel costs to operate machinery.

From the statistical results, the author does not have enough basis to conclude the influence of the variables of capital expenditure, economic growth, and inflation on the cash holding ratio of companies in the construction industry.

6   CONCLUSION

The study takes data from 153 companies in the construction industry listed on the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX) during the period from 2010 to 2020. The study uses OLS, FEM, REM, and FGLS methods to examine the factors affecting cash holdings at construction companies in Vietnam.

From the research results, the author finds that the cash holding ratio is mainly affected by internal factors of the company rather than macro factors. Specifically, firm size has an inverse effect on cash holdings because large companies are often easier to raise capital than small firms. The part of cash the company holds is mainly spent on regular activities of the company, such as paying loans, salaries, provisions, etc. However, if the company relies on large scale without considering the holding ratio, Keeping cash at a low level can easily lead to a loss of liquidity, especially in some special economic conditions. In addition, the relationship between profitability and the cash holding ratio is positive and has a large influence on this ratio. Construction companies tend to finance their operations with retained earnings for the next period. This helps construction companies invest in more projects, develop high-quality human

resources, and invest in machinery and equipment to improve the quality of their work. However, the company needs to balance reinvestment with shareholder interests. In addition, the relationship between financial leverage and cash holdings is negative. It also shows that companies hold a lot of cash in order to prevent the risk of a possible default and limit the risk when using financial leverage, but lose the benefit of the company's tax shield.

Besides internal factors, macro factors also affect the cash holding ratio of companies. The negative relationship between oil price and cash holdings shows the negative impact of rising oil prices on input material costs, production costs, etc., on companies' output prices. Thus, it can be seen that the role of the Government and the State Bank in regulating the economy and stabilizing oil prices in the most effective way is very important.

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APPENDIX

Tab. 5 - Summary of variables used in the regression model. Source: own research

No.	Variable	Symbol	Measure	The author has previously studied	Expected
	Dependent variable				
	Cash holdings	CASH	Cash And Cash Equivalents / Total asset		
	Independent variables				
1	Firm size	SIZE	Ln (Total asset)	Ferri & Jones (1979), Harris & Raviv (1990), Ferreira & Vilela (2003),	-

No.	Variable	Symbol	Measure	The author has previously studied	Expected
				Nguyen (2005), Saddour (2006), Bigelli & Vidal (2009), Mai Thanh Giang (2016), Nguyễn Thị Uyên Uyên & Từ Thị Kim Thoa (2015)	
2	Profit	PROF	Profit before interest and taxes / Average assets	Kim et al. (1998), Caglayan-Ozkan & Ozkan (2002), Bates et al. (2009), Mai Thanh Giang (2016)	+/-
3	Capital expenditure	CAPEX	Tangible fixed assets / total revenue	Bates et al. (2009), Song & Lee (2012)	-
4	Financial leverage	LEV	Total liabilities / total assets	Ferreira & Vilela (2003), Caglayan – Ozkan & Ozkan (2002), Opler et al. (1999) , Mai Thanh Giang (2016), Kim et al. (2010)	+/-
5	Net working capital	NWC	(Current assets - Cash - Current liabilities) / total assets	Kim et al. (2010), Bates et al. (2009), Opler et al. (1999), Ferreira & Vilela (2003), Song & Lee (2012), Bigelli & Vidal (2009)	-
6	Economic growth	GDP	$\dfrac{GDP_t}{GDP_{t-1}} - 1$	Anand et al. (2018), Chen & Mahajan (2010), Orlova (2020), Abushammala & Sulaiman (2014)	+
7	Oil price change	OILC	$\dfrac{Brent_t}{Brent_{t-1}} - 1$	Anand et al. (2018)	+
8	Inflation rate	INF	$\dfrac{CPI_t}{CPI_{t-1}} - 1$	Anand et al. (2018), Chen & Mahajan (2010), Orlova (2020), Wang et al. (2014)	-

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FACTORS AFFECTING THE SUCCESS OF APPLYING INDUSTRY 4.0 TOOLS TO TOTAL QUALITY MANAGEMENT IN MANUFACTURING SECTOR

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Abstract

The fourth industrial revolution has created a powerful wave of life that influences all facets of existence, particularly technological advancements. To gain a competitive advantage in their respective markets, a growing number of companies are incorporating technology related to Industry 4.0 into their production and total quality management (TQM) systems. However, few studies investigate the factors that influence the success of integrating the tools of Industry 4.0 into TQM in manufacturing organisations. Consequently, the purpose of this study is to utilise the Delphi approach in order to analyse the elements that influence the success of incorporating technologies related to Industry 4.0 into TQM in the manufacturing sector. Six criteria were identified as having an influence on the success of Industry 4.0 technologies in TQM after an analysis of two rounds of the Delphi methods. Collected data was answered by panellist experts from academia, consultancy, and production/quality supervisors/managers. Six criteria include Data 4.0, Top management support, Training 4.0, Top management commitment, Employee empowerment, and Digital skills. The findings may be valuable in the future for both academics and practitioners when incorporating the tools of Industry 4.0 into TQM implementation in the manufacturing sector.

Keywords: Industry 4.0 tools, Total quality management, manufacturing enterprises, Delphi method

1 INTRODUCTION

The fourth industrial revolution has produced a powerful wave of life that affects all facets of existence, particularly technology. The fourth industrial revolution based on digital, biological, and physical technologies, such as Artificial Intelligence, the Internet of Things, Robots, 3D, and Big Data, is of interest to researchers, instructors, and business practitioners (Shi et al., 2020; Sanders et al., 2016; Salimova et al., 2020). The proactive application of this revolution to practise is the foundation for research orientation, the improvement of training programmes in research institutes and universities, decisions on research and development (R&D) direction, and innovation investment in corporations. Enterprises are currently confronted with numerous obstacles as a result of the radical changes wrought by globalisation and the fourth industrial revolution. To strengthen their competitive egde, businesses must innovate continuously. Numerous businesses are integrating Industry 4.0 technologies into their production and total quality management (TQM) systems. Several authors have begun researching the integration of Industry 4.0 tools into TQM (Asif, 2020; Gunasekaran et al., 2019; Nguyen et al., 2023). In spite of this, there are currently few studies conducted on the factors that influence the effectiveness of integrating Industry 4.0 tools into TQM in manufacturing organisations. The research of these factors is essential both academically and practically. Therefore, this study aims to investigate the factors influencing the success of implementing Industry 4.0 tools into TQM in the manufacturing sector by employing the Delphi method.

2   LITERATURE REVIEW

2.1 Industry 4.0 tools

The framework of Industry 4.0 (I4.0) demonstrates an evolutionary stage of production systems characterised by the fourth industrial revolution, focusing on technological transformations that have emerged within the last decade. The phrase "Industry 4.0" was first introduced in 2011 at the Hannover fair to debate the importance of technology as a competitive factor for the German manufacturing sector (Sanders et al., 2016).

Mechanisation, or steam power use in England, started the First Industrial Revolution in the 18th century. In response to increased demand, the 19th century's Second Industrial Revolution "electrified" large production lines. Programmable robots for production optimisation ushered in the 1970s Third Industrial Revolution. Automation and technology integration in manufacturing enabled a more significant industrial leap. It includes computers, smartphones, and the internet-enabled "digitisation," or autonomous generation. According to some authors, Cyber-Physical Systems (CPS), Artificial Intelligence (AI), Robotics, Big-Data, Machine Learning (ML), Internet of Things (IoT), Cloud Computing (CC), Augmented Reality and Virtual Reality (AR/VR) are all part of the Fourth Industrial Revolution (Sanders et al., 2016; Chiarini, 2020; Neumann et al., 2021). These innovations created smart factories, machinery, and goods. Industry 4.0 has affected TQM 4.0, Agribusiness 4.0, Logistics 4.0, Health 4.0, and Service 4.0, among others.

2.2 Total quality management (TQM)

TQM is an organisational strategy that is used in the industrialised world, and it provides the concepts, tools, and procedures that senior management and employees use to attain stakeholder satisfaction in their businesses (Zhang et al., 2020; Alshourah, 2021; Potkány et al., 2022). In addition, Total Quality Management encompasses all aspects of a business, including production, marketing, human resources, and financial management.

Other researchers give TQM through using business excellence models such as EFQM, the Baldrige Malcolm Quality Award, and the Deming Prize. Some academics define TQM as the standardisation of quality management, such as ISO 9001. The quality management system (QMS) criteria are defined by the international standard ISO 9001. This standard is derived from many different quality management principles, such as an intense concentration on the needs of the customer, ongoing development, the participation of leaders, and methodical approach. Both a self-assessment tool and guidelines for improving an organisation's ability to achieve sustainable development are included in ISO 9004, which may be used to determine the extent to which an organisation has adopted the standard (ISO, 2021).

2.3 Utilisation of Industry 4.0 tools in TQM

According to Sader et al. (2019), it is possible to make use of Industry 4.0 as a significant enabler for Total Quality Management (TQM), particularly by merging its methodologies with the TQM best practices. Industry 4.0 has the potential to serve as a crucial enabler for Total Quality Management. Interconnectivity, integration, and big data may boost the adoption of quality management systems, which is why the researchers recommend a broader viewpoint, as presented by Sader et al. (2019), to combine the elements of Industry 4.0 with the practises of Total Quality Management. According to Asif (2020) and Park et al. (2017), businesses are transferring their focus from the product to the data, and quality management in conjunction with Industry 4.0 is now regarded as a data-driven discipline.

Sader (2019) proposes that Industry 4.0 tools will enable organisations to improve customer satisfaction by improving product and service quality. Industry 4.0 tools will also allow enterprises to regularly develop and supply "individual customised" products and services without having to change mass manufacturing regimens. Therefore, customers will be served individually, improving satisfaction and meeting quality standards. Customers will be able to communicate before, during, and after the production process thanks to Industry 4.0 networking characteristics. Big-data analysis will help the organisation estimate market demand and consumption trends, enhancing responsiveness by supplying the right products at the right time. Industry 4.0 will boost innovation by increasing employee involvement in company growth. Industry 4.0 tools like big data analysis, ERP systems, Artificial Intelligence, and instant data interpretation will help people in their positions avoid risks and suggest virtual, tested solutions, making them more proactive and creative. Industry 4.0 elevated personnel from "machine operators" to "augmented operators" who supervise machine work. Industry 4.0, which does not replace employees, enable ongoing product, process, and business performance enhancements. Integrating manufacturing will boost value chain performance and system responsiveness. AI and machine learning will also allow the industrial system to identify or forecast machine faults or faulty goods early on and give quick root cause analysis and remedial suggestions (Sader, 2019). In Industry 4.0, TQM also makes sophisticated modifications based on real-time data and keeps digital recordings, rendering classic models' "establishing evidence" aspects unnecessary. From AI-based solutions, lean structures and faster decision-making results. Quality models that apply AI-based operations are lean, efficient, and responsive (Asif, 2020).

2.4 Factors affecting the success of applying Industry 4.0 tools into TQM

Several researchers have studied important factors for the successful implementation of Industry 4.0 tools application in an organisation. Sony & Naik (2020) analysed 84 articles in depth through a systematic literature review. A descriptive, categorical, and thematic analysis was performed on the document. This study identifies ten critical success factors required for an organisation to implement Industry 4.0 successfully. These ten elements include aligning Industry 4.0 initiatives with organisational strategy; Industry 4.0 top management support; employees' role in the success of Industry 4.0; making your product or service smart; digitising the supply chain; digitising the organisation; change management; project management; network security management; and sustainability. Concentrating on these ten factors will aid organisations in achieving sustainable growth during the Industry 4.0 implementation process. Moeuf et al. (2020) conducted research with the objective of identifying the risks, opportunities, and key success factors of Industry 4.0 in relation to the industrial activities of small and medium-sized businesses. As prominent industry participants, these businesses must meet customers' increasingly complex expectations. To accomplish their research objectives, Alexandre Moeuf and his colleagues chose 12 experts to participate in a Delphi study. Their research indicates that a lack of experience and long-term strategic thinking are the two most significant threats to SMEs' adoption of Industry 4.0. Their research also shows that training is the most essential success factor, and managers play a vital role in the success or failure of an Industry 4.0 project. Lastly, Industry 4.0 presents an opportunity to redesign and implement new business models for SME production processes. Sader et al. (2022) reviewed the implemented Industry 4.0 technology in accordance with the principles of total quality management.

The authors proposed areas where the use of 4.0 technology can facilitate total quality management implementation. The recently ISO 9001:2015 standard is extremely popular and widely adopted across the globe. This standard outlines seven quality management principles:

customer focus, leadership, people involvement, approach, process, improvement, evidence-based decision-making, and relationship management. Technology 4.0 has successfully supported ISO 9001 implementation when it provides many modern tools to help enterprises collect and analyse data automated and in real-time. From these results, enterprises can enhance quality management principles. However, research on implementing total quality management by technology 4.0 is theoretical.

Consequently, using a quantitative method to assess the impact of 4.0 technology on total quality management is crucial. Experimentation is required to find a practical interface between 4.0 technology and total quality management. Lee et al. (2019) conducted a comprehensive review of documents to develop the Industry 4.0 implementation of digital devices in the quality management ecosystem. The authors analyse examples from various industries to demonstrate how predictive maintenance can improve operational and service efficiency. This study's findings have both academic and practical significance. Firstly, to make predictive maintenance possible in Industry 4.0, advanced technology must be utilised in order to increase productivity and create value. Secondly, while real-time big data analytics can be implemented, policy support should be provided to professionals who make decisions through data analytics. Thirdly, in order to maintain the quality management forecast, some measurement methods should be proposed for cause-and-effect analysis. However, the views presented in this paper are contentious because they propose a future direction for quality management based on predictive maintenance cases utilising digital technology.

In Table 1, the authors propose factors affecting the success of applying Industry 4.0 tools to TQM based on a synthesis of prior research.

Tab 1. – Factors affecting the success of applying Industry 4.0 tools to TQM. Source: own research

No.	Factors	Explanation	References
1	Quality culture 4.0	Quality 4.0 culture is one of the most important variables for 4.0 tool implementation in TQM.	Sader et al. (2019); Sony et al. (2021); Nguyen et al. (2023)
2	Data 4.0	The success of Industry 4.0 tools application to TQM depends on data collection, analysis, and decision-making based on big data, AI, and machine learning.	Sony et al. (2021); Nguyen et al. (2023)
3	Improved production process 4.0	Improve production process in accordance with the requirements of Industry 4.0.	Shi et al. (2020)
4	Top management support	Support from top management for the implementation of Industry 4.0 tools into TQM	Sader et al. (2019); Sony et al. (2021); Nguyen et al. (2023).
5	Training 4.0	Training on quality management systems according to the Industry 4.0 model	Kupper et al. (2019); Nguyen et al. (2023)
6	Employee involvement	Employee involvement in Industry 4.0 implementation.	Salvadorinho et al. (2022); Nguyen et al. (2023)
7	Top management commitment	The commitment of top management to applying Industry 4.0 tools to TQM.	Sader et al. (2019); Nguyen et al. (2023)
8	Employee empowerment	Managers encourage employee empowerment in applying Industry 4.0 tools to TQM.	Sader et al. (2019); Nguyen et al. (2023)
9	Digital skills	Digital skills for quality employees.	Salimova et al. (2020)

3 METHODOLOGY

This survey study employs the Delphi research method to investigate the factors influencing the success of applying Industry 4.0 tools to TQM in manufacturing companies in Vietnam. The Delphi method organises group communication to solve complex problems. Anonymity maximises the benefits of an expert panel while minimising the drawbacks of collaborative decision-making.

Experts were sent an initial questionnaire containing nine factors affecting the effectiveness of applying Industry 4.0 tools to TQM. There was a set of open-ended questions that were included, and they were based on the experiences of the researchers and the contributions from the literature that was summarised. Members of the academic community, consultants, and practitioners were all present on the expert panel. Academics needed to have previous experience in TQM research or teaching. Practitioner experts, such as production or quality managers or supervisors, were required to obtain at least five years of work experience in production or quality management in addition to having a fundamental understanding of the tools that are part of Industry 4.0. On the questionnaire, the factors are presented using a Likert scale with five points, ranging from one (not important) to five (extremely important).

In the first round of analysis, there are a total of 30 individual observations. The authors compute a Mean and a Content Validity Ratio (CVR), and a Mean less than 3.5 or a CRV less than 0.33 is rejected. The critical value of CVR, as determined by Lawshe (1975), is 0.33 when using a panel of thirty experts as the sample size. Lawshe (1975) assumed that there were three possibilities for each item, which included essential, useful but not essential, and unessential. Due to the fact that this study uses the Likert scale, both scales need to be compatible with one another. Accordingly, the concepts of "extremely important" and "very important" were treated as equal to "essential," whereas "moderately important" was regarded as indicating usefulness but not essentiality. Similarly, "slightly important" and "not important" were equated with "not necessary." The computation of CVR for each indicator is performed using the below formula:

$$Content\ Validity\ Ratio\ (CVR) = \frac{x_e - X/2}{X/2} \qquad (1)$$

In which x_e is the number of panellists indicating "essential", and X is the total amount of panellists (Lawshe, 1975).

During the second round of the Delphi method, the authors sent questionnaires to the same 30 experts who had participated in the first round. However, only 20 of those experts responded. In this iteration, the authors calculate Mean and CRV; results with a Mean less than 3.5 or CRV less than 0.29 are deemed unacceptable because, according to Lawshe (1975), the minimum score of CVR that can be accepted by a panel of 20 experts is 0.42.

Tab 2. – Minimum Values of CVR. Source: Lawshe (1975)

No. of Panelists	5	6	7	8	9	10	11	12	13	14	15	20	25	30	35	40
Min Value	0.99	0.99	0.99	0.75	0.78	0.62	0.59	0.56	0.54	0.51	0.49	0.42	0.37	0.33	0.31	0.29

4 RESULTS

Using the data from the first Delphi round and resulting from the calculation steps, the following are the research outcomes in Table 3.

Tab. 3 - The results of the first Delphi round. Source: own research

No.	Factors	Mean	CVR
1	Quality culture 4.0	3.625	**0.25**
2	Data 4.0	4.375	0.97
3	Improved production process 4.0	3.625	**0.23**
4	Top management support	4.500	0.85
5	Training 4.0	4.625	0.96
6	Employee involvement	4.000	**0.25**
7	Top management commitment	4.250	0.50
8	Employee empowerment	5.000	1.00
9	Digital skills	3.875	0.50

The findings of the first round of the Delphi method reveal that the Mean value is higher than 3.5, while the CVR values for three of the participants are lower than 0.33. Therefore, we remove three factors that do not meet the conditions: Quality culture 4.0, Improved production process 4.0, and Employee involvement.

Tab. 4 - The results of the second Delphi round. Source: own research

No	Factors	Mean	CVR
1	Data 4.0	4.375	0.87
2	Top management support	4.500	0.83
3	Training 4.0	4.625	0.89
4	Top management commitment	4.250	0.51
5	Employee empowerment	5.000	0.99
6	Digital skills	3.875	0.67

When examining the second round of results, we find that all Mean values and CVR values are greater than 3.50 and 0.42, respectively (see Table 4). Thus, the factors affecting the success of Industry 4.0 tools in TQM in companies in Vietnam include six factors: Data 4.0, Top management support, Training 4.0, Top management commitment, Employee empowerment, and Digital skills.

5 DISCUSSION

After using the Delphi method to calculate and give the results, the research indicates that there are six factors affecting the success of Industry 4.0 tools into TQM at companies in Vietnam. This was determined after using the Delphi method to calculate and give the results. These factors include Data 4.0, Top management support, Training 4.0, Top management commitment, Employee empowerment, and Digital skills.

This result is comparable to that of some earlier studies on the factors affecting the successful application of TQM and the successful application of tools associated with Industry 4.0. For instance, some authors believe that top management support, top management commitment, training 4.0, and employee empowerment are important factors in the success of the TQM application (Eriksson et al., 2016; Sony et al., 2021), as well as the success of Industry 4.0 tools application (Moeuf et al., 2020; Shi et al., 2020). Nonetheless, Data 4.0 and Digital skills are added as new explorations when incorporating tools from Industry 4.0 into TQM. The traditional approach to TQM promotes the gathering of relevant data. Organisations have also

focused their attention on analysing data in order to make decisions. However, the data are neither sufficiently comprehensive nor kept up to date, which results in decisions that are not accurate. In the Industry 4.0 context, real-time and total data generated by AI has enabled managers to make decisions that are both accurate and timely.

The development of skills is always important for the operation and growth of businesses (Kupper et al., 2019; Moeuf et al., 2020). Digital skills are a requirement for incorporating Industry 4.0 tools into TQM. This is understandable due to the fact that Industry 4.0 has many specialised tools geared towards digital transformation, such as CPS, AI, big data, IoT, etc. Therefore, a high-quality workforce with digital skills is required to effectively employ Industry 4.0 tools. When big data analysis is an important task for quality staff, it is assumed that quality staff can also be data scientists (Park et al., 2017).

Although investigating the factors influencing the success of implementing Industry 4.0 tools into total quality management in the manufacturing sector has not been performed in many other geographical areas, studies on the implementation of Industry 4.0 tools have been carried out in one number of countries, so we can compare their results. For example, a study in another Asian country, which is India. An exhaustive sample consisting of three hundred fifty replies from a variety of Indian firms was gathered and analysed. The investigation's findings showed that the variables known as Software Infrastructure (SI), System Flexibility (SF), Operational Accuracy (OA), and Technical Capabilities (TC) have a preponderant influence in the successful adoption plans of Industry 4.0 in India (Parhi et al., 2022). These factors have numerous technical facets, some of which correspond to the Data 4.0 factor of this investigation.

A more closely related comparison to the TQM field is the study of important success elements in project management in relation to Industry 4.0, Human Resources, and sustainability at Czech manufacturing companies. Vrchota et al. (2021) identified the important success elements in project management based on the opinions of managers working in Czech manufacturing companies. Their goal is to investigate how Industry 4.0, Human Resources, and sustainability are all connected to the aspects that contribute to success. Through the use of correlation coefficients, they were able to investigate the potential interconnection of the essential success elements. According to the findings, businesses believe that Leadership and Experience, Employees and Flexibility are the most important variables in the success of Project Management. This result is quite similar to the results of this study, where both emphasise the role of top management leadership and employee empowerment in implementing successful strategies.

According to the study's findings, in order for managers to successfully implement Industry 4.0 tools into total quality management, they must prioritise the support and commitment of top management. They additionally have to prioritise Employee empowerment in the implementation of Industry 4.0 into TQM. Finally, businesses need training on quality management systems in accordance with the Industry 4.0 model, with an emphasis on digital skills training.

6   CONCLUSION

The purpose of this study is to investigate factors that contribute to the success of Industry 4.0 tools in total quality management at manufacturing companies. The result shows that six factors impact the application of Industry 4.0 tools into TQM, including Data 4.0, Top management support, Training 4.0, Top management commitment, Employee empowerment, and Digital skills. Despite the fact that this study makes significant contributions to the field of QM, there are some limitations. First, because participation is typically lower in Delphi surveys, requiring respondents to take part in two rounds proved to be a difficult practical challenge. Second, this

research carried out a literature review and two rounds of Delphi sessions in order to carry out an exhaustive investigation into all of the factors that influence the success of Industry 4.0 tools in total quality management. Despite this, some of the components have not yet been recognised in the conceptual framework that will be used for this research. Because of this, it is strongly suggested that future researchers look into additional aspects that might have been ignored in the current investigation. In conclusion, it is important to consider that the research was carried out in a developing country, which has a consciousness about the tools of Industry 4.0 that is still in the growth stage. As a result, confirmation from other geographical areas is required. Therefore, in future research, it is necessary to investigate the factors affecting Industry 4.0 tools application in various fields or countries.

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HOW DOES CORPORATE SOCIAL RESPONSIBILITY INFLUENCE EMPLOYEE WORK ADDICTION?

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Abstract

Although corporate social responsibility (CSR) practices affect positive employee behaviour, such as work performance, job satisfaction has been widely explored. Less extant literature focus on negative employee behaviour in the work place of responsible organization. Drawing on social identity theory, we addressed this issue by investigating the risk of CSR in the organization related to employee work addiction behaviour. This study was conducted in Vietnamese firms and examined corporate social responsibility practices that influence employees to work excessively. In addition, this research also proposes and evaluates the role of organizational identification and work meaningfulness of employees in mediating the relationship between CSR and work addiction. A qualitative approach was used initially to synthesize literature on CSR and employee work addiction in organizations for further analysis. In the next stage, 261 respondents who worked in a wide range of companies in Viet Nam were gathered to examine the proposed hypotheses by Structural Equation Modelling. This study provides empirical evidence about the indirect effects of responsible organizations on employee work addiction, while organizational identification and work meaningfulness play a vital mediation role, forcing negative behaviour among employees. Interestingly, work addiction was not weaker in the direct effect of CSR practices. Our study contributes to other aspect of CSR literature regarding employee outcomes in the context of emerging economy, Viet Nam.

Keywords: *Corporate social responsibility, work addiction, organizational identification, work meaningfulness, social identity theory, Viet Nam*

1   INTRODUCTION

Previous studies on corporate social responsibility (CSR) have depicted the effects of CSR on employee behavior positively. Employee working for organization with CSR practices shows higher level of commitment, motivation, and tend to more involvement with work (Aguinis, 2017; Meynhardt et at., 2018; Story & Castanheira, 2019). Recent studies have more paid attention organization encourage positive employee behaviors in CSR context. However, in light of CSR outcomes, it seems missing in CSR literature related to a negative influence on employees as work addiction (Brieger et al., 2019; Khaskheli et al., 2020; Viererbl & Koch, 2022).

Work addiction has been considering by both scholars and managers. It has become severe issue in the workplace, leading employees to ignore other important aspects of life caused for mental disorders (Daniel et al., 2022). The majority of experts recognized addiction at work primarily as is an undesirable behavior. While engaged workers and workaholics put in a lot of effort and are actively interested in their jobs, the work for the first group is mainly enjoyable. In contrast, work addiction is mostly the obsessive compulsion typical of practically every addiction (Clark et al., 2020).

In general, CSR practices aims to create positive employee behaviors toward quality of life so as to avoid work-life unbalance in organization culture (Diamantis & Puhr, 2022). However, the other side of the CSR picture encourages employees work excessively to suffer from psychological and physical problems caused by being over-obligated in socially responsible

organization are arising (Brieger et al., 2019; Ali, 2021). Therefore, it is important for organization to take into consideration both sides of CSR on employee engagement.

Despite the effects of socially responsible organization on employee engagement have been explored widely. Less of the extant literature have fully explored the possible drawback of corporate social responsibility practices toward employee work addiction. Especially an emerging economy requires more deliberation related to CSR practices and negative employee behavior, which needs to do more in-depth investigations.

Thus, to fill the gap, this study aims to bring a better understanding about the impact of organization related to CSR on employee work addiction in the context of Viet Nam. Particularly, this study investigates (1) the relationship between CSR and employee work addiction in Vietnamese firms and (2) the mediating roles of employee organization identification and work meaningfulness in association between CSR culture and employee work addiction.

2 LITERATURE REVIEW

The notion of corporate social responsibility (CSR) has been around for a long time, and evolved over time with business to meet the changing requirements of society (Rahman, 2011). There is plenty of definition regarding this term but the common thing is that employee working for organization's sense of corporate social responsibility tend to be more commitment and more satisfaction with their job rather than others who working in the workplace without CSR culture (H. Y. Ali et al., 2020; Chatzopoulou et al., 2021b). Corporate social responsibility practices in organization thus can be understanded as a management concept related to human resource management issues. The current literature of corporate social responsibility present "corporate social responsibility refers the triple bottom line of economic, social, and environmental performance" (Aguinis, 2017). This term can be defined is a set of activities, policies which aims to promote social well-being by integrating social - environmental concerns into business practices. In different words, the notion of CSR focuses on not only both many types of stakeholders in and outside of organization but also outcomes that go beyond financial performance of organization.

According to business ethics literature, working in organization's sense of CSR context is a positive workplace culture that employees are looking for. Because of CSR practices on employee outcomes have been recorded extensively, including high levels of motivation and efforts, increasing employee engagement and heighted sense of loyalty and performance at work (Chaudhary, 2018). Working relationship within socially responsible organization is likely to be much stronger among employees as a result of job satisfaction which can reduce intention to leave job (Eliyana et al., 2019, Chatzopoulou et al., 2021).

Empirical evidences support to positive effects of CSR on employee from extant literature are undeniable. However, the extant literature has not yet fully explored the possible drawback of corporate social responsibility toward employee. Missing critical discussion related to potential risks which may coexist with positive effects of CSR practices are captivating scholars and practitioners. The concerns about potential risks related to CSR intriguing attentions is employee work addiction (Brieger et al., 2019).

The relationship between organization with corporate social responsibility practices and employee work addiction:

The literature shows that CSR has a favorable effect on employment and working conditions. Numerous businesses regulate work hours, enhance overtime supervision, and promote the usage of holidays in an effort to support work-life balance. Employees should therefore be less

impacted by work addiction and place greater importance on other vital sectors of life, such as health or personal relationships, since socially responsible firms utilize techniques to lower the danger of work addiction (Andreassen et al. 2014).

To promote work-life balance, organization committed CSR provide polices aims encourage employee overcome to fear of incompetence at work or obsession of working under demand. The possible scenario can explain that employees work excessively way by forcing themselves due to the more time they work, the more value will be added into socially responsible organizations (Ali, 2021).

Organization's external CSR initiatives enable staff members to realize that there is something more than their own interests, such as the good of the whole. This could encourage a work atmosphere that is less concerned with individual performance and career advancement, increasing teamwork and reducing internal competitiveness as well as the probability of working too much. According to recent study, CSR enhances team effectiveness and self-esteem, which in turn improves team performance (Le, 2022).

Based on positive effect for employe working at CSR culture, this study proposed an inverse relationship between organizational CSR engagement and employee work addiction. Thus, the first hypothesis was proposed:

H1: Corporate social responsibility is negatively related to employee work addiction.

The relationship between CSR, organizational identification, work meaningfulness and employee work addiction

Despite of CSR positive effects on employee is very convincing. It is possible to believe that CSR can encourage work addiction which posed exhausted and burnout (Ali, 2021; Gabriel and Aguinis, 2022). Drawing on social identity theory, people who identify more strongly with employers tend to participate in jobs beyond a healthy level stimulating work addiction (Ali 2021).

This could be understanded as people who exhibit high levels of organizational identification are more likely to have self-images that are somewhat reliant on the performance of their organization. So, these individuals could have more motivation to work harder than normal in order to contribute to the success of their company. Labors who exhibit both a material and psychological dependence on their company may be more vulnerable to developing work addiction.

Social exchange theory explained that people are more likely to return when they obtain benefits from others. The welfare of CSR organization may be caused by employee's exaggerated obligation to socially responsible organizations. Employees who have a high level of organizational identification may therefore experience greater incentive for reciprocal behavior and may be more eager to participate in the success of the company by putting a lot of effort into their work (Conteh & Yuan, 2021).

Previous studies related to CSR and employee identification, organizational identification is likely to contribute to the understanding of the connection between CSR engagement and employee work addiction, serving as an effector variable to modify the detrimental direct impact of CSR on employee work addiction. Hence, the following hypotheses were proposed as:

H2: Corporate social responsibility is positively related to organizational identification.

H3: Organizational identification is positively related to work addiction.

When it comes to talk about work meaningfulness, particularly the links between meaningfulness and addiction of work are limited. Aguinis (2017) argued that employee in CSR context is likely to find meaningfulness in life easily. Because CSR concept expands outside of organization and beyond profit-focus approach. It is a great channel for individual to make sense of and find meaningfulness through work. A very few studies address work meaningfulness related to CSR organization. Glavas and Kelley (2014) found the positive relationship between CSR and job meaning. Following this light of thought, employee sense of work meaningfulness neglects others important thing of their life due to excessive in work.

Considering the current literature, in this study we proposed hypotheses related to CSR, work meaningfulness and work addiction such as:

H4: Corporate social responsibility is positively related to work meaningfulness.

H5: Work meaningfulness is positively related to work addiction.

3 METHODOLOGY

Research design:

This study initially conducted a qualitative approach to collect literature on corporate social responsibility and its role related to employee work addiction in organization. In the context of business firms in a developing country, Viet Nam, this study aims to investigate the association between CSR and employee work addiction as well as provide empirical evidence about the outcome of CSR practices through organizational identification and work meaningfulness may lead to the risk of working excessively among employees.

In the second stage, the quantitative study was utilized to evaluate the relationship between corporate social responsibility and work addiction, the role of organizational identification and work meaningfulness also are examined in the link between corporate social responsibility practices and work addiction. The proposed hypotheses of this study were tested by Smart PLS 4.0.

Data collection

The survey by questionnaire was used to collect data from employees in the various business firms in VietNam. There are some advantages of using survey for empirical research such as consistency and dependability of the results, costless, speeding up data processing and one of the most important is that survey may provide timely feedbacks. Due to limited resources and advantages of convenience sampling as comparatively fast, low cost and validity of samples, this method is adopted in the first step of collection data. Google form is used to create questionnaire. In order to get corrected feedback of employee working in Vietnamese firms. The questionnaire will be given with a proper instruction by two parts: Part 1 is the introduction of research and purpose of using data and part 2 is the list of structure questions. Thanks to consent of HR departments from authors networking and university support for student research working. The questionnaire was sent via a short link to all means of employee communication in various fields during two months. In order to avoid bias of result feedback, personal information related to respondents are not included in the survey. After period time for data collection, 261 completed answers were returned. 11 out of 261 completed answers were eliminated out of data set due to inadequate answers. Thus, the final data remains in 250 answers which were used for data analysis in the next stage.

Measurement

Based on the structure and scope of existing and past literature possible, the independent and dependent variables were adopted for appropriating the research context. All the scales that had not been used for Vietnamese employees before. Corporate social responsibility was measured using 5-items scale which adopted and validated by Glavas & Kelly's (2014). In order to measure organizational identification and work meaningfulness, 4-items scales in each variable which were adapted and edited by Aguinis & Glavas (2017) were used, respectively. Work addiction including 6-items was adapted using the Bergen Work Addiction Scale (BWAS; Andreassen et al., 2012), which is based on Griffiths (2005) "components" model of addiction. A total of 19 items were developed from previous studies to evaluate the relationship between corporate social responsibility and employee work addiction of Vietnamese firms. All the above items were scales by five-point Likert Scale with strongly disagree (1) to strongly agree (5). We applied a back-forward translation approach for all items to create a questionnaire to be administered in Vietnamese

Data analysis

Sample descriptive analysis

The sample of this study consists of 34% male, and 66% of female. A majority of respondents are from 23 to 30 years old (61.6%), and more than 90% (90.8%) of respondents hold a university degree, while a minority of them (3.2%) have a high school education background. Seniority of respondents showed that over 80% (84.8%) respondents have within 3 years working experience. Respondents, one whose income is 5 million to around 20 million dongs per month, occupied more than 50% (59.2%) of this survey.

Tab. 1 - demographic variables of sample. Source: Own research

Variables		Frequency	Percentage (%)
Gender	Male	85	34
	Female	165	66
Age	<22	44	17.6
	23 – 30	154	61.6
	31 – 40	45	18
	> 50 years old	7	2.8
Education background	High school	8	3.2
	University	227	90.8
	Postgraduate	15	6
Seniority	> 1 year	100	40
	1- 3 years	112	44.8
	> 3 years	38	15.2
Position	Junior employee	205	82
	Senior (team leader, deputy, manager, owner)	16	6.4
	Professionals (doctors, teachers, engineers)	29	11.6
Wages	> 5 million VND	65	26
	5 – 10 million VND	89	35.6
	11 – 20 million VND	59	23.6
	> 20 million VND	37	14.8

After gathering demographic information of sample, quantitative test was deployed to evaluate fitness of model study so as to examine the impact of corporate social responsibility on employee work addiction by PLS-SEM. The quantitative method used this stage including reliability and validity based on common measures, such as Cronbach's alpha, Composite Reliability, Average Variance Extracted (AVE), Exploratory Factor Analysis (EFA),

Convergence Value and Discriminant Validity to ensure measurement scale of study qualify statistical requirement before running the structural equation modeling (SEM).

Reliability test

Firstly, the research instrument will be a reliability test. Cronbach's coefficient alpha, Composite Reliability and Average Variance Extracted were used for this test by SPSS. The Cronbach's alpha value of variables shows higher than 0.7 while composite reliability results range from 0.860 to 0.874 and AVE values are higher than 0.56. The results in table 2 were found to confirm reliability (Peterson and Kim, 2013).

Validity test

Next, to further examine the convergent and discriminant validity of independents and dependent variables, the outer loading coefficients and Average Variance Extracted (AVE) are used to compute the convergent validity while Fornell - Larcker criterion and the Heterotrait - Monotrait Ratio criterion (HTMT) combined with Average Variance Extracted used to evaluate discriminant validity. The result of AVE from table 3 has shown the range of value from 0.56 to 0.63 and the outer loading coefficients of the observed variables range from greater than 0.7. This result confirmed convergent validity of the model is qualified. In addition, Fornell-Larcker criterion is meet by all square roots of AVE with coefficients greater than 0.5 (between 0.751 and 0.793) and AVE is larger than the correlation coefficient of other values in the same column for each value. Thus, discriminant validity was confirmed (Leguina, 2015; Fornell and F. Larcker, 1981).

Tab. 2 - Reliability and validity result. Source: Own research

Values	CSR	ORG	MEA	WOR
Cronbach's Alpha	0.807	0.790	0.807	0.819
Composite reliability	0.866	0.864	0.872	0.874
Average variance extracted	0.6	0.61	0.63	0.6
Number of items	5	4	4	5

Note: CSR= Corporate social responsibility, ORG= organizational identification, MEA= Work meaningfulness, WOR= employee work addiction.

Tab. 3 - Fornell and Larcker (1981) criterion Source: Own research

	CSR	MEA	ORG	WOR
CSR	*0.751*			
MEA	0.454	*0.793*		
ORG	0.570	0.570	*0.784*	
WOR	0.330	0.441	0.479	*0.763*

Note: The square roots of AVE for each construct is denoted in bold and italic.

Tab. 4 - Results of Heterotrait - Monotrait Ration (HTMT). Source: Own research

	CSR	MEA	ORG	WOR
CSR				
MEA	0.546			
ORG	0.704	0.698		
WOR	0.396	0.526	0.586	

The result of exploratory factor analysis (EFA) indicates that all item of scales satisfied the requirement with factor loadings (>0.5), KMO's value between 0.5 and 1, p-value is less than 1%, total of variance extracted and the number of factors extracted also are satisfied.

Before testing the proposed hypotheses, the variance inflation factor (VIFs) values were analyzed to test multicollinearity. The result of VIFs shows that the values rank from 1.431 to 1.933, this value qualified due to falling below the threshold of 4 (O'brien, 2007).

4   RESULTS

Structural equation modeling analysis utilized to test the relationship of the whole model. The t-value was used to estimate the statistical significance of each path coefficient, the correlation among the remaining relationships in the model is statistically significant at 5%. The table 4 shows the result of the proposed hypotheses, the positive effect of CSR on organizational identification and work meaningfulness are supported (p<0.005) as well as the positive relationship between organizational identification, work meaningfulness and work addiction are also supported (p<0.005). Thus, hypotheses H2, H3, H4 were found to be supported.

The hypothesis testing also reveals a surprisingly insignificant negative relationship between CSR and work addiction (p>0.580) which means hypothesis H1 was rejected. Thus, employee work addiction may be affected by various reasons, even working in an organization with CSR culture.

Tab. 4 - Hypothesis testing result. Source: own research

Hypothesis	Relationship	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
H1	CSR → employee work addiction	0.039	0.070	0.554	0.580	Rejected
H2	CSR → organizational identification	0.574	0.066	8.689	0.000	Supported
H3	Organizational identification → work addiction	0.318	0.093	3.433	0.001	Supported
H4	CSR →work meaningfulness	0.459	0.060	7.540	0.000	Supported
H5	Work meaningfulness → work addiction	0.247	0.083	2.894	0.004	Supported

In addition, the effect size f2 shows how much an exogenous variable contributes to the R2 value of an endogenous variable, the values of 0.02, 0.15 and 0.35 indicate modest, medium and strong effects, respectively.

Basing on the formula of effective size:

$$f^2 = \frac{R^2\,included - R^2\,excluded}{1 - R^2\,included} \tag{1}$$

The result of this study predicts that corporate social responsibility has a strong effect on organizational identification (f2=0.48) but a moderate effect on work meaningfulness (f2=0.26), while organizational identification and work meaningfulness have weak impact on work addiction, f2=0.078 and f2=0.052, respectively.

Mediating effect of organizational identification and work meaningfulness

The mediating effects will be confirmed when independent variables influence dependent variables, which requires not only a significant relationship between an independent variable and mediating variables, but also significant links between mediators and dependent variables (VanderWeele et al., 2012). Hypotheses testing shows the positive significance of H2, H3, H4, and H5, which means organizational identification and work meaningfulness mediated between corporate social responsibility and employee work addiction.

5 DISCUSSION

Prior studies confirmed corporate social responsibility practices affects employee performance, employee attitude and their behavior positively in several way (Aguinis & Glavas, 2017; Meynhardt et al, 2018). Thus, implementing corporate social responsibility benefits organizations and their various stakeholders, and its function is receiving attention in practice (Brieger et al, 2018; Kaplan & Kinderman, 2017). Beside corporate social responsibility's advantage, negative outcomes of corporate social responsibility basically have been influencing organization. This study basically discussed the negative effect of CSR may promote working excessively among employees. Drawing on prior studies indicated the effectiveness of CSR practices to employee attitude and their behavior. We firstly proposed CSR initiatives should be seen as negative effect to work addiction directly, which means applying this practice into organization help to reduce work overload and addiction during workplace. Interestingly, the research finding has shown the direct negative effect between CSR and work addiction is insignificant. Because of H1 was rejected, it turns out that workers who work in businesses with a CSR culture may nevertheless be prone to becoming workaholics. This result may be explained by basing on the research context, in fact that employee workloads might be influenced by various reasons, even working on CSR organization causes their employees work uncontrollable which harming employee well-being.

 Also, based on social identity theory, this study's result confirmed the direct positive effect between CSR with organizational identification; CSR with work meaningfulness, and positive direct effect of organizational identification, work meaningfulness toward work addiction. The hypotheses of H2, H3, H4, and H5 are accepted implies that employees have kind of strong sense of organization identification and work meaningfulness tend to work harder and willing to sacrifice their value time for job.

In this study, the mediating role of organizational identification and work meaningfulness in association with CSR and work addiction were confirmed. This result contributed to CSR literature regarding the double-edged sword of corporate social responsibility practices which may lead to both physical and mental of employee problems in long run. Furthermore, there is

very little study investigate the dark side of CSR practices, especially the negative effect of CSR practices toward employees in Vietnamese firms are rare. By doing this study, it is important to bring empirical evidence to support the links between CSR practices and its outcomes as employee connection with their organization as well as sense of work meaningful. In addition, this study also revealed the positive effect of CSR outcomes on work addiction in the context of Vietnamese firms, raising the awareness of CSR dark side once applying this practice into organization as well as strategies to minimize the risk of work addiction.

6 CONCLUSION

This study investigates the effects of organizational corporate social responsibility engagement on employee work addiction in the context of developing country, Viet Nam. The results of this research not only have value contributions to theory but also have crucial implication for strategic makers. In the one hand, the study result demonstrates organization with corporate social responsibility engagement is linked to a variety of favorable employee outcomes, including job engagement, employee performance, and satisfaction. The hypotheses of this study were found to be confirmed the positive relationship between corporate social responsibility and organizational identification and work meaningfulness. This result contributes a better understanding of social exchange theory and the CSR literature by focusing on individual level of analysis. Hence, it is possible for organizational corporate social responsibility engagement to get its advantages since employee is likely to identify more closely with organization.

On the other hand, this study depicts both two variables organizational identification and work meaningfulness are mediators in association between CSR and employee work addiction. Thus, the positive relationship between CSR outcomes and work addiction explaining adoption of CSR strategies into organization can thus unintentionally force employee work excessively. This is the double-edged sword of CSR that encouraging managers should aware the risk of taking CSR related to widespread issue of work addiction.

This study has some limitations that could be addressed in the future research. First, this study was applied in the context of Vietnam firms to investigate the effect of CSR practices to employee work addiction, future study should apply this model to other culture or countries to make the generalizability of the findings. Second this study was conducted by convenient sampling which might remain limitations. It would be interesting to replicate this research with different samples to get further results. Finally, future study should investigate moderation factors might moderate the relationship between CSR practices and employee work addiction in the context of diverse culture or countries.

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AZERBAIJAN'S EASTERN ZANGEZUR AND KARABAKH ECONOMIC REGIONS: IMPORTANT SOCIOECONOMIC FACTORS FOR THE DEVELOPMENT OF SMART CITIES

Orkhan Nadirov, Vusal Mammadrzayev, Bruce Dehning

Abstract

Due to their connections to the creative performance of cities, several aspects may be relevant for the development of smart cities. To create smart cities in the Eastern Zangezur and Karabakh economic zones, this paper seeks to identify key socioeconomic aspects. Fourteen areas from each of the regions make up the sample. The analysis was done using pivot tables. The results of the present study have political ramifications for governments planning to build smart cities. The present study's practical relevance is that governments desiring to build smart cities should consider urban density, business density, business growth and population growth. Finally, the findings show that the only localities in these areas that are suitable for smart city ideas are Agdam and Fuzuli. The number of schools in the aforementioned locations should be a priority for the government as it develops the concept of smart cities.

1   INTRODUCTION

By decree dated February 2, 2021 (President, 2021) of the President of the Republic of Azerbaijan, "Azerbaijan 2030: National Priorities for Socio-economic Development" was adopted. One of the key objectives for the next ten years is to realize the five national priorities for the country's socioeconomic growth that are listed in Table 1. The following objectives are anticipated for successful achievement for each of these priorities. The achieved financial advantage will, first and foremost, establish favourable conditions for the full utilization of the economic potential already present in the liberated regions for the benefit of our people, as mentioned in the directive. The fourth priority serves as the primary focus of our study, as we go into further depth below.

Due to their connections to the innovative performance of cities, several aspects may be crucial for the development of smart cities. We will mostly discuss socio-economic aspects of smart cities in this study. Most of the information in this article are based on agency documents, also known as administrative records and archival records. The fact that the data are probably already accessible makes using agency records for assessments advantageous since it eliminates the need for expensive additional data collecting operations (Newcomer et al. 2004). We'll make use of data from the Republic of Azerbaijan's State Statistics Committee (State Statistics Committee of the Republic of Azerbaijan, 2022). For our investigation, five key characteristics were gathered, which are displayed in Table 2. These variables were chosen in accordance with the research done by Duygan et al (2022).

The remainder of the article is organized as follows. Section 2 describes the literature review. Section 3 presents the methodology. Section 4 summarizes the results and analysis. Section 5 and 6 includes the discussion and conclusion, respectively.

Tab. 1 – Azerbaijan 2030: National Priorities for socio-economic development". Source: President (2021)

Priorities	Goals
1. sustainable economic growth that is competitive.	- strong, long-term economic expansion. - the ability to withstand both internal and external pressures.
2. a dynamic, inclusive, and socially equitable society.	- how the progress will benefit every person. - a strong social safety net and an inclusive society. - balanced growth of the capital and the regions.
3. competitive human capital and modern innovation space.	- education that meets the needs of the twenty-first century. - an inventive and creative civilization. - the residents' healthy way of life.
4. a large return to the territories freed from occupation.	- sustainable settlement. - reintegration into economic activity.
5. a country with a clean environment and "green growth".	- a superior ecological setting. - room for renewable energy.

2 LITERATURE REVIEW

Numerous factors might be pertinent for the development of smart cities because they are connected to cities' inventive performance (Duygan et al., 2022).

The first requirement is *population*. The size and resources of a city are largely determined by its population. For a variety of reasons, people in big cities are perceived as being more creative. They frequently have more resources and talented human capital. Additionally, urban areas frequently have a variety of socioeconomic actors and intricate ecosystems, both of which can promote innovation. The need for better services is also correlated with high population density. Large cities frequently struggle with the difficulty of providing services to fulfil the demands of residents who have a variety of wants and preferences. These demands' external forces can spur innovation.

The second prerequisite is *population growth* that is natural. Regardless of the city's overall size, population growth is a direct correlate to innovation. The development of new housing and infrastructure brought on by population growth also offers opportunities to experiment with new technologies and techniques, turning new urban areas into testing grounds for innovation. This is in addition to the growing demand for effective services to meet the growing demand.

The third factor is the quantity of commercial enterprises (*service sector*) engaged in catering. Cities with greater service sectors are likely to have more public demand for innovation, particularly digitalization, which is the foundation of many smart city programs. Furthermore, the infrastructure in these cities is probably up to date. This is because the service sector is frequently linked to white-collar jobs and rising ICT usage.

Tab. 2 – Overview of the main socio-economic conditions favourable to the innovativeness of the regions.

Source: Adopted from Duygan et al. (2022)

Name	Description	Mechanism of Influence	Some key references
Population (size)	Population (at the end of the year, thousand people)	- More resources - Requirements and preferences of different residents - More desire to improve the service	Arduini et al. (2010); Damanpour (2006) Gonzalez et al., (2013); Reginato et al., (2011); Rodriguez-Pose & Wilkie (2016)
Population growth	Natural growth, people	- Greater demand for services	Walker (2008)
Service sector	Number of business entities providing catering activities, unit	- Increased use of ICT - Greater demand for innovation and digitization	Shearmur and Poirier (2016)
Schools	Number of full-time general education institutions	- Increased knowledge creation	Ardito et al. (2019); Ferraris et al., (2018) ; Ranga & Etzkowitz (2013)
Urbanisation Density	On average, per person of the population (total area, sq.m.)	- Closer physical distances encourage denser networks and information	Audretsch, (1996); Boschma (2005); McKinsey & Company (2011); The World Bank (2017)

Schools make up the fourth criterion. Cities' originality is sometimes attributed to the close proximity of the economic players and academic institutions that support the creation and exchange of information. Therefore, it is believed that education is a fundamental component of knowledge-based urban economies that create smart cities.

The sixth factor is the degree of *urbanization*. Numerous individuals concur that closeness among various socioeconomic players is essential for innovation. It is argued that closer physical distances and dense urban areas are better for communication and information sharing. Table 3 above shows all major impacts of socioeconomic factors on smart city efforts.

3   METHODOLOGY

Only predicting methods will be available in this empirical examination, thus we will not be able to use any causal approaches. The dataset utilized in this investigation may be found in Appendix A. Panel data from two economic zones are included in our sample. A maximum of 84 observations will be used, as shown in Table 3. The analysis will consider the economies of East Zangezur and Karabakh. Out of 84 observations, 30 are connected to Eastern Zangezur and 54 are related to Karabakh. During the analysis, 14 areas will be considered. The years that are available begin in 2015 and finish in 2021.

Tab. 3 – Descriptive Statistics. Source. own research

Variables	Obs	Mean	Std. Dev.	Min	Max
Regions	84	7.5	4.055	1	14
Population	84	87.945	50.936	27.8	205.8
Population growth	84	659.881	548.655	21	2590
Service sector	30	113.233	68.157	26	241
Schools	72	62.431	37.911	12	135
Urban Density	30	15.613	7.215	5.9	22.8

Population figures range from 27.8 thousand to 205.8 thousand people. Additionally, the population's mean figure is 87.9 thousand. The lowest population was recorded in Xocali in 2015 (27.8 thousand), while the greatest was recorded in Agdam in 2021 (205.8 thousand). The population increase is highly variable. The average number of people added to the population is 659. In our sample, Agdam had the highest rate of population increase in 2015 (2590 persons), while Xankendi had the lowest rate (21 individuals) in 2020. The service sector ranges from a low of 26 individuals in Agdam in 2015 to a high of 241 individuals in Agcabadi in 2021. The mean value for service sector is 113. There are between 12 and 135 schools. Additionally, the average school number is 69. Agdam has the most schools (135), while Xocali had the fewest (12). Agdam's urban density in 2020–2021 was at a low of 5.9 square meters per person while Barda's urban density in 2017–2018 was at a high of 22.8 square meters per person. The average area per person in the population is 15.6 square meters.

Population is strongly connected with population growth; hence it stands to reason that these two variables should also be favourably correlated. Population and service sector are unrelated. This outcome is also oddly unfavourable. This suggests that population growth does not result in the establishment of new businesses in the service sector. In the study that follows, this result will be carefully examined. It makes sense that when there is a rise in both the population and its growth rate, there would be a great need for additional schools because the number of schools is positively associated with both factors. The most intriguing finding is once more the negative correlation and statistical significance between the number of schooling and the profession profile. Another conundrum is that schools will become less important if the regions want to boost the number of enterprises in the service sector since students will be able to transition from education to employment in the service sector. Expectedly, there is a negative correlation between urban density and both population and population increase. Since there are fewer people in a region when the per square meter density per person grows, there are also negative correlations between the number of schools and urban density, which is also comprehensible. The negative correlation between the number of schools and urban density is also present, which is also comprehensible given that as the number of people per square meter grows, the importance of the schools for a given area decreases.

Tab. 4 – Correlation Matrix. Source: own research

Variables	(1)	(2)	(3)	(4)	(5)
(1) Population	1.000				
(2) Population Growth	0.806*	1.000			
	(0.000)				
(3) Service Sector	-0.213	-0.175	1.000		
	(0.258)	(0.355)			
(4) Schools	0.750*	0.697*	-0.510*	1.000	
	(0.000)	(0.000)	(0.004)		
(5) Urban density	-0.557*	-0.408*	0.758*	-0.787*	1.000
	(0.001)	(0.025)	(0.000)	(0.000)	

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

4 RESULTS

Based on the criteria including urban density, population growth, and business growth, the chart indicates that Agdam and Fuzuli are viable locations for the smart city ideas. For the sake of comparison, we took the mean values for the five chosen areas, which ranged from 2015 to 2021. Agdam and Fuzuli have the lowest sq. meters per person and are the only two below the mean. They also have the highest business density and are the only two above the mean (Tartar is the same as the mean). In business growth Agdam and Fuzuli are the only two regions with above-average growth, 13.2% and 12.4% compared to the average of 10.1%. However, it is clear from the percentages that the Agcabedi, Tartar, and Barda have average business growth rates that are, respectively, below the mean values at 7.8%, 8.6%, and 8.4%.

Tab. 5 – Pivot table results. Source. own research

	Urban Density	Business Density	Business Growth %	Population (in thousands)	Population Growth	Schools (numbers)
Agdam	6.0	0.2	13.2%	201.98	1.1%	135
Fuzuli	8.1	0.5	12.4%	132.45	1.2%	81
Agcabadi	19.9	1.5	7.8%	135.77	1.0%	62
Tartar	21.4	0.8	8.6%	104.20	0.5%	47
Barda	22.7	1.2	8.4%	156.50	0.8%	75
Grand Total	**15.6**	**0.8**	**10.1%**	**121.82**	**0.9%**	**67**

5 DISCUSSION

The data pertaining to urban density is consistent with findings reported by Audretsch (1998), Boschma (2005), McKinsey and Company (2011), and The World Bank (2017). It should be mentioned that shorter physical distances are thought to facilitate the spread of knowledge, especially implicit knowledge (Boschma, 2005). Additionally, it is asserted that basic service costs may be between 30 and 50% lower in densely inhabited places (The World Bank, 2017).

The findings regarding business density and growth are consistent with Shearmur and Poirier's (2016) research, which argues that innovation is a very significant endeavor due to the need for efficient and higher-quality services that meet the needs of users, or citizens.

Additionally, a higher population density is linked to a higher need for service improvement (Arduini et al., 2010; Damanpour, 2006; Gonzalez et al., 2013; Reginato et al., 2011; Rodriguez-Pose and Wilkie, 2016). According to Walker (2008), there is a clear correlation between innovation and population growth, regardless of a city's exact size. Our results are also supported by those of the earlier research.

The school's findings are consistent with those of Ardito et al. (2019) and Ferraris et al. (2018), who thought of schools as knowledge producers of smart cities and as a crucial component of knowledge-based urban economics. The number of schools remained essentially constant, hence we were unable to obtain a percentage estimate for the schools in our analysis. For this reason, having an exact estimate for Agdam and Fuzuli based on the school factor is quite difficult.

6 CONCLUSION

This study aims to explore the variables affecting smart cities in Azerbaijan's Eastern Zangezur and Karabakh Economic Regions. The goal of this study is to draw attention to the ways in which key socioeconomic issues influence the growth of smart cities.

Our research suggests that a dense area would have cheaper infrastructure costs. This is because a denser population and higher business density means fewer network lines, cell towers, switching stations, etc. per capita. Business growth shows a growing economy, so the smart city is being built in a growing area and not a failing area. On the other hand, if a city is too large, it is hard to build the required infrastructure and coordinate smart city development. But if it is too small, it might not have enough resources, so business density must be high (business/population). If business density is changing rapidly, meaning more people are being added faster than new businesses, then there might not be enough resources. The city needs intellectual capital, so lots of schools, but not too many schools for each resident (schools/population).

The study's primary drawback is that we can only project results for the Eastern Zangezur and Karabakh Economic Regions of Azerbaijan. As more individuals are relocated to Karabakh and Eastern Zangezur as a result of the Great Return Program, future research can test the prediction models.

The government needs to raise public knowledge of sociodemographic elements that affect the development of smart cities, such as population growth, business growth, urban density, and business growth. Future school priorities should be higher as there is evidence that the number of schools has not changed. The government should raise the number of schools while also being aware of the maximum number of schools per population. Future research may look into this issue as well.

APPENDIX

Dataset

regions	years	Population (at the end of the year, thousand people)	Population growth (people)	Population growth (%)	Service sector (units)	Development of the service sector (units)	Business Growth (%)	Business density (per thousand people)	Schools (units)	Schools (%)	Urban density (square meters per person)
Agcabadi	2021	138.4	908.0	0.01	241.0	27.0	0.1	1.7	62.0	0.0	20.0
Agcabadi	2020	137.5	700.0	0.01	214.0	9.0	0.0	1.6	62.0	0.0	20.0
Agcabadi	2019	136.8	1,341.0	0.01	205.0	16.0	0.1	1.5	62.0	0.0	19.8
Agcabadi	2018	135.5	1,172.0	0.01	189.0	10.0	0.1	1.4	62.0	0.0	19.8
Agcabadi	2017	134.5	1,432.0	0.02	179.0	13.0	0.1	1.3	62.0	0.0	19.8
Agcabadi	2015	131.9	1,952.0		166.0			1.3	62.0		20.0
Agdam	2021	205.8	658.0	0.00	47.0	6.0	0.1	0.2	135.0	0.0	5.9
Agdam	2020	205.1	1,162.0	0.01	41.0	2.0	0.1	0.2	135.0	0.0	5.9
Agdam	2019	204.0	1,849.0	0.01	39.0	0.0	0.0	0.2	135.0	0.0	6.0
Agdam	2018	202.2	1,833.0	0.01	39.0	4.0	0.1	0.2	135.0	0.0	6.0
Agdam	2017	200.0	1,932.0	0.03	35.0	9.0	0.3	0.2	135.0	1.0	6.1
Agdam	2015	194.8	2,590.0		26.0			0.1	134.0		6.2
Barda	2021	158.9	636.0	0.00	212.0	19.0	0.1	1.3	75.0	0.0	22.7
Barda	2020	158.2	759.0	0.00	193.0	6.0	0.0	1.2	75.0	0.0	22.7
Barda	2019	157.5	1,305.0	0.01	187.0	4.0	0.0	1.2	75.0	0.0	22.7
Barda	2018	156.3	1,239.0	0.01	183.0	8.0	0.0	1.2	75.0	0.0	22.8
Barda	2017	155.4	1,350.0	0.02	175.0	32.0	0.2	1.1	75.0	0.0	22.8
Barda	2015	152.7	1,743.0		143.0			0.9	75.0		22.6
Fuzuli	2021	135.3	557.0	0.00	72.0	3.0	0.0	0.5	80.0	0.0	8.0
Fuzuli	2020	134.7	782.0	0.01	69.0	-1.0	0.0	0.5	80.0	0.0	8.0
Fuzuli	2019	133.8	1,252.0	0.01	70.0	5.0	0.1	0.5	80.0	-1.0	8.0
Fuzuli	2018	132.4	1,245.0	0.01	65.0	5.0	0.1	0.5	81.0	0.0	8.1
Fuzuli	2017	130.9	1,272.0	0.03	60.0	18.0	0.4	0.5	81.0	0.0	8.2
Fuzuli	2015	127.6	1,678.0		42.0			0.3	81.0		8.2
Tartar	2021	105.2	243.0	0.00	99.0	6.0	0.1	0.9	47.0	0.0	21.9
Tartar	2020	105.0	268.0	0.00	93.0	9.0	0.1	0.9	47.0	0.0	21.8
Tartar	2019	104.7	644.0	0.00	84.0	0.0	0.0	0.8	47.0	0.0	21.8
Tartar	2018	104.2	596.0	0.01	84.0	5.0	0.1	0.8	47.0	0.0	21.8
Tartar	2017	103.6	501.0	0.01	79.0	13.0	0.2	0.8	47.0	0.0	21.7
Tartar	2015	102.5	712.0		66.0				47.0		19.1

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DIGITAL TRANSFORMATION DETERMINE PHENOMENON PURCHASING 4.0 IN THE PURCHASING PROCESS

Lukáš Petrucha

Abstract

We are currently found in period of Industry 4.0 revolution. We see that the digital age brought to us variety of new digital technology innovation. Industry 4.0 together with digitalization progress is today not only trend. This is essential to keep continuity development of organizations. Digitalization implementation influenced every company processes. One of these processes is purchasing process. The purpose of this paper is to obtain base understanding of the impact of digitization on the purchasing process. In contrast with studies that examine digitization as a driving force in supply chains, which means operational purchasing, this study focuses more on strategic data analysis and supplier management. Holistic focus is strategic purchasing process.

Many articles and studies have been published in with regards Industry 4.0. In the professional literature, however, we find only a few of the number of articles on the topic of Purchasing 4.0 or Procurement 4.0. The aim of the research is to map the existing literature sources describing Purchasing 4.0 and capture the development of Purchasing 4.0 from the perspective of the level of development, data analysis capabilities and digital purchasing. For this research, digitization is considered as a major factor shaping Purchasing 4.0. The main goal of the research is to find and formulate the Purchasing 4.0 strategy based on a literature review.

The research design and methodology are based on a systematic literature review from sources with impact. The finding of the literature research is that few articles deal specifically with the Purchasing 4.0 phenomenon. Nevertheless, it was possible to define 5 Purchasing 4.0 factors: Digital transformation, Blockchain, Sustainability, Industry 4.0 and Purchasing 4.0. These 5 factors are the basis for conducting semi-structured interviews with managers of selected companies. This research method leads to an understanding of the development of Purchasing 4.0, its parts and the connection with the development of Industry 4.0.

The value of this research is a contributing to a greater understanding of Purchasing 4.0. Since the investigation of Purchasing 4.0 is not yet so frequent, there are several open research questions that could serve as guidelines for other researchers. How can we define Purchasing 4.0 term and what is driving it? Which advance technologies are part of digital transformation in purchasing process? How will be consist digital purchasing process? The research could also serve practitioners to better understand the development of Purchasing 4.0 and be able to evaluate the current level of strategic purchasing process and define future strategies in accordance with the digitization transformation.

This study provides for academic sphere the latest literature review. Discussion section compare results with conclusion of other authors. Finally, are defined future research opportunities and future research questions.

Keywords: Industry 4.0, Purchasing 4.0, digitalization, big data, blockchain, process

1 INTRODUCTION

The status of strategic purchasing in business organizations has strengthened over the past 20 years. At the same time, the amount of data potentially usable to support purchasing and supply chain management has grown. The growing importance of strategic purchasing for the achievement of added value by organizations call for continuous development. Just as other company processes have been affected by Industry 4.0 in recent years, the purchasing process is taking on elements and ideas of this progress of the fourth industrial revolution.

Purchasing processes are becoming more demanding and complex because of rapid changes coming from the competitive on global market environment. This requires adapting existing processes to innovative and more efficient processes. Buying requires quick reactions with a great deal of agility. The initiation of innovation is based on the Industry 4.0 phenomenon, which is based on digital transformation. Then we talk about purchasing as "Purchasing 4.0" whose processes are influenced by the integration of information and communication technologies (ICT) and automation (Gunasekara *et al.,* 2022). The purchasing process can be considered an important link in supply chain management, as new opportunities can be implemented in supply chains, leading to improvements in their efficiency and effectiveness. By opportunities we mean the application of Industry 4.0 technologies. However, these applications can be expensive and may not be reasonably available to all sizes of businesses. There may be an aversion to investing in the digitalization of the purchasing process. Therefore, it is necessary to create comprehensible materials describing to managers the advantages of implementing these advanced technologies. Despite the importance of this issue, only few articles deal with the implementation of Industry 4.0 technologies and intelligent systems into the purchasing process (Jahani *et al.,* 2021).

In the literature we can find the designation *Purchasing 4.0*, *Procurement 4.0* or *Sourcing 4.0*. But none of the authors gives a clear definition of these terms. We do not even have research based purely on examining the effects of digitization and the elements of Industry 4.0 in Purchasing 4.0. Many articles have been published regarding the term Industry 4.0, but there is no research that clearly conceptualizes Industry 4.0 in the supply chain (SCM) context (Frederico *et al.,* 2020). There is thus room for creating a definition of Purchasing 4.0. It is also necessary to define the difference in the use of Purchasing 4.0, Procurement 4.0 and Sourcing 4.0 and to clearly define these terms in the professional literature. Determinants leading to the transformation of traditional purchasing to technology-enabled purchasing also need to be explored.

Pellengahr *et al.* (2016) pointed out the fact that 37% of German companies implemented Industry 4.0 technologies in their processes, but only 1/3 of these companies also made interventions in the purchasing process (Gottge *et al.,* 2020). This fact confirms that further research in the field of purchasing is necessary. It is necessary to find out the current approaches of companies to the implementation of Industry 4.0 elements also in the purchasing process. Alternatively, find out the reasons for the low involvement of companies in the implementation of advanced technologies and approaches in purchasing processes.

From the research knowledge it can be concluded that the Purchasing 4.0 phenomenon is still not an important topic on the academic field, and it is not so frequently exploring as phenomenon Industry 4.0.

2 LITERATURE REVIEW

The Web Of Science and Scopus databases were chosen as the source for obtaining information. Basic keywords were defined before starting the search. The initial keywords were Industry

4.0, digitalization, procurement and business models. A first sample of 30 works was generated by combining these keywords and gradually selecting sources according to information from the abstracts. Through the study of these works, other resources needed for research were identified by so-called chaining. An extended list of keywords was also created, viz. Tab. 1. The literature search and selection strategy is as follows:

Tab. 1 – The list of keywords. Source: own research

Keyword
Industry 4.0
Purchasing 4.0
Procurement 4.0
Sourcing 4.0
Logistics 4.0
Digitization
eProcurement
eSourcing
Automatization
Big data
Cloud

In the second phase of the search, a new list of keywords was used. Keywords were entered in various combinations to obtain the widest possible range of works potentially usable for research. The exceptions in the combinations were the keywords eProcurement and eSourcing. It was found that in combination with other words, zero or numerically negligible results were achieved. eProcurement and eSourcing are an integral part of the digitalization of purchasing and therefore all relevant sources must be sought. Within the keywords, the word Logistics 4.0 was also chosen in one of the combinations, because purchasing and logistics are related in certain processes and can complement each other in the context of digitization. It was found that the keyword Purchasing cannot be used as the word itself, as it occurs in articles dealing with diametrically different topics and purchasing is used here in different contexts.

11 sets of acquired literature were systematically created. Some sets contained only units of articles due to a wider combination of keywords, others contained hundreds of articles due to a simpler combination. The logic of combinations of keywords and search results are shown in Tab. 2. These sets were subsequently reduced of duplicates by cross-checking of the generated lists, and everything was inserted into one comprehensive overview of the obtained literature.

Tab. 2 – The logic of searching literary sources according to keywords. Source: own research

Logic of searching literary sources according to keywords - status k 9.5.2023					
Topic	Topic	Abstract	Abstract	Abstract	Results
Purchasing 4.0	Purchasing	Purchasing			640
Procurement 4.0	Procurement	Procurement			209
Sourcing	Digitization	Sourcing	Digitization	Procurement	11
Supply chain	Digitization	Procurement	Digitization		25
Supply chain	Industry 4.0	Procurement	Digitization		10
eProcurement					61
eSourcing					14
Procurement		Big data			173
Purchasing		Big data	Procurement		17
Purchasing		Cloud	Digitization		4

Logistics 4.0		Procurement	Digitization			8

Thus, the search system for literary sources began with a combination of basic keywords obtained mainly from the definition of research questions. Furthermore, the list of articles was expanded by so-called chaining. The broadest list of literature was obtained in the last step of the detailed search. A total of 1,546 literary sources relevant to digitization research and the Purchasing 4.0 phenomenon in the purchasing process were obtained. This number was reduced by gradually verifying the topic of article titles and reading abstracts. This is where the biggest selection of the first set of acquired resources took place, thanks to the word "purchasing". An analysis of citations and the year of publication of the article was used for further selection. The selection logic consisted in selecting the articles with the largest number of citations. The list of literary sources should primarily include the latest articles. The researched topic is dynamically changing over time, and it is not beneficial to focus more on information that is 3 or more years old. For the purposes of detailed selection, an extended list of keywords was created, thanks to which it was possible to focus on specific necessary topics, viz. Tab. 3. So far, this comprehensive and detailed selection has generated a list of 84 literary sources for more detailed examination.

Tab. 3 – The extended list of keywords. Source: own research

Extended list of keywords
Process
Automation
Internet of Things
Artificial intelligence
Business
Business models
Business intelligence
Sustainability
Blockchain

The literature sources in the final list come from 21 research areas. 1/3 of resources come from Business & Economics. 1/5 then from Operations Research & Management Science. 1/10 resources from Computer Science and Engineering. From the other 17 areas of research, mostly 1-2 literary sources were obtained from the total actual number of 84 sources.

The importance of the topic for research is confirmed by the dynamics of research on the given topic over the years. Fig. 1 shows the number of sources from the final selection by individual year of issue. I assume that in 2023 and the following years, the number of cited sources will continue to grow and the topic of digitization of purchasing and Purchasing 4.0 will be further expanded with new knowledge. One of the future tasks of the research will be to re-examine and analyze the literature with the year of issue 2022. The assumption is that the literary sources from this year do not yet have enough citations to be captured by the system described above. A possible cause is also an error in defining key words or identifying trends in the field of digitization and automation of purchasing processes, which researchers have recently dealt with.
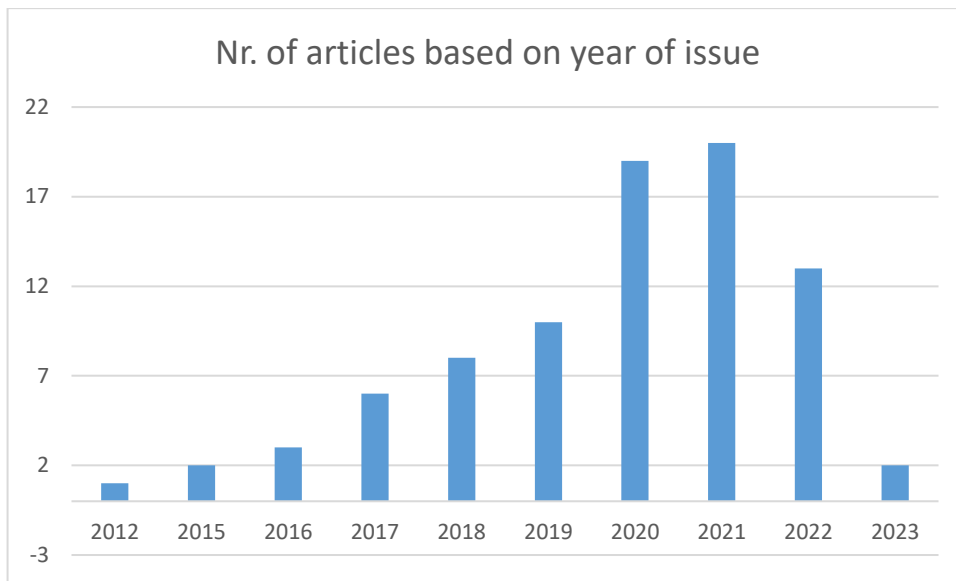
Fig. 1 – The nr. of articles overview based on year of issue. Source: own research

2.1 The base thesis of literature review

In this chapter are provide the base important thesis related to the defined keywords.

Industry 4.0: We understand Industry 4.0 as a revolutionary concept of the production process, oriented towards new technologies that interconnect machines and devices with digital data into automatic, intelligent systems (Rolínek *et al.,* 2022). The adoption of Industry 4.0 technologies or digitization in the purchasing process is perceived as a catalyst for a revolution in the indispensable development of supply network management. This leads procurement functions to seek, discover, and experiment with new technological solutions (Gualandris *et al.,* 2018).

Digitization: The rapid pace of digitization in industry, or Industry 4.0, is also a trend in Supply Chain Management (SCM) (Schniederjans et al., 2021). Companies are encouraged to digitize their purchasing processes to remain competitive (Bals *et al.,* 2019).

Digital procurement transformation: Various terms, such as "advanced procurement digitalization", "procurement 4.0", "purchasing 4.0", or "digital procurement", are used interchangeably to broadly describe the "use" of advanced digital technologies in the procurement context. While all these terms refer to newer digital technologies (such as AI or blockchain) that go beyond the use of the internet (which is e-procurement), the contingencies for employing these are largely missing from existing definitions (Herold *et al.,* 2023).

Strategic Purchasing 4.0: The Strategic Purchasing 4.0 process includes many variables, such as specification co-creation and parameter-based negotiation, including added sub-processes and change management. Unlike strategic purchasing 4.0, fewer changes are expected to take place in operational purchasing 4.0 (Gottge *et al.,* 2020).

Big data: Companies competing in a global market environment with operational business processes that shape supply chains are characterized by an excessive amount of data and information exchange (Hallikas *et al.,* 2021). Big data and its value are a commonly discussed and thoroughly researched topic in marketing and sales. Although some authors mention their importance for purchasing and supply chain management, there has been little literature on this topic (Moretto *et al.,* 2017)

Internet of Things: The number of enterprises adopting IoT is growing with the number of IoT connected devices worldwide. The IoT reflects this growing trend in the possession of

physical devices that have the computational communication technical ability to collect information and data in real time (Sestino *et al.,* 2020).

Business Intelligence: Business Intelligence (BI) driven by big data (BD) is considered a new development phase within industrial engineering management to achieve higher business value creation (Rajnoha *et al.,* 2021). In supply chains, large volumes of data are generated from various sources (applications) and through transactions and other operations, this data is further multiplied. It is, for example, data obtained with the help of sensors or other sensors, when IoT solutions provide new opportunities in traditional SCM (Opresnik and Taisch, 2015; Wang *et al.,* 2016; Tortorella *et al.,* 2019).

Purchasing process: Supplier collaboration platforms and the role of the strategic buyer have been found to influence the entire strategic purchasing process (Gottge *et al.,* 2020). Purchasing and supply management (PSM) competencies are a separate level of measurement of organizations' performance in the PSM process. Considering recent developments within companies and in the external environment, the question of what competencies in PSM are needed now and in the future is becoming increasingly important (Bals *et al.,* 2019). In most industries, the cost of purchasing raw materials and components represents the main cost of the product, and in some cases these costs can exceed 70%. In such circumstances, the purchasing department can play a key role in reducing costs, and supplier selection then becomes an important purchasing function (Ghodsypour *et al.,* 1998). Purchasing and supply management (PSM) has come into focus as an important and critical business activity to deal with the large number of stakeholders demands in multi-layered supply networks. Practice, identity, and development in PSM both academically and in practice requires us to answer several important questions. What is a purchase and what does it consist of? And what isn't shopping? (Bäckstrand *et al.,* 2019)

Blockchain: Blockchain technology was introduced to the market with the potential to make trading more secure and transparent. This technology enables the optimization of the supply chain management process and at the same time provides control over this process. Adaptation, innovation and sustainability are the pillars of organizations in a period of continuous digital transformation. The adoption of blockchain means the control of transparency between suppliers and customers, the credibility of the product life cycle, the confirmation of sustainability and the optimization of supply chain processes through automation (Abreu *et al.,* 2021).

3   METHODOLOGY

The status of strategic purchasing in business organizations has strengthened over the past 20 years. At the same time, the amount of data potentially usable to support purchasing and supply chain management has grown (Jääskeläinen *et al.,* 2016). The growing importance of strategic purchasing for the achievement of added value by organizations entails the need for continuous development. Just as other company processes have been affected by Industry 4.0 in recent years, the purchasing process is taking on elements and ideas of this progress of the fourth industrial revolution.

Authors of recent articles have mentioned that there is still not enough publications and research on the topic of digital transformation in purchasing. The primary goal of the research is to map literary sources that focus on topics and research from the areas of Industry 4.0, Purchasing 4.0 and Procurement 4.0 in purchasing processes, digitization and automation of purchasing. It is necessary to find out what advanced tools from Industry 4.0 are taken into the purchasing process. What digital tools are implemented if the organization wants to decide on a digital transformation of its purchasing processes. The survey must also answer the question of the

form of implementation of digitization technologies. Basically, two options are offered, own development of tools or use of standardized solutions.

The digital transformation of purchasing is at the top of the list of all defined trends. Without digitization, it would not be possible to achieve progress in directions such as sustainability, resilient supply chains or diversification. Massive data is the driving force with which we can achieve effective steps in sustainability, for example, but it would not be possible without digitization. Without digitization, it is not possible to manage and manage huge amounts of data. It is not possible to effectively use this data to achieve goals leading to progress in purchasing processes and create added value. The trend is the creation of a huge amount of data that needs to be processed somehow. Data is modern-day gold that needs to be harnessed to advantage through digitization.

Tab. 4 shows a list of five factors that will be examined on a scale of 1 - 5, from fully agree to fully disagree. Thus, a Likert scale will be used to measure people's attitudes and opinions. "Purchasing 4.0" has been dropped from the list of factors for the time being. In the article Industry 4.0 technologies in the purchasing process, Gottge, Menzel and Froslund mention this term, but other authors use the term Procurement 4.0. Outputs from semi-structured interviews will be used to complete the overview of the issue of using this term.

Tab. 4 – The five factors. Source: own research

Factor	Characteristic	Source
Digital transformation	Big data IoT Cloud Blockchain 5G technology	van Tonder et al. 2020, Bjorkdahl 2020, Alabdali et al. 2022, Richnak 2022, Sestino et al. 2020, Es-Satty et al. 2020, Varriale et al. 2021
Blockchain	An important technology for supply chain optimization and management. Blockchain technologies help develop supply chains towards sustainability.	Dolgui et al. 2022, Varriale et al. 2021, De Giovann 2020, Abreu et al. 2020, Esmaeilian et al. 2020, Varriale et al. 2021
Sustainability	Digital transformation Sourcing decision Government regulations Reduce CO2	Thomson et al. 2022, Fallahpour et al. 2021, Bals et al. 2019, El Jaouhari et al. 2022, Corbos et al. 2023, Bueno et al. 2022, Yevu et al. 2021, Manavalan et al. 2019, Abreu et al. 2020, Varriale et al. 2021
Industry 4.0	Purchasing 4.0 Procurement 4.0 IoT Cloud Big data	Dolgui et al. 2022, Richnak 2022, Seyedghorban et al. 2020, Srai et al. 2019, Fallahpour et al. 2021, Gottge et al. 2020, El Jaouhari et al. 2022, Bueno et al. 2022, Szozda 2017, Jahani et al. 2021, Mavidis et al. 2022, Sjodin et al. 2022
Purchasing 4.0	eSourcing eProcurement Green digital twin	Alabdali et al 2022, Jerome 2022, Bueno et al. 2022, Sjodin et al. 2022, Bag et al. 2020

In the first phase, an analysis of the state of implementation of digitization in purchasing processes is carried out according to individual groups of companies. Finding the status of digitization implementation is divided into three categories, not implementing digitization (w/o digitization), use of standard digitization tools, and own digitization development. The

approach of digitization implementation through in-house development is considered as the highest level of digital transformation of purchasing processes.

For statistical testing of hypotheses and the power of the test, the sample size of individual sets of enterprises is generally chosen according to the parameters of the analysis of the power of the test below:

- probability to the err. α 0,05

- probability to the err. β 0,2

- effect size 0,3

The software tool GPower is used for statistical analyses. The minimum effect size was chosen to be 0.3, which corresponds to an ambitious analysis. The probability error β is set at the usual 20%, which corresponds to 80% of researchers performing the same test finding the effect.

4 RESULTS

Digitization in the purchasing process domain requires answering questions related to technical capabilities, inter-organizational processes and the ability to absorb available information. The key challenge in this issue is related to the huge amount of data from internal and external sources that are generated using new technologies (Hallikas et al., 2021). A deeper investigation needs to focus on the connections between the level of newly introduced technologies, knowledge creation and SCM effectiveness. The level of digitization of strategic purchasing is key to enhancing the effectiveness of the entire SCM process.

The analysis of the current literature shows that the term Purchasing 4.0 or Procurement 4.0 appears in a larger number of articles. However, only a small number of articles deal with the term Purchasing 4.0 in the context of Industry 4.0. Has been found in database Scopus and WOS 8 articles directly describing Procurement 4.0 and only 2 articles deal with Purchasing 4.0 trends.

Results of current level of digitization implementation in companies is shown in Fig. 2. These results will be subjected to statistical testing and comparison with previous research. In these paper fictive data to the methodology were used.
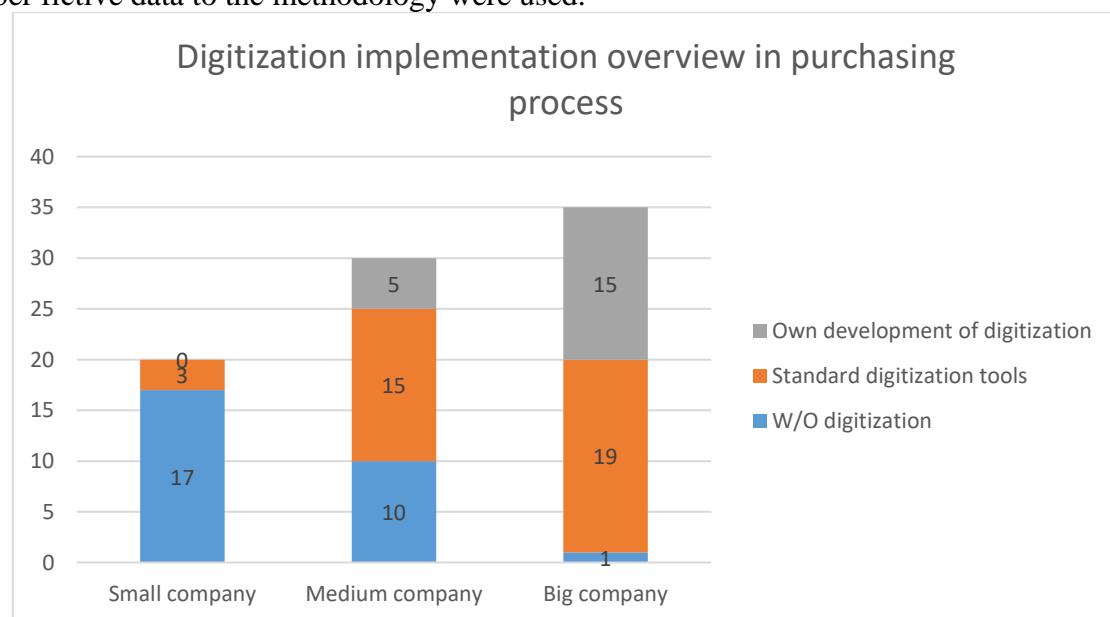
Fig. 2 – The digitization level overview. Source: own research

Result showed on Fig. 2 provide information that the digital transformation in large enterprises takes place on a larger scale than in medium and small enterprises. Are digital technologies bringing better performance outcomes? Are performance outcomes different among small, medium and large enterprises? Multiple studies have provided evidence of better procurement performance outcomes when digital technologies are adopting.

The scientific hypothesis says that digital transformation in big enterprises takes place on a larger scale than in medium and small enterprises but brings similar added value. This hypothesis is in confrontation with current studies and need to be more explore. From the available sources, it is found that 30% of companies carry out digitization in the purchasing process. The share of digitization in purchasing is 75% for large companies. For small and medium-sized enterprises, the share of digitization in purchasing is 20% lower. This proportion generates an effect size of 0.42. To test this hypothesis, it is sufficient to use a sample of 37 respondents. Results are shown in Fig. 3
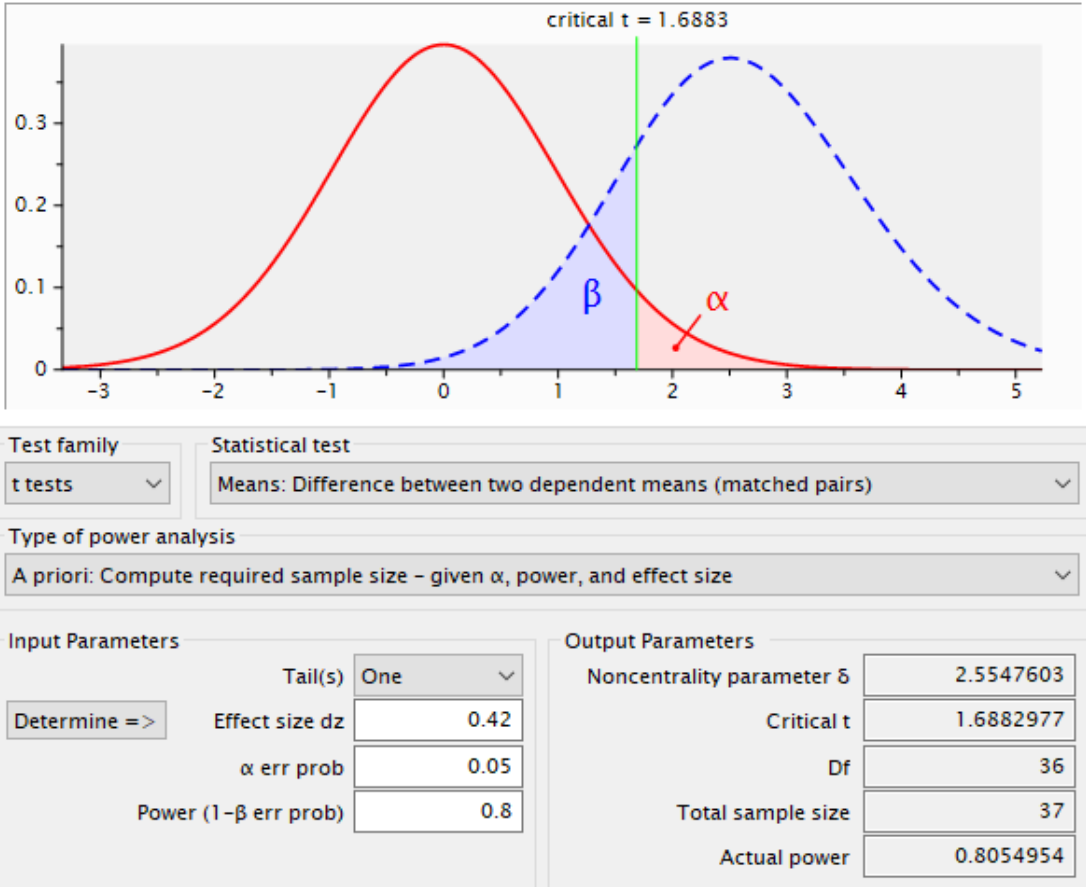
Fig. 3 – The effect size calculation for testing sample. Source: own research

One of important result from semi-structure interview with procurement leaders and managers is idea of sixth factor of Purchasing 4.0 which is artificial intelligence. This topic should be considering as separate variable. Next studies need to open question about artificial intelligence and it´s contribution in purchasing digitalization implementation. How artificial intelligence influence market research, how help with create strategy or how support supplier management? Research shows that artificial intelligence will replace for example every dash and dash of dashes. This technology will define future markets and finally artificial intelligence will be able to proceed request for quotation activities. However, this topic is changing too fast it is expected that more research papers will be issued during next years.

5 DISCUSSION

In this article were identify basis of the research, which will be subjected to a closer examination. The research is aware that the researched topic of the digital transformation of purchasing is very dynamically developing over time. Therefore, some conclusions and hypotheses may have a short validity period.

One of the goals of the research is to capture and describe the essence of Purchasing 4.0. It is also necessary to choose only one of the terms Purchasing 4.0 or Procurement 4.0 for using in professional publications. Other researchers should conduct similar research for other industry sectors. Compare conclusions between research and verify the definition of Purchasing 4.0 or Procurement 4.0.

If organizations still see the role of purchasing in the traditional setup and have not yet considered a shift in this area closer to Industry 4.0 technologies, then it is necessary to ask why. Is it because of the limited amount of funds needed for investment? Is the cause a lack of resources that would extend the implementation of Industry 4.0 from production processes to supply chain processes as well? Are the representatives of these organizations aware of the difficulties of processing and using a large amount of data and its possible contribution to the performance of the organization?

The overview of number of articles per year in this study is in accordance with other studies. This finding confirm need for more deep research of this topic and also is showing the trend of increasing number of research activities in this current interesting topic.

Herold et al. mentions that their study is the first to synthesize previous findings in the field of digital procurement transformation. This conclusion confirming the uniqueness of the topic and the need for further research.

Next research activities need to consider big data in procurement since this is still not frequent topic for this process as Mr. Moretto et al. says.

There are a still future research questions on the digital transformation of strategic procurement process and Purchasing 4.0 phenomenon. Concrete questions and hypothesis rise in this study were compared with other authors like Herold et al., Moretto et al., Abreu et al, Gottge et al., and Bals et al. It is no doubt the alignment with the questions and hypothesis. Systematic literature review show that this research is on right way. Next research needs to classify questions to the groups and provide systematic deep dive analysis.

Potential research questions:

- In which procurement processes does digitization bring significant effect?

- How current procurement processes will be transformed by the implementation of digitization tools?

- How digital skills will be implemented into procurement to adopting advanced digital technologies?

- What are ways for procurement management to promote a digital mindset within the procurement organization?

- How involved suppliers to the digitalization interface and ensure that suppliers are open to collaborate and interact?

- Does the degree of digitization affect KPI values?

- How can we quantify and measure performance outcomes of Purchasing 4.0 approaches?
- How can research support digital transformation in purchasing within companies?

Based on statements of authors Abreu et al or Herold et al. is important to involved to the definition of digital transformation in procurement terms like blockchain or artificial intelligence. What is clear that after we will find answers to current questions, we need take our focus mainly to the question how artificial intelligence influenced Purchasing 4.0.

6 CONCLUSION

The goal of the research is to provide a comprehensive insight into the Purchasing 4.0 phenomenon associated with the digital transformation of purchasing processes. Describe the characteristics of Purchasing 4.0 or Procurement 4.0 for a better understanding. The list of determinants should be reviewed, and new determinants found. With the gradual development of digital technologies, the defined trends should be reviewed, and these trends should be transformed into new trends. This topic needs to be constantly developed and bring new knowledge in the following years.

Other incentives for investigating the influence of digitization in the purchasing process are a long-term sustainable supply chain, a carbon-neutral footprint, reducing emissions, inventing more efficient flows of goods, focusing on shortening logistics routes. Very important is to explore trends of using artificial intelligence. Future research needs to evaluate positive and negative aspects of digital transformation. Need to be take into consideration risks, weakness, and opportunities.

Finally, the raised hypotheses should be subjected to review and an attempt should be made to refute or confirm them.

All aspects of trends 4.0 can be seen as a challenge and an opportunity to create an even greater importance of strategic purchasing. In the future, strategic purchasing may play an even greater role in creating added value for the company or influencing other supply chain processes. Strategic purchasing processes will have to adapt to new digitization trends in accordance with the management system of the entire company, where especially production processes, are already undergoing digital transformation.

This study has certain limitation. First is that my study takes into consideration only extant articles found in Scopus or WOS database. The number of academic literatures is still not sufficient to do wide academic discussion about this topic. Second, data used in my study are only fictive. This study is initial document for next research of Digital transformation determine phenomenon Purchasing 4.0 in the purchasing process.

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BOOSTING CUSTOMER LOYALTY: THE ROLES OF CORPORATE SOCIAL RESPONSIBILITY, CORPORATE IMAGE AND CUSTOMER SATISFACTION

Nhat Tan Pham, Nhi Nguyen Huynh Thao, Khuong Thanh Nguyen, Ly Thi My Hanh

Abstract

This study examines the connection between corporate social responsibility (CSR) and consumer loyalty in Ho Chi Minh City, Vietnam. It investigates the role that consumer contentment and corporate image play as mediators in this relationship. Due to the absence of a firm theoretical foundation based on market factors, this study examines the difficulty of instituting effective CSR practices in Vietnamese businesses. Through online surveys, data from 257 participants were obtained and analyzed using a structural equation model (SEM) with SPSS, and the AMOS software. The research concentrates on three aspects of CSR: economic, social, and environmental responsibility. The results indicate that CSR has a positive effect on customer loyalty, with the social aspect of CSR having the greatest impact. The study also emphasizes the important role of customer satisfaction and corporate image as mediators in the relationship between CSR and customer loyalty. In this relationship, customer contentment emerges as the determining factor. These findings highlight the significance of meeting customer expectations and delivering positive experiences in order to increase customer loyalty. This study contributes to the theoretical foundation for future CSR investigations in Vietnam. It offers recommendations for enterprises, governments, and consumers to implement CSR initiatives effectively. By understanding the mediating effects of customer satisfaction and corporate image, organizations can strategically align their CSR efforts to strengthen their brand image, increase customer satisfaction, and cultivate long-term customer loyalty.

Keywords: corporate social responsibility, social responsibility, economic responsibility, environmental responsibility, customer satisfaction, customer loyalty

1 INTRODUCTION

In today's business landscape, fostering customer loyalty has become critical for companies across industries. Loyal customers not only affirm the quality of products and services but also serve as a sustainable revenue source. The significance of customer retention is evident from research conducted by Harvard University, which indicates that a mere 5% increase in customer retention can yield profits ranging from 25% to 95%. Moreover, retaining existing customers costs only about ⅙ compared to acquiring new ones. Recognizing these advantages, businesses are actively focusing on strategies to enhance customer loyalty. However, achieving absolute customer loyalty remains a daunting task in practice, given the increasing competition, rising standards of living, and diverse marketing initiatives available in today's market. While traditional factors such as price and product quality have long been regarded as key drivers of competitive advantages, a shift in consumer behavior is being observed. Consumers now seek more than just value for money; they demand brands that demonstrate corporate social responsibility (CSR) and ethical conduct. This shift highlights the evolving market dynamics, where CSR has emerged as a significant market differentiator. Modern consumers are more socially conscious than ever before, and they actively seek brands that contribute positively to

society and demonstrate environmental responsibility. In fact, a Futerra poll revealed that approximately 88% of consumers prefer to purchase goods and services from socially responsible companies. Implementing CSR not only benefits enterprises but also contributes to the well-being of communities, potentially leading to higher levels of customer loyalty.

The advent of multinational corporations investing in Vietnam has propelled the spread of the CSR concept throughout the country. In recent years, an increasing number of Vietnamese businesses have actively embraced CSR, further enhancing their brand reputation within society. However, it is essential to recognize that for many businesses and entrepreneurs in Vietnam, CSR still remains a relatively new and unfamiliar concept. The lack of understanding regarding the benefits of CSR implementation hinders its widespread adoption in practice. To address this knowledge gap and provide Vietnamese businesses with concrete evidence and theoretical insights into the benefits of CSR, it is imperative to conduct a study examining the impact of CSR on customer perceptions and behaviors. While numerous studies have explored the effect of CSR on customers in various countries, there are still gaps in the literature that make it challenging to fully comprehend how CSR influences customer loyalty. Scholars have debated whether the relationship between CSR and customer loyalty is direct or indirect, and research findings have been inconclusive. For instance, CSR positively influences customer satisfaction more than customer loyalty, with corporate image playing a moderating role (Chung et al., 2015). On the other hand, the research was unable to establish a direct link between CSR and consumer loyalty (García de Leaniz & Rodríguez Del Bosque Rodríguez, 2015). Moreover, the existing literature has rarely explored the simultaneous mediating effects of corporate image and customer satisfaction in understanding the indirect relationship between CSR and customer loyalty. In the context of Vietnam, where consumer psychology and behavior are influenced by unique cultural and market factors, these mediating factors hold significant importance. Therefore, the primary objective of this study is to investigate how CSR affects consumer perceptions of loyalty in Ho Chi Minh City (HCMC) and determine the relative impact of various CSR aspects. Additionally, this study aims to examine the mediating effects of corporate image and customer satisfaction, shedding light on their roles in shaping Vietnamese consumer behavior. By pursuing these objectives, this research contributes to both academic and practical understanding of the relationship between CSR and customer loyalty, ultimately assisting businesses in Vietnam in formulating effective CSR strategies.

2 LITERATURE REVIEW

2.1 Corporate social responsibility (CSR)

Corporate Social Responsibility (CSR) has gained significant attention in the field of business administration (Kraus & Brtitzelmaier, 2012). The concept of corporate social responsibility (CSR) underscores the obligation of firms to harmonize their policies with societal objectives and ideals (Bowen, 2013). Traditional viewpoints focused on profit maximization, while the stakeholder approach emphasized considering the interests of various stakeholders (Davis, 1973). The "Pyramid of Corporate Social Responsibility" and the triple bottom-line framework further defined CSR dimensions (Abe & Ruanglikhitkul, 2013). Despite the ambiguity in its definition, businesses view CSR as a tool to shape stakeholder attitudes and behaviors (Dahlsrud, 2008). Research suggests positive relationships between CSR and consumer responses, market value, and financial performance (Yoo & Lee, 2018). Businesses practicing CSR often exhibit greater financial success and liquidity buffers (Birindelli & Intonti, 2018). Further research is needed to explore the impact of CSR on business performance and its role in gaining a competitive advantage.

2.2 Corporate image

Corporate image is the stakeholders' beliefs, attitude, perception, or impression of the company's product, service, and operations (Holzhauer, 1999). Business identity is another name for it. As it serves several groups, a company will have multiple images. Internal operations and marketing tools help corporations build a positive image among varied stakeholders (Dowling, 1988). Personal experience, word-of-mouth, promotion, and marketing all contribute to a company's image (Lemmink et al., 2003). Businesses' external stakeholders—customers—choose to interact with them because of their values. This suggests that brand image influences customers' choices and gives enterprises a competitive edge (Mazzarol, 1998).

2.3 Customer satisfaction

Customer satisfaction is the foundation of every mission statement and the goal of all initiatives (Zairi, 2000). Customer satisfaction is extremely subjective and impacted by expectations. The expectancy-disconfirmation theory states that customer satisfaction is based on performance differences. If client satisfaction surpasses expectations, the expectation is reinforced. However, if performance falls short, the client is disappointed. Customer satisfaction is defined differently by each company, although it typically involves a customer's relationship with a product or service and its supplier (Liu & Jang, 2009). Satisfied customers are more likely to return and spend more (Terpstra & Verbeeten, 2014).

2.4 Customer loyalty

Loyal consumers as those that bought a brand regularly, thought exclusively about it, and didn't research it (Newman & Werbel, 1973). Another define "customer loyalty" as "the biased, behavioral response, expressed over time, by some decision-making unit, with respect to one or more alternative brands out of a set of such brands, and is a function of psychological decision-making, evaluative processes (Jacoby et al., 1978)." Customer loyalty, is a long-term commitment to utilizing or repurchasing a product or service despite external variables and marketing campaigns (Oliver, 1999). Customer loyalty is customers' propensity to buy from a firm again. Loyalty is one-way consumers show their happiness with the brand and the product or service (J. M. Bloemer & Kasper, 1995). Long-term product use and trust may cause it. Customer loyalty creates a substantial entry barrier to competitors, increases the firm's ability to respond to competitive threats, boosts sales and revenue, and makes customers less sensitive to competitors' marketing (Elena & Jose, 2001).

2.5 Theoretical background

The theory of stakeholder approach and sustainable development will serve as the foundation for the CSR measurement in this study, with the CSR structure consisting of three parts: economic, social, and environmental.

Stakeholder Approach

Corporate social responsibility has several facets, depending on the organization and sector. A corporation may satisfy CSR after defining it. To optimize the CSR effect, companies must explicitly identify their targets. There are three main approaches to determine who a firm is accountable to: The shareholder approach, the stakeholder approach and the three-domains approach (Freeman, 2010; Friedman, 1962; Schwartz & Carroll, 2003). To analyze the impact of a company's CSR efforts on its stakeholders, especially its customers, the stakeholder approach is considered the most appropriate.

Stakeholders are crucial to CSR activities. Hence more writers are emphasizing the stakeholder approach in their CSR theories (Nikolova & Arsić, 2017). Stakeholders are "any group or

individual who can affect or is affected by the organization's objectives" (Freeman, 2010). Specifically, firms have internal and external stakeholders (Carroll, 2004). The external group includes customers, government, society, other civil society, and environmental organizations, while the internal group includes business owners, managers, employees, and investors. A company can promote equality, diversity, and inclusion in the workplace; give back to the community by improving society's welfare; make ethical business decisions; and be environmentally friendly and eco-conscious. Stakeholder management theory seeks a "win-win" outcome in the medium to long term (Carroll & Brown, 2022). Over the past 30 years, extensive research has found a positive relationship between social responsibility policies and financial success (Orlitzky et al., 2003)

Sustainable Development and Triple Bottom Line Approach

Corporate social responsibility (CSR) is often linked to sustainable development, which involves meeting current needs without compromising future generations (Elkington & Rowlands, 1999). The concept of the "triple bottom line" (TBL) captures the three dimensions of sustainability: economic, social, and environmental (Goel, 2010). The economic line of the TBL focuses on the organization's economic impact and its contribution to economic growth and support (Elkington & Rowlands, 1999). The social line of the TBL highlights ethical corporate practices that benefit the community, workers, and human capital (Elkington & Rowlands, 1999). This includes fair wages, health insurance, education assistance, philanthropy, and more (Engardio et al., 2007). Social sustainability, although less understood, is integral to overall sustainability and sustainable development. The environmental line of the TBL focuses on protecting the environment and its resources for future generations (Goel, 2010). It involves reducing greenhouse gas emissions, energy usage, and ecological impact through environmental management efforts (Elkington & Rowlands, 1999). Environmental sustainability holds significant importance according to various scholars (Porritt, 2012). By adopting the TBL strategy, businesses can define their CSR initiatives and fulfill the expectations of internal and external stakeholders (Elkington & Rowlands, 1999). The use of sustainable development (TBL) as a framework allows consumers to better understand and visualize CSR practices. Further research is needed to explore the practical implementation and effectiveness of the TBL approach in evaluating CSR and its impact on organizational performance and stakeholder perceptions.

2.6 Hypothesis development

Effect of CSR on Corporate Image and Customer Satisfaction

A socially responsible company considers economic, social, and environmental issues. CSR actions show the business's responsiveness to society's demands, which is crucial to its survival (Marin et al., 2009). Consumers like socially responsible companies (Karem Kolkailah et al., 2012). Moreover, customers pay more attention to companies that share their beliefs. Socially conscious customers' perceptions of a corporation are greatly influenced by its CSR issues and their purchase experience (Bhattacharya & Sen, 2003). CSR awareness is growing through corporate image advertising. However, neglecting corporate or social commitments might hurt the firm. Previous research found that organizations that act ethically and impress their stakeholders are more likely to succeed financially (Park & Kim, 2019). Consequently, we hypothesize that:

H1. CSR has a positive impact on Corporate Image.

CSR efforts improve consumer happiness. Businesses must meet consumers' requirements at fair rates and offer additional benefits to fulfill society's CSR. Enhancing product quality is socially acceptable and boosts customer happiness (Carroll, 2004). Customers also assume

ethical firms operate honestly and consider both sides' interests when making choices, which boosts their happiness (Martínez et al., 2013). Moreover, CSR-engaged businesses satisfy customers (Luo & Bhattacharya, 2006). A socially responsible company's products and services make consumers feel like they're indirectly helping society, which boosts their satisfaction. Furthermore, no mediation between customer pleasure and corporate value (S. Lee & Heo, 2009). Thus, we propose the following hypothesis:

H2: CSR has a positive impact on Customer Satisfaction.

Effect of corporate image and customer satisfaction on customer loyalty

In competitive markets, customer loyalty is priceless, so understanding what drives it is essential to retaining a strong customer base. A strong correlation between brand image and brand loyalty, indicating that consumers are more inclined to stick with a company they value (Mabkhot et al., 2017). Moreover, loyalty is closely connected with good emotions from engaging with a well-respected organization (Chebat & Slusarczyk, 2005). For example: Hermes, Starbucks, and McDonald's prove that brand reputation affects consumer loyalty. A business with a strong reputation acquires a competitive edge by growing customer loyalty and encouraging them to buy more of its products and services, as well as by those loyal consumers promoting the brand to others (Sondoh et al., 2007). Thus, this study propose the following hypothesis:

H3: Corporate Image has a positive impact on Customer Loyalty.

According to various research, customer satisfaction is a crucial component in determining loyalty in the service sector, such as commercial airlines, hotels, and education (Kandampully & Suhartanto, 2000). When customer satisfaction reaches a certain level, loyalty increases dramatically (Bowen & Chen, 2001). When it drops to a certain point, loyalty drops equally dramatically. In other industries, there is inconsistent evidence linking these factors (J. Bloemer et al., 1998). In this study, we argue that customer happiness is vital to customer loyalty since pleased customers often want to keep doing business with their preferred companies. Based on previous studies, we propose a hypothesis that:

H4: Customer Satisfaction has a positive impact on Customer Loyalty.

The mediating role of corporate image and customer satisfaction

As indicated earlier, CSR-applied enterprises may improve customer satisfaction and image in numerous industries. However, corporate image and consumer happiness affect purchase behavior. Customers are happier with products and services from organizations with a good image (J. Bloemer et al., 1998). However, when a brand has a strong reputation for ethical and social concerns, people think the brand respects them and become more loyal to the firm. CSR should indirectly affect consumer loyalty through business image and customer happiness. The second two hypotheses are simultaneously reviewed for further evidence verifying this connection and validating (Martínez et al., 2013). Thus, this study hypothesizes that Corporate Image and customer satisfaction as mediators of the connections from CSR to Customer Loyalty, respectively.

H5: Corporate Image mediates the relationship between CSR and Customer Loyalty.

H6: Customer Satisfaction mediates the relationship between CSR and Customer Loyalty.

2.7 Theoretical framework

The research's theoretical framework illustrates how company image and customer satisfaction play a mediating role in the relationship between perceived CSR and customer loyalty. The following provides an explanation of the hypotheses indicated in the study's framework.
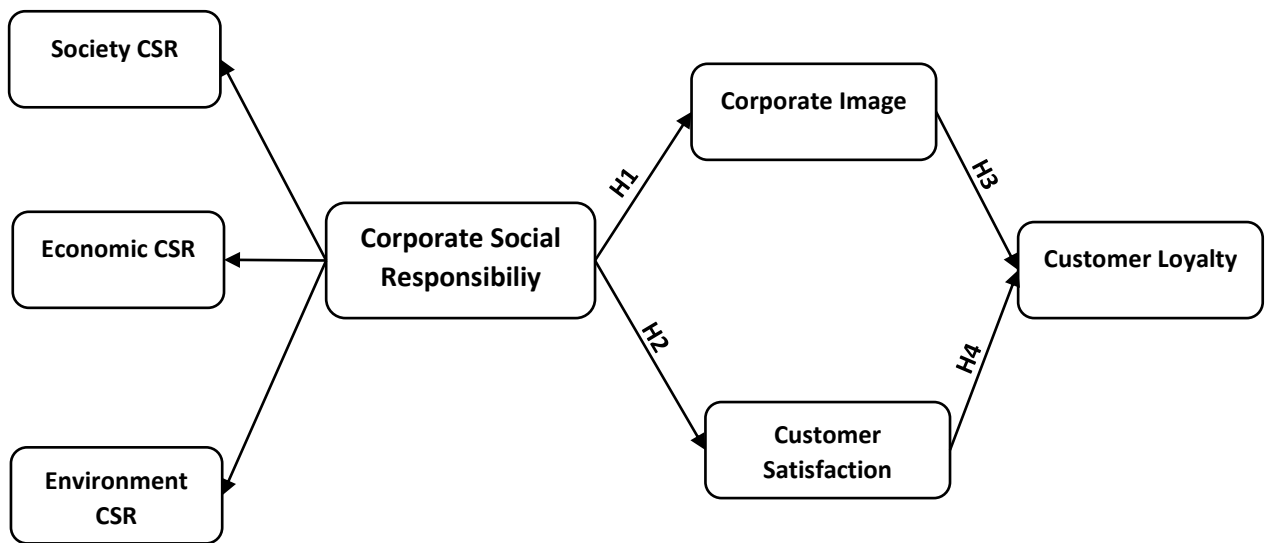
Fig. 3 - The conceptual research. Source: own's research

3 METHODOLOGY

In this study, data is analyzed using deductive research. Deductive research investigates beliefs about the issue and tests hypotheses based on those assumptions utilizing evidence from the study (Soiferman, 2010). Research questions are used to categorize data, assess it, and find patterns and trends (Boutmaghzoute & Moustaghfir, 2021). Deductive research may explain causal links between theories and variables, use numerous reputable literature sources, and be done quickly and cheaply.

3.1 Measure

The 26-item survey measured 6 variables such as society, economic, environment csr, corporate image, customer satisfaction, and customer loyalty. (Carroll & Shabana, 2010), (Turker, 2009), (Y.-K. Lee et al., 2012), (Martínez et al., 2013), and (Kapoor & Sandhu, 2010) used a scale with three dimensions and 14 items to measure CSR perception. Society, economics, and the environment are used to evaluate CSR holistically. Four components make up the customer satisfaction measure from (Kaur & Soch, 2012) and (Cronin Jr et al., 2000). Customers rate the business, products/services, and CSR actions. The study measured corporate image with two scales from study of (Fombrun et al., 2000) and two scales of (Nguyen & Leblanc, 2001). Customers may quit buying even if they're happy if a firm has a bad reputation. Customer loyalty was assessed using four items from three relevant research publications of (Ishaq, 2012), (Sirdeshmukh et al., 2002), (García de Leaniz & Rodríguez, 2015). All questions in this study were assessed on a five-point Likert scale (1 = severely disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = highly agree). The Likert Scale is used in business and research to assess respondents' agreement (Garland, 1991). This study's findings may be better compared and referenced using the 5-point scale, which is the most frequent in research investigations.

3.2 Data collection

This study uses primary data to achieve its purpose. Google Forms created a digital questionnaire to obtain consumer feedback on how supplier CSR activities affect brand

perceptions, satisfaction, and loyalty. Survey questions were adapted from English literature and translated into Vietnamese. To reach many individuals quickly, the poll mainly was circulated via social media and personal networks. This poll was open to numerous Facebook community groups, especially those with shopping experiences at various shops. Student, e-learning, and cross-survey groups share survey connections. Researchers also use connections to request help disseminating this survey to many others. International University and several Ho Chi Minh City coffee establishments distribute QR codes with survey links offline. 14 incorrect questions were removed from 271 total. All 257 remaining forms were analyzed.

3.3 Sample size

This survey targets Ho Chi Minh City customers of all ages and occupations. Commerce, culture, entertainment, and education draw a diverse population to Ho Chi Minh City. This research suits the city's variety. Respondents should know CSR basics. One control question is "Do you consider a company's social, economic, and environmental impact when making purchasing decisions?"

To determine the appropriate sample size for the study, a power analysis was conducted using G*Power software (Faul et al., 2009). The analysis was based on a multiple regression model with three predictor variables, representing different dimensions of Perceived CSR include society, economic, and environment CSR.

Parameters Used:

- **Test Family**: F tests
- **Statistical Test**: Linear multiple regression: Fixed model, R^2 deviation from zero
- **Effect Size f^2**: Based on prior research, a medium effect size of 0.15 was assumed.
- **α err prob**: The alpha level was set at 0.05.
- **Power (1-β err prob)**: The desired statistical power was set at 0.80.
- **Number of Predictors**: 3

Based on these parameters, the G*Power analysis indicated that a minimum sample size of 77 would be required to achieve the desired statistical power of 0.80 at an alpha level of 0.05. Therefore, the study aims to recruit at least 77 participants to ensure adequate statistical power for the analyses. Moreover, Comfrey and Lee (1992), 50 is extremely bad, 100 is poor, 200 is fair, 300 is good, 500 is very good, and 1000 or more is exceptional. Kline (2005) classifies 100 as small, 100–200 as medium, and beyond 200 as high for structural equation model (SEM) analysis. The researcher decided that more than 250 respondents are needed for a meaningful sample size after carefully analyzing these scales for this investigation. This option improves study reliability and generalizability. This survey sample varied Ho Chi Minh City customers. The survey uses control questions and over 250 respondents to produce a representative sample that sheds light on CSR, corporate image, customer satisfaction, and loyalty.

4   RESULTS

Descriptive statistics

Table 1 shows 257 respondents' demographics. 150 women (58.37%) outnumber 107 men (41.63%). The difference may be because women worry more about shopping than men. Five age groups were surveyed. 57.20% were 18–25, 21.01% were 26–35, and 12.45% were under 18. 5.84% are 36–45 and 3.50% are 45+. Due to poll scope and methodology, information from

tech-savvy young people varies. Respondents were classified as students, employees, or entrepreneurs. The working group contributed 38.13% and the student group 49.03%. Entrepreneurs and other workers make up a small percentage of participants. Since most participants are students, university and high school graduates made up 76.26% and 18.29% of participants, respectively.

Tab. 2 - Respondents' demographics. Source: own research

Item	Category	Frequency	Percentage
Gender			
	Male	107	41.63%
	Female	150	58.37%
Age			
	Under 18	32	12.45%
	18-25	147	57.20%
	26-35	54	21.01%
	36-45	15	5.84%
	Over 45	9	3.50%
Occupation			
	Student	126	49.03%
	Worker	98	38.13%
	Entrepreneur	16	6.23%
	Others	17	6.61%
Education			
	High school	47	18.29%
	University	196	76.26%
	Post-graduate	14	5.45%
Total		257	

4.1 Exploratory factor analysis (EFA)

The exploratory factor analysis (EFA) includes all 26 observable variables that passed Cronbach's Alpha test. Principal Axis Factoring (PAF) extraction and Promax rotation are utilized in this investigation. Gerbing and Anderson (1988) proposed that PAF combined with non-perpendicular rotation (Promax) more accurately reflects the data structure than Principal Components Analysis (PCA), which does not. Factor loading (also known as factor weighting) represents the correlational relationship between the observed variable and the factor. The stronger the relationship between the observed variable and the factor, the greater the factor loading coefficient. For improved results, factor loadings should be greater than 0.5, according to previous research (Truong & McColl, 2011; Hulland, 1999). As seen in Table 2, all items have factor loadings that are significantly greater than the cutoff value. In addition, 26 items are classified into six independent factors, and none of the items exhibit cross-loading, indicating good convergent validity (Kaiser, 1958). Consequently, all of the components can be retained and used to describe the properties of this factor.

Tab. 3 - Structure of Components and Scale. Source: own research

Variables	Measurement items	Loading	Cronbach Alpha	CR	AVE	Source
	Social CSR		0.911	0.912	0.634	
SOC1	This firm assists to enhance quality of life in the local community	0.688				(Carroll & Shabana, 2010)
SOC2	This firm operates in a manner consistent with expectations of societal and ethical norms	0.599				
SOC3	This firm fulfills its legal obligation	0.812				
SOC4	The firm protects consumer rights beyond the legal requirements	0.754				
SOC5	This firm implements policies to ensure employees' rights	0.843				(Turker, 2009)
SOC6	Generally, I think this firm is responsible to the society	0.947				
	Economic CSR		0.858	0.859	0.604	
EOO1	This firm continually improves the quality of their products	0.829				(YK Lee, 2012)
EOO2	This firm use customer satisfaction as an indicator of their business performance	0.767				
EOO3	This firm has a strong competitive position.	0.768				(Carroll & Shabana, 2010)
EOO4	This firm aims at ensuring its survival and success in the long run	0.756				(Martinez et al., 2013)
	Environmental CSR		0.855	0.857	0.602	
ENV1	This firm manufactures eco-friendly products.	0.897				(Kapoor & Sandhu, 2010)
ENV2	This firm implements special programs to minimize its negative impact on the natural environment	0.809				
ENV3	This firm makes efforts to educate employees, customers, and partners to support the environmental protection	0.682				(Martinez et al., 2013)
ENV4	Generally, this firm tries to protect the environment	0.701				
	Customer satisfaction		0.887	0.889	0.666	
CS1	The policy of CSR of this firm meets my expectation.	0.770				(Kaur & Soch, 2012)
CS2	I am satisfied with CSR activities of this firm.	0.817				
CS3	I am satisfied with product and service of this firm.	0.876				
CS4	Overall, I am satisfied with this firm comparing to its competitors	0.744				(Cronin et al., 2000)

Variables	Measurement items	Loading	Cronbach Alpha	CR	AVE	Source
	Corporate Image		0.870	0.876	0.641	
CI1	I familiar with the products and services that are provided by this firm	0.834				(Fombrun et al., 2000)
CI2	I think the company is well known	0.845				
CI3	I have always had a good impression of this firm	0.526				(Nguyen & Leblanc, 2001)
CI4	In my opinion, this firm has a good image in the minds of consumers	0.827				
	Customer Loyalty		0.876	0.878	0.642	
CL1	I prefer usingthe products of this company than the products of other companies	0.808				(Garcia de leaniz et al., 2015)
CL2	I will always be willingto try new products offered by this firm	0.895				
CL3	I would like to recommend this firm to people who seek my advice.	0.678				(Ishaq, 2012)
CL4	I wish to contain a long-term relationship with this firm.	0.685				(Sirdeskmukh et al., 2002)

4.2 Confirm factor analysis (CFA)

The threshold for adopting the model fit index consists of a number of general requirements as well as a number of unique requirements based on the research of different authors. The research of Hu and Bentler (1999), for example, suggests that the model fit indices listed in Table 3 are considered. The result of CFA analysis on the measurement model shows that most of the model fit indices are well fit with the above standards (χ2/df = 2.179, CFI = 0.92, TLI = 0.909, RMSEA = 0.068, p < 0.01). However, the value of GFI = 0.832 is below the fit value (0.9). Model Fit index acceptance thresholds in CFA will vary according to sample size, number of factor groups, and number of observed variables (Hair et al., 2010). Model fit indices CFI, GFI, and TLI > 0.80 are deemed acceptable for subjects with a small sample size (Baumgartner & Homburg, 1996). Therefore, GFI = 0.83 is adopted in this study. In general, it can be concluded, based on the results of model fit testing, that the measurement model is compatible with the data.

Tab. 4 - CFA Indicator. Source: own research

Indicator	Level of acceptance	Results	Reference
RMSEA	RMSEA <0.08	0.068	(Hair, 2010)
GFI	GFI ≥ 0.9, the model fits satisfactorily. 0.8≤ GFI ≥0.9 is an acceptable level of model fit.	0.832	(Seyal, Rahman, & Rahim, 2002); (Hu & Bentler, 1999)
CFI	CFI ≥ 0.9, the model fits satisfactorily.	0.92	(Hair, 2010)

Indicator	Level of acceptance	Results	Reference
TLI	TLI ≥ 0.9, the model fits satisfactorily.	0.909	(Hair, 2010)
CMIN/Df (χ^2/dF)	1.0 < Cmin/df <3.0	2.179	(Hair, 2010)

4.3 Structural equation modeling (SEM)

Hypotheses testing

A comparison of all fit indices with their recommended values revealed an appropriate model fit (χ^2/df = 2.228, GFI = 0.824, CFI = 0.914, TLI = 0.905, RMSEA = 0.069, p < 0.01). As previously stated, a GFI score of 0.824 > 0.8 was considered somewhat acceptable. Overall, the model tends to reflect the data well (See Figure 2).
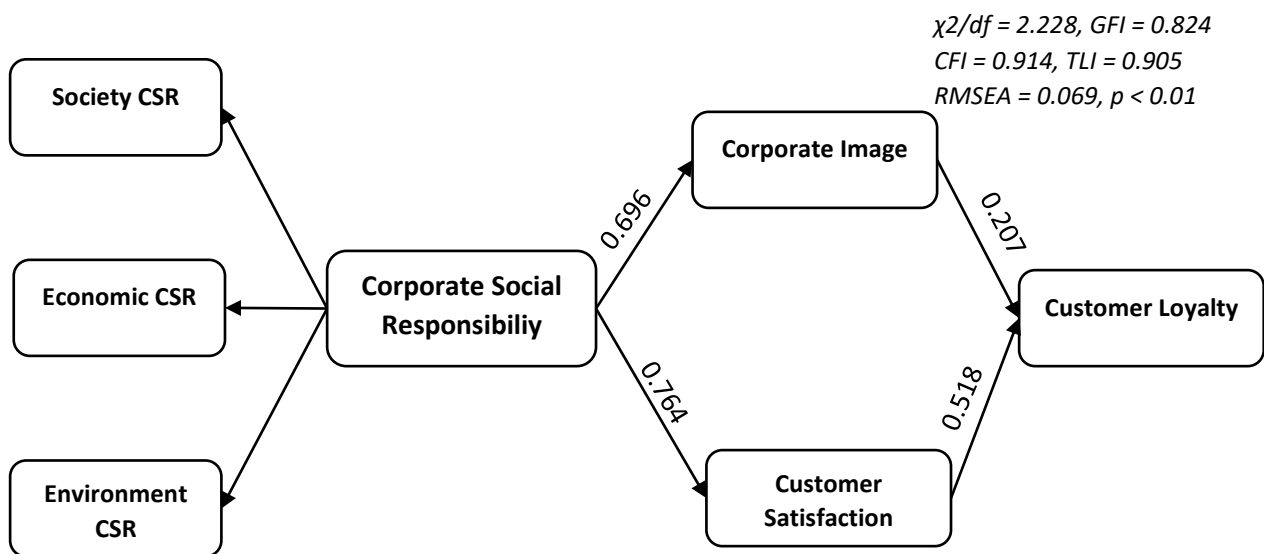
Fig, 4 - The structural equation model result. Source: own's research

The hypotheses were tested in terms of analyzing the importance of the path coefficients. The proposal paths all have values that are significant (p < 0.01). The direct effects of CSR on company image and customer satisfaction are assessed by H1 and H2. All coefficient values clearly indicate that the CSR construct had a significant positive impact on corporate image (β = 0.696, SE = 0.096, p < 0.01) and customer satisfaction (β = 0.764, SE = 0.099, p < 0.01). Among the 3 dimensions, society CSR shows the strongest effect on both CS and CI, with estimated values of 0.426 and 0.513). In contrast, environmental CSR has a small impact on customer satisfaction (0.217) while the corporate image is less affected by economic CSR (0.015). With H3 and H4, corporate image and customer satisfaction were found to have a positive impact on customer loyalty, with β = 0.207, SE = 0.069, p < 0.01 for H3 and β = 0.518, SE = 0.076, p < 0.01 for H4. It is reflected that customer satisfaction has a stronger impact on customer loyalty than corporate image. The results are shown in Table 4, with H1, H2, H3 and H4 are clearly supported.

Tab. 5 - Hypotheses testing. Source: own research

Hypothesis	Relationships			Estimate	SE	CR	P - value	Result
H1	CSR	→	CI	0.696	0.096	8.225	***	Supported
H2	CSR	→	CS	0.764	0.099	8.539	***	Supported
H3	CI	→	CL	0.207	0.069	2.889	***	Supported
H4	CS	→	CL	0.518	0.076	6.771	***	Supported

Mediation analysis

The indirect effects of corporate social responsibility on customer loyalty are shown in Table Y. The standardized indirect (mediated) effect of CSR on CL is 0.54. This implies that when CSR increases by 1 standard deviation, CL increases by 0.54 standard deviations. Based on this finding, the specific indirect effect of corporate social responsibility on customer loyalty was investigated, with customer satisfaction and corporate image serving as mediators. The indirect effect of CSR on customer loyalty via customer satisfaction was found to be statistically significant (standardized estimate = 0.396) with a 95% bootstrap confidence interval. With a standardized estimate of 0.144, the result is similar with corporate image as a mediator. These findings confirm that the relationship between CSR and customer loyalty is mediated by corporate image (H5) and customer satisfaction (H6).

Tab. 6 - Mediation analysis summary. Source: own research

Hypothesis	Relationships					Direct Effect	Indirect Effect	P - value	Result	Conclusion
H5	CSR	→	CI	→	CL		0.396	***	Supported	Partial Mediation
H6	CSR	→	CS	→	CL	0.540	0.144	***	Supported	Partial Mediation

5 DISCUSSION

This research examines how corporate social responsibility influences customer loyalty. This study investigates CSR and loyalty through consumer happiness and business image, unlike prior research. 257 Ho Chi Minh City clients were randomly recruited for the research. This group's study conclusions are believable if CSR is comprehended. H1 and H2 show that CSR positively affects customer satisfaction and corporate image, supporting prior research (Ali et al., 2021; Bhattacharya & Sen, 2003; Emmanuel & Priscilla, 2022; Islam, 2013). Customer satisfaction (0.764) is more affected than the corporate image (0.696) by empirical study. Ali and Islam (2021) found the opposite in investigating this link. In HCMC, CSR predominantly affects corporate image through social activities, although all three CSR dimensions have a significant impact on customer satisfaction. Thus, organizations should choose CSR efforts depending on their stage-specific goals. Hypotheses H3 and H4 indicate that business image and customer satisfaction affect loyalty. Customer happiness is the key to corporate loyalty (Martínez et al., 2013; Oliver, 1999). Customer satisfaction leads to brand loyalty because satisfied customers are more likely to buy again. The corporate image also matched with (Ishaq, 2012; Nguyen & Leblanc, 2001)

This study found that customer pleasure affects loyalty more than business image. Some studies corroborate this outcome (Abbasi et al., 2011; Chang & Fong, 2010), while most disagree with studies (Andreassen & Lindestad, 1998; Darmawan, 2018; Tu & Chang, 2012). Few studies have compared customer happiness with corporate image, and most have been done in the service industry. Thus, industry factors may affect results. In Vietnam, especially in Ho Chi Minh City, customers care more about a company's benefits than its reputation. However, these factors affect client loyalty. Businesses must examine methods to optimize this connection. As H5 and H6 were supported, CSR improved consumer loyalty in Ho Chi Minh City. This matches Lee's 2018 Taiwan market research. Martinez et al. (2013) in Spain's hotel business and Islam et al. (2021) in Pakistan's telecom sector corroborate this association. CSR may boost consumer loyalty across industries and nations.

5.1 Theoretical implication

This study examines how CSR affects consumer loyalty in emerging nations like Vietnam. Several authors have studied the effects of CSR on consumers using various metrics. Consumer happiness, company image, and customer loyalty are crucial owing to their widespread use. In most previous research, CSR is directly linked to two of the three elements mentioned or used as a moderating variable. Martinez et al. (2013), Islam et al. (2021), and Ali et al. (2021) use corporate image and customer satisfaction as intermediate variables in their research models, but their impact levels have not been compared. Thus, the study's findings should benefit anyone interested in this area. Second, this study constructs CSR from three dimensions— society, economic, and environmental—which are regarded to be highly practical. This survey found that customers regard societal CSR the highest, whereas economic CSR is less important. This conclusion differs from previous ones. This data shows how CSR components affect studies differently. Finally, despite CSR's recent popularity, research on its use in Vietnam is scarce. Thus, CSR's impact on customers in Ho Chi Minh City, Vietnam's economic hub, is useful for future research.

5.2 Practical implication

CSR improves consumer loyalty, proving that the company should use CSR initiatives. This survey shows that HCM City customers like socially responsible enterprises. However, the firm's economic and environmental CSR operations have not been effective or well received by customers. Customer loyalty is less affected by CSR than satisfaction. CSR adoption is now the greatest way to improve a company's reputation. First, corporations must decide which CSR actions target customers like. Businesses could invest more and market their CSR initiatives on Facebook, LinkedIn, TV, and online publications if most consumers have a CSR interest, such as survey results. However, if the firm has concentrated on one area of CSR and is not receiving the desired results, management may wish to modify the focus or take additional activities to boost CSR's influence on consumers. Based on the findings of the CSR-customer satisfaction relationship on loyalty, firms should engage in CSR activities that benefit customers. The corporation can provide products and services that demonstrate their social impact. Second, companies should use CSR to boost brand image. CSR expectations might boost reviews and image. CSR will help achieve this aim. Previous studies noted CSR's drawbacks. In addition, honest businesses improve consumer satisfaction (Martins et al., 2020). Businesses should emphasize learning and implementing CSR efforts that benefit their clients. Research shows that buyers dislike companies who utilize CSR for marketing but don't help society. Goodwill fosters consumer satisfaction and appreciation in CSR. Finally, CSR is a long-term strategy for companies. Thus, continuing research must inform the approach to each CSR group. Because this research shows that commercial and societal variables affect CSR activities. Maintaining

regular operations shows clients the organization is trustworthy. Thus, CSR will improve consumer attitude, corporate image, and long-term customer loyalty.

6 CONCLUSION

6.1 Conclusion

This study provided empirical support for the claim that CSR positively influences customer loyalty in HCM City via customer satisfaction and corporate image as mediators. The findings supported the stakeholder theory and triple-bottom-line approach by demonstrating that all three facets of CSR - social, economic, and environmental responsibility - have a positive impact on consumer satisfaction and a company's reputation. Which social CSR has the greatest impact on the aforementioned two factors and on customer loyalty. In addition, the mediating function between corporate image and consumer satisfaction has been demonstrated. These two variables were discovered to have a direct relationship with customer loyalty, with customer satisfaction having a greater effect. Therefore, all six proposed hypotheses are supported. In order to implement CSR with the best potential results, companies in Ho Chi Minh City should prioritize marketing CSR initiatives that benefit the local community and society as a whole. For the purpose of attracting and retaining loyal consumers, it is also suggested that research be conducted on additional elements that promote customer satisfaction in order to improve the outcome of CSR initiatives.

6.2 Limitations and further research

As with any previous research, this study is constrained by time, financial, and geographical constraints. First has a restricted survey purview. The majority of survey respondents are either college students or office employees. Consequently, this investigation may be affected by sampling bias. To investigate the influence of age and occupation on the study's findings, the subsequent inquiries should be conducted with a larger and more diverse sample size. The number of observed variables for each component is the second limitation of this investigation. If the number of survey questions for each category is increased, the collected data will more accurately and precisely reflect the participants' opinions. The survey concludes with a comprehensive examination of the influence of CSR on consumers regardless of industry. Because CSR operations and consumer expectations in each industry sector have distinct focuses and approaches. The subsequent research should have a narrower industrial focus in order to yield an accurate and optimized result.

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ANALYSIS OF CONSUMERS' PRO-ENVIRONMENTAL PURCHASING BEHAVIOUR AND THE INFLUENCE OF INFORMATION ON GROCERY MARKET

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Abstract

In this paper, a small-scale quantitative research is conducted through a questionnaire survey. This research is targeted at Generation Z, i.e. the 18-25 age group. A total of 102 respondents were interviewed online, of which 46.9% were women and 53.1% were men. A totally of 120 UTB undergraduate students were contacted and the return rate of the questionnaire was 85%. The aim of the questionnaire survey is to analyse the purchasing behaviour of Generation Z when buying food and also to define the relation between information and knowledge in relation to buying behaviour and decision making. The evaluation of the questionnaire is then presented on two aspects. Firstly, the questionnaire is evaluated as a whole to understand the buying behaviour of Generation Z. And in the second line, the individual's perspective is studied by assessing the level of information and information seeking ability in relation to the normal grocery buying behaviour. And then by assessing the pro-environmental intention while purchasing. Descriptive statistics were used to evaluate the questionnaire. As a result, a correlation can be observed between the level of awareness and pro-environmental purchasing behaviour. Limitations include sample size and the scope of the survey. However, these limitations will be overcome in the following research in the context of a doctoral study.

Keywords: *consumer behaviour, pro-enviromental behaviour, purchase decision, generation Z, information influence.*

1   INTRODUCTION

Research on pro-environmental purchasing behaviour started to slowly increase only at the beginning of the 2nd millennium, and as time goes by, interest in pro-environmental research grows. Most of these researches focus on all 4 domains of life at the same time, but there are also researches that address each domain separately or only a fraction of it. Energy consumption and resource conservation is the most frequently researched area of life, but food consumption is an area of life that has been less researched.

At the same time, this study focuses on the purchasing power of Generation Z, which is coming to the fore today and will occupy a major position of purchasing power in the market in the future. As Generation Z is a young generation, the research area is not sufficiently explored.

First, a theoretical backround will be presented that defines the topic of pro-environmental buying behaviour of Generation Z in the food market. Subsequently, the methodological part will be described, including a questionnaire survey and evaluation through descriptive statistics. Finally, the results and conclusion will be evaluated.

This pre-research will serve as a basis for the subsequent continuation and narrow focus of further doctoral research towards further publications and the completion of a dissertation.

2 LITERATURE REVIEW

As a result of climate change, humanity is currently heading towards a climate catastrophe that will have a significant and perceptible impact on all countries of the world. These changes do not only affect nature and its ecosystem, but above all have a significant impact on people's lives and their living conditions. This results in a change in the lifestyle of consumers (Cherian and Jacob, 2012). According to the author Akenji, this change in lifestyle is mainly related to consumers' consumption preferences and also significantly more environmentally friendly behaviour (Akenji, 2012). Several authors have agreed (Gansser and Reich, 2023) (Kim and Hall, 2019) that active measures are needed to at least reduce climate change, including waste reduction (Vorobeva et al., 2022), dietary change (C. Chen et al., 2019) (Korkala et al., 2014), energy reduction and resource conservation (Borgstede et al., 2013), and a fundamentally low-carbon lifestyle (Zeng et al., 2022).

According to the authors (Gansser and Reich, 2023), two categories of interventions can be distinguished as countermeasures against climate catastrophe: changes in human behaviour or the development of technical innovations. This awareness has already reached the society (Kim et al. Hall, 2019) and is reflected in the study of von Borgstede et al. (2013), which showed that from 2005 to 2010 people's opinion changed. In 2005, people believed that the development of new technologies to mitigate global warming was most important. While the 2010 results showed that the majority believed that changing lifestyle and purchasing behaviour was more important than developing new technologies (Borgstede et al., 2013).

2.1 Purchasing behaviour

Consumer behaviour has changed dramatically over the last few decades. Consumers today can order many customised products online, from fitness equipment to computers. Many have replaced their daily newspapers with a form of online published media, and they are increasingly getting their information from online sources. Choosing a university is no longer dependent on receiving prospectuses through the mail. Instead, applicants have online access to all relevant information about university courses and teachers, and in some cases can virtually attend actual classes. People looking to sell their old computers or grandma's antique desk no longer have to advertise in the local newspaper or rely on an expensive auctioneer. Instead, they can sell these items through an online auction or simply create their own online advertisement on countless servers. Consumers who want out-of-print books no longer have to visit run-down stores with hundreds of poorly organized dusty shelves, and those who want to buy a book published in another country no longer have to call foreign publishers or deal with the bureaucratic nightmare of overseas delivery. Instead, they can visit online stores where they can easily find and place orders for the books they are looking for. TV viewers can now avoid advertising by using the "skip" function on their recorders to order previously on-demand TV shows and movies. All these new ways of selling products and services have become available to consumers over the last 15 years and are the result of digital technology. There is one more thing they have in common: they exist today because they reflect an understanding of consumer needs and consumer behaviour (Schiffman, 2012).

The literature on consumer behaviour is diverse, extensive and describes how changes in society, the economy and technology influence the way consumers behave. These changes inevitably lead to changes in consumer behaviour studies. These studies depend on when, how, and why the topics are studied. As in any other discipline, it is the systematic analysis of the state of knowledge development in consumer behaviour that is critical to ensure its future growth (Williams and Plouffe, 2007). According to MacInnis and Folkes (2010), what makes

a field such as consumer behaviour more important is that it has been able to deepen the knowledge of the topics studied through the growing number of articles.

2.2 Definition of consumer behaviour

The concept of consumer behaviour is defined as the behaviour that consumers exhibit in seeking, purchasing, using, evaluating and disposing of products and services that they expect to satisfy their needs. Consumer behaviour focuses on how individuals make choices and spend their available resources (time, money, effort) on consumption-related items. This includes what they buy, why they buy it, when they buy it, where they buy it, how often they buy it, how often they use it, how they evaluate it after purchase, the impact of such evaluations on future purchases, and how they dispose of it (Schiffman, 2012).

Downes (2013) states in his publication that human behaviour, and thus consumer behaviour, is best understood as the result of a myriad of causal factors. For any given set of behaviours, say conspicuous consumption, there are many proximate causes and perhaps even a few ultimate causes. Figuring out what all of these proximate causes are and how they relate to each other in producing the relevant behaviour is a difficult task that is not always made easier by proposing a final cause for the relevant behaviour.

Aaker elaborates that it is important to understand customer values and key preferences, such as what role quality versus price, service levels, brand loyalty and distribution channels play. Consumer buying behaviour has become such a part of everyone's lifestyle that they are not even aware of it (Cabaguing et al., 2017) (Aaker et al., 2011).

Kianpour et al (2017) who quote Kuester (2012) who define consumer behaviour as the study of individuals, groups, organizations or processes that choose to secure, use and dispose of products, services, experiences or ideas to satisfy needs, including consideration of the impacts these processes have on consumers and society.

As Oliver (2010) explains, understanding the behaviour and psychological intention of consumers when buying a product is a great help to marketers in designing marketing strategies by understanding how consumers think, feel and select products. Understanding consumer behaviour also makes it easier to see how the environment influences consumer behaviour, and how other external elements also influence consumer buying behaviour.

2.3 Pro-environmental behaviour

Throughout human history, environmental impact has largely been a by-product of human desires for physical comfort, mobility, relief from work, enjoyment, power, status, personal security, maintenance of traditions and family, etc., and the organizations and technologies that humanity has created to fulfill these desires. Only relatively recently has environmental protection become an important consideration in human decision-making. This development has given environmentally significant behaviour a second meaning. From an actor perspective, it can now be defined as behaviour that is undertaken with the intention of changing (usually benefiting) the environment (Stern, 2000).

Kollmuss and Agyeman (2002) define pro-environmental behaviour as "behaviour that consciously seeks to minimise the negative impact of one's actions on the natural and built world". This approach is also supported by Steg and Vlek (2009) who define pro-environmental behaviour as "behaviour that does the least harm to the environment or even benefits the environment". By adding the word 'consumer', this definition focuses on the individual as the final buyer and end-user of a product or service, up to the stage of disposal or reuse of the product (e.g., recycling, minimisation, disposal, separation). Schultz et al. (2005) state that the

importance of environmental issues can be seen as an important influence on environmental attitudes. They explain environmental attitudes, or attitudes towards sustainable behaviour in relation to the environment and climate, as "the set of beliefs, affects, and behavioural intentions that a person holds about activities or problems related to the environment".

The current literature focuses on two types of environmental attitudes as reported by Nguyen et al. (2017), namely general attitudes and specific attitudes. General environmental attitudes, which can be operationalized as the new environmental paradigm (Dunlap and Van Liere, 2008) or environmental concern (e.g., Kilbourne and Pickett, 2008), are judgments about environmental problems. Whereas specific environmental attitudes refer to the evaluation of a particular environmentally friendly product or a particular environmentally friendly behaviour. Mainieri et al (1997) and Tanner and Kast (2003) argue that it is the specific beliefs and attitudes of consumers that are more likely to be reflected in their behaviour. Furthermore, McCarty and Shrum (1994) point out that many pro-environmental behaviours also involve a conflict between individual and collective benefits, which according to the authors suggests that consumers may have both positive and negative attitudes towards such behaviours. Therefore, they distinguish consumers' attitudes towards recycling behaviour as two distinct factors, i.e., the importance for environmental protection and the inconvenience for the individual. Similarly, Follows and Jobber (2000) argue that consumers consider both environmental and individual consequences when formulating attitudes towards green purchasing behaviour.

However, Stern adds that the impact of an individual's personal behaviour on the environment is small. Such individual behaviour has an environmentally significant impact only in the aggregate when many people independently do the same things (Stern, 2000).

2.4 Information and knowledge

As stated by many authors, digital media has become a prevalent and major source of information since the early 2020s (Akdim et al., 2022) (Alzaidi and Agag, 2022), with social media being used by billions of people around the world, and therefore stated to be "one of the defining technologies of our time" (Appel et al., 2020) (Arora et al., 2019) (Fernandes et al., 2022). As Asamoah (2020) explains, traditional media sources no longer have complete dominance over the dissemination of information; on the contrary, through digital media and social platforms, it is much easier to transmit information and influence ordinary users with their messages.

The continuous development of social media has not only changed people's communication style, but also influenced purchasing-related decision-making processes and changed the digital marketing landscape (Huo et al., 2021). According to rational choice theory, information is a prerequisite for the formation of consumers' environmental attitude and individual environmental mental behaviour, where consumers make rational decisions based on the information they receive. After receiving new information, the cognitive basis of individual behaviour changes, and subsequently, attitudes and intentions, and ultimately environmental behaviour (Lorenzoni et al., 2007) (Lane and Potter, 2007).

2.5 Consumer knowledge

Knowledge is considered a prerequisite for voluntaristic behaviour and plays an important role in predicting consumer attitudes (Levine and Strube, 2012). Environmental knowledge, which is an important component of environmental consciousness, includes people's knowledge about the natural environment and the related key relationships leading to environmental protection (Mostafa, 2007). In general, consumers who have relatively high environmental knowledge are more likely to engage in environmentally friendly behaviours (Steg, 2008) (Zepeda and Deal,

2009) (Peattie, 2010) (Lee, 2011). Polonsky et al. (2012) examined knowledge as general knowledge about the environment and specific knowledge about certain environmentally friendly products or pro-environmental behaviours. Furthermore, knowledge has been widely used to support green purchasing behaviour in the research of Steg and Vlek (2009). The division of knowledge into general and specific knowledge was also addressed by Barber and Co. (2009) in their study of environmental awareness of wine consumers, which revealed that specific knowledge was more significant than general knowledge in predicting environmental attitudes. Pagiaslis and Krontalis (2014) show that consumers with a relatively high level of knowledge about renewable energy sources are more likely to believe that biofuels contribute to environmental improvement. Similarly, Ha and Janda (2012) report that consumers' knowledge of energy efficient products is positively related to their attitudes towards the importance of environmental protection when making purchases. Nguyen et al. (2017) assessed similar results by focusing on the effect of consumers' knowledge on two aspects of their pro-environmental attitudes, i.e., environmental protection and individual discomfort. Their findings show that consumers with high knowledge of energy efficient appliances tend to believe that purchasing such products is important for environmental protection and are likely to downplay their perception of the discomfort associated with the purchase. On the other hand, a survey of consumers conducted by Ellen (1994) shows that consumers with low levels of subjective environmental knowledge tend to perceive that buying products in recycled packaging requires more time and additional effort. The results of a correlation analysis in a study on organic food by Tanner and Kast (2003) suggest that consumers with weaker activity-related environmental knowledge have lower levels of trust in eco-labels. They also found a significant negative relationship between environmental knowledge and perceived financial barriers associated with product purchase.

2.6 Generation Z and information resources

Generation Z currently represents one of the most promising consumer target groups, as according to GWI research (2021), by 2026 this segment will represent approximately 40% of the global population with a purchasing power of $44 billion and a household spending impact of $600 billion.

Unlike previous generations (e.g., millennials, and Generation Y), these individuals are influenced primarily by a historical period in which technology, specifically the internet and social media, has become an integral part of their lives. In fact, the distinction from other consumer segments is quite clear, as Generation Z seeks information and entertainment specifically in the ubiquity of digital media (Serravalle et al., 2022) (Turner, 2015). Djafarova and Bowes (2021) refer to Generation Z as "digital natives" who have grown up witnessing technological advancement and have access to a great deal of information through social media, which influences their decision-making. Dimock (2019) adds that Generation Z has a lived experience of being constantly connected to the internet compared to previous generations.

The authors Blocksidge and Primeau (2023) state that Pew Research defines Generation Z as those born after 1996, distinguished by their constant access to the Internet by their ability to have always available means of communication and information gathering. White (2017) states that according to sociological and demographic research, Generation Z is identified as the generation born between the mid-1990s and the beginning of the first half of the 2nd millennium. There is a split among authors when it comes to defining the exact age group of Generation Z. For example, Grigoreva et al. (2021) define Generation Z as the generation born between 1996 and 2012, while Pham et al. (2021) state that it is the age range 1995 to 2003.

In terms of consumer characteristics, Kotler (2021) states that Generation Z is more financially conscious, responsible, and particularly attentive to social change and environmental

sustainability than previous generations (i.e., Generation Y, Generation X). Furthermore, Generation Z consumers are confident in their ability to drive change through their everyday consumption decisions. (Turner 2015) also reports in his publications that the generation, unlike other generations, has a greater preference for realism along with a strong social sensibility, environmental concern, and is the first generation to actively engage in the cause of improving the quality of life in line with sustainable and conscious development. This view is echoed by Dabija et al. (2019), who argue that Generation Z is characterised by a view of global improvement. As consumers also expect socially conscious behaviour from brands, these consumers are indeed aware of the impact their purchases can have on the environment and expect companies to operate responsibly.

2.7 Consumer Behaviour Analysis (CBA)

It is the most advanced research program using operational behavioural perspectives on marketing and consumer behaviour. Goldsmith (2004) and Foxall (2001) describe the initial emergence of CBA and define it as the use of behavioural principles to interpret consumer economic behaviour at the intersection of economic psychology and marketing.

Many studies based on different aspects of behavioural psychology have subsequently followed this line of research, just as there are many applications to different contexts of marketing and consumer behaviour. The first stream was the development of a model of consumer behaviour, the Behavioural Perspective Model (BPM).

Foxal (1990) provides extensive details in his publications on the development of the BPM model, but in general, it can be stated that the degree of behavioural responses is explained by the two different stimuli. Stimuli in the behavioural setting, or levels of informational reinforcement and utilitarian reinforcement.

Wells (2014) explains in his paper that utilitarian reinforcement captures the technical and operational qualities of the products themselves, while informational reinforcement refers to feedback. So, while utilitarian benefits of having a car include the ability to go from point A to point B, some prestige cars also provide informational reinforcement through social status and prestige when consuming such a brand. Research has tested the BPM in many ways, situations and international contexts e.g. (Foxall and Greenley 1998, 1999, 2000; Foxall and Yani de Soriano 2005; (Foxall and Greenley 1998, 1999, 2000; Foxall and Yani de Soriano 2005; Soriano, Foxall, and Pearson, 2002), most recently in neurophysiology (Foxall, Yani de Soriano, Yousafzai and Javed, 2012).

3   METHODOLOGY

As mentioned in the literature review, it can be concluded that the degree of behavioural responses is explained by two main cues in the behavioural setting, which are divided into informational reinforcement and utilitarian reinforcement. When applied to food research, utilitarian reinforcement represents the quality of food, e.g., the freshness and nutritional value of fruit or healthful meat without chemical stimulants. Food quality is influenced by several factors. These include the way food is raised or grown, the amount and types of pesticides used, the fertilisation of animal manure, the quality of the soil, the quality of the water, the handling of livestock or the treatment of trees during fruit picking. There is also a difference in the ripening of food. Ripening can take place naturally on the plant before harvesting or, in the case of imports from abroad (Spain, the Netherlands, etc.), in boxes stored in a transport vehicle. Each consumer has a different type of preference for food, but the question arises whether or to what extent consumer buying behaviour could be influenced by information reinforcement. That is, if a consumer shopping for frozen foods in supermarkets or meat from large farms

receives the right information stimuli that he or she has never looked up or found on his or her own, either due to lack of time or lack of interest in the topic, he or she will begin to realize the consequences, as in the previous theories of TRA et al. he or she will become aware of responsibility, raise personal norms, and acquire higher prosocial behaviour.

Therefore, the next chapter will present quantitative research that will examine this issue retrospectively in consumer buying behaviour. It will first focus on the awareness of the consumers interviewed, and then they will be asked questions about where and how often the selected groups buy food, and the link between consumer buying behaviour and awareness will be sought.

3.1 Research on the awareness and influence of information on the food purchasing behaviour of consumers aged 18-25

The thesis contains small-scale quantitative research in the form of a questionnaire created in the Google forms platform. Furthermore, the questionnaire was distributed through the social network Facebook targeting the age group of 18-25 years old specifically university students. All returned questionnaires were used for the research and were purposively distributed to Generation Z respondents, as the questionnaire contained a basic age criterion right at the beginning. The aim of the questionnaire survey is to analyse the purchasing behaviour of Generation Z when buying food and also to define the relation between information and knowledge in relation to buying behaviour and decision making. The food items were categorized into 3 main groups namely: meat, fruits and vegetables and dairy products. This is because these are the 3 basic supergroups of everyday foods, which can be used to determine whether information about the food is being tracked or just the opposite.

The first two questions are designed to identify the student by gender and place them in an age group. Questions 3-10 are aimed at the information-seeking rate of the consumers surveyed to determine how often a given sample of age group consumers seek information about the food they eat. These questions offer a range of responses from 1-5, with 1 being "not at all" and 5 being "always".

Question 9 should provide an indication of how informed the consumer is in the marketplace about the prices of the products and the effort to find out more. There is a perception in society that organic food, such as meat from a farm, is much more expensive and the consumer is often not willing to pay for it.

Question 10 is also aimed at environmental impacts, to reveal an awareness of responsibility, not towards one's health, but mainly towards other environmental impacts that remain hidden from the consumer. The question is whether consumers, in this case young, college-educated people, are even aware of the environmental impacts of agriculture and the processes involved in growing food.

Another question 11 asks why consumers do not keep track of what they eat more often. This is because they are not interested in the topic of the fuel, they feed their bodies. Despite the fact that we learn from a young age that we are what we eat.

Question 12-13 divides consumers into two groups. The first group who predominantly shop only in supermarkets with occasional supplementation e.g., butchers. The second group that buys local produce from farms, markets, local vendors, either directly at the source or through a platform. The groups are then compared to see if awareness has any relation to the division into these two groups.

Questions 14 and 15 are then designed to show consumer preferences, which are findings of what really matters to the consumer groups in their purchases.

4 RESULTS

A total of 102 respondents participated in the questionnaire, with a ratio of 46.9% women and 53.1% men. A total of 120 UTB university students were contacted and the return rate of the questionnaire was 85%. All respondents are aged 18-25 years and belong to the target group of Generation Z.

4.1 Results related to information retrieval

Based on the evaluation of the questionnaire data, it can be stated that the majority of respondents look up the country of origin of the products (78.1%) and are interested in the quality and origin of meat products (59.5%). On the other hand, for fruits and vegetables, there appears to be minimal interest in looking up information (31.3%). I attribute this phenomenon to the influence of the media, where reports on the quality of meat products and inhumane farming conditions are much more frequent than on the quality of fruits and vegetables. Also, according to some researchers, society in general has a higher level of compassion and empathy for animals than for plants.

In terms of information about products from the backside of the product, which is literally within reach and requires no further searching, the data clearly indicates to us that the majority of consumers do not look properly at the other side of the label (28.1%) and, as the following question suggests, this may be due to ignorance and misunderstanding of terms and ingredients that are incomprehensible to the average end consumer without further searching in books or on the internet, as reported by 78.1% of respondents.

4.2 Results on consumer awareness of product prices

As mentioned above, there is a prevailing view in society that organic products, and with them local/farm products, are more expensive than supermarket products and therefore may deter many potential buyers who could find their way to local food and thus support their health and the environment. The questionnaire shows that consumers mostly and regularly check supermarket prices (87.6%) and only 18.8% of respondents check prices of locally sourced products. Marketing communication by the retailers may be involved, as prices and promotions from supermarkets are sent directly to our mailboxes on a daily basis in immeasurable quantities and we also see them around us in advertising, e.g., on TV and on billboards. Whereas small farmers or local retailers do not take advantage of this form of promotion, where their only promotion is usually just a website or 1 billboard by the roadside. Therefore, the consumer has to make an effort to get relevant information that would then give them an insight into the price comparison of the products.

4.3 Awareness of the environmental impacts of food production

It is said that it is the generation of young people aged 18-25 who will be solving environmental problems and it is on their shoulders to restore our green planet. According to the survey responses, it can be concluded that young people are mostly not interested in seeking information regarding the impact of their actions on the environment, as only 25% responded positively on a scale of 1-5. The most common reasons for not looking into the topic were: not being interested in the topic (34.4%), local products are more expensive (28.1%) and "I never thought of it" for 15.6% of respondents.

4.4 Food shopping choices by location

From the data obtained, it can be seen that 81.3% of students buy meat products in butcher shops and 65.6% of students buy them in supermarkets, i.e., there is a combination of purchases.

The remaining 9.4-15.6% of students buy meat products from farms or local vendors. Fruits and vegetables are overwhelmingly purchased by a total of 90.6% of the students in supermarkets in combination with 43.8% of the students purchasing from markets and 18.8% of the students purchasing from local vendors or farms. For dairy products, a total of 93.8% of students use supermarket shopping, with 6.25% combining this with a milk vending machine and a maximum of 9.4% of students buying from farms.

A link with awareness can already be seen, as the information retrieval results for fruit and vegetables were significantly lower than for meat products. Similarly, dairy products are least likely to be bought from local vendors and milk vending machines are not fulfilling their function for young people. Overall, a total of 78.1% of consumers buy from supermarkets, combined with 21.9% of consumers in that age group buying from regionals. This low number of regional purchases may be mainly due to the income conditions of students, who do not earn enough money to shop extensively in different places and whose lifestyle preferences do not include tracking down information on food consumption.

4.5 Food shopping preferences

Respondents who answered that they buy mostly from local suppliers, either from farms, markets or via scuk.cz, were asked about their purchasing preferences. The most important preferences were: quality, regionality and health. Close behind are ecological preferences such as environmental impact, recycling, and packaging-free.

And the least respondents answered product price and appearance. For respondents who answered the question of the location of their most frequent supermarket purchases, price was the top preference for the majority of respondents, followed by quality, regionality, and appearance for a minority. Recycling and the environment were not very popular.

4.6 Individual questionnaire evaluation

To see if there is a link between awareness and consumer buying behaviour, we need to look at individual responses. This is because parts of the questionnaire are interrelated for each individual and this insight can only be gained if each individual is looked at individually.

The questionnaire investigation showed that awareness values are higher for consumers who choose to buy products mainly from local retailers, farms, market and platforms like scuk.cz. This is the case for all consumers exhibiting pro-environmental behaviour, which supports the assumption that information reinforcement has an impact on consumer behaviour, in this case positive stimuli that lead them to repeat purchases.

In this case, information builds social norms and attitudes, leading to prosocial behaviour whereby the individual is aware of the consequences of their actions, not only in relation to themselves and their bodies, but also in the wider context of minimising negative impacts on the environment and our planet.

The disproportion between women and men is also an interesting finding, as of the total number of respondents exhibiting pro-environmental buying behaviour, a total of 71.4% of women and only 28.6% of men responded that they buy mainly from local retailers and farms, when in total the number of women and men was almost equal. It is also interesting to note that the older age group of 24-25 years tends to be more attracted towards this lifestyle.

5 CONCLUSION

In the first part of the term paper, the literature review on consumer buying behaviour, pro-environmental behaviour, Generation Z and the theory of consumer buying behaviour analysis CBA was summarized.

In the following chapter, small-scale research was conducted through quantitative research to collect data through a questionnaire survey from 102 respondents targeting young consumers aged 18-25 years, specifically university students. The questionnaire revealed the awareness of this target group regarding the food they purchase. It aimed to find out if there is any link between consumers' awareness and their buying behaviour in the market. As a result, it was shown that this link does exist and that the amount of information has an impact on consumer buying behaviour.

I consider one of the main limitations to be the small number and size of the sample. By sample size we mean a small number of respondents and by range we mean a small age group of respondents. In future research, I recommend that the older age groups, where responsible behaviour towards the consequences of actions is expected to increase, to the senior groups, where shopping in places other than the supermarket is expected to decrease. Further research could also be extended to include gender, where another aspect to be investigated could be whether the respondent is male or female. Subsequently, an interesting study could also take into account income group and find the price threshold where the consumer starts to think that they could afford better quality food and turns their interest in that direction.

I would like to conclude the term paper with a sentence about how an open mind, enough information and lifelong learning can change a lot. Let us be open-minded, let us investigate what works and how it works and let us not be careless about our surroundings, nature and our planet, because our survival and the survival of our future generations depends on it.

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THE INFLUENCE OF COMMUNICATION BARRIERS ON EMPLOYEES' PERFORMANCE

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Abstract

Communication is one of the main significant elements that influence a company's employees' performance. The ability of employees to communicate well with others in the workplace creates an atmosphere of work and optimal circumstances. Additionally, communication helps in the creation of productive interactions at the workplace and a shared awareness of company goals among employees. However, employees' performance within the working environment is greatly affected by communication barriers. This paper aims to explore the influence of communication barriers on employees' performance in developing economies. The influence of interpersonal interactions on worker performance is impeded by these obstacles. To close this gap, this study uses a qualitative approach particularly document analysis as its methodology to retrieve relevant documents on the subject area. To be more precise, nineteen empirical papers were used in arriving at the objective of the study through the database of Web of Science, Google Scholar, and Scopus through keyword search. The study's findings revealed that employees' performance is greatly influenced by semantic, language barriers, and cultural barriers. The study, therefore, offers both theoretical and practical implications for management on how best to eliminate the barriers to communication to foster positive results in employee performance. The limitation of the study is also outlined at the end of the paper.

Keywords: Communication, Employee Performance, Barriers

1   INTRODUCTION

The readiness of people to relate with one another and respond well determines the efficacy and importance of workplace communication. Communication can be deemed to be fundamental to improving the general performance of various commercial entities since it affects efficient collaboration between employees and their supervisors or between the firm and its customer base (Kalogiannidis, 2016). Being acquainted with the communication methods employed by an organization is an essential asset in the process of improving project performance (Ejohwomu et al., 2017). Successful interpersonal interaction is essential in fostering productive collaborative environments and accomplishing work of the highest excellence, the level of complete trust among employees is enhanced if everyone adopts the initiative to deliver clear information (Sahoo & Das, 2011).

The concept of communication is frequently employed to refer to the sharing of ideas between parties. Knowledge of communication has become vital wondering that it underlies every managerial ability, job, and implementation, regardless of direct communication or indirect communication. Identical to how it is in humanity, communication is the essential component of a company of any size. It suggests that interpersonal relationships are essential to achieving the success and goals of every enterprise (Belout & Gauvreau, 2004). Therefore, a vital element of corporate tasks, communication constitutes a tool that organizations have to employ to enhance their ability to satisfy their client's needs and prerequisites with improved assets (Gungor et al., 2013). Communication interference is any barrier that prohibits individuals from understanding the strategies others employ in expressing their opinions, notions, and facts (Annapareddy et al., 2016).

A link to communication limitations may distort the extent to which someone understands a particular thing, individuals at the workplace are also susceptible to these verbal hurdles (Darabkh, 2016). Organizations coupled with an extreme absence of efficient corporate communication rarely function better relative to those with a high degree of it (Kalogiannidis, 2020). The Manufacturing Sector, number of employees, firm cultural backgrounds, distribution rivalry, and economic conditions all play considerable effects on the obstacles to growth that exist (Østergaard et al., 2011). Technological innovation has made interaction in various places immensely easy, but it also brought about several technological limitations that cannot be overlooked (Aceto et al., 2019).

Native speakers had contrasting opinions on enlisting non-native speakers of English as colleagues, based on a study examining verbal disagreements between native and non-native speakers of English (Evans & Suklun, 2017). Few staff members believed that engaging employees was essential, but others saw it as an inconvenience that might hamper efficiency and interaction by arguing that the pronunciations of the non-native speakers had impaired their ability to communicate. It is vital to consider how communication can break down irrespective of whether two people are speaking the same language, and that this issue is commonly brought about by different accents, about another research (Martin, 2023). The effectiveness, as well as productivity of an organization, is severely compromised by a lack of dialogue.

Organizational management experts are increasingly concerned with investigating topics relating to interpersonal interaction. Nevertheless, there is little research that has specifically examined the influence of the main obstacles to communication on employees' performance in developing economies. Literary works have served as the main theme of past research examined a few external obstacles in the contexts of Malta, Malaysia, and the Slovak Republic, this pertains to the impact of communication barriers on organizational performance (Rezapour et al., 2022; Mahmud et al., 2020). Therefore, this study seeks to deal with the issue of a decrease in efficiency and discipline in the organization by discovering the main communication barriers that must be highly considered when delivering services in developing economies. This study seeks to evaluate some of the most significant interpersonal challenges that affect the way personnel function in an enterprise in this paper. The main aim of this study to explore the main communication barriers on employee performance in developing economies. The study examines typical obstacles to dialogue using the literature that has been analysed. Furthermore, there was an evaluation of the few external obstacles using empirical information from the present literature.

2 LITERATURE REVIEW

2.1 Communication

Employees can thus be able to perform better in fulfilling their responsibilities when they have become conscious of those communication barriers present in the working environment (Prayogi et al., 2019). Communicating successfully may inspire individuals to succeed in their particular tasks (Syahruddin, 2020). Employee interactions are absolutely an important tool for the achievement of growth and profitability (Selimović et al., 2021). The way an institution handles its workforce encompasses influence on the way efficiently those people work (Hee et al., 2019a). Issues with communications remain common in certain workplaces, despite having been shown that boosting interaction while performing duties can guarantee good job performance and positive relationships between both managers and workers (Yusof & Rahmat, 2020).

2.2 Method of Communication Within the Workplace

Both primary components of every kind of interaction are the person who transmits the information and the other side of the exchange who is the recipient; the sender establishes interactions (Fairhurst et al., 2022). An individual who needs to share an announcement with others in an organized environment is referred to as the sender. Tensions in spoken interaction may render individuals feel dissatisfied within the workplace and have a rapid adverse impact on both the speaker and those listening (Yusof & Rahmat, 2020). In the administration of a venture, communication is vital. Since the outcome must be done clearly through a channel or means. The transfer processes need the use of a sender, which broadcasts the information taken by a receiver (Dina & Pajalic, 2014). When workers are inexperienced or communication is not prioritized, people turn skewed and lose trust in the enterprise and its management (Bocken et al., 2013). It may thus carefully or inevitably work towards the viability of the enterprise. Since communication is the bedrock of human interaction and collaboration, every decent company must give it the utmost importance. Communicating is the lifeblood of any enterprise, just as it is to serve people. Studies into how to improve communication effectiveness and the challenges to communication channels within an enterprise are essential. The fundamental concepts of communication theory indicate that in any communication circumstance, general interpersonal principles should be expressed.

In the case of any act of errors that transpires internally as well as externally, there are certainly specific regulations governing the organization's response to complaints from clients and staff members (Weibel et al., 2016). By Alhazred and Dee's general theory of communicative action from 1984, interaction and mutual awareness are two essential components of successful communication. The circumstances additionally foster a detailed analysis of the findings. Understanding one another is the main objective of every interpersonal exercise. After outlining methods of communication and idea form qualities, it can be done to link communication methods to content that is shared in the company by personnel (Sagie et al, 2002). The efficiency of a group can be unveiled at great length by utilizing communication or processes (Gervits et al., 2016). Several theories, including the framework of structural equations, multiple calculations, and a decision-based framework, have been created by many of these investigations to access the significance communication has on the performance of an organization (Hee et al., 2019; Giri & Pavan Kumar, 2010). Similar research on the building industry in Nigeria led to a boost in interpersonal interactions and trust among workers and customers (Muktar Ishaq et al., 2019). The scholarly evaluation dealt with corporate macro-environmental variables which influence transmission performance, but analysing communication effectiveness at the micro-environmental level could deliver additional understanding. As a result, both individuals and organizations should be able to come up with alternatives that enhance corporate profitability as well as productivity.

2.3 Employee Performance

Employee performance includes production quantity and high-quality, engagement in the workplace, a tolerant and friendly disposal, and merchandise punctuality (Deery et al., 2002). Firms devote a lot of energy to delight clients, however they fail to put as much emphasis into gratifying personnel (Akhigbe & Osita-Ejikeme, 2021). It is for this reason communication barriers hampers on employee performance by limiting them from conducting their duties effectively (Proctor & Doukakis, 2003).

Employees get discouraged by the increasing number of communication barriers in the workplace which hampers their performance, while they endure during meaningless and uninteresting briefings where they are given vague tasks, resulting in unpredictability as well as repetitiveness. Creativity among employees is another victim of communication barriers that

hampers their performance (Saleem et al., 2022). In spite of the firm's capacity to make positive contributions to employees, its capacity to make achievements is overlooked and deemed ineffective (Manzoor et al., 2021). This is critically important since being able to exchange instructions and generate stimulating concepts and improvement is corresponding with one's capacity for creativity (Paulus, 2000).

Collaboration among individuals is unable to resolve organizational communication barriers on by itself. It would appear unrealistic to suppose that communication issues do not have unforeseen implications (Kim & Kreps, 2020). An essential electronic mail from an employee might have remained undetected by management, or a request may have been stalled a result of an unanswered conversation (Heath et al., 2020). Communication barriers do results in reduced productivity (Waizenegger et al., 2020).

This includes unclear electronic correspondence that must be officially certified, and even documents that need to be edited due to inaccurate information (López-García et al., 2021). Employee morale worsens because of the extremely communicative and collaborative working atmosphere (Cho et al., 2023).

2.4 Communication Barriers

Individual dialogue cannot entail adding one's viewpoint to a different person's viewpoints, as in a formal addition, or imposing one's perspective towards the opinion of the other (Klimova & Semradova, 2012). This study emphasizes communicating at the enterprise and line supervisory levels since communication within an organization regarding staff responsibilities and issues with organizational structure is the most important element in interactions at work. The value of dialogue has risen significantly, managers seek to communicate and implement creative concepts into place when appropriate, but individuals additionally prefer to be maintained in a cycle whenever changes are introduced. However, as a result of supervisors' poor communication, these goals are not always met. Employee performance has significance to an enterprise, which motivates managers to establish a climate of transparent interaction at work (Pham et al., 2019). The framework, though, highlights observations such as a lack of modern effects like talents, methods, and customs as an obstacle to communication personnel face while fulfilling their duties. Additionally, there look to be three different kinds of communication limitations in a company (Torelli et al., 2020). These obstacles include those that hinder technical barriers, semantic barriers, and barriers to organizational efficacy. Personnel will be allowed to contribute their perspectives to the way the organization makes choices once communication obstacles have been determined. Entities gain confidence from the employees whenever supervisors display compassion for and openness to their employees in their task of uncovering communication barriers. Supervisors are advised to interact with their subordinates in a successful atmosphere.

The capacity to build trust tends to improve with expertise and an opportunity to accomplish, particularly before establishing group work or collaborating with diverse groups (Morrison-Smith & Ruiz, 2020). It could be useful to examine obstacles to communication given that communicating effectively structures are one of the key production variables for both regional and national economic development (Maneejuk & Yamaka, 2020).

2.5 Language Barriers

The whole principle of an administrative ethic implies that employees have a deep knowledge of it (Mao et al., 2021). The organizational code rejects the notion that language is imperfectly shared, that some people are better able to utilize language, and that there may be disputes among employees of the company over the meanings of procedures and processes (Park, 2021).

People use spoken language in distinct ways, address themselves in certain situations with greater precision than others as well, and sometimes fail to accord on the true significance of expressions (Ferreira & Yang, 2019). The value and quality of services are significantly affected by language obstacles in every organization and tend to occur when there is a language disparity between workers and clients (Al Shamsi et al., 2020). Professionals are obligated to offer consumers outstanding services that uphold the standards of the rights of humanity despite any language constraints. The language barrier to communication impedes the progress of every organization especially in the context where organizational goals cannot be adhered to due to misinterpretation (Van et al., 2022).

P1: Language barriers have a positive effect on employee performance.

2.6 Cultural Barriers

One major obstacle that stops the communication process in a business setting from being effective is a cultural barrier (Kiselev et al., 2020). It is extremely challenging to articulate the degree to which racial and cultural biases have penetrated our work environment since culture is a learned set of principles, opinions, conventions, and behavioural habits (Bond & Haynes, 2014). Since there are distinctions between education levels and economic status stand in society and people mostly experience social and cultural distances (Martela et al., 2021).These limits inhibit communication, which may end up in contextual differences. Cultural barriers within the organizational context are the manager's and employees' racial attitudes, the manager's ignorance of the employee's background, and the client's lack of familiarity with organizational services (Graamans et al., 2021).

P2: Cultural barriers have a positive effect on employee performance.

2.7 Semantic Barriers

Semantic hurdles arise from the words we use, how we use them, and the meanings we give them. Concepts and words like efficacy and improved profitability could imply a certain thing to the supervisor and a completely different thing another to an employee, thus many individuals may interpret the same word entirely (Abun et al., 2021). Organizations utilize skilled professionals and personnel who create and use terminology which only other professionals in this field and personnel of the same class can fully understand (Ewing et al., 2019). In this case, the message will not be conveyed if individuals are unable to comprehend what it means. However, many organizations still struggle to communicate effectively considering the need to share information that is well-understood by the employees to enhance their performance within the organization (Yu et al., 2019).

P3: Semantic barriers have a positive on employee performance.
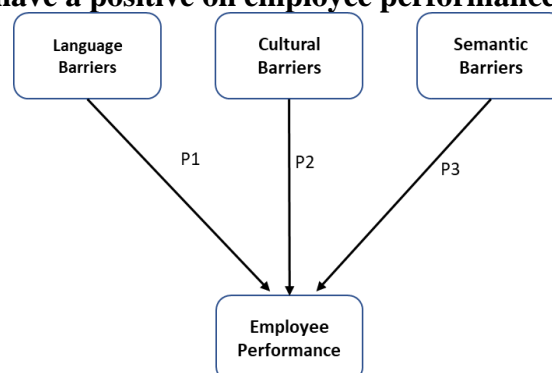

Fig. 1 – Conceptual framework sourced by authors own construct depicting the various propositions made.

Source: own research

3 METHODOLOGY

The qualitative method was used as the primary strategy for this paper. The primary technique for this investigation was document analysis. (Bowen, 2009) describes document analysis as investigating and assessing papers using written and electronic information to get relevant results. The use of document analysis produced sufficient grounds for pertinent information and sources for this study, which was also beneficial for this study. Document analysis as a form of qualitative approach has been used by recent scholars like (Amoah, 2020; Odei et al., 2021). The main aim of this study was to explore the communication hurdles that influence employee performance in developing economies. Data search was between the year 2017-2023.According to analysed information, additional sources connected with the research' insight, the uncovered connected areas were related to the key study elements, communication barriers. In addition, due to the abundance of literature dealing with the wider topic of communication obstacles. Document analysis is a suitable technique since it offers a broad scenery to examining the disparities of the study's event. The study's themes were usually based on the employee performance plan, particularly the concept of communication hurdles in emerging economies. In general, the authors have organized a lot of concepts of pertinent information that they could using document analysis in order to fulfil the study's aims. The aim of this concept was to develop a conceptual mode. Relevant information was sought out using the Scopus, Web of Science, and Google Scholar databases using communication barriers and employee performance as the keyword search. Based on the intended goal, numerous studies on the subject area were downloaded. In all, twenty-one articles were resourcefully used. The downloaded articles used in this study were all written in English. As part of the study methodology, certain information from secondary sources connected to the subject was also examined (Tambe et al., 2019). The researchers clearly dispute the comprehensive analysis of documents and the associated subjects that resulted from the technique used. However, an attempt is being made to demonstrate significantly linked topics of inquiry with the goal to deepen the body of research on the subject under the investigation.

4 CONCLUSION

Interaction regarding workers or staff will enhance the results for tasks within the enterprise, under previous studies in the academic field on employee performance management. The obstacles in communication within other emerging nations have also benefited from very little research. By evaluating the impact of barriers to communication on employee performance in developing economies, this study seeks to address the key issues hampering communication on employee performance. According to the literature reviewed in this study, the communication obstacles affecting worker performance in developing economies are semantic barriers, cultural barriers, and language barriers. The research will offer important impacts, particularly for individuals involved in the service industry. Individuals and management ought to take steps to establish an environment of effective communication within their companies. The company will not be able to achieve its desired level of efficiency and effectiveness without an efficient communication system.

One of the key factors that influence the success of an organization is communication. Entities that have trouble with communication are slower to adopt new ideas and face the possibility of causing workplace miscommunication. As a result, there is evidence that linguistic barriers greatly hamper employee performance within an organization. Effective communication is generally required for successful organizational performance. Additionally, irrespective of communication features, an enterprise is unable to achieve its desired level of effectiveness unless it takes into consideration a supportive environment for different communication

channels and coordination. Diversity in communication channels is an issue for most businesses. Individuals should regularly receive instruction and guidance on the strategies they employ when carrying out their tasks to guarantee efficient communication within the company. The operation of a communication processes and staff productivity may be impeded by differences in communication channels.

4.1 Limitation of the Paper

To provide a bigger base and an overall comprehension of the prominent concerns highlighted and discussed in this research, this study may have been reinforced by integrating several other well-known online databases that publish on employees' performance. Again, since the study is not backed by empirical data, the generalization of the findings must be done with much caution.

4.2 Theoretical and Managerial Implications

On the other hand, it seems that one of the major components addressing how well an organization does is communication. The leadership team of the company determines the decision to enhance efficient communication among personnel. This assists with helping those living in developing economies learn the fundamental values and themes that might drive national development. It also helps develop an improved awareness of the concept of communication and the channels that are available in an organization. The outcome of this study will add to the empirical and theoretical base in the discipline of corporate communication initiatives. Managers can use the analysis of the present study as an ongoing basis for monitoring the interpersonal behaviours of their staff. When these organizational communication barriers are identified, managers will offer preservice and in-service training to help managers and staff reflect on their attitudes toward those from different cultural backgrounds and expose them to the culture of their clients.

By assisting managers and representatives in creating an atmosphere that will encourage economic and the growth of the nation, communication will improve the state of the economy.

4.3 Suggestion for Further Research

It could be interesting to discover the impact of communication barriers on organizational and employee performance in a developing economy as well as the best practices that business owners and managers ought to employ to address the issue of poor communication.

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THE FALL OF A MAJOR ADVANCED ECONOMY: A TALE OF TWO COUNTRIES

Dominik Salat

Abstract

Czechoslovakia. A long time ago it was one of a major advanced economy. It was part of the Soviet Union in the past and there was no private property. The Business Environment was very limited. For some of entrepreneurs this were a certain guarantee of safety. For some this were the horror. The fall of this large of union also meant the economic collapse of the countries in this bloc. Further of shock which hits this state was the division into two separate states: the Czech Republic and Slovakia Republic. Thus, begins a separate chapter in the history of the two countries and their enterprise development. Current research is targeting on an analysis of the emergence of new companies in these countries. So, there is a possibility to find out whether and how different the results of these brotherly nations of this once conjoined country are. Based on this was performed a time series analysis. The research period was the years from 1993 to 2022. The aim of this study is comparison of the creation and disappearance of economic entities in these regions. The contribution of this paper is a recent view of entrepreneurship in the countries concerned and a possible continuing trend in the future. It is then up to other to decide whether they want to use the results to further analyse the potential differences and develop the issue.

Keywords: *Czechoslovakia, Czech Republic, Slovakia Republic, enterprise, business environment*

1 INTRODUCTION

A long time ago Czechoslovakia was one of a major advanced economy. The history of this land is very colourful. It all started in 1918 when the state itself was formed. Since then, it has been a turbulent period for this state. In September 1938 it was the Munich Agreement (The Editors of Encyclopaedia Britannica, 2023) settlement reached by Germany, Great Britain, France, and Italy that permitted German annexation of the Sudetenland, in western Czechoslovakia. The Hlinka Slovak People's Party (HSĽS) took advantage of this and on 6 October 1938, in the presence of representatives of other parties, proclaimed the autonomy of Slovakia Republic. World War II ensued.

Not all citizens and politicians in the former Czechoslovakia were willing to come to terms with the state of affairs after the dissolution of the republic. Many chose instead to emigrate to the states fighting against Germany and from there sought to rebuild Czechoslovakia. Therefore, on 29 August 1944, the German leadership began to pacify the already manifested (partisan movement) or potential anti-German resistance in the rear of its defending troops. This is how the so-called Slovak National Uprising began after the agreement with the Red Army. After the defeat of Germany and its ally, the Slovak Republic, the Czechoslovak Republic was restored on the territory of Slovakia Republic. However, the Czechoslovak Republic was not an automatic restoration of its pre-war regime. The Munich dictatorship, the existence of undemocratic regimes during the war and, above all, the influence of the Soviet Union in Central Europe caused the creation of a new social system in Czechoslovakia, oscillating between democracy and totalitarianism, which has been described as 'people's democracy' (Museum of Slovak National Uprising, 2005).

This post-1948 period is the beginning of a centrally planned economy in the state. Another important event in the history of Czechoslovakia was 1968 and the so-called Prague Spring (Navrátil and Benčík, 1998). This resulted in Charter 77. This document (Encyclopaedia Beliana, 2010) drew attention to violations of civil and political rights in Czechoslovakia, referring to the Final Act of the Conference on Security and Cooperation in Europe, signed in Helsinki on 1 August 1975.

The subsequent next milestone in the state's history came in 1989. Velvet Revolution (Wolchik, 1993; Adam, 1995; Glenn, 1999; Trnka, 2012; Hejlová and Klimeš, 2019). During this period (Charap and Dyba, 1991; Hayo, 2004) there were also dramatic changes in Europe. Change also came in 1993. The division into two separate states: the Czech Republic and Slovakia Republic. It meant the fall of a major advanced economy. The country's ensuing division and history inspired this article and exploration of enterprise development and the business environment. So, there is a possibility to find out whether and how different the results of these brotherly nations of this once conjoined country are. The aim of this study is comparison of the creation and disappearance of economic entities in these regions. The research period was the years from 1993 to 2022. The contribution of this paper is a recent view of entrepreneurship in the countries concerned and a possible continuing trend in the future.

2 LITERATURE REVIEW

Germany, Czechoslovakia and Britain, were all industrialized (Reddy and Goldenberg, 1990) and became major users of steam-powered technology in the century or more before World War I. It is indisputable (Krejčí et al., 2016) railway development have particularly contributed to the development of given regions and localities. The importance of transport for both local and regional development is inarguable. As stated by Dostál and Adamec (2011), transport has to be considered as an important pillar of the economy, and economic impacts of transport on areas is of great importance (e.g. Rietveld and Nijkamp, 1992; Rephann, 1993; Banister and Berechman, 2003). This was largely based on domestic coal resources, with significant shares of their domestic production being exported abroad. The country's prime location and 'unfair advantage' in the form of mineral riches have become a prerequisite for economic development in the country. This at that time was also used by the Czech inventor and entrepreneur Ludvík Očenášek who devoted himself to the beginnings of rocket development in Czechoslovakia (Plavec, 2011).

The fact that entrepreneurs in Czechoslovakia prospered is evidenced by the following Tab. 1 – Comparison of net production and employment share by industry in 1935 in %. The table shows that the economy of Czechoslovakia has similar results to the economy of the United Kingdom and continues to follow the trend among the developed economies of the world after a couple of years.

Tab. 1 – Comparison of net production and employment share by industry in 1935 in %. Source: Broadberry and Klein, 2011; own processing

Industry	Net output		Employment	
	Czechoslovakia	United Kingdom	Czechoslovakia	United Kingdom
Chemicals	7.5	7.8	3.7	4.2
Metal manufacturing	6.7	11.1	5.6	11.0
Engineering	16.7	19.4	19.1	18.9
Textiles and clothing	30.1	18.9	31.5	27.3

Industry	Net output		Employment	
	Czechoslovakia	United Kingdom	Czechoslovakia	United Kingdom
Food, drink and tobacco	7.2	15.3	5.2	8.7
Miscellaneous	20.8	17.1	24.9	15.8
Total manufacturing	**89.0**	**89.6**	**90.1**	**85.9**
Mining and quarrying	11.0	10.4	9.9	14.1
Total industry	**100.0**	**100.0**	**100.0**	**100.0**

The following World War II changed not only the economy of the state but also the world. Three years after the war, in 1948 GDP (Gross Domestic Product) was still 8% below the value of 1937, while energy consumption, which had rapidly recuperated after 1945 was already 8% above the pre-war level (Kuskova et al., 2008). The period, however, saw a 14% decline in population which was mostly due to the transfer of 2–3 million people, mostly Germans from borderlands. This had a considerable impact on land use and agriculture, as it left large border areas uncultivated and enforced reforestation (Bičík and Štěpánek, 1994) However, agricultural output was comparatively constant before and after the war. This might be a result of farmers' organisation efforts for cooperation which continued until 1948 and could have alleviated the war damages (Kubačák, 1995).

In February 1948 (Myant, 1989) the Communist Party established an effective monopoly of power in Czechoslovakia. It promised to create a more secure, more just and generally wealthier society than would have been possible under any other political leadership. The change in political power would, it was believed, lead to the best possible economic system. Although no official sanction was given to the idea, leading activists were talking optimistically of turning Czechoslovakia into a 'shop window' of socialism that could provide an attractive example for other developed countries in the world. When the Czechoslovak Communist Party took monopoly control of power, the more democratic machinery of the Two-Year Plan implemented by the Communist-led National Front gave way to the centralized system of central planning established in all countries under the Russian sphere of influence. At the top of the hierarchy was the State Planning Office, with ministerial rank, presiding over the ministers responsible for individual industries. The next level down was the main administrative bodies, with the lowest level being the individual enterprises (Teichova, 2013). As in the Soviet system, the plan involved setting targets for individual outputs and checking for consistency with input–output coefficients. After initial drafting, the plan was fed down the hierarchy and adjusted before repeating the process (Eichengreen, 2008). Whilst the system of central planning can undoubtedly be criticized for distorting the composition of output towards heavy industry and away from consumer goods, its performance in terms of raising labour productivity in the production of the goods that the central planners chose to manufacture was initially, at least, surprisingly good. In this respect, the centrally planned and regulated market economies may not have been so different during the heyday of mass production in the 1950s and 1960s. Both systems allocated resources within large industrial units, using hierarchies rather than markets. If the similarities were already apparent in mass production consumer goods industries such as motor vehicles, they were even more striking in the production of armaments, where markets played little role in western countries like Britain as well as in centrally planned economies such as Czechoslovakia (Ergas, 1987; Nelson, 1993).

According to Bajona and Locay (2009) it considers a model economy with infinite lived individuals who differ in their level of entrepreneurial ability. Individuals with high ability become entrepreneurs, and those with low ability become production workers. In the

decentralized framework, the resources that each entrepreneur gets are determined by the market. In the centralized economy, where the government owns and distributes all resources, managers (the equivalent to entrepreneurs in a decentralized society) need to spend time lobbying the central planner to obtain inputs for their enterprises. This reduces the amount of time devoted to productive activities and, thus, reduces output. Even if the government distributes output in an 'efficient' way (that is, in a way that distorts individuals' decisions the least, compared to the decentralized economy), the reduction in production effort translates into a reduction in the rate of accumulation in the stock of managerial knowledge. Can call this mechanism the 'lobbying effect.' Furthermore, as centralized economies tend to seek a more egalitarian distribution of income, the behavior of individuals is distorted further by reducing their incentives to become entrepreneurs, reducing managerial effort even more. Can call this effect the 'redistribution effect.'

The end of communism was accompanied by dramatic changes in Czechoslovakia's economy (Ščasný et al., 2003). The shift from a planned to a market economy (Kuskova et al., 2008) was related to temporary recession and massive restructuring of the economy: with the collapse of the Soviet Union the major trading partner vanished and Czechoslovakia had to adopt to new export markets. High volumes of industrial and agricultural production were reduced, inefficient production and allocation structures eliminated and industries restructured. This is also reflected in Tab. 2.

Tab. 2 – Post-Communist period development, 1989-1992 (Percentage change). Source OECD (1992)

Czechoslovakia				
	1989	**1990**	**1991**	**1992**
Output (GDP/ Net Material Product)	0.7	-1.1	-16.0	-14.1
Industrial production	1.1	-3.7	-21.2	-18.9
Employment (whole economy)	0.3	-0.4	-7.4	-12.2
Labour productivity in industry	1.7	-0.3	-14.4	5.2
Nominal wages	2.3	3.6	16.4	22.1
Real wages	1.3	-5.8	-26.3	5.0
Consumer price index	1.0	10.0	57.9	3.0

The annexation and subsequent collapse of the Soviet Union with the advent of the currency crisis (Dabrowski, 2016) that occurred in the post-Soviet economies and the transition to a market economy demonstrate the fall of a major advanced economy. And nobody knew that a few years later there would be another surprise in the form of the division of one state into two. Thus, begins a separate chapter in the history of the two countries and their enterprise development. A tale of two countries.

3 METHODOLOGY

Historical and content analysis was used for the literature review. This paper presents the result of secondary data of two nations that were obtained through the national statistical offices (Czech statistical office - https://www.czso.cz/csu/czso/home and Statistical office of the Slovak Republic – a shorted link: https://1url.cz/Sr6R6). Using this data, a historical description method of countries development was performed demonstrating the trend of the creation and disappearance of new economic entities in these states since the breakup of Czechoslovakia (i.e. from 1993 to 2022). The description of historical development was also used in the case of the selected economic indicators. The paper includes a description of the global index of both countries. These data were then compared with one another, which resulted in a synthesis of the findings.

This type of study is a possibility to find out '*whether*' and '*how*' different the results of these brotherly nations of this once conjoined country are. The aim of this study is comparison of the creation and disappearance of economic entities in these regions. The contribution of this paper is a recent view of entrepreneurship in the countries concerned and a possible continuing trend in the future. It is then up to other to decide whether they want to use the results to further analyse the potential differences and develop the issue.

4 RESULTS

At the outset, it should be noted that private ownership was not allowed in Czechoslovakia until 1989. Even in December 1990 no foreign company was still operating there but Czechoslovakia had 229 joint ventures (OECD), this changed only in December 1991 when 3225 foreign companies and 4984 joint ventures were already active in Czechoslovakia what the arrival of an unknown word of enterprise in this area meant. Number of registered entrepreneurs was 87,000 in 1989, the next was an increase of 84.87% and in 1991 it was 69.94% more than the previous year. In 1992, this change represented an increase of 18.3%.

The last period of Czechoslovakia was not economically favourable. The transition from a closed economy to an open economy with new opportunities for entrepreneurship has given many people hope for their sails. And although one country was divided on the basis of political decisions, neither country was able to build on the economic level of Czechoslovakia.

4.1 The selected economic indicators of the Czech Republic and the Slovakia Republic

Although the same legislation was in force in both countries after the collapse of Czechoslovakia and the accession to the European Union gradually synchronized with the other states of this association, both countries show different economic indicators. The first example (Figure 1) is the GDP annual growth rate, where the Slovak Republic is more volatile than the Czech Republic. Slovakia was one of the fastest growing economies in Europe. Foreign direct investment, particularly in the automotive and electronics industries, has underpinned much of this growth.
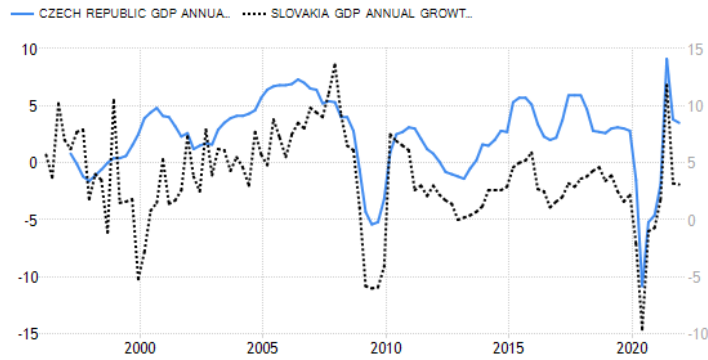
Fig. 1 – GDP annual growth rate of the Czech Republic and the Slovakia Republic. Source:

tradingeconomics.com (n.d.)

Until 2003, a higher unemployment rate prevailed in the Slovak Republic compared to the Czech Republic. Since that year, the rate has been lower and the trend is similar in both countries. This is demonstrated in Figure 2.
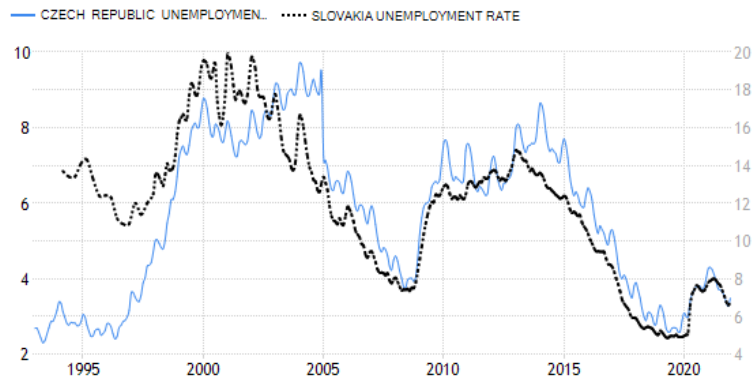
Fig. 2 – Unemployment rate of the Czech Republic and the Slovakia Republic. Source: tradingeconomics.com

(n.d.)

Another indicator (Figure 3) is industrial production, which measures the output of enterprises included in the industrial sector of the economy. For the Czech Republic, manufacturing, mining and utilities are the most represented. In the Slovakia Republic, manufacturing is the most important sector and accounts for 85 percent of total production.
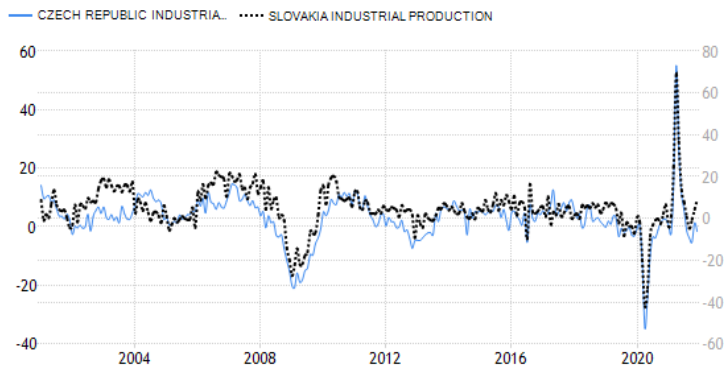
Fig. 3 – Industrial production of the Czech Republic and the Slovakia Republic. Source: tradingeconomics.com

(n.d.)

Better results for the Slovak Republic can be observed from this indicator. As in the case of the unemployment rate, both countries follow the same trend for this parameter.

In Czech Republic, the most important category in the consumer price index is Housing and Utilities (27 % of total weight). Food and Non-Alcoholic Beverages accounts for 18 %; Transport for 10 %; Alcoholic Beverages and Tobacco for 9 %; Recreation and Culture for 8 % and Miscellaneous Goods and Services for 6 %. Furniture, Household Goods and Maintenance; Restaurants and Hotels; Clothing and Footwear; Communication; Health and Education account for the remaining 27 % of total weight. In Slovakia, the most important categories in the Consumer Price Index are: Housing & Utilities (27% of the total weight) and Food & Non-alcoholic Beverages (21%). Furnishings, Household Equipment & Routine Household Maintenance accounts for 7%, Transport for 6%, and Alcoholic Beverages & Tobacco for 5%. Others include: Clothing & Footwear (5%), Communications (4%), and Health (3%). In terms of the rate of inflation (Figure 4), the Slovak Republic has a higher rate. The highest inflation rate was around 2000 when the rate of 16.55% was recorded.
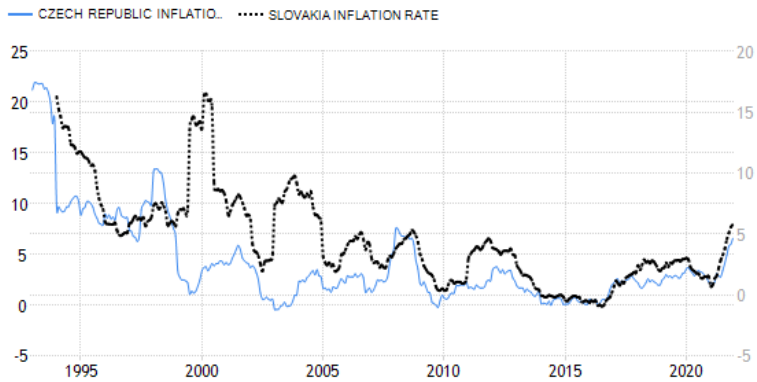
Fig. 4 – Inflation rate of the Czech Republic and the Slovakia Republic. Source: tradingeconomics.com (n.d.)

The Czech Republic's tax rate declined very slowly until it reached 19% in 2010. In contrast, the Slovakia Republic had a tax rate of 40% until 1999. Then came a reduction for two years, followed by a further subsequent reduction. Therefore, from 2000 to 2010, there was a great opportunity to do business because the rate was lower than in the Czech Republic. In 2013, the tax rate was increased and a year later it was reduced from 23% to 22%. Since 2017, the tax rate has been at the same level of 21% until today in the Slovakia Republic. In contrast, the Czech Republic has kept this rate at 19% since 2010. Figure 5 represents this.
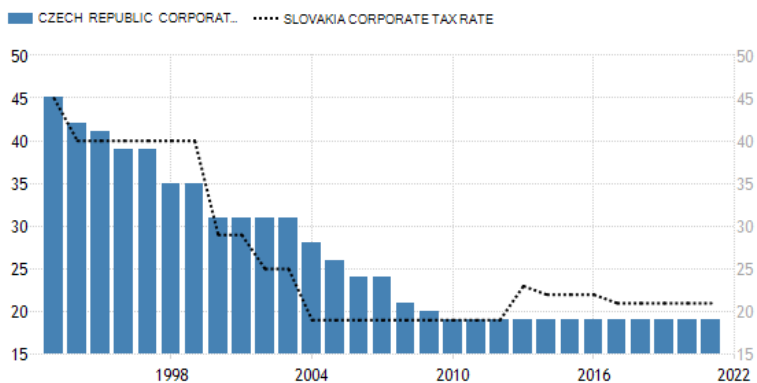
Fig. 5 – Corporate tax rate of the Czech Republic and the Slovakia Republic. Source: tradingeconomics.com

(n.d.)

The others factor examined is the productivity indicator (Figure 6). Based on this parameter, both states show an increasing linear trend. The lowest point is reached by the Czech Republic at 58.52 while in the case of the Slovakia Republic this value is lower at 44.90. In terms of the highest point achieved in this case, the Slovakia Republic reached 120.93 while the Czech Republic reached only 114.20.
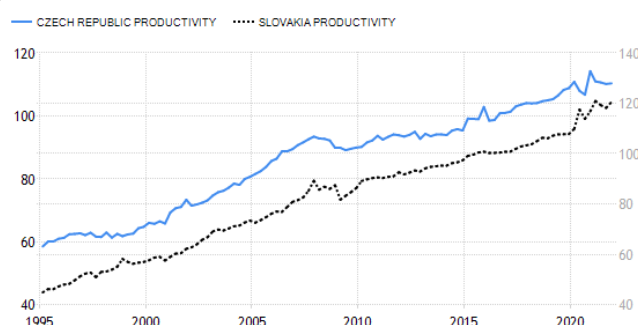
Fig. 6 – Productivity of the Czech Republic and the Slovakia Republic. Source: tradingeconomics.com (n.d.)

For a better overview of the differences between these countries, see Table 3 - Country rankings. This is a global ranking that is worked on by selected international organizations that compile it. The table contains data for the year 2022.

Tab. 3 – Country rankings. Source: *Global Economy, World Economy*, (n.d.)

	Czech Republic		Slovakia Republic	
	Result	Global rank	Result	Global rank
Population growth	-1.81 %	192	-0.21 %	163
Political stability index	0.96	30	0.56	65
Poverty ratio	8.60 %	49	12.30 %	41
Corruption perceptions index	56	41	53	50
Human development index	0.889	32	0.848	45
International tourism revenue, percent of GDP	1.58 %	53	1.22 %	67
Innovations index	42.8	30	34.3	47
Trade balance, percent of GDP	-0.10 %	48	-5.76 %	77
Capital investment, percent of GDP	32.99 %	19	23.66 %	67
Share of industry	30.69 %	47	28.63 %	56
Fiscal balance, percent of GDP	-3.64 %	60	-2.00 %	43
Fiscal freedom index	93	30	76	77
Monetary freedom index	79	71	75.5	104
Business freedom index	81	22	76	34
Firms using credit to finance investment	34.00 %	13	26.00 %	22
Cost of starting a business	1.10 %	154	1.00 %	160

As can be observed in Table 3, the Czech Republic outperforms the Slovak Republic in most of the analysed indicators. And although the results in favour of the Czech Republic are

outstanding, the Czech Republic still failed to be among the top 10 countries in any of these indicators.

4.2 The case of the Czech Republic

Looking at the current trend (Figure 7) in the number of registered economic entities in the Czech Republic, the trend is positive and, with the exception of 1994 when there was a small decline, the number of registered economic entities is increasing.
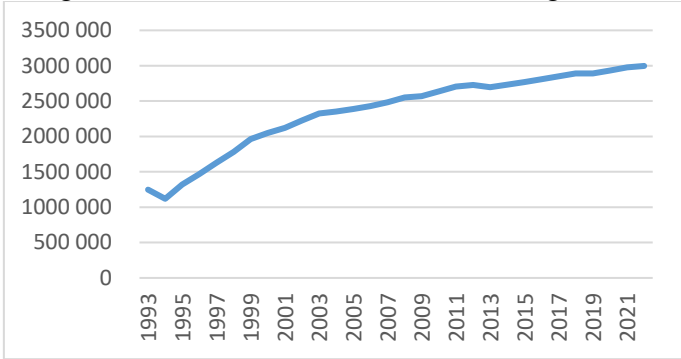
Fig. 7 – Current trend in the number of registered economic entities in the Czech Republic. Source: Czech statistical office (n.d.)

Another phenomenon examined (Figure 8) was the Enterprise Birth and Enterprise Death in the Czech Republic. The results provide interesting findings. Most enterprises disappeared in 1993 as a result of the division of Czechoslovakia into two separate states. Other interesting years are 2009 and 2013 when the financial crisis caused by the US mortgage crisis was the cause of the companies' demise. Other interesting years are 2009 and 2013 when the financial crisis caused by the US mortgage crisis was the cause of the companies' demise.
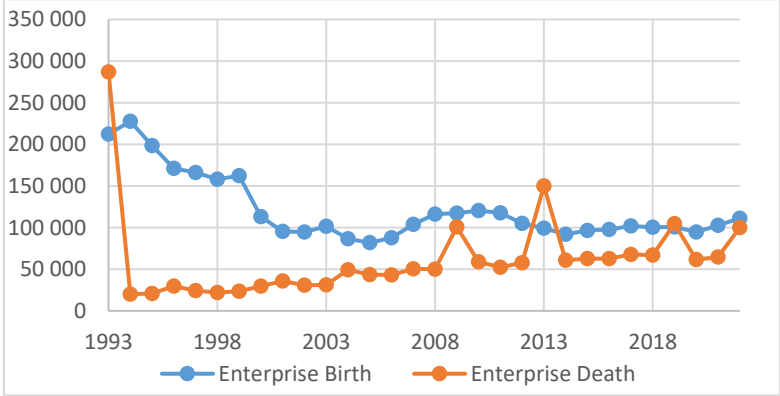
Fig. 8 – Enterprise Birth and Enterprise Death in the Czech Republic for the period 1993 to 2022. Source: Czech statistical office (n.d.)

In the case of established businesses, a sharp decline would have been expected in the period 2004 what did not happen and Czech entrepreneurs were prepared for new competitive challenges associated with the accession to the European Union.

4.3 The case of Slovakia Republic

The Slovakia Republic, like the Czech Republic, has an increasing trend in the number of registered economic entities. This is demonstrated by the results in Figure 9. The highest "boom" was recorded between 2014 and 2015 when a record number of economic entities

registered in the state. This is due to the ending of the financial crisis and the absence of further structural reforms is already beginning to appear.
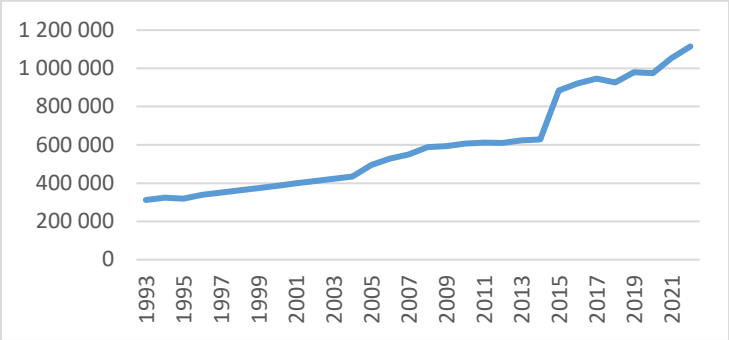
Fig. 9 - Current trend in the number of registered economic entities in the Slovakia Republic. Source: Statistical office of the Slovak Republic (n.d.)

It is interesting to look at Figure 10, which shows Enterprise Birth and Enterprise Death on the territory of the Slovakia Republic. After the division of Czechoslovakia, however, a fundamental problem arose. Most of the institutions were based in Prague (Czech Republic) and so they had to start from zero in the new state (Slovakia Republic).
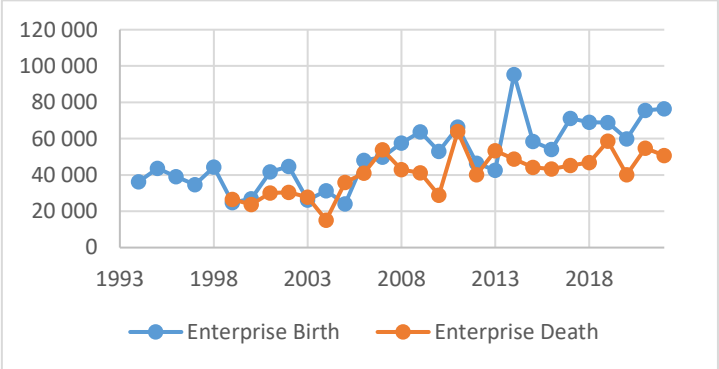
Fig. 10 – Enterprise Birth and Enterprise Death in the Slovakia Republic for the period 1993 to 2022. Source: Statistical office of the Slovak Republic (n.d.)

For this reason, some data are missing (for Enterprise Death in 1993 to 1998). After the division of the state, companies could decide in which state they wanted to continue their business, which is why some data from the Slovak Republic for defunct companies could be recorded by the Czech Republic. The number of companies established in Slovakia was also related to the evolving legislation. An example is the increase of flat-rate expenses from 40% to 60% of total income. Also increasing their annual limit from €5,040 to €20,000 from 2017 or increasing the deduction for research and development expenses from 2018. Other significant changes, such as the reduction of the income tax rate from 21% to 15% for corporations and sole traders with annual income up to €100,000, the increase of the tax-free part of the tax base or the further increase of the deduction for research and development expenses. Most businesses were established in 2014, this was related to the adoption of the law on the necessity to pay the share capital into a bank account. The legislation has sparked interest in registering new companies by the end of November, as long as they could still be formed without having to pay the share capital into a bank account. In the following year, this change had the effect of rapidly reducing the number of new registrations by almost half. Following the abolition of this obligation in 2016, there was a renewed increase in the number of companies formed.

From 2004 to 2007, the entry of the Slovakia Republic into the European Union and the arrival of new competitors became evident in the Slovakia Republic were reflected in the number of defunct companies. In 2011, the largest number of business entities disappeared. The increase in business closures is mainly due to companies operating in business services (SK NACE K to N). The reason for this was the tightening of the conditions for the performance of financial agents, namely a greater emphasis on the education and experience of financial agents. Changes have also been made in the determination of the amount of commission for intermediation or in the introduction of a tax on non-life insurance.

5 DISCUSSION

A long time ago Czechoslovakia was one of a major advanced economy. Compared to other world economies, it was one of the best. All that changed with the transformation to a centrally planned economy. For some of entrepreneurs this were a certain guarantee of safety. For some these were the horror. Therefore, the Velvet Revolution became an important stage, which brought with it many changes, including the opportunity in the form of entrepreneurship. A huge number of people took this up, and even when Czechoslovakia broke up people continued to take up the occasion (this can be seen in figure 7 and figure 9). The results of individual countries are interesting. While the Czech Republic has a slower decline in business start-ups from 1993 to 2004, the situation is stable thereafter. In terms of defunct enterprises, the highest number of defunct enterprises was in 1993, which may be due to the fact that enterprises registered in the Czech Republic changed their registration to the Slovakia Republic. The subsequent fluctuations in the number of disappeared enterprises are only the consequences of the crises that have affected this business environment. The opposite example is the Slovak Republic. This environment is very volatile. Even a small change in the functioning of this fragile environment can have unexpected consequences. This may be because the environment is still evolving. The unanswered question is why the situation in these countries is so different even though they were separate states.

Interestingly, even though both countries are following the same developing trend as shown by certain economic indicators, the Slovak environment still achieves worse results (see Table 3). Yet in both countries the same legislative rules apply throughout the European Union community. Both countries are experiencing negative population growth, which is also beginning to look like a Europe-wide problem. From this perspective, one would expect the business environment in both countries to provide a good opportunity for enterprise. Looking at the total number of registered entities, this appears to be the case, as both countries are experiencing annual growth. However, when examining the established and defunct entities, a strong influence is found in the case of the Slovakia Republic due to political and legislative decisions. This environment shows a certain degree of instability which affects its subsequent development. For this reason, the Slovakia Republic performs worse in the individual country ranking (Table 3) categories than the Czech Republic, where the business environment demonstrates stability. This stabilization in the Czech business environment is usually only disturbed by global crises that affect other countries as well.

6 CONCLUSION

Entrepreneurship and entrepreneurs are seen as an important driver of economic growth, contributing to the creation of new jobs, new employment opportunities, new innovations, as well as stimulating competition and competitiveness. International organisations, governments and political leaders are therefore paying more attention to the function of business in generating economic development. The example of Czechoslovakia is a fundamental

illustration of how political leaders can devastate one of the most powerful economies by their determination. All this led to the division into two states - Czech Republic and Slovakia Republic.

It was found that both these states have an increasing trend in the number of registered economic entities. From the perspective of the Czech Republic, this is a more stable growth over the whole period under review, while in the case of the Slovak Republic, the year 2015 was the breakthrough year when the highest number of economic entities registered. The level of established and dissolved economic entities in the Czech Republic is also stable, with the highest number of economic entities dissolved at the time of the collapse of Czechoslovakia. Subsequent fluctuations are just the consequences of global crises. Although a similar scenario could be expected in the case of the Slovak Republic, the situation is very untypical and any even minor change in the legislation of the state has an impact on the number of economic entities created and disappeared. These countries also perform differently in other country rankings, such as the innovation index, the cost of starting a business, economic growth or the entrepreneurship ranking. In most cases, the Czech Republic scores better than the Slovakia Republic. This is due to the unstable business environment in the Slovak Republic. Since the same developing trend was observed in selected economic indicators of both countries, the same conditions in these countries would be expected. Therefore, it can be concluded that the Czech Republic provides a more stable business environment and has the potential to follow the success of Czechoslovakia.

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SYSTEMIC MANAGEMENT AND INTERVENTION OF ORGANISATIONS – A SYSTEMATIC LITERATURE REVIEW

Andrej Schneider

Abstract

This conference paper presents the results of a systemic literature research to substantiate the current state of research on systemic management as well as systemic intervention. Following the step-by-step model according Prisma, this thesis leads gradually to the object of investigation and aims to summarize the key aspects. The basis from 37 research papers is the result of a step-by-step screening by keywords, evaluation, and analysis of all possible findings in various search engines. The methodology is based on a qualitative analysis of the 37 papers that have been selected. Based on this, the works are coded, paraphrased, and compared with MAXQDA to synthesize the different statements. The present work documents the steps as detailed as possible to guarantee a reproducibility of the results.

The focus of the conducted systemic literature research is not on the comparison of the opinions of different authors, but to provide concrete information about the current state of research of systemic management & intervention. It also shows which factors need to be considered to stimulate a system to change. The subsequent presentation of research gaps shows an alignment of statements from the analyzed papers. The goal of this paper is to highlight the theoretical framework to provide an approach for future research projects that apply these assumptions to organizations practically. The results of the work are intended to make an important contribution to research in the field of systems theory.

Keywords: *systematic literature review, SLR, system theory, systemic management and intervention.*

1   INTRODUCTION

Modern companies face significant hurdles that must be overcome. These challenges arise from the increasingly complicated business environment, which forces social structures such as organizations to change radically. These changes are often triggered by the introduction of new technologies, evolving regulations, societal demands, and global interdependencies. As the complexity of the environment increases, so does the complexity of the organizations themselves. The increasing complexity of today's problems results from the interconnected nature of the challenges as well as the accompanying processes. To effectively address such problems, systemic thinking with appropriate methodologies is necessary. Customer requirements are changing rapidly today, and global interactions and technological advances are accelerating this change even further. Traditional non-systemic management solutions fail due to inadequate prioritization, complexity, lack of connection to strategies and goals, and delayed and incomplete adaptation to change. This drives organizational managers to seek alternative solutions. Therefore, comprehensive systems are developed to better manage more complex problems and analyze different aspects of a system (Vahidi & Aliahmadi, 2019). One approach to deal with complexity is the systems theory view. Systems theory and the associated approach of systemic organization theory include a holistic-systemic world view. Organizations should act in completely new patterns of thinking and acting. Emphasis is placed on the holistic systems view, communication, the interconnection of elements and thinking in networks of effects. Systems theory should enable better management as well as a deeper understanding of

dynamic and complex reality. It involves viewing the world in terms of systems, elements, and their interrelationships of effects. These structures can be regulated and controlled by the aspects of cybernetics to enable companies to adapt to their dynamic environment (Rajagopalan, 2020). However, many organizational developers are daunted by this complex theoretical construct and tend to use simple traditional approaches. Therefore, there is a lack of practical experience in systems theory (Midgley, 2021). The research gaps reveal the lack of results and impact when systemic management methods are applied practically in organizations (Bengtsson et al., 2018).

In the following chapter 2, some basic assumptions of systems theory are presented. This is intended to give the reader a first impression of the field of systems thinking. The theoretical background was elaborated concretely with the process of a systematic literature research including a systematic comparison & evaluation described in chapter 2.2. Chapter 3 describes in summary the methodology and the tools used to get to the corresponding research results. The main part of the thesis, which reflects the results, highlights the current state of research and gaps of systemic management and systemic intervention. In the last section, Chapters 5 and 6, the results are compared and critically reflected. In the end of the paper, an outlook for future research based on the results is suggested. The motivation is to present the complex definitions and views of systemic research to the public in an understandable and comprehensible way to inspire future research with systems thinking. As a result, the work is intended to provide a starting point and preparation for systemic intervention.

2 LITERATURE REVIEW

2.1 Theoretical Background

The origin of systems theory is usually dated back to the mid-twentieth century, when Wiener published his work on cybernetics (1948) and Bertalanffy his general system theory (1956). This created a new field of research that analyzed social systems using the innovative view of systems thinking. Systems thinking embraces the view that the whole is more than the sum of its parts. From this comes the need to understand the outcomes that result from the interaction of the components of a system and the interaction of the system with its environment. The general system theory is a new way of looking at the world in which individual phenomena are seen as interrelated rather than isolated, and in which complexity has become an object of attention (Rajagopalan, 2020). The main goal of systems science is how to successfully deal with complexity or uncertainty in the real world. Complexity must be successfully understood and dealt with in a business context. In the history of scientific management, it has been shown that business management deals with rational decision-making processes by assessing the possible consequences of each option and then choosing the appropriate course of action. But how can one make an appropriate or effective decision when one is uncertain about what the right course of action is? Such decisions can be highly complex because they interact with conflicts of human interests, values, uncertain situations, and vague interpretations of their own situation. The goal of systemic inquiry is not necessarily to find definitive solutions or answers to a problem, but merely to increase our understanding and ability to find alternative ways to deal with the dynamics and complexity of the environment (Yu, 2006).

The systemic approach consists of learning and applying different methods and models so that managers can best manage the complexity, volatility, and heterogeneity of the problem situations they face today. To understand the complexity and heterogeneity of problem situations, it is important for the system's practitioner to take a critical look at the situation as comprehensively as possible, but gradually focus on the aspects that are critical to the organization at this stage of its development. After identifying the critical problems or even

areas for the organization, a selection of appropriate system methods and procedures to address the problem situation must be made. This is done based on a review of the strengths and weaknesses of the various systemic management methods and procedures (Jackson, 2006). As systems thinking has gained popularity in recent years, there is now a wealth of systemic methods available. Managers are victims of the failure of organizational methods due to the one-dimensional view of organizations. Such one-dimensional views lead to improvements in one particular organizational aspect, but may affect another. Consequently, systems methods should be applied together in the form of a multi-method approach to effectively address complex problems. The science of systemic management includes many approaches and methods to introduce such views into organizations and their management processes with the help of systemic interventions (Vahidi & Aliahmadi, 2019). Systemic management is used to observe the system and the system boundaries. By observing the structure, the behavior and output of the system can be analyzed and optimized. This results in actions that ensure the preservation of the boundary and the survival of the organization. Observation and management can reveal a difference between the system and the environment. To ensure the survival of the system, systemic interventions are needed to eliminate the difference. The so-called systemic intervention can trigger a desired self-change or self-reference of the system in the short term by intervening in the behavior of the system. Management and leadership must intervene in the system, taking into account the basic premise, until the irritation leads to a new outcome. In the increasing dynamics of society, systems thinking is becoming more and more important. It is therefore necessary to elaborate and understand application-oriented aspects such as systemic management (Midgley & Rajagopalan, 2021).

2.2 Systematic Literature Review

The systematic literature review is a procedure to identify, evaluate and interpret all possible research papers under consideration as in this paper, the main component of the paper is systems thinking and the holistic aspect. Systemic management is a complex research field with a lot of potential and applicable possibilities. By applying a systematic literature review, the complexity can be reduced step by step and suitable research works can be identified by extracting. By suitable research work is meant that the content of the documents used specifically answers the goals and questions of the present work. This should clarify that the focus is not on the comparison of the opinions of different authors but on the development of the core definition and the current state and gaps of research. The first step of the systematic literature search starts with a detailed formulation of the objectives and the resulting research questions that are to be answered. After the goals and questions have been formulated, the main process of searching for research papers begins. From the title of the dissertation, some keywords are formed that are necessary to research the databases. It is recommended to search in several databases. Due to limitations, only four different databases used with free access of research (Wang et al., 2022).

Google Scholar is a good starting point for the literature search. The search term "systemic management and systemic intervention" achieves a total number of 1,130,000 findings, which are impossible to analyze. The most successful combination of search term "systemic management" systemic "intervention" automotive resulted in 105 findings. In all databases shown, the search terms were experimented with until an appropriate number of findings occurred. SCOPUS, on the other hand, has a very detailed filter that allows searching in specific research areas and in addition to the document type. Through the advanced filter, SCOPUS was used to find papers on the systemic aspect as well as on the field of automotive industry. SCOPUS resulted in a total of 101 findings. The search in Emerald resulted in a number of 8000 findings similar to Google Scholar with the term systemic management and systemic

intervention. To reduce the findings to a suitable level, the terms management and intervention were separated from each other and supplemented with the keyword automotive. By using two separate search terms, a total of 133 findings could be obtained. Springer as the fourth and last database used achieved the maximum number of findings. By adding call out marks to the term systemic intervention, the database achieved a total number of 281 findings. Figure 1 summarizes the search results and workflow of the literature review (Bauer & Strauss, 2016).

As shown in Figure 1, 620 findings remain that need to be filtered and checked. To reduce the effort of the extraction at the beginning, all duplicate entries are merged via Zotero. This leads to the very fast and easy deletion of 59 redundant findings. With the help of Zotero, the entries can be organized well. A specific folder was created for each database to collect the entries. As a last step to prepare and reduce the effort, all incorrect entries are deleted first. Errors are, for example, entries with missing titles or source information. As already mentioned in the methodology, the principle from the rough to the detailed applies here. Based on the formulated research questions, each heading is now selectively checked. Some of the headings provide clear information about research areas, topics, as well as disciplines that are not relevant for the present work. The extraction was able to reduce the total number from 680 to 120 relevant papers (Hermanu et al., 2022). To filter the remaining results more deeply, the abstract is reviewed and analyzed. All the abstracts that do not refer to the formulated research questions are sorted out. This step of extraction reduces the number of remaining papers from 120 to 56 (Trif et al., 2022). During the qualitative analysis described in chapter 3, a further 19 works were eliminated as they did not provide any direct statements on the topics presented here. As a basis, 37 research papers remain. Each of these remaining works has a high potential to achieve the research goals and answer the research questions. The entire procedure leading up to the analysis is illustrated visually and summarized in Figure 1 (Bauer & Strauss, 2016).
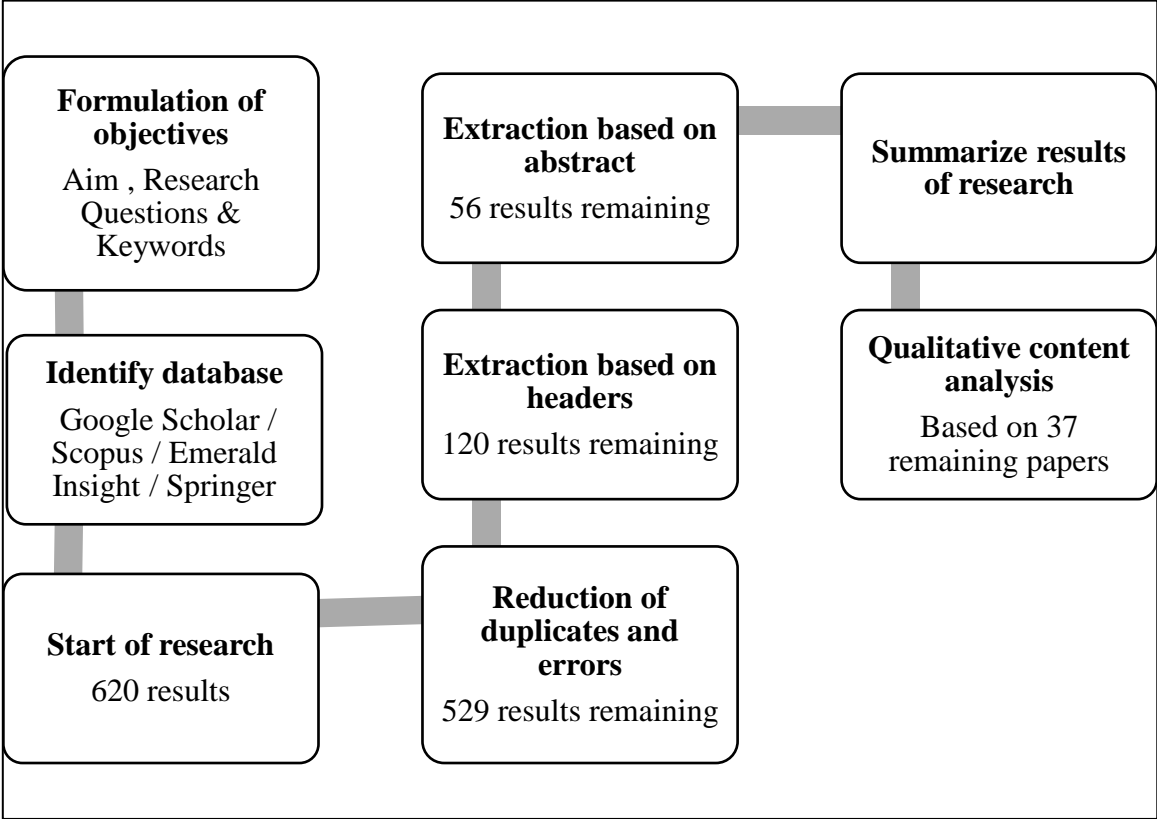
Fig. 6 - The review protocol based on Prisma. Source: Own processing based on (Wang et al., 2022)

Effective use of Zotero for thorough documentation allows for the retrospective analysis of the number of findings in various research fields, determined by the chosen tags. The distribution depicted in Figure 2 reveals that a majority of these findings are concentrated on the realm of Medicine & Healthcare. This indicates a more pronounced presence of the systemic approach within this specific research domain compared to others like education, and so forth. (Hermanu et al., 2022).

Main research fields of the findings (total 529 papers)

- Medicine & Healthcare: 255 papers exluded
- Business & Management: 37 papers included ; 74 papers excluded
- Education: 43 papers exluded
- Demographics & Culture 120 papers exluded

48%, 23%, 8%, 21%
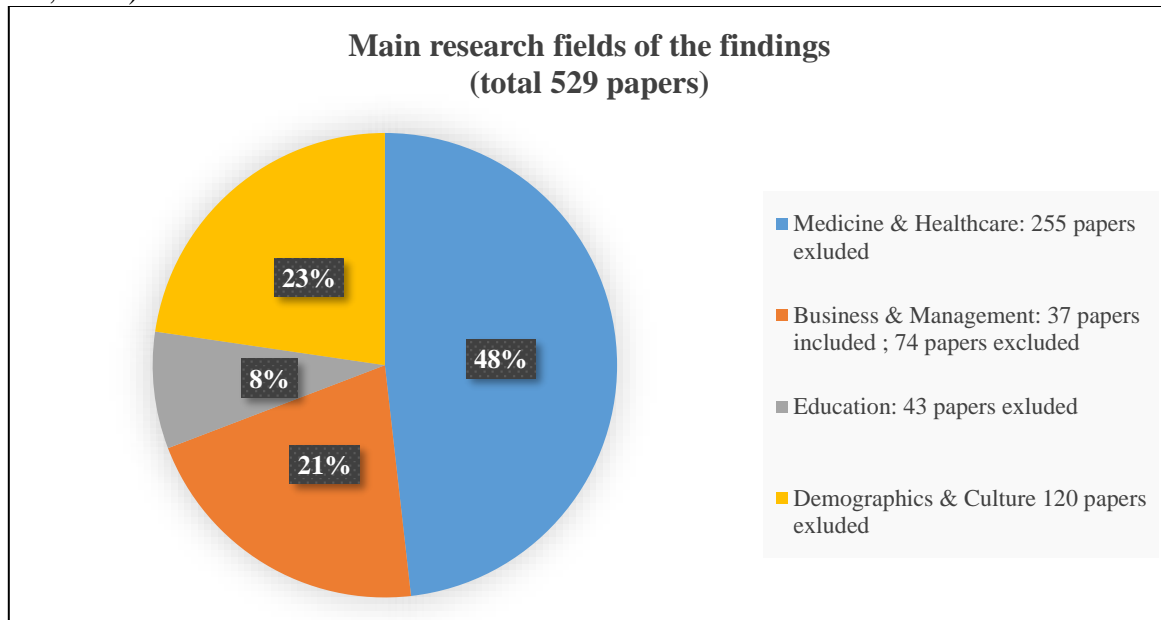
Fig. 7 - Main research fields of the findings. Source: Own processing based on (Hermanu et al., 2022)

Figure 3 shows the years in which the 37 papers were published. The maximum is in 2021-2022, when 12 of the 37 papers were published. The diagram also shows a clearly increased fluctuation of the publications, from this no clear trend can be determined. From 2018, there is a renewed increase in publications (Hermanu et al., 2022).
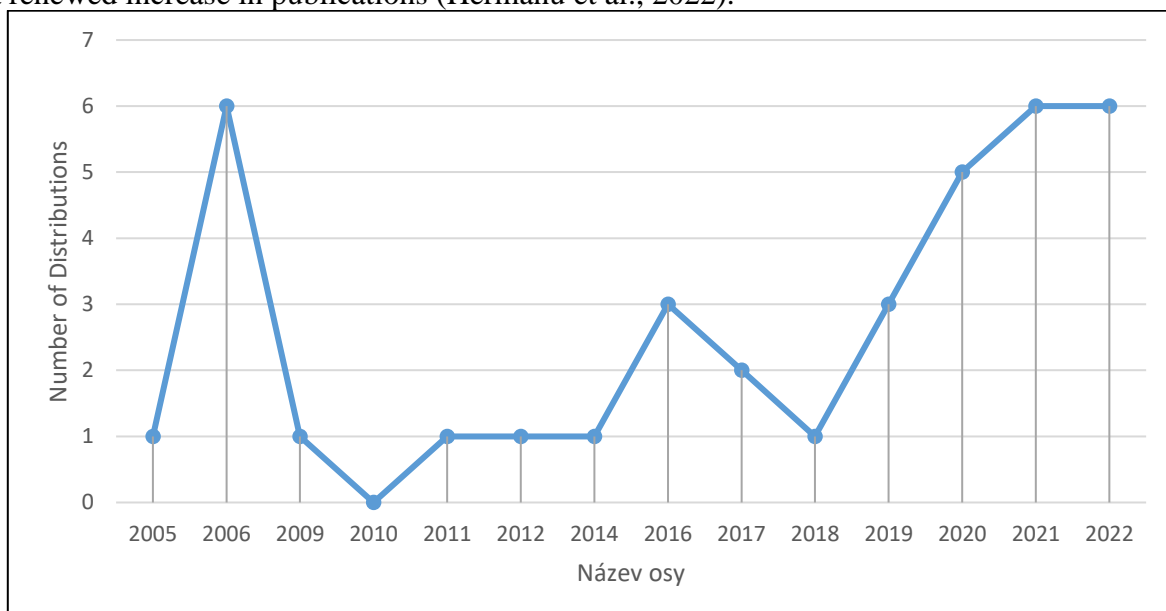
Fig. 8 - Number of Papers per Year. Source: Own processing based on (Hermanu et al., 2022)

Due to the large amount of data in the 37 papers to be analyzed, it is necessary as well as helpful to perform a preliminary analysis of the data to know the basic structure of the papers. With the

help of MAXQDA, 25 keywords were found that occurred at least three times and visually represented within a word cloud, see Figure 4. The most frequently cited words are systems and management. Figure 4 provides a structured framework with which to start the analysis in relation to Chapter 3. The most frequently words form the code structure for MAXQDA to deductively analyze the 37 papers (Roque Júnior et al., 2023).

Fig. 9 – Word cloud based on MAXQDA. Source: Own processing based on (Roque Júnior et al., 2023)

3   METHODOLOGY

The methodological approach of this research is based on the Prisma Protocol. The special thing here is that in addition to the evaluation, the complex definitions of the holistic aspects are presented, and research gaps are discovered. Following the PRISMA protocol, the starting point of the work is the research objective. It is intended to create a theoretical framework on systemic management and systemic intervention which can be used as a basis in future research projects. Furthermore, research gaps should reveal possible points of intervention. After searching in different databases, the papers are sorted out as presented in chapter 2 and the selected work is being evaluated. In addition to the individual steps, it must always be ensured that every step and every process is documented in detail and is reproducible. (Haynes & Alemna, 2022). The next step of the research, following the Prisma protocol, is based on a detailed analysis. The entire text as well as the contained information will now be completely structured and investigated. In order to obtain a suitable overview of the content of the papers, it is recommended to code, paraphrase and summarize the key statements of the papers via MAXQDA (Bauer & Strauss, 2016).

In this paper, the focus is on qualitative data analysis. The reason for this is the available information framework, which contains 37 papers that in turn have different structures and core statements on individual systemic aspects. The following quantitative analysis involves a deductive and inductive approach. Both refer to the way of categorization and structuring. The deductive approach builds the structure derivative from the research questions and most frequently words shown in figure 4. The inductive approach develops the structure from the contents and statements of the 37 papers. It is recommended to proceed deductively and inductively in the analysis to combine the advantages of both approaches. For example, from

the deductive main category "Systemic Management" different inductive subcategories can emerge from diverse interpretations of the analyzed works. All categories that later form a hierarchy must have a meaningful relationship to each other and to the data to be analyzed (Saunders et al., 2009). The MAXQDA program is used as a technical support. It is a popular tool for qualitative text analysis. It enables the coding of the text and a systemic and clear visualization of the core statements. Furthermore, all data is centralized and a variety of visualization tools are accessible to the user. From this, the data is characterized and evaluated with the help of the tool. To avoid confusion, the terms categories and codes are used synonymously. (Miseliunaite et al., 2022). In the final step of the analysis, the codes will be paraphrased and synthesized with the analysis function of MAXQDA to summarize the key statements on the main categories shown in chapter 4 (Yin & Fernandez, 2020).

4 RESULTS

4.1 Systemic Management

The starting point for systemic management according to (Tuczek et al., 2022) is that humans cannot understand the real world and that we as people live in a complex and dynamic reality. The author describes the real world as volatile, uncertain, complex and ambiguous, or VUCA for short. In the VUCA world, it is necessary for managers to develop a systemic understanding of complex relationships, as thinking in terms of simple linear causal relationships is no longer sufficient. Similarly defined by (Schwaninger, 2006a), complex problems can only be managed by higher level solutions. These solutions involve strategies for dealing with rather than eliminating the problems. This can be done, for example, by designing a system that is better suited to deal with the problem or by adopting a strategy that makes living with a dilemma more tolerable. From this understanding derives the approach of systemic management and related systems thinking, using higher-level solutions can be developed and complex real-world systems such as organizations can be designed.

The core definition of systemic management starting from (Schwaninger, 2006b) is that management is seen as a fundamental function essential for the viability and self-transformation of organizations and societies. Management involves the design, control and development of an organization or complex, productive social system. Through this, the efficiency, effectiveness and legitimacy must be fulfilled in the long term to ensure the survival of the social system. Design is the effective creation of a system. Control involves the constant adaptation to the complex and dynamic system environment. Development is the growing ability and desire of a system to meet its own needs and the needs of others. Another view, according to (Beer, 2011), is that organizations are systems made up of subsystems with their elements in special interactions. An organization can only be successful if its strategy is aligned with structure, personnel, processes, management, culture and its impact relationships with the environment. According to (Jackson, 2006), systemic management includes all possible methods and models (based on the principle of systems thinking) to ensure the viability of social systems. Summarizing this, systemic management is also the practical application of the doctrines of systems theory to the social system of organizations.

System theory considers systemic management as dealing with dynamic complexity and therefore adapting the system's boundaries and interaction with the system's environment. For this purpose, a system must always be adapted to the dynamic fluctuations of the environment by means of control variables. An important basic component is the concept of cybernetics, which includes the regulation and control of a system. This involves intrinsic control, self-organization and self-transformation. Control here does not mean mechanistic domination, but observation, feedback and influence. Effective control requires a dynamic balance between an

organization and its environment. Any system that sets a value absolutely is wrong (Schwaninger, 2019). Cybernetics attempts to manage increasing complexity through adaptation by identifying the basic mechanisms or structures of the system that control the behavior of the elements or subsystems and are therefore fundamental to system behavior (Jackson, 2006).

In addition to the current state of research on the understanding of systemic management, the systematic literature review also provides practical methods that can be used to control and regulate the system. In the following, three selected methods are presented which, according to the result of the literature search, are frequently used in the analyzed works. Starting with a method for systemic understanding and structuring of the organization, an approach for simulation and change of system structures is also presented.

An important tool for managing complexity according to the principle of cybernetics is, in reference to (Vahidi & Aliahmadi, 2019) and (Yu, 2006), the Viable System Model in short (VSM). It shows how systemic views can be applied to organizational structures such as management. According to the authors, a system that is to remain viable consists of five subsystems that are in constant interaction with each other. System 1 includes all operational units. System 2 monitors interactions between units and provides stability. System 3 optimizes collective operations and generates synergies. System 3 serves as a communication channel. System 4 gathers information about the environment and adjusts strategies. System 5 defines the identity and vision of the organization. To better understand and categorize this from a practical perspective, (Yu, 2006) describes in the following how the subsystems are embedded in the different levels of management. Operational management deals with operating costs, profitability and productivity and includes subsystems 1, 2 and 3. Strategic management explores the company's core competencies in order to improve the company's potential to compete with other competitors. Included in this is system 4 which interacts with system 3. The normative management provides values and an ethical basis for the company, contained in it is the system 5. In the current state of research, according to (Vahidi & Aliahmadi, 2019), the VSM combined with other systemic methods such as the System Dynamics is increasingly used to solve management issues.

To understand the interaction of the elements and the associated output, (Zolfagharian et al., 2021) describes the System Dynamics short (SD) as a classical method to model and simulate complex systems. The simulation of the model allows exploring different scenarios and test the robustness of the system. The model can also be used in combination with other methods such as the VSM presented earlier to increase its effectiveness. According to (Freeman et al., 2016), SD allows capturing and analyze the structures and behavior of systems. The model in itself is a graphical representation of various feedback loops that are interconnected and explain how and why organizations exhibit certain trends. Following (Noto & Cosenz, 2021), SD can represent a target structure to achieve a defined output, this also promotes strategy development and implementation in the organization.

The methods described above serve to present a systemic view of organizational structures and to analyze interactions and outputs of the system. This process serves to define a structure to ensure the survival of the system. Based on this, a system must be stimulated to change in order to achieve the desired output. The systemic approach of change management based on a multidimensional concept should lead to organizational change. Different types of change require different approaches, but these approaches often focus only on specific aspects and do not act holistically. Mixed methods are needed to effectively manage the interactions of different changes so that the entire system adjusts. The systemic view of change management

combines these methods in the approach of systemic intervention (see chapter 4.3) to stimulate a system and its structures to adjust actively (Cao & McHugh, 2005).

Current research indicates that systemic management approaches can be applied in a variety of areas, including business management, project management, organizational development, and strategic planning. It enables more effective management of uncertainty, complexity, and rapid change by emphasizing a holistic view of organizations and fostering the ability to adapt and innovate (Vahidi & Aliahmadi, 2019). Referring to the complexity companies face today, implementing systemic views into the organization can generate a significant competitive advantage in the global marketplace. This shows the benefits that entrepreneurial research in the field of systemic management can be (Schwaninger, 2019).

4.2 Systemic Intervention

According to the definition from (Cao & McHugh, 2005), change management in chapter 4.2 shows that systems and their structures can be stimulated to change in order to achieve a certain output. Through regulation and adaptation, systems can respond to the dynamics and complexity of the environment. According to (Vahidi & Aliahmadi, 2019), the ultimate goal of a social system is always to ensure survival. The VSM in chapter 4.2 has shown an example how such structures can look like. According to (Tuczek et al., 2022), such structures can only be created through the creation of high-performance organizations that act according to the principle of self-organization. Organizations need a collective mindset and cooperation that enables them to react quickly to market changes through constant reflection, feedback and thus contribute to the survival of the entire organization. In short, structures that self-regulate through constant feedback loops and optimize the output of the system. Such is the goal of systemic intervention. Similarly, (Vezzoli et al., 2017) formulates the intervention as a tool of systemic intervention in the structures which should remove the weaknesses of the individual elements. However, (Vezzoli et al., 2017) also point out that if certain conditions are not met or even parameters are set incorrectly a systemic intervention can lead to a deterioration of the system parameters. It is therefore important to understand the principle of systemic intervention and how it is applied to social systems such as organizations.

From the perspective of systems thinking, the main feature of systemic intervention is the synergy and combination of boundary critique and methodological pluralism. Through boundary critique or observing the boundary, the observers make analyses and diagnoses of problematic situations. With the help of various interlocking methods, the structures are to be stimulated to change in order to eliminate the problems. The synergy between boundary critique and methodological pluralism ensures that each aspect of the systemic intervention corrects the potential weaknesses of all elements in the system (Midgley, 2021). The process is extended by (Jackson, 2006). According to the author, after the implementation of the methods, a continuous reflection and feedback loop occurs by constantly revisiting the phases of observation, implementation, and reflection until the system provides the desired output. The reflection at the end of the loop is to measure and evaluate the desired success of the intervention.

In the previous section, it was made clear that a main feature of intervention is the observation of boundaries. Observation is viewed very critically in systems theory. According to (Midgley & Lindhult, 2021) everything in the world is directly or indirectly interconnected, and because the complexity is so large, we will only ever be able to understand part of it. Every observer has his own blind spot, more precisely, he sees the world only as he wants to see it. Observing the real world is therefore not possible. One can only see a part of it and can therefore only recognize the problems that need to be dealt with to a limited extent. According to (Lindhult et al., 2022) the principle of placing system boundaries is affected by the same problem. The boundaries of a system are closely related to the value judgments that influence decisions about

who and what is included in an intervention. In practice, the boundary should be as broad as possible and include many observers to address a wide range of information and concerns (Vezzoli et al., 2017).

In order to effectively address complex and multidimensional management problems, it first requires reflection on the boundaries of the organization. It is a matter of deciding what should be included in the investigation and what can be considered less important or irrelevant and excluded from the intervention process. The questions of where the boundaries should be drawn when observing a problem situation and what values guide the process of setting research boundaries play a role in this process. The answers to these questions determine the dimensions, variables, and entities of the systemic problem that will be included in the exploration, as well as the actions that will be taken during the intervention to bring about improvement. Determining the boundaries of exploration requires judgment and may be variable depending on one's perspective. The boundaries of observation and intervention should be viewed as social or personal constructions that determine both the knowledge and interests of the actors involved (Petrovic, 2015).

The second main characteristic of a systemic intervention refers to methodological pluralism. This means the need to choose between different theories and methods to bring about certain changes in the system (Lindhult et al., 2022). Starting from the critical observation of the limits, useful theories and methods are selected to cope with the complexity of the problems and to change the system in a goal-oriented way. There are two forms of methodological pluralism: learning from other methodologies to expand one's understanding, and combining methods from different methodologies. A system can be effectively intervened when a variety of methodologies are used that are consistent with the boundary critique (Midgley & Rajagopalan, 2021). Multi-methodology is a form of methodological pluralism that combines qualitative and quantitative methods. The combination of methods allows for better control and management of subsystems, diagnosis and analysis of organizational problems, and provides the necessary information and knowledge about the structure in the context of the intervention. The current commonly used methods in practice are presented in Figure 5 (Vahidi & Aliahmadi, 2019).
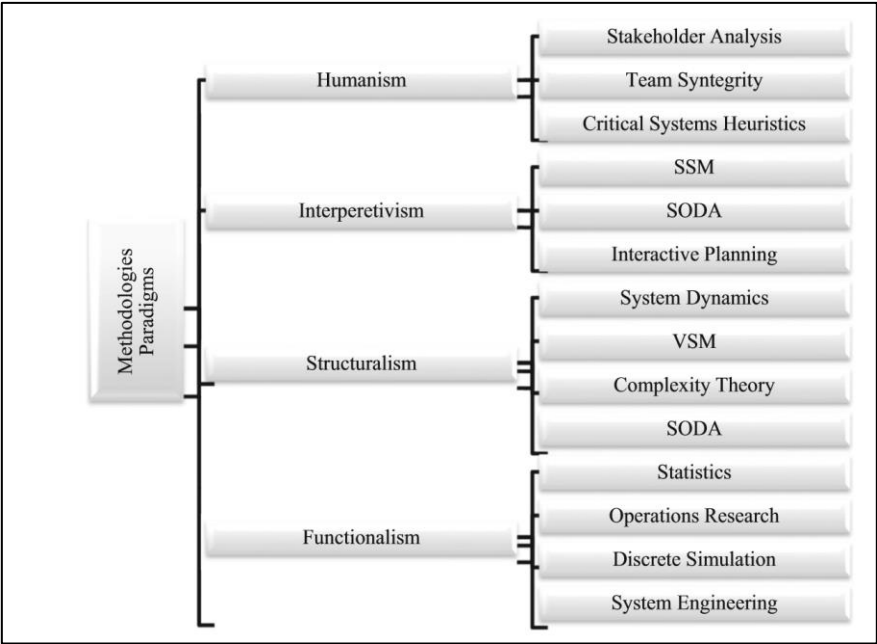
Fig. 10 - Most well-known systemic methodologies paradigms. Source: (Vahidi & Aliahmadi, 2019)

A very important framework condition for systemic intervention is that a system accepts and allows the change. As in change management, in the systemic context we speak of barriers in the intervention process. These barriers are conflicts in organizations triggered by different stakeholders and latencies. Conflicts are seen as a dynamic process within a social context and can lead to resistance. The conflicts consist of the actors involved in the change and the interests and values of the participants. Change in organizations can create different perceptions among the participants, which can range from positive reinforcement to rejection. It is important to understand and evaluate the perspective of the parties involved in the conflict in order to implement appropriate interventions (Raza & Standing, 2011). Systemic research identifies six such barriers: 1. Unclear strategy, values, and conflicting priorities. 2. An ineffective leadership team. 3. A rigid management structure 4. Inadequate coordination and communication between functions and business units. 5. Inadequate leadership competencies. 6. Poor vertical communication (Beer, 2011).

Organizations today face complex and dynamic challenges. The social system is in constant change and requires continuous adaptation through systemic interventions. In order to change the structures positively and to avoid that the function of the system is deteriorated by the changes, certain factors must be critically observed as described before. A boundary critique by an adequate number of observers. The choice of appropriate methods. The consideration of the barriers as well as a continuous reflection of the results in the context of a feedback loop (Freeman et al., 2016). The current state of research shows that systemic intervention is a method for organizational development and social change projects. These approaches go beyond simply solving surface problems and strive to understand the deep structures and dynamics that influence the behavior and functioning of a system. The application of systemic interventions requires a deeper understanding of systems theory and a high sensitivity to social and emotional dynamics within the groups involved (Midgley & Lindhult, 2021). It follows that companies that engage in this type of intervention should be prepared to strive for long-term results and to react flexibly to unexpected as well as negative developments. Systemic intervention can make companies more resilient, adaptive and effective, but should only be coordinated by experts who understand the assumptions of systems theory to reduce the risk of negative change. (Midgley, 2021).

4.3 Current Gaps in the research field

Within the framework of the analysis, statements were also specifically noted and coded that represent possible gaps in systemic research. These are briefly substantiated in the following in order to provide approaches for future research.

Many companies today place a great deal of emphasis on sustainability. This is also a current trend term that many organizations are focusing on. However, the problem is that the interactions between consumption and services, as well as the effective design of the product life cycle in terms of sustainability is not yet fully explored. Systemic management approaches can be used to influence the cycles with targeted interventions to make the processes more sustainable (Freeman et al., 2016) and support organizations in digitalization (Struyf et al., 2021). A research gap that builds on this is the study of the impact of structural and dynamic interventions on value-adding processes and complex supply chains. To illustrate the impact, insights from systemic research need to be applied to the structures described earlier. For this purpose, the system could be modeled and simulated to show the results of change over time (Abbasi & Varga, 2022). Systemic intervention and systemic thinking is a deep and complex theoretical construct. It is recommended that independent research projects put these ideas and methods into practice to uncover the impact of systemic interventions. Through this, the current state of research can be further optimized. Through practical application, insights grow to

improve the concepts and methodologies of systems theory. In this regard, problems may also emerge that have not yet been explored in systemic approaches (Midgley, 2021). Because of the growing interest in holistic thinking, there are a variety of systems approaches to choose from. A systemic approach requires the ability to look at problems from different angles and combine different systems approaches. Critical systems thinking fosters this creativity. There are research gaps regarding the creativity of systems approaches and their combination (Jackson, 2006). Related to this, there is also a lack of research into the effectiveness of the system approaches (Bengtsson et al., 2018).

5   DISCUSSION

The evaluation of the literature has shown in section 2.2 that from 2018 onwards an upward trend is emerging which specifically addresses the topic of systemic management. Also, (Haynes & Alemna, 2022) realizes in his systemic literature research that from 2010 the trend to systemic research works increases. He justifies this based on the economic crisis in 2010 and the resulting loss of confidence in linear assumptions.

The results in chapter 4 reveal that, according to (Tuczek et al., 2022), we live in a complex world that we cannot understand with our mind. In order to reduce complexity, systemic thinking should support the process of understanding and acting. According to (Vahidi & Aliahmadi, 2019), organizations must continuously adapt to the dynamics of their environment. This change requires a systemic intervention, according to (Midgley, 2021). Only through the critical border critique as well as the combined use of systemic methods and the attention to barriers, structures can be stimulated to adapt. The authors listed above are similar in their opinions. The basic understanding is identical. It is evident from the synthesis that the authors focus on the multi-method aspect of systemic intervention. Statement is that by the connection and the use of different methods see in figure 5 the systemic intervention should deliver better results. A comparison to the work of (Carr, 2014) shows that in the medical or psychological research area, the focus of the intervention is also on the combination and use of different methods.

In summary, chapter 4.4 shows that the statements about the research gaps in the listed works are partly consistent. It is made clear that systemic research lacks practical experience. Future research should therefore apply the systemic methods in organizations like the management process to show the actual effects. According to (Midgley, 2021), these results can further complement the theoretical constructs of systems theory in a practical context. Correlating results can also be found in the work of (Sony & Naik, 2020). In addition to the gap in practical application, the author highlights the idea of introducing aspects of system theory into the complete product life cycle. The industry 4.0 system is also expected to improve functionality and performance by combining it with systemic assumptions at the social level.

6   CONCLUSION

Following (Midgley & Lindhult, 2021), each observer has his blind spot. This means that the result of the systematic literature review always depends on the observer and his interests and values. Closing the research gaps from chapter 4.3 through practical application is therefore a contradiction to the assumptions of systems theory. Every application of systemic methods to companies is influenced by the values, judgments and opinions of the users. It is therefore impossible to determine a direct output from an input that can be estimated in the same way in all situations, based only on experience from practical studies.

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WINE CONSUMERS IN THE CZECH REPUBLIC: A SEGMENTATION STUDY

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Abstract

Market segmentation is a powerful tool for companies to help them target products to specific sets of customers whose characteristics are key to tailoring product attributes. It can help them to increase profits by selling products that consumers in the market are really interested in. The aim of this paper is to create segments in the wine market in the Czech Republic. Data was collected through an online questionnaire with a sample size of 205 respondents. Both hierarchical and non-hierarchical cluster analysis was used for data reduction and creation of market segments in IBM SPSS Software. After analysis of the collected data, four segments were created in the market – "indifferent", "enthusiastic", "regular", and "demanding" consumer segment. Segments were characterized by their consumer behaviour, such as frequency of consumption, price per bottle, which is usually paid, or preferred place of consumption etc. Winemaking is one of the important sectors of Czech agriculture and Czech wines are also valued internationally. The results can therefore be relevant for Czech winemakers as well. The limitation of the research lies in the focus on the Czech market and the size of the sample. Also, the method of distribution of the questionnaire can be perceived as a limitation as it was distributed on social networks.

Keywords: typology, wine, Czech market, consumer behaviour, product attributes

1   INTRODUCTION

The wine market in the Czech Republic is a significant market as winemaking is one of the important agriculture sectors. This alcoholic beverage enjoys considerable popularity among Czech consumers. Not only are wines imported from abroad, but there are also several important wine-producing regions in the Czech Republic, particularly in southern Moravia (Hejmalová et al., 2011). The preference for domestic wines over foreign wines, regardless of price, is 54%. Czech wines are labelled as "Wines from Moravia wines from Czech" and the knowledge of this brand is improving year by year and the experience with these wines is rated at 43% very positively (Straková, 2022).

The total consumption of wine within the Czech Republic is higher than its production. In particular, domestic production covers about one third of the total demand. Thanks to technical progress, although the production potential of Czech vineyards has increased threefold since 1960, wine must be imported, mainly from Hungary and Italy (Tomšík & Sedlo, 2013). Wine is a differentiated product where the price per bottle varies depending on the quality of the grapes, the method of production, the brand, the packaging and its design (Kučerová, 2014). Therefore, it is important to identify segments and their preferences when buying this product.

This article deals with consumer segmentation in the Czech wine market. The aim is to create a typology of consumers and describe their characteristics including their consumer behaviour such as frequency of purchase or rating the importance of the product factors. Segmentation of the Czech wine market has not yet been carried out, so the research tries to fill this gap. The only study focused on wine consumers in the Czech Republic comes from Anchor and Lacinová (2015) however, its aim was not to purpose the consumers segmentation, but to "identify the

most important motivations for Czech consumers to drink wine and the factors involved in wine purchase" (Anchor and Lacinová, 2015, p. 169).

This article focuses on all age groups in the Czech Republic over the age of 18 and also on all categories of economic status. The article consists of the following chapters: firstly, the theoretical basis is described, the second chapter focuses on the research methodology. In the third chapter, the results are described, the fourth chapter discusses the findings and finally, the article is summarized, and some recommendations are made.

2 LITERATURE REVIEW

2.1 Consumer behaviour for wine

Consumer behaviour generally includes the whole range of steps and activities that a consumer performs when choosing and consuming a specific product. As reported by East et al. (2022), consumer behaviour research plays a vital role in marketing because it provides answers to questions that are crucial in various aspects of marketing management. Also, Solomon et al. (2016) mention that marketers can only satisfy consumer needs to the extent that they know them. They also point out that knowledge of consumer behaviour enables organizations to properly target as well as identify possible opportunities and threats in the market.

Wine as a product from the category of alcoholic beverages is very popular in the Czech Republic. Even here, however, the consumer has different needs and preferences when purchasing this alcoholic beverage. Studies that deal with consumer behaviour in the wine market come mainly from abroad and focus on different aspects. Quinton and Harridge-March (2008) examine differences in in-store and online wine purchases in the UK market. The influence of packaging and labelling is the subject of research by Goodman (2009) or Barber et al. (2007). Brunner and Siegrist (2011b) describe how lifestyle determinants influence wine consumption, and as the strongest ones they identify the knowledge about wine, drinking wine to relax, and sociability. Van Zanten (2005) investigates what are the reasons for drinking wine, and as the main ones there are identified the variety of tastes and flavours, and the fact that it is a kind of drink that is suitable for drinking with meals. MacDonald et al. (2013) examine how the influence of drivers and choice factors in the purchase and consumption of wine varies by generational cohorts, while Thach and Olsen (2006) focus only on Millennials as the important target group in the wine market. Young adults are also the subject of research in paper by Silva et al. (2014), who applied the theory of planned behaviour to identify perceptions, attitudes and behaviour of this target group concerning wine consumption. Many studies look at how consumers perceive the effect of wine consumption on their health. Chang et al. (2016) found that red wine is perceived as healthier than the other types of wine and healthier than beer or spirits. These conclusions are consistent with the study by Higgins and Llanos (2015) who also found that consumers associate the positive health effects of red wine mostly with the cardiovascular system and cholesterol reduction. Vecchio et al. (2017) examine the opinions of French, Italian and Spanish consumers on moderate wine consumption and its health impacts. An interesting topic in connection with the consumption of wine is the issue of sustainability and environmental friendliness. Pomarici et al. (2016) focused their study on Italian consumer interests toward eco-friendly wines. Also, Janssen et al. (2020) investigated what are the consumers' attitudes toward organic wine.

2.2 Segmentation of wine consumers

According to Freter (2008) segmentation is the process by which customers are divided into different groups, which allows for better handling and effective differentiation between given

segments. Segmentation allows companies to manage resources efficiently and focus on the groups of consumers they are able to satisfy (Cline et al., 2014). Segments can be distinguished by their lifestyle, demographic, geographic or behavioural characteristics such as brand loyalty, frequency of product use or preference for product attributes (Bock & Uncles, 2002; Hoyer et al., 2012).

Lockshin and Corsi (2012) mention that the segmentation in the wine market is one of the major areas which is focused on wine marketing papers. Geraghty and Torres (2009) conducted research on the Irish wine market, and they identified three groups of wine consumers: "casual wine buyer", "value seeking wine buyer", and "wine traditionalist". Brunner and Siegrist (2011a) examined the Swiss wine market and identified the following six segments: "the price-conscious" wine consumer, "the involved, knowledgeable" wine consumer, "the image-oriented" wine consumer, "the indifferent" wine consumer, "the basic" wine consumer, and "the enjoyment-oriented, social" wine consumer. Since price is often a significant factor in consumer decision-making, Thach and Olsen (2015) decided to examine US wine consumers behaviour based on a price segmentation. Johnson and Bastian (2015) applied an instrument called Fine Wine Instrument (FWI) to identify these Australian wine consumer segments: "wine enthusiasts", "aspirants", and "no frills". Calvo-Porral et al. (2020) created consumer typology based on emotions that consumers feel when consuming wine. They recognize four clusters: "emotionally unattached", "negatives", "contented circumspects", and "wine lovers". Caracciolo et al. (2022) identified four groups of Italian households according to wine consumption characteristics: "habituals", "switchers", "loyals", and "variety seekers".

3   METHODOLOGY

A questionnaire was used as the data collection method and was distributed on social media from 25 January 2023 to 23 February 2023. The baseline sample consisted of residents of the Czech Republic over the age of 18 who are interested in wine.

The data were then coded in MS Excel and converted into IBM SPSS Statistics. Statistical tests were performed in SPSS as well as factor and cluster analysis. The sample was constructed using non-probability sampling method, specifically the opportunity method and also the snowball sampling method. A total of 224 respondents took part in the research, 19 of whom had to be excluded from the research because they were non-consumers of wine and therefore not part of the sample. The final sample size was therefore 205 respondents. All defined age groups, but also income groups and economic status categories were represented in the sample. Sample structure can be seen in table 1.

Tab. 1 – Sample structure. Source: own research

Age	18-25 years	24.9%			
	26-35 years	23.4%	Gender	Female	62.9%
	36-45 years	18.5%		Male	37.1%
	46-55 years	15.6%	Education level	Secondary s. without diploma	14.6%
	56-65 years	14.2%		Secondary s. with diploma	46.8%
	66 + years	3.4%		Higher education	38.6%
Economic status	Employed	61.5%	Net monthly income	Up to 10 000 CZK	16.6%
	Student	17.6%		10 001 – 20 000 CZK	15.1%
	Self-employed	9.8%		20 001 – 30 000 CZK	29.3%
	Maternity leave	6.8%		30 001 – 40 000 CZK	21.0%
	Retiree	3.9%		40 001 – 50 000 CZK	9.8%
	Unemployed	0.5%		50 001 – 60 000 CZK	8.3%

3.1 Cluster creation

Cluster analysis was used to divide consumers into given segments, whereby four clusters were formed. The goal of cluster analysis is to organize objects into certain groups, while these groups differ from each other and at the same time the objects within one group are similar. Each object belongs to one cluster and the clusters do not overlap (Hennig et al., 2015). In this paper, both hierarchical and non-hierarchical clustering methods were used. Firstly, the hierarchical clustering was performed. Euclidian distance was used to measure the distance and Ward's method was used as clustering method, which allows small clusters of approximately equal size to be formed (Everitt et al., 2001; Landau & Ster, 2010). The number of clusters was determined by the largest difference between the coefficients. According to these differences, four clusters were created. To determine whether this number of clusters was optimal for the sample, an ANOVA test was needed. Based on the ANOVA test, the significance values were less than 0.05, indicating that the determined number of clusters can be considered sufficient. Subsequently, the non-hierarchical K-Means method was used, in which the number of clusters needs to be known in advance (Malhotra et al., 2017). Therefore, it was worked with number of clusters from the previous analysis.

4 RESULTS

First, hierarchical clustering was performed using the Ward method and four clusters were formed using the distances between the coefficients. This number was then worked with in the non-hierarchical clustering using the K-Means method. Due to the sample size, hierarchical clustering was preferred as it is suitable for samples with the size up to circa 200 respondents.

The newly formed clusters were subsequently named according to the degree of agreement with the statements concerning the wine market. The first cluster was named "indifferent" consumers and comprises of 23.9% of respondents. The second cluster was named "enthusiastic" consumers and comprises a total of 16.6% of respondents. The third cluster is "regular" consumers which includes a total of 22.9% of sample. The last and largest cluster was named "demanding" consumers and comprises of 36.6%. Characteristics of segments consumer behaviour can be seen in table 2.

The clusters were created based on the rating of the importance of wine factors on a scale of 1 to 5 with one being "absolutely unimportant" and five being "absolutely essential". They were also created based on statements related to wine consumption, as well as respondents' purchasing behaviour, where they were asked to choose one from several options in the questions. Respondents were asked to rate how important each factor was to them when buying wine.

"Indifferent" consumers are most likely to consume wine less frequently (36.7%), but there are also those who are more likely to consume wine at least once a week (24.5%). This segment prefers mainly dry wine (34.7%). Average price per bottle of wine ranges from 101 to 200 CZK and the most preferred places of purchase are wine shops (46.9%) or retail units (40.8%). "Indifferent" consumers prefer to consume wine at home and when visiting. Only 8.2 % of them prefer to consume wine in bars, restaurants or wine shops.

The frequency of consumption varies among the segment of "enthusiastic" consumers. The same percentage (32.4%) consume wine at least once a week and at least once a month. They mostly prefer semi-dry wine (32.4%) and sweet wine (26.5%). "Enthusiastic" consumers are most often willing to pay 101-200 CZK for a bottle (67.6%). The preferred places of purchase are the wine shop (47.1%) and the retail unit (38.2%). Most often they consume wine at home (55.9%), but not at all in wine cellars.

"Regular" consumers most often drink wine at least once a week (74.5%). They prefer dry wine (40.4%), but semi-dry wine is also popular (31.9%). They most often buy wine in the price range of 101 to 200 CZK (59.6%). The preference for the place of purchase is somewhat balanced, with the most frequent purchases being made in a wine shop (38.3%), followed by a retail unit (31.9%) and the winemaker (25.5%). The vast majority (89.4%) consume wine at home.

The same percentage (34.7%) of "demanding" consumers drink wine at least once a week or once every 14 days. They mostly prefer dry wine (45.3%), but to the same extent they also prefer semi-dry and semi-sweet wine (25.3%). The biggest part of segment (69.3%) usually spends from 101 to 200 CZK for a bottle. Purchasing from a wine shop is most preferred (64.0%) and wine is most often consumed at home (57.3%).

Tab. 2 – Consumer behaviour of the segments. Source: own research

		Indifferent	Enthusiastic	Regular	Demanding
Frequency of consumption	At least once a week	24.5%	32.4%	74.5%	34.7%
	At least once every 14 days	22.4%	29.4%	21.3%	34.7%
	At least once a month	16.3%	32.4%	4.3%	20.0%
	Less often	36.7%	5.9%	0.0%	10.7%
Wine preference by residual sugar content	Dry	34.7%	23.5%	40.4%	45.3%
	Semi-dry	18.4%	32.4%	31.9%	25.3%
	Semi-sweet	26.5%	17.6%	25.5%	25.3%
	Sweet	20.4%	26.5%	2.1%	4.0%
Price per bottle of wine	Under 100 CZK	18.4%	8.8%	2.1%	2.7%
	101–200 CZK	49.0%	67.6%	59.6%	69.3%
	201 – 300 CZK	24.5%	17.6%	27.7%	22.7%
	More than 301 CZK	8.2%	5.9%	10.6%	5.3%
Preferred place of purchase of wine	At the winemaker's	4.1%	11.8%	25.5%	22.7%
	In a wine shop	46.9%	47.1%	38.3%	64.0%
	In a retail unit	40.8%	38.2%	31.9%	8.0%
	Elsewhere	8.2%	2.9%	4.3%	5.3%
Preferred place of consumption of wine	At home	44.9%	55.9%	89.4%	57.3%
	At a visit	42.9%	23.5%	4.3%	26.7%
	Bars, restaurants, wine shops	8.2%	20.6%	4.3%	12.0%
	Wine cellar	2.0%	0.0%	2.1%	2.7%
	Elsewhere	2.0%	0.0%	0.0%	1.3%

The importance of factors in wine purchasing was rated differently by respondents from each segment as can be seen in table 3. For the "indifferent" segment, previous experience (4.57) was rated as the most important factor, as well as wine variety (4.27) and country of origin (4.24). The least important criteria were promotion (1.45) and awards in competitions (2.06).

For the "enthusiastic" consumer segment, previous experience is significantly more important than other factors (4.48). Only the importance of price comes close (3.71). The other factors are on average rated relatively low in importance, with respondents giving the least importance to competition awards (1.52) and promotion (1.69) as in the previous segment.

For the "regular" consumer segment, the importance of the factors is rated similarly on average. The alcohol content of the bottle (2.84) and promotion (2.81) are most important to them. Least important are previous experience (2.29) and variety (2.32), although the difference is essentially negligible.

By the factors importance rate of "demanding" consumers, the highest importance is given to previous experience (4.69) and also to recommendations (4.23). Alcohol level (2.71) is

considered the least important factor, along with promotion (3.05). In general, the average importance of the factors is highest compared to the other segments.

Tab. 3 – Factors importance between the segments. Source: own research

	Indifferent	Enthusiastic	Regular	Demanding
Previous experience	4.57	4.48	2.29	4.69
Wine variety	4.27	3.00	2.32	3.89
Recommendation	3.24	2.75	2.45	4.23
Price	3.33	3.71	2.77	3.12
Country of origin	4.24	2.17	2.52	3.40
Producer	3.78	1.90	2.45	3.36
Wine region	3.39	2.02	2.48	3.47
Packaging	2.55	2.19	2.71	3.48
Alcohol level	3.14	2.06	2.84	2.71
Awards in competitions	2.06	1.52	2.61	3.59
Promotion	1.45	1.69	2.81	3.05

Regarding the demographic structure of the segments which can be seen in table 4, in the "indifferent" segment we can observe a high percentage of people between 18 and 25 years old (42.9%). More than half (55.9%) are people with a high school diploma. Of all the observed segments, the highest proportion of students is found here (26.5%). The income structure is relatively evenly distributed, with an excess of groups with incomes up to 30 000 CZK.

The "enthusiastic" segment is equally represented by persons under 25 and under 35 years (29.4%). This segment has the highest proportion of economically inactive persons compared to the other segments (23.5%). Also, persons with secondary education with a high school diploma are significantly represented (64.7%).

For the "regular" consumer segment, there is the highest representation of people aged 26 to 35 years (34.0%). These are largely people with higher education (57.4%) and higher income, typically above 40 000 CZK (31.9%), which are significant differences from the other segments.

The last segment of "demanding" consumers has the most balanced age structure compared to the other segments. There is an equal share of people with secondary education with a high school diploma and with higher education (42.7%) and the largest share of employed people (73.3%). Among income groups, those with incomes of 20 000 CZK and above are more likely to be represented.

The structure of the segments according to gender does not need to be commented on further, since given the structure of the sample, all segments are dominated by women, who make up around 60% of each segment.

Tab. 4 – Segment structure by the demographical criteria. Source: own research

		Indifferent	Enthusiastic	Regular	Demanding
Age	18-25 years	42.9%	29.4%	14.9%	17.3%
	26-35 years	16.3%	29.4%	34.0%	18.7%
	36-45 years	16.3%	8.8%	12.8%	20.0%
	46-55 years	14.3%	11.8%	19.1%	24.0%
	56 +	10.2%	20.6%	19.1%	20.0%
Gender	Male	36.7%	41.2%	36.2%	36.0%
	Female	63.3%	58.8%	63.8%	64.0%
Education	Secondary s. without diploma	18.4%	14.7%	10.6%	14.7%
	Secondary s. with diploma	55.1%	64.7%	31.9%	46.8%
	Higher education	26.5%	20.6%	57.5%	38.5%
Economic status	Employed	44.9%	50.0%	68.1%	73.3%
	Economically inactive	16.3%	23.5%	6.4%	5.3%
	Self-employed	12.2%	8.8%	12.8%	6.7%
	Student	26.5%	17.6%	12.8%	14.7%
Income	Up to 10 000 CZK	24.5%	17.6%	12.8%	13.3%
	10 001-20 000 CZK	22.4%	20.6%	6.4%	13.3%
	20 001-30 000 CZK	30.6%	35.3%	29.8%	25.3%
	30 001-40 000 CZK	16.3%	23.5%	19.1%	24.0%
	More than 40 000 CZK	6.1%	2.9%	31.9%	24.0%

5 DISCUSSION

As mentioned in section 2.2, several studies have already looked at segmentation on the wine market. However, the authors of each of them approach segmentation in a different way and focus on different criteria – demographic, behavioral, etc. It is therefore difficult to compare the results of each study. In this paper, the results of segmentation are presented mainly in terms of behavioral characteristics (frequency and place of purchase, average price per bottle, place of consumption and the importance of selected factors in the purchase of wine).

Geraghty and Torres (2009) conducted the segmentation of Irish wine market. The segment which they called "casual wine buyers" is like the "indifferent" group in this paper, in both cases price, wine variety and origin are important when buying wine. The only difference is that "casual wine buyers" are older than "indifferent" ones. Irish segment "value seeking wine buyers" is quite similar to Czech "enthusiastic" because of demographic characteristics (age, education, economic status) and less spending for wine. Also, importance of price and consumption at home are typical for both of them. The third Irish segment called "wine traditionalists" has some similar features with Czech "regular" consumers. They are high consumption of wine, willingness to pay more, because price is not the important factor, high education and higher age.

Brunner and Siegrist (2011a), who focused on Swiss wine market, identified six different segments. The segment labelled "involved, knowledge" wine consumers is similar to "regular" consumers in this paper. For both groups, more frequent consumption of wine is typical. Price is not an important criterion for them, at the same time they are willing to pay more for wine. In both cases, these are consumers with higher incomes who prefer to consume wine at home. Although the authors of the Swiss study also identified the "indifferent" segment, this profile does not correspond to Czech "indifferent" wine consumers, especially in terms of age. In this study, indifferent consumers mainly belong to the younger age category, which is characterized

by a rather lower wine consumption and a preference for lower prices. The "basic" segment has these characteristics in the Swiss study.

The study by Johnson and Bastian (2015) focuses on similar aspects of Australian wine consumers. The segment labelled "enthusiastic" in their study can be likened to the segment of "regular" consumers in this paper. In both cases, these are the consumers who consume wine most frequently compared to other segments, are willing to spend more money on wine, and also have the highest level of purchases from winemakers. The segment that Johnson and Bastian referred to "no frills" is similar to the "indifferent" segment of this paper. In both cases, these are the consumers who drink wine least often, spend the least amount of money on it, and prefer to buy from wine shops or retail chains. Australian "aspirants" have some similar characteristics to the Czech "demanding" wine consumers, as they are willing to pay higher prices, they are influenced by promotion and interested in wine that was awarded.

6 CONCLUSION

The aim of this article was to create segments of the consumer market for wine in the Czech Republic. These segments were then described using characteristics related to consumer behaviour such as frequency of consumption, importance of product factors or usual price per bottle purchased. Four segments were created, namely "indifferent", "enthusiastic", "regular" and "demanding" consumer segment.

In addition to the previously mentioned differences, there are some similarities between the segments in terms of consumer behaviour. The most common place of purchase are wine shops. This is where most of the "indifferent" (46.9%), "enthusiastic" (47.1%), "regular" (38.3%) and "demanding" (64.0%) consumers buy wine. Most often, the members of the segments spend on wine an amount between 101-200 CZK. For the "indifferent" segment it is 49.0%, for the "enthusiastic" 67.6%, for the "regular" 59.6% and for the "demanding" 69.3%.

In terms of the importance of product factors, the "indifferent" (4.57), "enthusiastic" (4.48) and "demanding" (4.69) segments of consumers rated previous experience as the most important factor. A previous positive experience therefore leads to a repeated purchase of wine, so it can be spoken of consumer loyalty to a given brand or type of wine. This was different only for the "regular" consumer segment - none of the product factors were particularly important to this segment. The alcohol content of the bottle (2.84) was rated as the most important factor, along with discount promotions (2.81).

Wine is an essential commodity for the Czech Republic, not only in terms of domestic production, which is supported, for example, by the "Wines from Moravia wines from Bohemia" brand, but also in terms of imports, which are necessary given the level of consumption and the preferences of certain consumers. Examining consumer behaviour in this market can help producers to focus on those segments that are targeted by them and can improve their profits. It has been shown that there are significant differences between segments in, for example, frequency of consumption or evaluation of the importance of certain product attributes. Such results can certainly be worked with in the future.

The limitations of the research presented in this paper, lie mainly in the size and structure of the sample, which was not obtained in a representative manner. In terms of future research, there are several areas that could be explored further. First, consumer attitudes towards wine consumption can be included in the segmentation, e.g., from the point of view of beliefs about the impact of wine on consumer health or the preference of wine over other alcoholic beverages. Interesting findings could be obtained through the evaluation of consumers regarding their knowledge of wine, orientation between different types and variants of wine and in wine

quality, the ability to pair wine with food, etc. Here, however, the degree of subjectivity should be considered, or real knowledge testing should also be included in the research.

Another area of research could be the purchase decision itself and the process of buying wine. Which segments buy wine more spontaneously and who plans the purchase? On what occasion is wine most often purchased and consumed? Also, the choice of place of purchase may differ within individual groups of consumers, whether it is stores or e-shops. And finally, it would be interesting to find out whether individual segments differ in the way they search for information about wine, who influences them when choosing wine, and if at all.

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DREAMTEAM OR BAD BLOOD:
WHAT COMPETENCIES AND SUPPORT ARE NEEDED TO BUILD EFFICIENT INTERGENERATIONAL TEAMS?

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Abstract

The ageing of the population is a societal phenomenon, and one of the consequences is that people are longer active in the labour market. Currently, the labour market engages five different generations, which is more than ever before. With this, a question naturally arises: how these generations can coexist in the working environment? The topic of intergenerational cooperation is nascent and underdeveloped, particularly in the context of Slovakia. The focus of the paper is to examine which intergenerational competencies are important to work with different generations and how intergenerational cooperation can be supported. Based on the eight semi-structured in-depth interviews and thematic qualitative analysis, we identify five competencies crucial for intergenerational cooperation – openness, social trust, respect, cognitive empathy, and mindful communication. Further, using a phenomenological study approach, we establish a framework for studying the support of intergenerational cooperation. The framework promotes three pillars that encourage intergenerational cooperation – the organisation (system) itself, the leaders, and the development of intergenerational competencies. Our results offer practical implications for managers, business owners, and practitioners and contribute to the body of knowledge on social capital theory, social interdependence theory and high-reliability organisational theory in the intergenerational context.

Keywords: intergenerational cooperation, intergenerational competencies, multigenerational teams, thematic qualitative analysis, phenomenological study

1   INTRODUCTION

Today, people are living longer than ever before. WHO data (Ageing and Health, 2022) confirms growth in the size and proportion of older people in every country over the world. In 2020, there were more 60 aged persons living than 5 years old children. The predictions calculate that by 2030 one in six people will be aged 60 years and older (Ageing and Health, 2022). By 2050, the population aged 75-84 expects to rise by 56%, and persons aged 65-74 are supposed to increase by 16%. On the other hand, the population aged less than 55 years will decrease by 13% (Eurostat, 2023). The ageing of the population is a societal phenomenon. One-third of governments for which data is available (27 from 81) consider population ageing as one of the key factors to be taken into account in policy-making. The remaining two-thirds see population ageing as a fact that will need to be actively addressed in the next decade (United Nations, 2020). The ageing of the population has certain consequences, among them having an impact on the healthcare system, social system, and workforce (Ageing and Health, 2022). This study is focused on the workforce impacted by the ageing of the population. The workforce consists of different generations.

The topic dedicated to generations is not new. In the middle of the 20th century, society began to notice that people who were born in roughly the same years had several commonalities compared to people who were born in different decades (Mannheim, 1952). Also, many researchers examine the generational characteristics by describing main shared features

(Berkup, 2014; Dolot, 2018; McAlister, 2009), finding similarities and differences of generations (Kolnhofer-Derecskei et al., 2017; Lewis and Wescott, 2017) and exploring workplace behaviour based on belonging to particular generation (Bencsik et al., 2016; Valickas and Jakštaitė, 2017; Iorgulescu, 2016). A considerable amount of research in this area is devoted to the topic of how to manage multigenerational teams (Cekada, 2012; Al-Asfour and Lettau, 2014; Rajput et al., 2013), or how to deal with conflicts in the workplace caused by generational disagreements (Rudolph and Zacher, 2015; Appelbaum, 2022). From a different point of view, the research also shows that there are stereotypes about certain generations, and we should avoid these stereotypes (Brecko, 2021).

However, an area that has not received the necessary research attention is the exploration of the competencies needed in intergenerational collaboration and the support of intergenerational teams. The topic of exploring competencies enabling intergenerational cooperation is highly relevant and actual, as there are currently five different generations working in the labour market (Kelly, 2023). The five different generations, with different values, expectations, experiences, and approaches to work are indeed a challenge for managers and business owners (Graystone, 2019). The studying intergenerational competencies and cooperation may help promote diversity in workplaces, may eliminate the conflicts among generations, may ensure better performance of organisations and businesses. Further, the decision-making tasks are crucial in managers' roles (Danihel, 2022), and managers start to include generation concepts within the decision-making process. Also, the ageing of the population means that seniors are longer active in the labour market. The older workers are concerned about working in multi-generational teams (Lojda et al., 2021). However, it seems that in the future they will not have a choice if they want to sustain themselves in the labour market. Also, data shows that older workers do not consider retirement as beneficial. The higher the educational attainment, the higher inability to enjoy retirement (Belas et al., 2020).

A considerable amount of effort is expected from each generation, whether younger or older, to make intergenerational teams successfully cooperate. We aimed to find out what competencies are needed to make intergenerational cooperation work and how intergenerational cooperation may be improved.

The structure of our paper is conventional. Section 2 reviews the former literature on competencies, capabilities, predispositions and support mechanisms that favour intergenerational cooperation in the working environment. Next, Section 3 describes the methodology used in our study, while Section 4 explains the obtained results. Section 5 discusses our findings against former research, the practical implications, theoretical contributions and the limitations of our study. Finally, the last section concludes the paper.

2 LITERATURE REVIEW

The literature review of our study is focused on analysing what do we know so far about competencies, capabilities, and predispositions to make multigenerational cooperation successful. However, we consider the literature on this topic lacking, as it is a specific topic. Furthermore, we analyse the literature related to the support of intergenerational cooperation.

2.1 Competencies

Regarding the definition of used terms, we consider competence as an ability to do something with successful or effective results. Also, competence is often described as an important skill that enables one to do a good job (Moghabghab et al, 2018), or can be described as skill or knowledge for an activity or process (Holtkamp et al., 2015). Multigenerational cooperation is characterized as an activity in which people from different generations work together with a

shared goal (Lojda et al., 2021). Multigenerational entrepreneurship is defined as social innovation focused on sharing the continuing entrepreneurial effort using synergies from differences and complementary characteristics of different generations (Pilkova et al., 2022). In our paper, we use the terms multigenerational and intergenerational as synonyms. Multigenerational cooperation, multigenerational teams, or multigenerational entrepreneurship is used in our study as an area where people from different generations meet and work together.

When it comes to competencies, previous research has already identified some particular competencies. For example, a systematic literature review was conducted addressing research questions related to competencies required for global start-up entrepreneurs working in intergenerational settings. The review grouped individual-level competencies into categories. The authors chose categories from previous research – creativity, cultural empathy, teamwork, networking, and organisational space and vision (Jensen, 2017; Knight and Cavusgil, 2004), while the capabilities that do not fit into any categories were assigned to new categories. The resulting eight categories were: effectual creativity, technical domain, growth virtues, cultural awareness, sustainable networking, responsive teamwork, intergenerational safety facilitation, and value-driven organising. Effectual creativity is linked with the ability to design thinking and foresight thinking, which enable one to establish a product or service with considering future performance. The technical domain expertise is associated in this context mainly with the ability to use digital technologies. The growth virtues grouped competencies that allow personnel to self-development and manage challenges. The competencies in this group are grit, self-determination, conscientiousness, intergenerational reflection, and resilience. Cultural awareness means that people can understand cultural differences, to do so, pluralistic thinking and digital empathy are needed. Sustainable networking promotes influencing, transparency, and effective communication. Responsive teamwork highlighted competencies such as active listening and conflict resolution. Intergenerational safety facilitation consists of competencies that can help build psychological safety, such as intergenerational flexibility and adaptability. The value-driven organising represents competencies for managing the resources based on the shared vision. Moreover, the authors offered a framework of the mentioned intergenerational competencies of global start-ups in the digital age, taking the three dimensions into account a degree of global innovation activity, a degree of intergenerational collaboration activity, and a degree of activity in the digital environment (Nurhas et al., 2021). Moreover, the authors performed a Delphi study to assess defined intergenerational competencies and set a ranking for each competency under a particular competency group (Nurhas et al., 2022).

Sticking with intergenerational competencies, another study was made where researchers focused on entrepreneurial competencies required in the current dynamic labour market whit huge changes, especially in the digital area. According to the study result, the most important competence is the empathy, followed by team ability and risk readiness (Labanauskaitė et al., 2021). The teamwork or ability to work in a team is highly strengthened by a collaborative attitude (Starks, 2013). Moreover, resulting from experts' observations, mutual respect and empathy are crucial to making intergenerational teams work (Perez-Encinas et al., 2021). Similarly, respect and willingness to make compromises are necessary to reflect differences among generations (Lojda et al., 2021).

Further, the lots of works do not primarily focus on identifying intergenerational competencies. However, we can imply or deduce competencies from their results. The former research (Poulsen et al., 2021) used case studies and inductive analysis to identify a typology of different learning profiles based on the groups' opinions and expectations. The authors saw the connection between the ability to work in a team and communication (the important is "common language") and continuous learning through teamwork in the digital area (Poulsen et al., 2021). Communication is the key to success not only for intergenerational teams but also

for the whole organisation. Therefore, the leadership style of managing multigenerational teams needs to be aimed at communication gaps among different generations and actively encourage mutual communication and mutual learning. What is more, mutual learning can reduce the costs of training and education. Regarding mutual learning, a person should be willing to share experiences, values, and ideas (Lojda et al., 2021). From the above-mentioned, we can conclude that communication skills and willingness to share are important intergeneration competencies.

Based on above mentioned research, we formulated the research question:

Which personal competencies are necessary for working in an intergenerational team?

2.2 Support of intergenerational cooperation

Literature about supporting intergenerational cooperation is quite fragmented and results are ambiguous. Some authors perceive, that solution for better intergenerational cooperation should be part of the business's strategy, as intergenerational cooperation influences communication and implementation of new technologies, and also impacts its organisational structure. When intergenerational cooperation is implemented into business strategy, the organisations may reach their full potential and get lots of advantages, among them a competitive advantage (Baran and Kłos, 2014).

Some see training as the most important tool, like in the study of Lojda et al. (2021), a focus group was used to suggest intergenerational training methodology. Results showed that to achieve successful intergenerational cooperation, specific training is necessary for both generations (authors divided the population of entrepreneurs into two main categories – juniors and seniors). Similarly, a practical training course was performed (Wagner and Luger, 2021). The sample consists of two generations of students. First, the 55+ years old students, and second the students between 18 to 30 years old. The questionnaires collected before the course showed greater comfort and kindship for their aged generation but also showed greater engagement with another age group. Surprisingly, the questionnaires filled out after the course examined that the younger generation significantly increased the affection, comfort, and enthusiasm for working with the older generation. However, the level of these variables remained the same in the older generation.

Others examined projects where intergenerational cooperation was studied 'on set'. Like a community-based project, where intergenerational learning occurred among immigrants via using ICT tools stated that learning was beneficial for both generations, i.e. younger and older as well, and that the intergenerational learning facilitated their mutual understanding (Leek and Rojek, 2021).

Some perceive the understanding of different generations and education as a key. When organisations understand generations and their dynamics in the workplace, it can lead to the elimination of conflicts and better intergenerational cooperation (Hirsch, 2020). Also, education about generations, their differences, and their similarities should take place in organisations (Marcee Everly, 2016). The positive outcomes from education and team-building activities require lots of time. Therefore, it should be planned in appropriate frequency and time horizons. Otherwise, the change in people's behaviour will not last (Cherry, 2014).

Other authors rely on the roles of mentors or counsellors. Like the study performed in the nursing sector confirmed that the support of mentors and opportunities for development are crucial. Then open communication and respect for each generation encourage mutual learning and help achieve each generation the best possible outcomes (Pawlak et al., 2022). Or, the research by Wawrzonek (2019) came with a counselling intervention approach as a form of the help of the intergenerational team. The counsellor may help people seek advice regarding

development in their carrier life. Thanks to sessions with a counsellor, people may be better prepared to interact and function within the intergenerational team. Further, the author highlights a position of an 'architect of intergenerational bridges' in an organisation, who will combine employees into intergenerational teams and help them interact. In line with our understanding, the author further emphasises that people need to acquire competencies to enable being in teams, especially in multigenerational ones (Wawrzonek, 2019).

Lots of authors focus on how to overcome conflicts regarding intergenerational cooperation (Rudolph and Zacher, 2015; Appelbaum, 2022), as conflicts or tensions are often linked with intergenerational teams. Despite this fact, some employees believe that generationally diverse teams increase team performance (Brecker et al., 2020). Therefore, companies should perceive intergenerational cooperation as an opportunity, not as an obstacle (Čiž and Žižek, 2017). Wolbert (2022) stated that leaders are those who can overcome conflicts regarding different generations in the organisation and can inspire others to perceive different generations as sources of opportunities. Leaders with emotional intelligence can manage their feelings but also understand the emotions of others. They can leverage their competencies to understand the differences among generations and form multigenerational teams (Wolbert, 2022). Moreover, intergenerational cooperation may reduce the fluctuation of people, so organisations do not lose young talent or tacit knowledge of older employees (Čič and Žižek, 2017).

Further, we can find inspiration in certain theories developed in the context of business organisations. From a business perspective, social capital theory explains entrepreneurs as people who succeed in businesses (among other things) thanks to social capital and a wide network of contacts who help them (Walker et al., 1997). The older generation is perceived as the one who has lots of contacts and knows the right people (Lojda et al., 2021; Pilkova et al., 2022). From an organisational perspective, the High-Reliability Organisational Theory (HROT) explains that when people, technology, and processes are properly managed, the organisation is in safer conditions and is better prepared to face conflict (Guise and Segel, 2008). In the context of multigenerational cooperation, we can propose that when the organisation has proper systems in place, it is also better prepared for a multigenerational workforce. From a sociological perspective, the social interdependence theory (Johnson and Johnson, 1989) explains there are two types of interdependence in human interaction – positive and negative. The positive interdependence means that people perceive they will achieve their goals when other people with whom they cooperate also obtain their goals. Positive interdependence leads to mutual help and encouragement. The negative interdependence represents the opposite, when individuals think they can achieve success only if others fail. The negative interdependence leads to rivalry and competitiveness. In the social interdependence theory, it is crucial how the goals of individuals are structured because the goals structure determines interaction among people (Johnson and Johnson, 2009). In the context of our paper, we can think of how goals structure may support interdependence within intergenerational teams.

Resulting from previous research and theories, we point out the following research question:

How can intergenerational cooperation in business organisations be encouraged?

3 METHODOLOGY

The study adopts a qualitative research approach. We gather data through eight in-depth semi-structured interviews. The interviews last from 40 to 60 minutes and were conducted during May and June 2023. Each interview was recorded, and we obtained consent before recording. After the transcription of the recorded interview, the records were deleted. The identity of the respondents is anonymous in order to receive honest answers, but we decided to ask particular respondents with the experience described below. All participants are Slovak, from different

parts of Slovakia. Validity of the obtained data is ensured by using the participants related to the domain from different perspectives. We interviewed people of different ages (28-72), from different sectors (public, private, academic) and with different experience – team members, team leaders, HR specialists, lectors, coaches, or experts in the field (researchers, academics).

Respondent 1 – a woman, an employee working in an intergenerational team in the public sector, 4 years of experience with coordination of different generations.

Respondent 2 – a man, an entrepreneur who has established an organisation with a focus on intergenerational cooperation, with 20 years of experience in this area.

Respondent 3 – a woman, a researcher with a doctoral degree who participated in research projects regarding different organisations. 20+ years of experience with team and age management.

Respondent 4 – a woman, a coach with experience with self-development, teamwork, and relationship, 10 years of experience.

Respondent 5 – a woman, a human resource manager with 20 years of experience working with companies of different sizes, sectors and generations.

Respondent 6 – a woman, a professor, and an academician with 20+ years of experience, established a project for supporting intergenerational cooperation.

Respondent 7 – a man, and associated professor, a researcher focusing on teamwork, human resource management and managing teams comprising different generations.

Respondent 8 – a woman, a lector who has established an organisation for training and education for support of intergenerational teamwork.

Regarding the methods employed, to identify the competencies from a transcript of depth semi-structured interviews, we used a thematic qualitative analysis. We decided for this method because it allows us to sort data to a theme, in our case to competencies. Further, we use a deductive approach of research because we already knew some theoretical framework from previous research (Braun and Clarke, 2006). Firstly, we transcribed all eight in-depth semi-structured interviews, then we identified the codes and, according to the frequency and semantic similarities, we identified the themes. In our case, each theme represents a particular competency.

Further, we use a qualitative phenomenological study approach (Gioia et al., 2013) to examine how intergenerational cooperation can be encouraged. As the interviews were semi-structured, we asked all respondents the following questions which were prepared in advance:

How can organisations promote intergenerational cooperation?

How can leaders/managers support intergenerational cooperation? What is their role?

How can intergenerational competencies be trained?

We purposely asked questions that started with "how" so we got deep and elaborated answers from the respondents' experiences. Then, we asked specific questions according to the respondents' answers, for example:

When do you start to feel that your colleagues respect you? What do you think helps you to gain their respect?

Have you ever experienced conflict in a team, when team members claim it is because the generational difference?

How did you feel starting working in multigenerational teams?

The phenomenological study examines the phenomenon of intergenerational cooperation, specifically in the context of work and business environments. Firstly, we transcribed all interviews. Then we made a first-round analysis resulting in basic groups of findings. Next, based on the second round of the analysis, we analysed similarities and differences among groups, and we got final sorting with descriptions. In the last step, we structured groups in a logical framework.

4   RESULTS

We asked respondents which competencies they consider important in terms of intergenerational cooperation. Based on a thematic qualitative study, we identified the following competencies presented in Tab 1. In particular, we identified five main competencies which are necessary for intergenerational cooperation.

Openness – six out of eight respondents mentioned openness as one of the most important competencies. Openness expresses that a person can think openly, and is open to new ideas and ideologies. A person with openness competency is ready to grow, to learn from others, and to know that it is not important who told the idea, but the idea itself. A person with openness competency is not afraid of failure because they realize that failure is part of learning and learning is a way how to grow.

Respect – seven out of eight respondents consider respect as a key competency. A person with respect competency can show respect to others, no matter their age and generation. Such person can appreciate others, acknowledge them, praise them, and is thankful for their team contributions. Respect competency means that a person can think without prejudices or can recognise and eliminate them. A person who respects others can tolerate them and even their differences.

Cognitive empathy – five out of eight respondents stated that empathy is an important intergenerational competency. Further, we added 'cognitive' as it results from the coding of meanings. Cognitive empathy is a competency that enables one to understand someone else. Also, respondents express that understanding someone is one of the hardest competencies to achieve. To understand someone, a person should have emotional intelligence and honest interest and ask relevant questions.

Mindful communication – all eight participants mentioned communication during interviews. Mindful communication is a competency when a person possesses good communication skills, but is also able to actively listen to others, to recognize how and what is appropriate to tell. A person with mindful communication competency communicates politely, with tact and diplomacy, and knows to communicate without insulting someone.

The social trust – all participants mentioned at least one time the word 'trust' during the interview, however in different meanings. On one side, respondents consider trust as necessary to work in a team and to build safety and psychologically healthy working environment. On the other side, respondents express that self-trust, self-confidence, and healthy assertiveness are positive to work in intergenerational teams. Above all, some respondents interestingly claimed that without self-confidence, self-trust, and realising their value it is not possible to build trusty relationships with other colleagues. The social trust competency, therefore, covers the ability to trust others and to trust organisations based on personal self-trust.

Tab. 1 – Identified competencies. Source: own research

Competencies - in themes	Openness	Respect	Cognitive empathy	Mindful communication	Social trust
Code	Open to ideas Open to other ideologies Growth-mindset Eliminate prejudices Open-minded approach Open to growth Open to failure	Respect Appreciation Show respect Praise Basal respect Eliminate judgement Tolerance Safety	Emotional intelligence Empathy Understand someone Understand different generation Empathy Cognitive empathy	Communication skills Own language of team Captivate others Active listening Mindful communication Courtesy in communication Tactfulness Diplomacy	Trust Culture of trust Social trust Trust within team Safety Safe to trust other Safe to make mistake Self-confidence Healthy assertiveness Self-esteem
Transcript	*"Don't push uniform thinking on others. It's okay that everyone thinks differently. "* *"People in intergenerational teams should be open to other ideologies, to other opinions."*	*"It was only when I gained the respect of my older colleagues that I was able to tell them that their work should be better. Until then, I rather correct their tasks by myself."*	*"I consider emotional intelligence to be a core competency, which includes empathy. "*	*"In intergenerational teams, there must be open communication."* *"I have noticed that communication improves when one is able to engage others. For example, the young can talk better to the older when they find them interesting. "*	*"Trust is important. I often come across the term 'culture of trust', but very little is said about it. It should be improved... "*

	"The perceptual barrier of stereotyping does no good. We should get rid of prejudices in thinking. Be open to new ideas." "Important is not the owner of the idea, but the idea itself."	*"People should be able to say we appreciate you. The respect is a key."*	*"You can't be empathetic if you can't understand someone."*	*"Social skills are very important and among them communication. Considering the different generations in the work environment, the team should create its own language so that everyone understands it. "*	*"If one is not capable of social trust, one should not even enter the job market, but should only do things on one's own, like writing a novel (laughter). "*
	"We should have an open-minded approach and generally be interested in cooperation."	*"We have to be able to show respect. To know how to give praise, to appreciate a person, to thank..." "Show basal respect, that everyone brings something to the team."*	*"When working with different generations, we should try to understand those generations. Understand each person. We can do that when we are empathetic. "*	*"Communication alone is not enough, but it should be mindful communication. For example, when we also actively listen to others. "*	*"The important thing is to move away from the construct that failure is bad. On the contrary, mistakes are normal. People need to feel safe enough not to be afraid to make a mistake, not to hide a mistake. "*
	"I consider it an important competence to have an open mind."	*"The respect is certainly important."*	*"To be able to understand another point of view, we need to be empathetic. "*	*"Communication within the team is very important, but of course also courtesy. "*	*"When people trust each other, the team environment is healthy, safe. This feeling of psychological safety in a team is very important."*

	"Changing your mind is not a failure, it is a sign that you are cultivating the will to grow."	*"I consider respect to be an important competence. The younger generation should not see the older generation as a burden. The older generation should understand that they can also learn something from the young."*	*"Cognitive empathy is important - trying to understand, not empathize. Most of the time it is not even possible to empathize with someone, and for objective reasons. But to understand someone, that's the basis. To understand a person I have to ask questions. "*	*"...tactfulness, not to touch anyone in an unwanted way, to be careful what I say and how I say it."*	*"The higher one's ego, the lower one's respect for others, and that's the problem. That's why there's a thin ice between being assertive and insulting someone. It's important for people to be able to differentiate."*
	"Older colleagues should avoid the attitude that they only wait to retire." *".. I would say that also growth-mindset is necessary."*	*"Respect is important, I don't judge people, I try to tolerate them. "*		*"Diplomacy and tact, these are very important to consider in intergenerational cooperation. Know how to communicate with other generations."*	*"People in an intergenerational team should be healthily assertive, that is, constructively defending their views without interfering with the rights of the other. So that no one is a winner."*

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		"A respectful environment is important - when people feel that whatever happens, the group won't push it. "		"On the one hand, it is important to have communication skills, but on the other hand, it is also important to be able to actively listen to others. Focus on what they are saying. "	"A person is incapable of cooperation when he or she is unaware of his or her own value. When he or she does not have a healthy self-esteem. Nor can one trust others unless one is at peace with oneself. "

To examine the second research focus – the encouragement of intergenerational cooperation in the context of business and the working environment, we established a framework based on the phenomenological study. In the centre, there is intergenerational cooperation as an examined phenomenon. We identified three main sources of support for intergenerational organisations.

Firstly, **the organisation (system) itself**. Organisations need to realize or be aware that they are dealing with different generations, as most organisations do not realize it.

„*The businesses do not deal with intergenerational cooperation, if they are doing it only randomly.” “Intergenerational cooperation is starting to be a topic in Slovakia.”*

Then, the organisational culture can have a significant influence on supporting intergenerational cooperation. Organisational culture can communicate the inclusivity value, and can build a positive attitude towards different generations within the organisation.

“Intergenerational cooperation should promote organisational culture and its values. Furthermore, organisations should perceive different organisations as an advantage, not as a disadvantage.”

Secondly, the **role of leaders**. As leaders are crucial in forming the others' behaviour and beliefs. We can consider leaders as examples of how people should behave, what should tolerate, and what should eliminate.

 “The leader is an imaginary compass, people adjust their behaviour according to the leader's reactions.”

“Leaders are the dominant creators of organisational culture.”

Therefore, leaders can have a significant impact on how to encourage intergenerational cooperation in business organisations. The important part of a leader is the leader's personality and his or her competencies. Above all, leaders should be authentic, they should behave according to their words, they should know people in their teams, they should know generations' expectations and motivations and according to those should offer appropriate feedback. Further, leaders are also examples regarding attitude to learning and development.

 “People must want to educate themselves, and they must see the example from the top, from the leadership.”

Fig. 1 – Framework of support of intergenerational cooperation. Source: own research, design in Miro

Lastly, we identified the **development of competencies** as an important factor that can encourage intergenerational cooperation. In this area, we divided the data into four groups – when, what, how, and why to develop. When - the company should think of personal competencies and fitting with generation inclusion right in the hiring process.

"The company should choose the right people with appropriate competencies to support intergenerational cooperation straight at the beginning."

Then, people should develop themselves lifelong. What – we identified group training, mentoring, coaching, team building, and workshops as appropriate forms of development of intergenerational competencies. How – we consider this area as most beneficial regarding support of intergenerational cooperation as we highlighted some points which can improve

cooperation among generations. The training should consist of case studies and group exercises as the purpose of this training is to raise discussion among people. Also, it helps when people find out something private from others' life. This tends to bring people closer and build trust.

"When I found something private from my colleague's life, we can start to have a closer relationship, and we start to trust each other."

Next, finding something common helps to improve conversation and understanding of each other. Further, the shared goals improved cooperation and the development of intergenerational competencies.

"From my experience, it helps when people have shared goals, even when their motivations or expectations are different. For example, treasure hunt during teambuilding activities."

And finally, the best way how to learn things is to experience them. Therefore, the teams should experience their cooperation and find out if they can work together.

5 DISCUSSION

The focus of our paper was to identify which intergenerational competencies enable intergenerational cooperation, and how intergenerational cooperation in the working environment can be supported. In relation to the first aspect, we found five personal competencies which are necessary for intergenerational cooperation – openness, respect, cognitive empathy, mindful communication, and social trust. Some of our findings are in line with previous research, like we see some overlap between openness and growth virtue (Nurhas et al., 2021) as openness in our study is linked with the ability to grow. Previous research on intergenerational cooperation highlighted cultural empathy (Jensen, 2017; Knight and Cavusgil, 2004) or basal empathy (Labanauskaitė et al., 2021; Perez-Encinas et al., 2021) as important attributes to understanding others' cultures. However, our results bring a new element for consideration –cognitive empathy as the ability to understand others without effort to empathise with the feelings of others. As understanding is crucial in intergenerational cooperation, unlike empathising which is often not possible for objective reasons. Previous research confirmed the importance of communication in multigenerational teams and suggested finding a common language (Poulsen et al., 2021; Lojda et al., 2021). We identified diplomacy and tactfulness along with active listening as key elements of mindful communication competency. In the context concerning respect competency, previous research examined its importance for mutual learning (Perez-Encinas et al., 2021; Pawlak et al., 2022), for teamwork in general (Starks, 2013); and as a factor that helps overcome generational differences (Lojda et al., 2021). Our results identified respect competency as an ability to acknowledge and praise others no matter their generation and also as an ability to eliminate prejudices while working with a different generation, which contributes to the actual research. Regarding social trust competency, this competency allows a person to build trust with others and is based on self-trust and self-confidence. When people possess social trust competency it ensures safety in the workplace. Similarly, previous research identified psychological safety as an important competency regarding intergenerational adaptability (Nurhas et al., 2021).

Next, the paper aimed at encouragement of intergenerational cooperation. We established a framework of support of intergenerational cooperation where the goal is to design the encouragement of intergenerational cooperation in the workplace and business environment. We proposed that intergenerational cooperation can be built and supported by three pillars – by the organisation (business) itself, by leaders, and by the development of intergenerational competencies identified above. Previous research identified managers as those who can overcome generational differences (Wolbert, 2022), and mentors who can significantly support

intergenerational team performance (Pawlak et al., 2022), and even the job position with intergenerational team development responsibility was described (Wawrzonek, 2019). We perceived leaders as role models for the behaviour of employees, therefore when leaders will talk and act in favour of intergenerational cooperation, the employees will naturally think of intergenerational cooperation as an advantage and be more likely to contribute to intergenerational teams. In the context of the development of intergenerational competencies, we established a framework for answering questions about when, what, how, and why to develop intergenerational competencies. Previous research emphasised education about generations (Marcee Everly, 2016), training measuring the attitude towards generations (Wagner and Luger, 2021); intergenerational learning process (Leek and Rojek, 2021), and training suggestions for both generations of seniors and juniors (Lojda et al., 2021). Regarding organisation or system pillar, previous research in this area is lacking. However, we see a good fit of our findings whit the HROT theory (Guise and Segel, 2008). When the organisation is properly managed, and appropriate technology and systems are in place, the organisation enables intergenerational cooperation but also is prepared to face potential obstacles regarding intergenerational cooperation.

Practical Implication

As we explain in the introduction of our study, intergenerational cooperation is a trend that will not be possible to avoid in the future, as most of the teams in the workplace and business are already intergenerational and still will be in the future. Our research tried to answer what competencies are necessary for working in an intergenerational team. By knowing that, managers, business owners, and practitioners can focus on how to ensure these competencies within the team and how to develop them in workplaces and business contexts, which can help to promote intergenerational cooperation. Practitioners and organisations can focus on the development of openness, respect, social trust, cognitive empathy, and mindful communication competencies. Or, when they are in the planning or formulating phase of intergenerational teams, they can choose team members with the required intergenerational competencies. Further, the framework of support of intergenerational cooperation may help understand how to improve intergenerational inclusion in organisations. Intergenerational cooperation is influenced by the personal competencies of team members, but also organisational aspects of support and leaders are crucial.

Theoretical contribution

In our study, we focus on analysing competencies necessary for working in intergenerational teams, and we aim at the formulation of a support framework for intergenerational teams. The main theoretical contribution lies in establishing an application of the High-Reliability Organisational Theory (HROT) (Guise and Segel, 2008) to the context of intergenerational workplace and business environment that will be more and more common in the future. Our findings indicate that when people, technology, and processes are properly managed from the intergenerational perspective, the organisation provides a safe environment for each generation and is better preferred to benefit from intergenerational cooperation. Further, based on social interdependence theory (Johnson and Johnson, 2009), positive interdependence among team members may promote intergenerational cooperation. In this case, the role of managers is crucial, as they set the goals for the team. When they align the individuals' goals into a shared team goal, it can promote cooperation among the team members. Sticking to social capital theory (Walker et al., 1997), intergenerational cooperation may improve when all team members realise that each team member has something to offer which can lead to overall team success. Particularly, the older generation can offer their contacts and the network they established.

Limitations and future research

Our study is not exempt from limitations. We emphasise the difficulty to generalise our findings as the experience of our respondents is subjective and, also, the number of respondents was limited. However, we tried to eliminate the limitations via examination of all related parties – members of intergenerational teams, managers of intergenerational teams, academics, specialists in this area, and lectors. Despite this, all respondents were Slovak. Therefore we see the difficulty to generalise due to the context-specific nature.

In terms of further research, studies with bigger research samples and from different countries would contribute to this stream of research and would help to better examine intergenerational competencies and cooperation. Also, the results of this study bring new questions which need deeper studying. For example, future research could examine how intergenerational competencies may be asses or what is the role of individual motivation for intergenerational teams.

6   CONCLUSION

The focus of the study was to examine individual competencies which are necessary for working in intergenerational teams. Based on semi-structured interviews with 8 respondents, we identified five intergenerational competencies: openness, respect, social trust, cognitive empathy, and mindful communication using thematic qualitative analysis. Further, based on a phenomenological study we elaborated a framework of support of intergenerational cooperation in the workplace and business context. The framework shows three main pillars of intergenerational cooperation encouragement - the organisation itself, leaders, and the development of intergenerational competencies. The organisation (system) itself secures activities such as spreading awareness of different generations' concepts, supporting inclusivity, and building positive attitudes towards different generations in a core of values in organisations. Then, leaders are role models for wished behaviour and beliefs in organisations and businesses. The leaders should communicate and act in favour of intergenerational cooperation. The leaders are capable to formulate the attitude of team members according to things that they sanction or reward. And finally, the development of intergenerational competencies may improve intergenerational cooperation. In the framework, we formulated when, what, how, and why should develop intergenerational competencies.

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THE IMPACT OF INFLATION IN THE PRODUCTION PROCESS OF A SELECTED ENTERPRISE

Tomáš Sýkora

Abstract

The aim of the study is to investigate the impact of inflation in the production process of a selected company in the Czech Republic. In this study, I analyse inflation because the relationship between it and the production process in the enterprise under study remains unclear. The study of the effect of inflation on the production process, which I have analysed step by step, was carried out in a medium-sized Czech engineering company. In my research, I collected and evaluated the main input data of this company, namely the prices of hot rolled sheets for the period 2018 to 2022. 90% of the production of this engineering company is made from the said material. I conducted research on large orders sorted by kilogram prices over time, setting 2018 as the starting date and comparing it to 2022. I also calculated the average inflation over a five-year period (2018 to 2022) and created three possible scenarios for future inflation and hot-rolled sheet prices in my study, including their impact on the corporate economy. I examined how inflation may affect costs associated with materials procurement, manufacturing processes, logistics and other aspects of the production process. The findings revealed gaps regarding the impact of inflation on the entire production process. It is important to note that inflation is not the only factor affecting hot rolled sheet prices and the overall production process. Other factors such as market supply and demand, exchange rates, raw materials and many others play an important role in determining prices and operating costs in the production process. I have also created an implication with a logical statement regarding the increase in inflation and the price of input material, I have elaborated and explained how inflation in the company under study can affect its production process.

Keywords: inflation, production process, enterprise, cost, price, order, raw material

1 INTRODUCTION

In today's dynamic business environment, inflation plays a key role as a permanent factor affecting the economic stability and strategies of firms. Inflation, caused by increases in the prices of goods and services, has far-reaching consequences for the production processes and profitability of companies. This study focuses on an in-depth investigation of the impact of inflation on the production process of a selected enterprise and analyses the various impacts that this ever-changing economic variable can have on key factors of the corporate environment. Differences in the personal experiences of firms and businesses likely contribute to the high degree of heterogeneity observed in lay inflation expectations (e.g. Malmendier and Nagel, 2016).

One of the critical factors dramatically affected by inflation is the cost of raw materials. Rising prices of metals, plastics and energy resources can significantly affect a company's production process. This phenomenon causes an increase in the cost of producing products and at the same time reduces the overall profitability of the company. The recent disruption in the supply chain network due to the COVID - 19 pandemic has negatively affected the supply of steel in the global market and firms have been forced to maintain large inventories to mitigate the supply crisis (Makgetla, 2021, Rath and Ram, 2021). This is particularly evident in engineering firms, which are forced to respond flexibly to market movements and

develop strategies to reduce costs, such as diversifying their raw material supply chain or seeking alternative materials.

Earnings development is another key aspect that requires careful analysis in the context of inflation. To achieve optimal policy, actions and decisions are often required that maximize the achievement of economic goals and status. In an environment of rising inflation, such policy may include measures that are conducive to earnings growth. The New Keynesian (NK) model is one approach that examines macroeconomic issues and the dynamics of the economy in response to inflation, with various implications for firms and households, including Internal capital markets that help maintain control over allocated resources and provide flexibility, which is an important financial and investment decision that affects the profitability and sustainability of the firm. Insiders who are part of firms have more information about them than outsiders and can use this information asymmetry effectively or opportunistically (Gonenc, 2009; Liebeskind, 2000).

However, within the company under study, inflation has a significant impact on costs related to raw materials, wages and capital. In order to remain competitive in the market, it is essential for enterprises to monitor economic indicators carefully, plan proactively and react quickly to inflation. Finding strategies to minimise costs and maintain a competitive position becomes a key element of their business strategy. Businesses should share costs and information, including co-developing relationship-specific assets, pooling technology and creating economies of scale where possible (Rungsithong and Meyer, 2020, Bag et al., 2021).

Overall, inflation has a significant impact on the production processes and strategies of companies. The aim of this study is to explore and analyse various aspects of this impact in more depth and provide recommendations for effectively managing these challenges within the business environment.

Research on the impact of inflation on economic stability and corporate strategies can provide valuable insights for businesses in their efforts to remain competitive and prosperous in a dynamic and changing economic environment.

2 THEORETICAL BACKGROUND / LITERATURE REVIEW

My study builds on work that examines the extent to which higher macroeconomic uncertainty in recessions often becomes an endogenous response to output shocks, while uncertainty about financial markets is a likely source of output fluctuations (Ludvigson, Sydney C., Sai Ma, and Serena Ng. 2021). The literature convincingly shows that exogenous changes in inflation expectations do affect the underlying economic decisions of agents, such as household and business spending (e.g., Coibion et al., 2022).

The study also relates to work on inflation expectations. While many observers have attributed the high inflation rate in the US to rising gasoline prices, recent research has shown that gasoline price shocks have had only a modest impact on US inflation since 2019 (e.g., Kilian and Zhou, 2022a, Kilian and Zhou, 2022b).

My paper also draws on the literature on the role of production networks in the propagation of monetary policy effects, such as La'O and Tahbaz-Salehi (2022), Pasten et al. (2020), Ozdagli and Weber (2017), and Ghassibe (2021). Specifically, Pasten et al. (2020) show that sectoral heterogeneity in price rigidity significantly amplifies the real effects of monetary policy and

show how heterogeneity in price rigidity amplifies the inflationary effects of demand reallocation from services to goods, given that service-producing sectors have, on average, higher prices than goods-producing sectors.

My paper deals with the price of hot rolled sheets and the effect of inflation on the production process of a selected company. My research revealed that Arcelor Mittal, South Africa's largest steel producer and the only company operating blast furnaces in the country, was severely affected by the COVID-19 pandemic, which led to a crisis in the steel industry (Business Live News, 2021) and manifested itself in an acute shortage of steel plate, flat bar, round bar and other industrial steel items needed by other B2B companies in light and heavy engineering projects. This situation led companies to start cooperating and sharing resources to overcome the shortage. For example, engineering companies shared raw materials, equipment and production facilities with business partners and customers. However, in times of crisis, suppliers find it difficult to meet the demand of their many customers with limited supplies, who then look for alternative ways to obtain raw materials. In this volatile environment, supplier firms have to limit their supply to a limited number of customers and select them based on several factors, including the ethical standards they adhere to and the level of trust in their relationships (Bag et al., 2022; Fready et al., 2022). Bendixen & Abratt (2007). Maintaining strong relationships with suppliers based on trust and mutual respect helps firms to position themselves well in relation to suppliers (Bendixen & Abratt, 2007). Indeed, developing sincere relationships with suppliers brings positive returns in the long run, especially in uncertain times such as the COVID-19 pandemic.

Businesses want to remain competitive through acquisitions, mergers or acquisitions of patented technologies or through contractual agreements between firms to collaborate on R&D and share results (Hagedoorn, 2002). Understanding the location and roles of all participants in the relational network through patent citation analysis (Daim et al., 2020; Wei et al., 2021). My research has shown that it is very important to understand the role and characteristics of location in the network of technical manufacturer relationships and the impact of the shift from a linear to a circular approach, which is a systemic change and requires that the circular shift and redesign occur at different levels, from individual firms and organizations (micro-level), to organizational collaboration and supply chains (meso-level), to regional and national developments (macro-level) (Khitous, Strozzi, Urbinati and Alberti, 2020; Ranta et al., 2018; Ünal, Urbinati, Chiaroni and Manzini, 2019).

Considering the effect of inflation on the production process and other inputs in engineering firms, the study takes a microeconomic perspective from the work on the impact of technological innovation and investment in knowledge assets on economic growth and firm performance. It focused on the impact of technological innovation and investment in knowledge assets, across different economies (Hall 2019), (Hall and Jones, 1999, Aghion et al., 2009, Hennart, 2022). Although some studies have looked at the impact of inflationary costs on investment (Blanchard, 2016; Brunnermeier and Sannikov, 2016, Phaneuf and Victor, 2021), investment in knowledge assets is essential for countries that seek technological innovation, digital infrastructure and industry, including economic growth (Li et al., 2022; Wang et al., 2022). These aspects are crucial for engineering companies, where investment in knowledge assets can play a significant role in maintaining competitiveness in the market.

The study links the microeconomic context with macroeconomic influences, especially in the context of inflation. In doing so, it seeks to provide a comprehensive view of the impact of inflation on firms' production processes and strategies, drawing on and extending the insights from the existing literature.

3   METHODOLOGY

The impact of inflation on the production process at the engineering company HOPAX Ltd. is undeniable, especially in the context of hot-rolled sheet prices, which are subject to change over time. However, this variability carries an element of scientific uncertainty about future price developments. Inflation can have a key impact on costs associated with the purchase of materials, production processes, logistics and other aspects of the production process, but the precise extent of these impacts is still unclear.

I decided to use a quantitative method to conduct my research. I analysed specific and hard data relating to the prices of hot rolled sheets from 3 mm thickness upwards, covering the period from 2018 to 2022. This data relates to 90 % of the material used in the selected company. I obtained the data from a trusted source, MEPS (Europe Hot Rolled Plate Price Forecast), which provides official raw steel price data in euro/tonne. Crude steel is the basic material from which metallurgical semi-finished products are produced, including plates, tubes and L, H, U profiles, which are used in HOPAX Ltd.

My aim was also to collate and analyse research on large orders, which I ranked by price per kilogram over time. I have chosen 2018 as the base year and made comparisons with data from 2022. This analysis is based on research conducted directly by HOPAX Ltd, which may introduce elements of subjective interpretation and therefore scientific uncertainty into the analysis.

In addition, I calculated the average inflation rate for the five-year period from 2018 to 2022. For this purpose, I used official sources published by the Czech Statistical Office, namely the "Consumer Price Indices (Cost of Living)", which themselves can be affected by various factors such as uncertain economic conditions or external events.

In the course of my study, I have developed three alternative scenarios that reflect future inflation and hot-rolled sheet prices. I developed these scenarios in order to uncover possible variations in the impacts on the economics of the firm under study. Within this section, there may be scientific uncertainty regarding the accuracy of the assumptions and modelling of future developments.

During my research, I have tried to understand how inflation can affect costs associated with material costs, manufacturing processes, logistics and other aspects of the production process. I believe that smaller businesses need to be proactive and forward-looking in order to respond effectively to uncertainties in the political and economic environment. However, this statement can only be true in certain circumstances and in different contexts, which introduces an element of scientific uncertainty.

I used primary sources in my data collection, including COMPUSTAT, the CBOE Volatility Index, the Federal Reserve Bank, and the University of Michigan Survey of Consumers. I also used the Baker et al. (2016) database - www.policyuncertainty.com. These data sources may be subject to various inaccuracies and limitations, introducing additional scientific uncertainty.

The main objective of my thesis was to provide a description and analysis of the impact of inflation on the production process in HOPAX Ltd, an engineering company with an international scope and approximately 250 employees. The outcome of my research is a thorough assessment of the impact of inflation on the manufacturing process of this company in terms of its economic efficiency over the last five years, although this analysis may be affected by the variability and uncertainty in the economic environment.

In some respects, my findings touch on previous empirical studies on the impact of the shift from a linear to a circular approach, which is a systemic change and requires circular shifts and redesign to occur at different levels, from individual firms and organizations (micro-level), to organizational collaboration and supply chains (meso-level), to regional and national developments (macro-level), (Khitous, Strozzi, Urbinati and Alberti, 2020; Ranta et al, 2018; Ünal, Urbinati, Chiaroni and Manzini, 2019). However, my analysis differs from this earlier literature in that it mainly examines the effect of inflation on the production process of an engineering firm, which may exhibit different behavior and uncertainties.

The research questions of my thesis are: ***How does inflation affect the production process of the selected company?*** Second question: ***Given the uncertainties associated with inflationary fluctuations, what is an effective way to reduce the cost of the production process of the selected company?***

In this research, I evaluate the success of cost reduction measures in a given company. ***The hypothesis of my research is that inflation is likely to significantly increase the cost of the production process in the selected company. To test this hypothesis, I plan to use publicly available data that covers the period from 2018 to 2023.***

4 RESULTS

Overall, it can be said that inflation can affect the production process in the company under study by increasing the costs of the individual steps of production, especially the purchase of materials and services. This may affect the overall cost of production of the company's products. It is important to monitor inflation trends. Trend inflation is an economic term that describes the long-term direction and rate of increase in the price level in an economy. It reflects the average rate at which the prices of goods and services increase over a period of time, usually annually. Inflation can be measured by various indicators such as the consumer price index (CPI), which we will use in our research, the producer price index (PPI) or the core inflation rate (subtracting volatile components such as food and energy). Trend inflation is the result of many factors, including central bank monetary policy, demand and supply in the economy, wage developments and other macroeconomic factors, and material prices, and needs to be adequately responded to and adjusted in the production process and pricing.

4.1 The impact of inflation on the production process in the company under study

The impact of inflation in the production process of the enterprise under study may vary depending on the specific circumstances. Below, I describe and explain how inflation can directly affect the production process in the enterprise under study at each step:

1. *Receipt of unit material:* inflation may cause an increase in the price of sheet and rolled sections, which could increase the cost of acquiring material for production.

2. *Dispensing of one-piece material:* If material prices rise, this can have an impact on costs for individual orders and the overall budget for the production process.

3. *Cutting of long material:* Higher material prices can affect cutting costs long material on band saws, which could be reflected in the total cost of for processing the material.

4. *Sheet metal blasting:* increased costs for sheet metal blasting could affect the cost of removal of rust and scale, which would be reflected in the total cost of surface treatment sheets.

5. *Sheet metal cutting on cutting machines:* if sheet metal prices increase, this can have an impact on the costs associated with cutting sheet metal on cutting machines, whether flame, plasma or laser cutting.

6. *Material identification:* Changes in material prices can affect identification costs material and assignment of production guides.

7. *Dressing of cross-sections and cuttings:* increased costs for dressing of cross-sections and cuttings could affect the total cost of deburring and deburring of cutting surfaces and edges.

8. *Making weld bevels:* if inflation causes the price of welding materials to rise or services, this may have an impact on the costs associated with performing weld bevels.

9. *Bending and bending of cuttings and cross-sections:* if prices for processing are increasing plates, this can affect the cost of bending and bending of cuttings and cross-sections.

10. *Dimensional inspection of parts:* higher material prices can affect the cost of dimensional inspection of parts before assembly.

11. *Assembly of parts: the* increase in the cost of individual components can have an impact on the overall the cost of assembling parts into assemblies.

12. *Welding:* rising prices for welding materials or services can affect costs associated with performing welds on weldments.

13. *Straightening after welding:* if the cost of materials or services associated with straightening increases after welding, it may affect the cost of the process.

14. *Weldment Dimensional Inspection:* higher prices for dimensional inspection equipment or services weldments can increase the cost of this step of the manufacturing process.

15. *Annealing or vibratory stress removal:* if the cost of annealing or vibratory increases removing stresses, this can have an impact on the overall cost of these processes.

16. *Machining on CNC machine tools:* increased material costs or services associated with mechanical processing can affect the cost of this step production process.

17. *Blade dressing:* if the prices of equipment or services for blade dressing are rising, this can affect the total cost of the process.

18. *Dimensional inspection after machining:* if the cost of dimensional inspection after ¨processing, this may have an impact on the overall cost of this inspection.

19. *Parts identification:* higher material prices can affect the cost of parts identification using serial numbers.

20. *Degreasing after machining:* increased costs for degreasing after machining can affect the overall cost of the process.

21. *Blasting before painting:* if the prices of equipment or services for blasting before painting are increasing varnishing, this can have an impact on the overall cost of this step.

22. *Surface inspection prior to painting:* rising prices for surface inspection equipment or services before painting can affect the cost of the process.

23. *Painting:* higher prices for painting materials or services can have an impact on costs associated with painting.

24. *Post-painting surface inspections:* Increasing the cost of post-painting surface inspections can affect the total cost of this step.

25. *Unmasking, cleaning, minor paint repairs:* If the price of materials or services increases associated with unmasking, cleaning or minor paint repairs, this can have an impact at a cost.

26. *Mechanical assembly of assemblies:* rising prices of materials or services for mechanical assembly assemblies can affect the cost of the process.

27. *Hydraulic assembly:* higher prices for hydraulic components or assembly services hydraulics can increase the cost of this step.

28. *Wiring installation:* if the prices of wiring components or services are increasing for the installation of wiring, this can affect the overall cost of the process.

29. *Equipment testing:* increased costs for equipment testing may affect the costs associated with this move.

30. *Packing and shipping:* higher prices for packing materials or services related to packing and dispatch may have an impact on the cost of this step.

The analysis above suggests that inflation has the ability to influence the production process of the company under study from different perspectives. Inflation can result in increased costs associated with key steps in the production process, particularly in the areas of purchasing materials and services. In this way, it can subsequently affect the overall costs associated with the company's production.

In the context of this issue, trend inflation, which represents the long-term direction and rate of growth of the price level in the economic system, plays a significant role. Close monitoring of inflation is essential in this context, as it has an impact on the price level of materials and services, which are an integral component in the production process. An analytical view of the inflationary effect enables the company under study to respond adequately to fluctuations in the prices of materials and services, thereby maintaining the ability to adapt the production process to achieve an optimal balance between costs and the quality of production.

4.2 Table 1, Figure 1, chart, analysis and evaluation of individual economic indicators of the manufacturing company HOPAX Ltd.

To analyse the effect of inflation on the price of hot rolled sheets, we can use the data provided to track price changes over time. We will split the data into different years and examine the price evolution:

Tab. 1 - Hot rolled sheet prices in euros per tonne for years 2018, 2019, 2020, 2021, 2022, 2023, 2024. Source: MEPS International Ltd.

YEAR 2018	EUR per tonne	YEAR 2019	EUR per tonne
July	639	January	612
August	639	February	602
September	660	March	612
October	641	April	610
November	630	May	585
December	621	June	581

		July	572
		August	557
		September	549
		October	544
		November	516
		December	518
YEAR 2020	**EUR per tonne**	**YEAR 2021**	**EUR per tonne**
January	533	January	644
February	539	February	664
March	535	March	694
April	526	April	787
May	518	May	986
June	480	June	1074
July	480	July	1068
August	488	August	1053
September	504	September	1011
October	512	October	961
November	498	November	963
December	543	December	947
YEAR 2022	**EUR per tonne**	**YEAR 2023**	**EUR per tonne**
January	935	January	903
February	957	February	959
March	1466	March	992
April	1876	April	989
May	1695	May	945
June	1495	June	865
July	1200	July	830
August	1114	August	830
September	1086	September	850
October	1056	October	860
November	989	November	850
December	893	December	840
YEAR 2024	**EUR per tonne**		

January	880
February	920
March	960
April	980
May	960
June	930
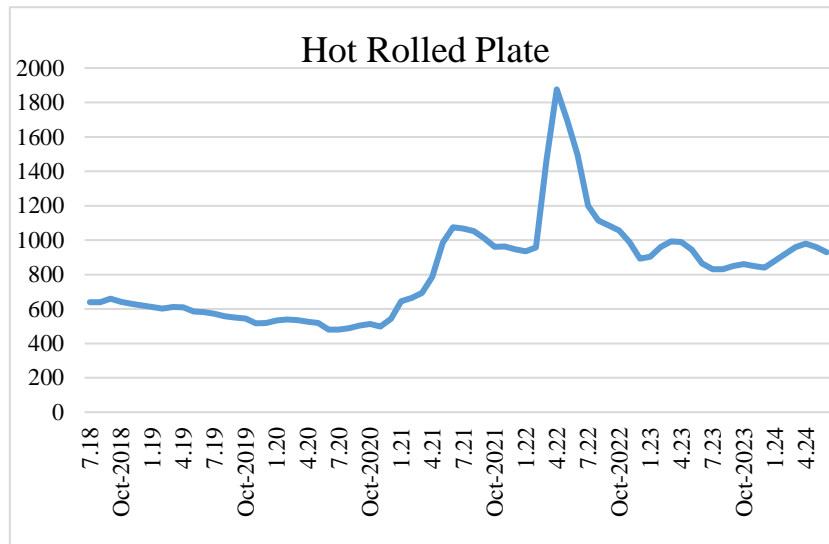
Fig. 1 - Hot rolled plate price Forecast in euros, per tonne. Source: MEPS International Ltd.

On the basis of these data, the following analytical trends can be identified:

There is a general downward trend in hot-rolled sheet prices between 2018 and 2019. In 2020, prices fluctuated slightly, but overall remained relatively stable compared to the previous year. Subsequently, 2021 saw a significant increase in prices, with particularly sharp increases from March 2021 onwards. Prices also increased significantly during 2022, peaking in April of that year and then beginning to decline. By mid-2023, we observe a reduction in prices compared to the previous year, although they remain at a relatively high level.

For the remainder of 2023 and 2024, the available data are only predictions and indicate a downward trend in hot-rolled sheet prices. It should be noted that these price changes are subject to the influence of various factors, including inflation, supply and demand dynamics, global economic conditions and industry-specific circumstances. While inflation plays an important role in shaping prices over time, other factors also have a significant influence on the pricing of hot-rolled sheets.

The following key trends emerged from the data analysis:

Since the beginning of the period under review, i.e. from July 2018 to December 2018, a relatively stable price dispersion with slightly decreasing tendencies can be observed. A gradual decline in price was observed from January 2019 to May 2019. During the period June 2019 to October 2019, the price was relatively stable, followed by a further decline from November 2019 to February 2020. In March 2020, a rapid decline was observed, which is probably related to the impact of the COVID - 19 pandemic on the global economy. The price remained low and stable from April 2020 to August 2020. It then rose suddenly between September 2020 and January 2021, signalling a recovery from the pandemic downturn. During February 2021 to

April 2021, the price continued to rise sharply. The period from May 2021 to August 2021 shows relatively high and stable prices. As the period from September 2021 to February 2022 progresses, prices fall again. From March 2022 to April 2022 prices rise again, which is probably due to the impact of the conflict in Ukraine. Then, over the period from May 2022 to September 2022, prices fell again. A further slight decrease in prices was recorded from October 2022 to February 2023, followed by a slight increase from March 2023 to May 2023.

Several key trends are evident from the analysis of hot-rolled sheet prices. Between 2018 and 2019, prices were on the decline. The year 2020 was characterised by greater price volatility, particularly in response to the COVID - 19 pandemic. 2021 and early 2022 saw significant price increases, likely driven by global economic factors and specific events, including mill closures in China and changes in demand.

During 2022, prices rose again significantly due to geopolitical events related to the conflict in Ukraine. Subsequently, from mid-2022 to mid-2023, a decline in prices has been observed, which can be interpreted as a response to this situation and probably also to the decreasing demand. The projected price development from 2023 to 2024 suggests a further slight decline.

Clearly, these price trends are complexly influenced by factors such as inflation, market demand and supply, global economic conditions and industry-specific events. Although inflation plays a role in the price formation process, other variables also have a significant impact on the final price of hot-rolled sheets.

4.3 Comparison and research on large orders ranked by kilogram price over time, see Table 2.

Tab. 2 - Large orders sorted by price per kg in euros. Source: own research from company Hopax Ltd.

Company	Product		Contract No.	Weight in kg	Price in EUR	Price in EUR/kg	Costs in EUR	Costs in EUR/ kg	Reserve
Dematic	Drums		81145	1,640	32,860.	20.	20,050.	12.	39 %
CZ Loko	Frame 744	2018		23,850	144, 101.	6.04	116,054.2	4.874	19 %
Goldhofer	Low-flying		81098	21,750	93,070.	4.3	87,170.41	4.02	6 %
Goldhofer	SLE frames		81120	21,454	90,000.	4.19	96,821.66	4.526	-8 %
Viastore	Conical column		81124	8,085	26,939.	3.33	18,664.68	2.32	31 %
Dematic	Drums S355		221151	471	14,922.	31.68	9,674.19	20.54	29 %
Dematic	Drums S690QL		221178	1,800	52,788.	29.32	29,714.	16.52	38 %
CZ Loko	Frame 744	2022	231012	21,939	200,820.	9.15	147,001.9	6.69	27 %
Goldhofer	Low-flying		221095	27,193	262,989.	9.67	180,309.1	6.62	25 %
Goldhofer	ES - E 4		221040	28,528	222,352.	7.79	169,299.4	5.92	16 %
Goldhofer	ES - E Frames		231025	35,092	257,500.	7.34	54,499.8	3.09	6,9 %
Goldhofer	ES - E 5		221041	17,612	128,500.	7.30	108,999.6	6.19	7 %

Viastore	Conical column		221118	33,000	199,500.	6.04	119,785.9	3.65	34 %

We compare only the same products, for 2018 with 2022

I.Analysis of the financial results and costs of the Dematic drums product

Year 2018:

- Weight: 1,640 kg

- Price: EUR 32,860.

- Price per 1 kg: EUR 20.

- Cost: EUR 20,050.

- Cost per kg: EUR 12.

Year 2022:

- Weight: 471 kg

- Price: EUR 14,922.

- Price per 1 kg: EUR 31.68

- Cost: EUR 9,674.19

- Cost per kg: EUR 20.54

Year 2018: Income (sales): EUR 32,860 Costs: EUR 20,050 Profit = Income - Costs = EUR 32,860. - EUR 20,050. = EUR 12,810. Profit rate = (Profit / Income) * 100 = (EUR 12,810. / EUR 32,860.) * 100 ≈ 38.99 %

Year 2022: Income (sales): EUR 14,922. Cost: EUR 9,674.19 Profit = Income - Cost = EUR 14,922. - EUR 9,674.19 = EUR 5,247.81 Profit rate = (Profit / Income) * 100 = (EUR 5,247.81 / EUR 14,922) * 100 ≈ 35.12 %

Conclusion: the profit margin in 2018 was approximately 38.99 %, while in 2022 it reached approximately 35.12 %. This represents a decrease in profit margin of 3.87 %. At the same time, the cost per kg of raw material increased by 41.58 % over the period under review.

This financial development indicates that despite the increase in the cost per kg of raw material, the profit margin has decreased minimally. Interestingly, despite this remarkable rise in raw material costs, the decline in the profit rate remained relatively moderate. This suggests that the company could have mitigated the effects of cost inflation through measures such as increased operational efficiency, strategic pricing adjustments or supply chain optimisation. Significantly, our investigation highlights that inflation, often considered the main driver of financial volatility, shows only a marginal effect on firm profitability. This finding puts a question mark over common assumptions and highlights the complex nature of financial interactions within the business system.

II. Analysis of financial results and costs of the product CZ Loko frame 744

Year 2018:

- Weight: 23.850 kg

- Price: EUR 144,101.

- Price per 1 kg: EUR 6.04

- Cost: EUR 116,054.2
- Cost per kg: EUR 4.87

Year 2022:

- Weight: 21,939 kg
- Price: EUR 200,820.
- Price per 1 kg: EUR 9.15
- Cost: EUR 147,001.9
- Cost per kg: EUR 6.69

Calculation of profit and profit rate:

Year 2018: Income (sales): EUR 144,101 Costs: EUR 116,054.2 Profit = Income - Costs = EUR 144,101 - EUR 116,054.2 = EUR 28,046.8 Profit rate = (Profit / Income) * 100 = (EUR 28,046.8 / EUR 144,101) * 100 ≈ 19.45 %

Year 2022: Income (sales): EUR 200,820. Cost: EUR 147,001.9 Profit = Income - Cost = EUR 200,820. - EUR 147,001.9 = EUR 53,818.1 Profit rate = (Profit / Income) * 100 = (EUR 53,818.1 / EUR 200,820.) * 100 ≈ 26.80 %

Conclusion: the profit margin in 2018 was approximately 19.45%, while in 2022 it was approximately 26.80 %. At the same time, the cost per kg of raw material increased by 27.20 %.

This financial analysis shows that the profit margin has increased over the time period under review, which may be due to various factors, including changes in prices and product weighting. The result of our research clearly shows that inflation had minimal impact on profit achievement. This indicates the robustness of the business model and its ability to adapt to external influences. This observation can serve as a valuable basis for formulating future strategies and decisions.

Overall, this analysis provides a prospective view of the financial development of the selected company and shows that despite changes in the surrounding environment, the company has been able to maintain a positive profitability trajectory. In this way, it offers valuable insight into how factors, including inflation, can affect the financial performance of a business and what mechanisms can be used to minimise their negative impact.

III. Analysis of the financial results and costs of the Goldhofer low-residue product

Year 2018

- Weight: 21,750 kg
- Price: EUR 93,070.
- Price per 1 kg: EUR 4.3
- Cost: EUR 87,170.41
- Cost per kg: EUR 4.02

Year 2022

- Weight: 27,193 kg
- Price: EUR 262,989.

- Price per 1 kg: EUR 9.67
- Cost: EUR 180,309.1
- Cost per kg: EUR 6.62

Calculation of profit and profit rate:

Year 2018: income (sales): EUR 93,070. Cost: EUR 87,170.41 Profit = Income - Cost = EUR 93,070. - EUR 87,170.41 = EUR 5,899.59 Profit rate = (Profit / Income) * 100 = (EUR 5,899.59 / EUR 93,070.) * 100 ≈ 6.34 %

Year 2022: Income (sales): EUR 262,989. Cost: EUR 180,309.1 Profit = Income - Cost = EUR 262,989 - EUR 180,309.1 = EUR 82,679.9 Profit rate = (Profit / Income) * 100 = (EUR 82, 679.9 / EUR 262,989.) * 100 ≈ 31.41 %

Conclusion: the profit rate in 2018 was approximately 6.34 %, while in 2022 it reached approximately 31.41 %. This represents an increase of 25.07 %. The cost per kg of raw material increased by 39.27 % over the period under review.

This financial analysis reveals a significant increase in our profit margin from 2018 to 2022. Higher profitability in 2022 may be the result of various factors, including changes in pricing structure and general economic conditions. Our investigation offers us a glimpse of the evolution of the financial condition of the selected company and the results of our analysis clearly show that inflation had no significant impact on profit achievement.

This confirms the robustness of the business model and its responsiveness to external influences. These findings can serve as a valuable basis for future strategic decisions.

All in all, this analysis provides us with the prospect of a significant increase in the profitability of the selected company. It shows that even in the context of a volatile environment, the enterprise was able to maintain a positive direction in its financial development. In this way, it provides valuable insight into how factors, including inflation, can affect financial performance and how they can be used to minimise any negative impacts.

IV. Analysis of the financial results and costs of the product Viastore conical column

Year 2018:

- Weight: 8,085 kg
- Price: EUR 26, 939.
- Price per 1 kg: EUR 3.33
- Cost: EUR 18,664.68
- Cost per kg: EUR 2.32

Year 2022:

- Weight: 33,000 kg
- Price: EUR 199,500.
- Price per 1 kg: EUR 6.04
- Cost: EUR 119,785.9
- Cost per kg: EUR 3.65

Calculation of profit and profit rate:

Year 2018: income (sales): EUR 26,939. Cost: EUR 18,664.68 Profit = Income - Cost = EUR 26,939. - EUR 18,664.68 = EUR 8,274.32 Profit rate = (Profit / Income) * 100 = (EUR 8, 274.32 / EUR 26,939.) * 100 ≈ 30.72 %

Year 2022: Income (sales): EUR 199,500. Cost: EUR 119,785.9 Profit = Income - Cost = EUR 199,500. - EUR 119,785.9 = EUR 79,714.1 Profit rate = (Profit / Income) * 100 = (EUR 79,714.1 / EUR 199,500.) * 100 ≈ 39.94 %

Conclusion: the profit rate in 2018 was approximately 30.72 %, while in 2022 it reached approximately 39.94 %. This represents an increase of 9.22 %. The cost per kg of raw material has increased by 36.44 % over the period under study. The result of the research shows that inflation has not affected the achievement of profit in any aspect.

The financial analysis above presents a significant rise in profitability rates between 2018 and 2022. The increase in profitability in 2022 leads us to question potential determining factors, including both price and economic variables. These developments force us to look for the deeper roots of these changes that affect the financial performance of the business. Overall, then, this analysis opens the way to a better understanding of changes in corporate profit margins. The significant increase in profitability in 2022 poses a challenge to closely examine the factors behind this trend. My analysis offers a starting point for future research and deepens understanding of the relationships between price and economic variables and profit dynamics. The results of my analysis clearly show that inflation had no significant effect on profit achievement.

It can be concluded that the entity under study was not affected by increased costs and inflation, but rather benefited from them. In view of the uncertainty regarding the development of inflation and its potential impact on the production process, several measures should be considered for the effective management of the company under study:

Diversifying the supplier portfolio can reduce the exponential risk to price shocks, including long-term contracting with multiple suppliers, which could reduce this impact. Accumulation and supply of key raw materials during periods of low prices could provide some form of protection against price turbulence in the market. Continuous monitoring and optimisation of production costs could include efficient production cycle planning, revisions to transport and storage costs and efficient energy consumption. Product pricing will help price elasticity of demand. In the event of significant cost increases, the company may consider passing on these costs to customers without negatively affecting demand. Systematic monitoring of inflation indicators such as the Consumer Price Index (CPI) and price forecasts could help identify potential price pressures early and then adjust strategies. Investments in innovative technologies and automation could increase production efficiency and reduce costs in the long term, including the ability to respond flexibly to market changes and demand, which is one of the keys to successful adaptation. This may include rapid adjustments to production schedules or product mix. Proactive dialogue and cooperation with key suppliers can provide a deeper understanding of market trends and enable better preparation for potential changes.

Inflation presents the potential to affect a company's production process from several perspectives, and this includes the cost of production and pricing strategy. An analysis of hot rolled sheet prices suggests that inflation could play a more significant role in future pricing trends for key raw materials. To effectively manage the inflationary impact, the company may consider strategies such as supply chain diversification, strategic storage of raw materials, implementation of efficient cost tactics and monitoring of inflationary indicators. Responding

flexibly to market changes and cooperating with suppliers become key elements in successfully managing the situation.

4.4 Implications

I have created a logical statement for the evolution of inflation, *If there is an increase in inflation or an increase in the price of hot rolled sheets per ton, then product prices will increase.*

This statement can be written using logical symbols and operators as follows:

p: There will be a rise in inflation.

q: There will be an increase in the price of hot rolled sheets per tonne.

r: The price of products will increase.

The statement can then be written as an implication:

$(p \lor q) \rightarrow r$

The statement uses the logical OR operator (denoted by $\lor$) to represent logical disjunction (or) and the IMPLIES operator ($\rightarrow$) to represent implication.

For this implication looks as follows:

1 = true

0 = false

Tab. 3 – Implication. Source: own research

p	q	r	$(p \lor q) \rightarrow r$
1	1	1	1
1	1	0	0
1	0	1	1
1	0	0	0
0	1	1	1
0	1	0	1
0	0	1	1
0	0	0	1

The table lists all possible combinations of values for "p", "q" and "r". The result of the implication "$(p \lor q) \rightarrow r$" is "true" only if either "p" or "q" holds and "r" holds. Otherwise, the result is "false".

4.5 Three possible scenarios for the future development of inflation and its impact on the production process of an engineering company, including calculations.

First, we calculate the average inflation, where the average inflation over a five-year period (2018 to 2022) = Total inflation (2018 to 2022) / Total quantity (number of years).

Thus, the average annual rate of inflation expressed as the increase in the average consumer price index (average of the last 12 months compared with the average of the previous 12 months) in the Czech Republic was:

- in 2018..............2.1%
- in 2019..............2.8%
- in 2020..............3.2%
- in 2021............. 3.8%
- in 2022............15.1%

These data have been officially published in the CSO publications "Consumer Price Indices" (cost of living) -
https://www.czso.cz/aktualni-produkt/41338 and https://www.czso.cz/aktualni product/41420

A weighted average can be chosen to calculate average inflation, with the weights corresponding to the inflation rate in each year. The weighted average can be calculated as follows:

Average inflation over the period 2018 to 2022 = (Σ inflation over the period 2018 to 2022) / (Σ number of years in the period) = (2.1 + 2.8 + 3.2 + 3.8 + 15.1) / 5 = 5.4%

Average inflation for the period 2018 to 2022 is 5.4 %.

Next, we calculate the average hot rolled sheet price per tonne for each of the years (2018, 2019, 2020, 2021, 2022) based on the available data:

Year 2018: average price = (639 + 639 + 660 + 641 + 630 + 621) / 6 = 638.33 EUR/t

Year 2019: Average price = (612 + 602 + 612 + 610 + 585 + 581 + 572 + 557 + 549 + 544 + 516 + 518) / 12 = 581.92 EUR/t

Year 2020: average price = (533 + 539 + 535 + 526 + 518 + 480 + 480 + 488 + 504 + 512 + 498 + 543) / 12 = 511.58 EUR/t

Year 2021: Average price = (644 + 664 + 694 + 787 + 986 + 1074 + 1068 + 1053 + 1011 + 961 + 963 + 947) / 12 = 914.92 EUR/t

Year 2022: Average price = (935 + 957 + 1466 + 1876 + 1695 + 1495 + 1200 + 1114 + 1086 + 1056 + 989 + 893) / 12 = 1284.75 EUR/t

So the average prices per tonne for the years are:

- Year 2018: 638.33/EUR/t
- Year 2019: 581.92 EUR/t
- Year 2020: 511.58 EUR/t
- Year 2021: 914.92 EUR/t
- Year 2022: 1284.75 EUR/t

Calculate the average price for all the years listed. Just add the average prices for each year and divide by the number of years. The following calculation will give us the required information:

- Average price = (638.33 + 581.92 + 511.58 + 914.92 + 1284.75) / 5 = 786.30 EUR/t
- So the average price of hot rolled sheets for the years is 786.30 EUR/t

Based on the above data, we predict three possible scenarios of inflation and hot-rolled sheet prices and their impact on the corporate economy.

*The first scenario is **positive.** If the inflation rate is below 5.4 % and the price of hot rolled sheets is below 786.30 EUR/t,* this may have a positive impact on the corporate economy. Lower

inflation could reduce the company's cost of production process, which could increase its profitability. Lower inflation and production process costs would also allow the company to invest more resources in other areas of the business or reduce the prices of its products or services, which could increase the company's competitiveness in the market.

*The second scenario is **neutral.** If inflation remains the same at 5.4 % and the price of hot-rolled sheets remains at 786.30 EUR/t*, this will have a stabilising effect on the corporate economy. The company will be able to plan its production costs with greater certainty and to adapt its strategies and investments on the basis of this stable price. As no changes in the inflation rate are expected, the company can continue its normal operations without major effects on its economy.

*The third scenario is **pessimistic**. If inflation is higher than 5.4 % and the price of hot-rolled sheets is higher than 786.30 EUR/t,* this may have a negative impact on the corporate economy. Higher inflation would mean increased costs for the company, which could reduce its profitability. Higher process costs could also limit the company's capacity to invest in development and growth. The enterprise could find itself in a difficult financial situation and may be forced to consider measures such as optimising the cost of the production process or increasing the prices of its products, which could adversely affect the enterprise's competitiveness in the market.

5 DISCUSSION

My thesis focuses on the analysis of the impact of inflation on the production process of a medium-sized engineering company, HOPAX Ltd. and draws on literature that analyses various aspects of economic phenomena and context. My findings regarding the impact of inflation on firms' production processes and strategies connect with many concepts and theoretical frameworks presented in the literature.

The first strand of the literature concerns research that examines how higher macroeconomic uncertainty in recessions can be an endogenous response to output shocks and how uncertainty about financial markets can affect output fluctuations (Ludvigson et al., 2021). This context helps to strengthen the foundations of my research by showing how uncertainty and shocks can affect economic decisions and outcomes.

My research shows that inflation is not the dominant factor influencing cost increases in the production process of the company under study. Instead, I have identified a complex set of factors that collectively affect the prices of hot rolled sheets and the overall production process. These factors include market supply and demand, exchange rates and raw materials. This conclusion is important as it supports a broader view of the factors affecting cost and price dynamics in the manufacturing sector.

The research on the impact of inflation in the production process of HOPAX Ltd. includes analysis in terms of both macroeconomic factors (such as inflation, supply and demand, exchange rates) and microeconomic factors (such as raw material costs and internal production processes). The identification of a complex set of factors shows a good ability to include both perspectives in the analysis.

My work has shown that within the time period, inflation has only indirectly affected the cost growth of the products under study at HOPAX Ltd. Rising prices of hot rolled sheets had a greater impact on cost increases in the production process than inflation itself. This finding supports the economic mechanisms in which rising prices of inputs such as raw materials can have a stronger effect on costs than inflation itself.

A detailed comparison of the impact of inflation and price increases in hot-rolled sheets is important from a microeconomic point of view. In this way, my work shows that while inflation may play a role, the rise in the price of specific inputs is a more significant factor affecting costs. This is consistent with the microeconomic concept where specific inputs and their prices have a key impact on the firm.

In terms of recommendations for cost reduction in the production process, my work emphasizes the need to shorten and streamline the production process. This recommendation corresponds to a microeconomic approach, where the company tries to optimize internal processes and reduce the waste of production resources. This may include the merging of sub-production processes and upgrading, which can reduce production costs and increase efficiency. This is a relevant approach because improving internal processes can reduce costs and increase competitiveness independently of macroeconomic factors.

Overall, my thesis provides a valuable insight into the issue of inflation and its impact in the production process of an engineering firm and the link between macroeconomic factors (such as inflation) and microeconomic factors (such as internal processes of the firm). My findings are consistent with economic theories that emphasize the complexity of factors affecting cost and price dynamics and confirm that costs in the production process are affected by various aspects of the economic environment and internal decisions of the firm

Part of the discussion is to put the changes in hot rolled sheet prices in the context of inflation. This is important because in macroeconomics inflation often affects the price level of various commodities, including raw materials

My analysis of hot sheet price trends and how they compare to inflation makes good sense, including the evolution of the cost of the production process to help us determine what factors have the greatest impact on overall costs. I stress that while inflation plays a role, there are a number of other microeconomic factors that also affect costs, such as market supply and demand, exchange rates and so on. This is very relevant because in the real world, a number of microeconomic mechanisms affect the cost of production

In my thesis I am critical of the hypothesis that assumed a stronger effect of inflation on the cost of the production process. My analysis shows that while inflation may have some effect, in the case of the firm under study it was not as pronounced as assumed. This critical approach and the ability to revise a hypothesis based on empirical data are important elements of scientific research.

My work focuses on the impact of inflation expectations on household and firm economic decisions (Coibion et al., 2022), where this finding supports my approach that inflation can indeed influence the decision-making of agents and have an impact on economic processes, including combining a macroeconomic view of inflation with a microeconomic view of a firm's production process.

My findings highlight that while inflation may play a role, there are many other factors that affect costs and the production process. In doing so, I bring a comprehensive view to the issue and highlight the importance of combining theoretical and empirical approaches in analyzing economic phenomena, specifically price shocks such as gasoline price shocks, and their impact on inflation (Kilian and Zhou, 2022a, Kilian and Zhou, 2022b). This sets the context for my research, which shows what specific factors can affect inflation and what factors can be dominant.

After the analysis of the research question, ***how does inflation affect the production process of the selected enterprise ?,*** it can be concluded that inflation is not as dominant a factor affecting costs in the production process of the engineering company as one might assume.

Although inflation, averaging 5.4 % over five years, has an impact, it is not as intense in terms of cost increases. During the period under consideration, the cost per kg of raw material for the selected product increased by 27,20 %, with inflation contributing only around 19 % of this increase. In the case of the largest cost increase, which amounted to 41,58 % for one of the products examined, inflation contributed around 12,98 %.

My research found that, despite its partial role, inflation is not the primary factor driving cost increases in the firm under study. A number of other factors have a more significant impact on cost increases and account for a much larger share of the total cost increase in the production process.

It should be stressed that the specificity of this research question lies in its focus on a particular aspect of the production process and its link to inflation. In analysing this question, a range of aspects related to costs in production were taken into account. The results of the analysis show that inflation has some effect but is not the main factor affecting costs in the enterprise under study.

This research question, which focuses on the impact of inflation in the production processes of engineering firms, is contextualised within the literature that has examined the impact of technological innovation and investment in knowledge assets on economic growth and competitiveness (Hall and Jones, 1999; Aghion et al., 2009; Hennart, 2022). This reinforces my argument that investment in knowledge capital can play an important role in maintaining competitiveness in engineering industries.

The study makes a relevant contribution by focusing on the impact of inflation on the economy and production processes of firms. Although inflation is not the main driver of cost increases in the production process of this particular company, this analysis contributes to a better understanding of the interactions between inflation and production costs, which can have important implications for the performance of companies in an economic context.

In response to the second research question, *how can we effectively reduce the cost of the production process of the selected company, given the uncertainties associated with inflationary fluctuations?* it can be concluded that the study identifies a key problem facing the company under study. The research reveals that the production process in the company is considerably prolonged and needs to be shortened and streamlined. Specifically, it could be beneficial to merge some similar sub-production processes and upgrade them, which would lead to an overall reduction in costs.

Good operational and strategic management is also key, enabling the company to maintain its competitiveness in an uncertain market environment while minimising costs. An important role is played by senior and middle management who must be able to understand and address the challenges in the organisation.

The hypothesis, my research hypothesis, that *inflation is likely to significantly increase the cost of the production process in the selected company, which I* have established for my research, concerns the relationship between inflation and the cost of the production process in the selected company. Specifically, I hypothesized that inflation is likely to significantly increase the cost of the production process. To test this hypothesis, I used publicly available data that covers the period from 2018 to 2023.

After conducting the analysis, I concluded that my original hypothesis is not fully confirmed. Inflation proved to be a less significant factor that would significantly increase the cost of the production process in the company under study over the time period. Instead, the problems associated with the cost of production were found to be more related to the input materials, specifically the price of hot rolled sheets. My research revealed a rather inverse correlation

between the level of inflation and the cost of the production process, with the price of hot rolled sheets per tonne apparently playing a greater role. Inflation is only indirectly reflected in the cost of the production process of an engineering company.

The original hypothesis was clearly stated and was testable, but the results of the analysis and verification suggest that inflation is not the main driver of significant cost increases in the company under study. These findings therefore refute the original hypothesis based on the available data.

My study also builds on the literature on production networks and the impact of monetary policy on these networks (La'O and Tahbaz-Salehi, 2022; Pasten et al., 2020; Ozdagli and Weber, 2017; Ghassibe, 2021). This approach reinforces my findings on the relationships between economic factors and production processes in the context of my research.

HOPAX Ltd. will need to effectively manage and minimize the impact of inflation on its production process. This may include strategies such as finding alternative suppliers with more competitive prices, optimizing production processes to reduce energy and material consumption, negotiating with suppliers and employees on prices and wages, and monitoring market and economic trends to adapt to changing conditions.

In my research, I used inflation data from the Czech Statistical Office for the period 2018 to 2022, as well as internal data from the company under study. I analysed this data to arrive at the above conclusions.

Overall, my study successfully builds on the existing literature and confronts my results with theoretical and empirical works that analyze similar or related concepts. In this way, my study engages in a broader discourse and contributes to a deeper understanding of the relationships between inflation, economic decisions and production processes. The results of my analysis do not support a direct link between inflation and significant increases in the cost of the production process at HOPAX Ltd, but instead show that other factors, such as the price of input materials, have a more significant impact on these costs.

6   CONCLUSION

In this study, I have focused on examining the impact of inflation on the production process in a selected company and have come up with some key findings. The gradual increase in product prices over the period 2018 to 2022 indicates a partial impact of inflation on the production process within the firm under study. However, in the context of this research, it is important to highlight that inflation occupies the role of a complementary factor that does not affect the production process more significantly than other determinants.

I conclude that while inflation does play a role in raising input prices, particularly the prices of key raw materials and the overall production process, its direct impact on this firm is relatively limited. More significant factors such as price shocks caused by external events, epidemics, war conflicts and natural disasters have a greater weight in this context.

Based on the findings of this research, I would like to emphasize that the strategic direction for the company under study should be to optimize the production process and cost structure.

I recommend conducting an in-depth cost analysis and then restructuring the production process to reduce the process length and identify key areas for efficiency. Reducing labour costs and costs associated with the production process should also be an important step.

Overall, it can be concluded that the company under study was in an environment where inflation was not the main driver of cost increases. Given the average inflation of 5.4 % between 2018 and 2022, the company should focus primarily on reducing production costs.

I propose that the management of the company undertake a thorough restructuring of the production process, explore alternative raw material suppliers and implement strategies to increase economic efficiency and maintain competitiveness in the marketplace.

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ADVANCING OF INDUSTRIAL ROBOTIC 3D PRINTING THROUGH SIMULATION

Ján Šido, Martin Csekei, Roman Ružarovský

Abstract

This article aims to introduce the concept of path generation in additive manufacturing, that involves creating a toolpath that guides the printer's nozzle or extruder to deposit material layer by layer. Additive manufacturing, commonly known as 3D printing offers a revolutionary production approach that enables the gradual creation of complex and precise objects layer by layer. 3D printing, plays a significant role in current Industry 4.0 as tool for fast prototyping, spare part production and supply chain optimization. Industry 4.0 refers to the fourth industrial revolution, characterized by the integration of digital technologies into manufacturing processes to create smart factories and optimize production. Industrial robots are instrumental in this field, as robots can be programmed to perform various tasks with high precision and repeatability. Choosing the right application software is a key factor for the effective implementation of additive manufacturing using industrial robots. Selected software solutions will be evaluated based on various criteria such as programming language, user interface and accessibility. The paper will then focus on the implementation of the chosen software (ABB RobotStudio), within relevant setting to demonstrate its practical application and effectiveness. The main goal we pursued wasn't the application per se, but rather the demonstration of how to incorporate G-code into the robot through ABB RobotStudio, given the lack of attention to this aspect by other publication.

Keywords: *Additive manufacturing, Industry 4.0, Path generation, Robotics, Simulation*

1   INTRODUCTION

Since beginning of the first Industrial Revolution, subsequent changes have revolutionized the manufacturing industry. From the utilization of water and steam-powered machines to the introduction of electrical and digital automated production, manufacturing processes have become increasingly intricate, automated and sustainable. These advancements have enabled people to operate machines with simplicity, efficiency and continuity. The term "Industry 4.0" represents the fourth industrial revolution, characterized by a new level of organization and control over the entire value chain and product life cycle. It aims to cater to individualized customer requirements, influencing various areas such as order management, research and development, manufacturing commissioning, delivery and even product utilization and recycling. A key distinction between Industry 4.0 and Computer Integrated Manufacturing (CIM) is the emphasis on the human role within the production environment. While CIM focuses on workerless production, Industry 4.0 recognizes the significant role of human workers in the manufacturing process. The Industry 4.0 paradigm promotes the interconnection of physical items like sensors, devices and enterprise assets both with each other and with the Internet. To achieve this, it is essential to review and assess the suitability of design and drafting methods across disciplines, aiming for a modern, interdisciplinary approach to product development. These methods need to be consolidated into a unified, integrated, interdisciplinary framework encompassing processes and IT solutions. In Industry 4.0, the production process is subdivided into small, value-oriented units that share information only with consecutive process steps. This approach enhances flexibility and potentially reduces the complexity of coordination (Vaidya et al., 2018).

Manufacturing is a process through which various raw materials are transformed into finished products using various production methods. Industrial robots are playing a vital role in the manufacturing industry. They find wide application in roles such as payload handling, welding, painting, assembly, packaging and etc.. These types of robots are automated, programmable and can move in all three dimensional axes. The industrial robot is defined by the Robot Institute of America as a programmable multifunction operator for handling mechanical parts or workpieces, or as a special mechanical device that can perform various tasks by changing programs. Additive manufacturing is the term that describes three-dimensional (3D) printing technologies. The American Society for Testing and Materials (ASTM) defines additive manufacturing as "the process of joining materials to make objects from 3D model data, typically layer upon layer," from material such as plastic, metal, concrete, or biological material (for example human tissue). It is the opposite of subtractive manufacturing, which starts with a block of material from which material is subtracted (cut) to reveal and create desired product (e.g., CNC technologies) (Marchment et al., 2019; Urhal et al., 2019; Liu, 2020; Vocetka et al., 2020).

Additive manufacturing begins with the creation of a virtual 3D CAD model. This CAD model typically needs to be in the form of a fully enclosed space, if one of the model's surfaces is missing or contains gaps, it represents an infinitely thin surface that cannot be printed. The CAD file is then converted into a file format compatible with the printing device. The file format is usually in a standard triangulated language (STL), which converts the original CAD file into a triangulated file (the higher the resolution of the STL file, the better the model's quality). There is also a new format of STL that includes more information, such as color and material type and allows the use of curved triangles to improve model quality. The STL file is then opened in a slicer, which positions the model in the best printing orientation suitable for printing. The slicer divides the STL files into thin layers and also allows for setting additional print parameters, including print resolution (layer thickness), material, speed, etc. When the software sends the part to the 3D printer, the part is created layer by layer. Once the 3D printer has finished printing the part, part needs to be removed from the print bed and post-processing is required (Brooks et al., 2017; Dine & Vosniakos, 2018).

In the subsequent sections a more in-depth examination of terminology related to both additive manufacturing and software solutions will be conducted. Through practical examples, the procedure of transferring code to the robot will be demonstrated, providing fellow researchers with a firsthand comprehension of this process.

2 LITERATURE REVIEW

The utilization of 3D printing with a robotic arm is a relatively new and less studied method in the manufacturing process. This manufacturing process is influenced by a significant number of factors required for the proper implementation of this method. It is not possible to design the correct generation of paths without fundamental knowledge of the applied 3D printing methods.

2.1 Basic information about commonly used materials in 3D printing

Individual materials for 3D printing include:

• Metals: These primarily include aluminum alloys, cobalt-based alloys, nickel alloys, stainless steel and titanium alloys.

• Polymers: The most well-known examples are polylactic acid (PLA), acrylonitrile butadiene styrene (ABS), polypropylene (PP) and polyethylene (PE). Recently, there has been trend in

using thermoplastics with higher melting temperatures, such as polyether ether ketone (PEEK) and polymethyl methacrylate (PMMA).

• Ceramic Materials: This primarily includes aluminum oxide, bioactive glasses, and zirconium oxide.

• Composites: Examples of composite materials for additive manufacturing include carbon fiber-reinforced polymer composites and glass fiber-reinforced polymer composites.

• Smart Materials: Examples can include shape memory alloys or shape memory polymers (Shahrubudin et al., 2019; Bhatia & Sehgal, 2023).

2.2 Basic information about commonly used methods in 3D printing

Some methods of 3D printing include:

• Fused Deposition Modeling (FDM) or Fused Filament Fabrication (FFF): This technology is based on melting and sequentially depositing thermoplastic material in the form of a thin filament. The material is heated in the printer's extruder and deposited layer by layer onto the print bed, where it solidifies. FDM/FFF is one of the most widely used and accessible 3D printing technologies.

• Stereolithography (SLA): This technology utilizes the photochemical curing of a liquid photopolymer using precisely controlled laser light. SLA is known for its high precision and details.

• Selective Laser Sintering (SLS): In this technology a laser is used to heat and solidify a layer of powdered material, typically a polymer or metal. The laser selectively fuses the layer by layer and support structures are typically not required. SLS enables the printing of robust and functional objects.

• Digital Light Processing (DLP): This technology is similar to SLA but uses a digital projector to create a layer of photopolymer. The projector creates the entire layer in a single step, allowing for faster printing. DLP is known for its high printing speed.

• Binder Jetting: In this technology, powdered material is bound together using a binder, such as adhesive. Layer by layer, the powder and binder are selectively applied until the object is fully formed. This technology is often used for printing ceramics or sand (Ngo et al., 2018; Sandeep et al., 2021).

2.3 Basic information about software's for path generation

There are numerous options available for generating robot paths for 3D printing using multiple software tools. Based on available information Grasshopper, RobotDK and RobotStudio are currently considered to be the best solutions on the market.

ABB RobotStudio 3D Printing Powerpac enables direct 3D printing through the RobotStudio software. It eliminates the need for manual programming and supports various types of 3D printing, such as wire arc printing, printing from granules or printing with concrete. This software solution is suitable for low-volume and high-mix printing applications. With the 3D Printing Powerpac, there is no need for manual RAPID programming. The Powerpac automatically generates a complete RAPID printing program by converting G-code directly into RAPID with support for multiple printing processes. It provides individual tools for interpolation calculation and allows for linear and rotational coordination of external axes, ensuring smooth motion. The extrusion of granules can be controlled directly as an integrated robot axis. There is no limit to the number of G-codes, so data for the printing coordinates is dynamically loaded during the printing process, allowing for large-scale prints. The Powerpac

also offers various tools to filter out extraneous G-code, ensuring smoother robot motion. In addition, tools are available for reachability control, ensuring the robot can access all essential printing positions (Nilsson, 2016; Pollák et al., 2018).

Grasshopper is a visual programming tool and a plugin for Rhinoceros 3D, enabling generative modelling and parametric design. It is widely used in architecture, design and industrial design. Grasshopper provides users with a graphical interface in which they can craft complex 3D models and animations using visual programming. Within the realm of 3D printing, Grasshopper boasts an array of tools and plugins that simplify the creation of 3D models and preparation of print files. Users can create parametric models and explore varying geometric shapes and structures. With Grasshopper's assistance, users can produce unique and intricate objects ready for 3D printing. Additionally, Grasshopper allows for the integration of other plugins and extensions, supporting a direct connection with industrial robots. This capability permits users to generate print files directly and monitor their output in real-time (Okur & Altan, 2021; Vantyghem et al., 2021).

RoboDK is a software platform designed for transforming robotic arms into 3D printers or CNC machines. Users can generate robot programs from curves embedded in CAD files, from text files that contain curves or points, or by creating custom paths via the RoboDK API interface. The software include library with over 200 robots from 15 distinct manufacturers, such as ABB, Fanuc, Kuka and Motoman. Its user-friendly interface allows for intuitive simulations, eliminating the need for prior programming experience. It supports the import of various file types, including STEP and IGES. Additionally, RoboDK's post-processors facilitate the export of programs to actual robot controllers, compatible with formats like ABB Rapid (mod/prg), Fanuc LS (LS/TP), Kuka KRC/IIWA (SRC/java), Motoman Inform (JBI), Universal Robots (URP/script) and more. A standout feature of RoboDK is its capability for offline programming and simulating industrial robot movements. This ensures rapid creation of a virtual environment for simulation, allowing users to program a broad array of robot manufacturers without delving into numerous robot programming languages (Svetlik et al., 2016; Pollák et al., 2018; Alabbasi, 2023).

3 METHODOLOGY

In this study a method of subjective comparison was used to evaluate the attributes of various software solutions. The programming language, user interface and availability of each software were assessed. By using this approach, their relative strengths and weaknesses were identified based on these key factors. Valuable insights were provided by our subjective analysis, and a foundation was laid for further research directions.

Comparing RobotStudio, Grasshopper and RoboDK offers intriguing insights into these software solutions. Each software has distinct characteristics: RobotStudio, though limited to ABB robots, provides a straightforward approach to robotic programming and stands out because of its C++ heritage manifested in RAPID. Grasshopper's strength is its visual programming capabilities, which allow for intricate automation logic; however, its complexity can sometimes pose challenges. RoboDK, although simple to operate, lacks a standardized graphical interface, which might hinder its seamless integration across various setups due to an unfamiliar interface.

RobotStudio was chosen to be used in subsequent methodology because the process isn't adequately detailed in other publications, especially given that this powerpack has been only recently added to RobotStudio.

Pre-testing and verifying a model's functionality before its physical realization is crucial. Simulation provides virtual testing and visualization of the model, helping identify and resolve potential issues and also optimizing system performance. Thus, the creation and use of simulations in robotic 3D printing with ABB RobotStudio and its 3D PowerPac are discussed further. Using simulations in ABB RobotStudio, combined with the 3D PowerPac offers multiple benefits. It reduces development time and costs by identifying and resolving potential problems and errors within the model. This enhancement ensures safety, efficiency and precision refining the robotic 3D printing operations. Moreover, simulation allows experimentation with various settings and scenarios, empowering users to fine-tune their processes for optimal results.

3.1 Creation of a Virtual Controller

Through the Controller tab and the Installation Manager function a new virtual controller was created. The "3DP" product was added under the "Products" tab after installing the add-in. In the "Options" tab a robot was selected for simulating the robotic 3D printing process. The "3D printing Dispense lean (printL)" application was chosen to simulate this process. Additionally, control of cooling fans or a heated bed could be added. While these applications would be necessary for implementing the simulated process in a real workspace, they were not required for simulation purposes. After setting all the parameters, the virtual controller was created. Next, an empty station was created, and the virtual controller was added to the station using the "Virtual Controller" > "Existing Controller..." function.

3.2 Creation of the Workspace

After adding the virtual controller, the model of the selected industrial robot was automatically loaded into the station. An extruder model and a worktable were then added to the station. The extruder was assigned to the industrial robot, and the worktable was positioned appropriately.

3.3 Generation of G-code

Several freely available slicers can generate G-code. In this case, "Ultimaker Cura" slicer was utilized. The model in STL format was loaded into the slicer, sliced and saved to disk. G-code let you choose variable of printing such as infill pattern and density. Infill density is the "fullness" of the inside of a part. In slicers, this is usually defined as a percentage between 0 and 100, with 0% making a part hollow and 100%, completely solid. Some slicers also allow for different infill patterns that can be chosen in regard of selected part. For example, Cura (5.3) has a selection of 14 different infill patterns such as lightning, lines, zig-zag, grid, tri-hexagon, cubic, gyroid etc.. For example, the gyroid pattern connects walls in three dimensions, providing more overall strength. As a result, this pattern consumes more material compared to patterns like lines.

3.4 Insertion of G-code and Verification/Adjustment of Printed Object's Position

Before inputting the G-code a 'Workobject' needs to be created either at a corner of the workplace or at any other desired location where the robot will conduct the 3D printing. Then, the 3D Printing add-in was enabled through the Add-Ins tab and the G-code file was inserted using the "Open" function. Upon import, the G-code was automatically linked to the established Workobject and a model preview appeared in the workspace. The orientation and position of the Workobject along with its associated G-code, were adjusted using the "Set position..." and "Rotate..." functions to ensure accurate positioning and the right orientation of the model.

3.5 Print Settings and Setting up External Axes

The 3DP PowerPac add-in provides various functions for optimizing and adjusting the 3D printing process, including "PathTune", "Targets Orientation" and "Process." These functions allow for optimizing the toolpaths, reducing the number of points, setting the tool orientation and adjusting printing speeds.

The add-in also provides a function for configuring external axes. These settings come into play if the robot is positioned on a 7th axis, if an extruder with a screw is controlled as an external axis or if a nozzle is controlled as an external axis where angle is relative to the path direction is defined. Since this study didn't utilize any external axes, we skipped this step.

3.6 Simulating 3D Printing with an Industrial Robot

Before simulating the complete robotic 3D printing process, the program had to be exported and a RAPID module created. Subsequently, the paths, targets and the entire station were synchronized to the RAPID code using the "Synchronize to RAPID..." function, allowing the simulation to proceed. When the simulation began, the material deposition process was visualized using the "Process Trace" function.

4 RESULTS

Following the procedure described in the methodology and illustrated in Fig. 1, we were able to obtain a functional simulation that provides new insights into robotic 3D printing using the 3D printing add-in in ABB RobotStudio.

We observed several significant changes related to the 3D printing add-in in RobotStudio, particularly when it comes to RAPID. Instead of the conventional path transformation, paths are written based on points computed by the slicer. Each point adopts a matrix format with some values indicating additional printing details beyond mere spatial location. RobotStudio doesn't save this data in a standard script; instead, it creates a "Print3DP" folder for this information. When a certain code line threshold is reached, the path splits into smaller sub-scripts, guiding the robot's trajectory. The maximum number of lines a script can have isn't set by RobotStudio, but by the computer's computational capacity where RobotStudio operates. As the script's line count grows, so does its execution time. If this duration nears RobotStudio's maximum execution time, it can trigger an automatic halt in task execution and the script. Thus, the add-in considers the computer's computational constraints, ensuring scripts are optimized to execute within an appropriate time frame and meet necessary requirements. In our observations, the Rapid scripts often exceeded 1000 lines of code.

In the simulation, we can witness the layer-by-layer material deposition and monitor the robot's individual paths during printing. These paths should mirror the robot's movements in the actual system. The simulation enables us to research different scenarios, assessing the feasibility and efficiency of the 3D printing process. We can experiment with different parameters, materials, and design adjustments to ensure optimal printing results. Through this simulation, we can pinpoint potential design or trajectory errors before they manifest in the physical system, thereby pre-emptively addressing issues, saving both time and resources. It serves as a platform for optimizing the printing process. By analysing the simulation results, we can identify areas for improvement, such as optimizing the robot's trajectory, adjusting printing parameters or enhancing the overall efficiency of the printing operation.

The use of this simulation also verifies the suitability of RobotStudio for robotic 3D printing. The simulation showcase the capabilities of RobotStudio in authentically representing the 3D printing process, including the generation of paths, trajectory planning and material deposition.
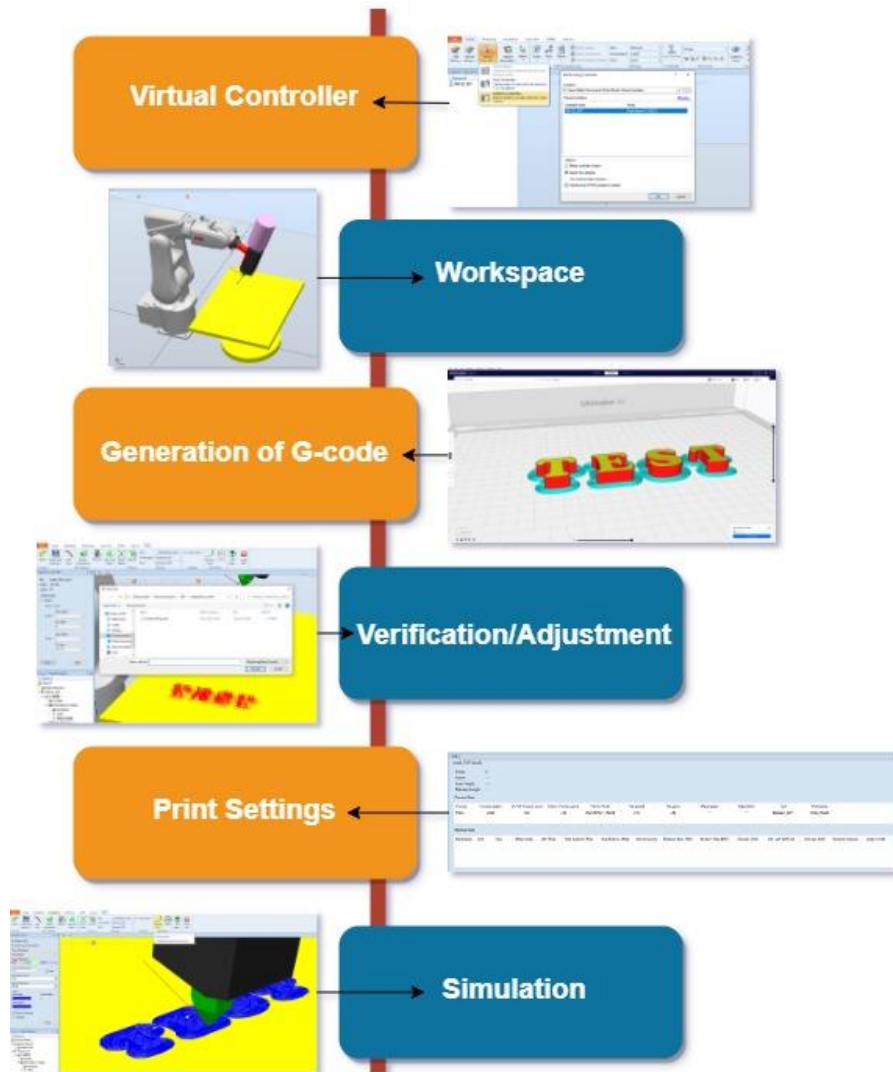
Fig. 1 – The methodological procedure. Source: own research

5 DISCUSSION

In the simulation conducted, we implemented an initial 3D printing design using ABB RobotStudio. This process provided essential insights needed for the real-world integration of the robot into additive manufacturing. Nonetheless, the simulation also unveiled specific discrepancies and limitations associated with this method.

One limitation we observed with ABB RobotStudio is its apparent inability to directly control an extruder from different suppliers based on the data we gathered. As a result, data transformation must be facilitated through an intermediary component with computational capabilities. However, our simulation tests revealed that any extruder can be modelled in the libraries. This model can then act as a placeholder in the simulation, closely mirroring the actual hardware.

Another factor to consider is the compatibility of the robot version with the intended power pack. Systems older than version 6.xx cannot import motion instructions from RobotStudio. For these older robots, a system update is necessary, which may entail significant costs.

Despite its limitations, such as challenges in directly controlling external extruders and the potential need for system updates, ABB RobotStudio's simulation capabilities enable modelling of placeholders and closely approximate actual hardware behaviour. Such insights are invaluable in understanding the challenges and necessary adjustments for integrating robots into additive manufacturing processes using ABB RobotStudio.

6 CONCLUSION

From the simulation data, it's evident that validation in a real system is essential to compare disparities between actual and virtual systems. This study is just an initial step towards gathering conclusive data. Before commencing actual printing process, we will conduct additional simulations in RobotDK and Grasshopper. Comparing their outcomes will help in defining the right parameters for printing. Moreover, the print quality will be assessed against different programming transformations.

A significant challenge identified during the simulation is the translation of robot speed to material deposition rate. Addressing this will involve devising a mathematical model, aiding us in selecting a speed that guarantees high-quality prints, optimal printing velocity, and seamless robot operations.

Overall, further research in this field is necessary. The simulation serves as a foundation, but real-world validation and additional research are required to refine the process and gather more comprehensive data.

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KNOWLEDGE MANAGEMENT AND SMALL AND MEDIUM-SIZED ENTERPRISES INNOVATION: A LITERATURE REVIEW ADOPTING VOS VIEWER APPROACH

Takyi Kwabena Nsiah, Comfort Adebi Asamoah, George Yaw Bludo

Abstract

The article aims to investigate the publication structure of academic research on Knowledge Management and its material impact on innovation through a Scopus literature search. The authors extracted the bibliometric data on Knowledge Management from the Scopus database. The VOS viewer model was used for the analysis of 88 articles for the period 2017–2022. Three academics read the articles to analyse their affiliation and significance to the research, producing a final list of 33 articles that fit the study's purpose. The results demonstrated that the trend in journal publications is increasing year over year. Journal of Knowledge Management (9 documents) and Strategic Management Journal (6 articles) received the most citations. On a country level, the UK has 11 documents with 227 citations, Italy has five documents with 85 citations, Spain has 4 with 56 citations, and France has 4 with 39 citations. Knowledge Management, Knowledge Transfer, Knowledge Sharing, and Innovation are the most researched areas. Future research areas of exploitation for the affiliation between Knowledge Management and Small and Medium-sized Enterprises innovation are suggested. The study is limited in terms of the data sources, as only Scopus database articles were analysed. As a result, the findings cannot be generalized for the nexus between Knowledge Management and Small and Medium-sized Enterprises innovation. However, the findings from this research are material to the current investigation of Knowledge Management and innovation.

Keywords: Knowledge management, SME's innovation, VOS viewer, Scopus, Enterprise performance

1   INTRODUCTION

A significant amount of research highlights the importance of Knowledge Management (KM) for the sustainability of both major corporations and Small and Medium-sized Enterprises (SMEs) in the global market. Academics and researchers have been studying the issues of SMEs innovation for decades (O'Connor & Kelly, 2017). Previous literature has demonstrated how innovation can improve the performance of SMEs competition in KM (Chaithanapat et al., 2022) and innovation (Raquel Merlo, 2017; Ton & Hammerl, 2021) in customer KM (Zheng et al., 2020). Leadership characteristics in KM, internal knowledge creation capability, informal knowledge, and absorptive capacity (Khraishi et al., 2022). The importance of KM to the global economy and the competitiveness of significant institutions and SMEs has been extensively documented (Corvello et al., 2014). This investigation developed three questions to answer the purpose of the research: What is the nexus between KM and SMEs innovation? What are the research directions and the gaps for further investigation? What is the role of the new framework for the body of researchers on KM and SMEs innovation, as well as its practical significance for policymakers and entrepreneurs?

SMEs are seen as the cornerstone of national economic growth, particularly in emerging nations (Zhou et al., 2021). Nonetheless, this essential industry faces tremendous obstacles in the form of global competitive rivalry, fast technological development, and shifting customer behaviour. The literature demonstrates that information technology skills substantially impact the growth

of SMEs through promoting knowledge transfer, which is the primary engine of innovation creation. According to Rodhiah and Hidayah (2022), who investigated one hundred SMEs in Tangerang using the Smart PLS analysis method, the results showed that KM positively correlates with innovation in SMEs. In researching what causes SMEs' performance, Setiyono et al., (2022) indicated that through KM enterprises, they can develop new products to meet competition.

Several researchers have examined the effect of KM on organizational innovation (Cardoni et al., 2020; Qader et al., 2022; Ton & Hammerl, 2021). Innovation has become vital to any company in the rapidly changing business world. This has been made feasible by rapidly developing technology, shorter product lifecycles, and an increasing rate of product creation. According to Pendevska (2022), organizations implementing more KM techniques are more innovative and achieve tremendous financial success. However, innovation has gotten more challenging because of intense competitive pressure, diverse customer needs, fast technological progress, and the increased knowledge bases of organizations. Because innovation mainly depends on the ease with which information can be obtained, businesses must be aware of and manage the complexity produced by expanding information's depth and scope. This investigation is a build-up intended to fill the gaps in literary research (Byukusenge & Munene, 2017; Durst & Edvardsson, 2012; Igartua-López et al., 2021; Li et al., 2019). Again, this research will pave the way for further investigation into the direction of KM and SMEs innovation.

1.1 Motivation and Contribution of the Study

Much research has been conducted without bias on the subjectivity of KM and SMEs innovation in the past years. This investigation adopts a qualitative or quantitative design, employing various analytical methods to establish the affiliation between the two (Gardeazabal et al., 2021; Khraishi et al., 2022; Zhou et al., 2021). Again, previous research explored the affiliation through a literature review (Maritz et al., 2011; Nuryakin et al., 2022; Ton & Hammerl, 2021) with the library database of the Web of Science, Science Direct, and Social Science Citation Index journals database. On the other hand, this study uses the Scopus database to investigate the relationship between KM and SMEs innovation.

The study first contributes to the very exciting investigation of KM and SMEs innovation for 2017 to October 2022 by using the bibliometric analysis tool of VOS Viewer. The research contributed to the RBV theory and the KM base-view theory. Again, the time frame is significant as knowledge and information have become essential in the Industry 4.0 era. In addition, the article will serve as a research guide for stakeholders in the SMEs industry making innovation decisions. Finally, the research will pave the way for further experiments on the nexus between KM and SMEs innovation.

The article is sectioned into steps: a review of theories and empirical research; the next step is method design (data search, filtering, and grouping). Finally, results, discussion, and conclusion with future research areas are provided.

2 LITERATURE REVIEW

Management and strategic management researchers have investigated the resource base-view paradigm (Kraaijenbrink et al., 2010). RBV (Wernerfelt, 1984) is predicated on various organizations' available resources, which results in varying performance over time (Barney, 1991). These resources may be divided into three categories: physical, organizational, human, and knowledge (Pereira & Bamel, 2021). Knowledge is considered one of the most critical elements of a company's performance and competitive advantage, particularly among these

resources. This technique is crucial to the creation of a firm's innovations. The knowledge-based view (KBV) hypothesis contends that firms obtain a competitive edge by implementing strategies to leverage their knowledge resources, such as organizational culture, management decision-making, and inventive new processes. Grant (1996) described the KBV model as a wing of the RBV theory, which sees knowledge as the most essential source of innovation, enhanced efficiency, and competitiveness. As a critical approach to enterprise learning, this idea "has unavoidably given rise to the notion that companies should become learning organizations to optimize their knowledge base and obtain a competitive advantage via creative and sustainable performance" (Farzaneh et al., 2021). The knowledge-based view and resource-based view theories have greatly appealed to academics (Toylan et al., 2020).

The issue of limited resources and its management to benefit the enterprise has pushed managers in the SMEs sector to develop strategic innovation processes. Instead of focusing on the knowledge itself, KM is primarily concerned with managing the human resources that maintain it. Any corporation must create an environment where trust is established between employees and management and all employees share their expertise, which adds to creativity and effective company performance. The domain of KM consists of various processes that mainly include knowledge creation, knowledge storage or retention, knowledge transfer (Marques Júnior et al., 2020), knowledge exploration, and exploitation. Similarly, investigations focusing on SMEs innovation have indicated that KM can be developed through acquisition, storage, sharing, codification, and application (Sahibzada et al., 2020). KM is critical for the success of Organisational Innovation (OI) activities at firms pursuing inter-organizational relationships.

The analysis of 200 European SMEs firms, according to Khraishi et al., (2022), suggests that internal knowledge-generating capability positively correlates with absorptive capacity. In addition to being favourably linked with OI performance outcomes, absorptive capacity positively mediates the influence of internal knowledge-generating capability on OI performance. In addition, institutionalized knowledge-sharing practices negatively modify the association between absorptive capacity and OI performance. In Finland (Partanen et al., 2020), research on 199 SMEs indicates that KM helps enterprises overcome their limitations through an innovation strategy of network resources, which allows them to survive the competition. According to studies of open innovation and SMEs performance, knowledge sharing and stakeholder relationships are essential for enterprises in Vietnam to innovate and achieve organizational performance (Tsai et al., 2022). Moderating the effects of KM, Hayaeian et al., (2022) explored the influence of IC on SMEs innovation among 170 SMEs managers in Iran. Using the Smart PLS model, the investigation found that KM positively correlated with intellectual capital and SMEs innovation. The impact of KM on sustainable enterprise innovation within the garment industry in Lahore and Gujranwala was explored by Abbas et al., (2020). Using stratified data collection and a structural equation model, the findings show that KM significantly positively influences long-term institutional innovation. To achieve innovation in product, process, marketing, and service, KM alone cannot create SMEs innovation, as other factors such as human capital, enterprise size, employee commitment, and investment play a more significant role in innovation.

Oliinyk (2022) investigated a conceptual model to implement KM in institutions. The analysis employed synthesis, theoretical development, and analytical methods. The article's conclusion advocated a modern online and software platform for KM implementation (Tettra, Propfrofs, Helpjuice, and Document360). Ton and Hammerl (2021) systematically reviewed 25 articles from 2010 to 2021. The reviewed articles and suggestions concluded that KM research is conducted in the innovation, efficiency, and relationships section. With the purpose of KM

being short-term run than long-term. On the determinates of workplace innovation, Khan (2021) conducted an experiment in India with various institutions.

An examination of 195 applicant questionnaires reveals that nine material factors influence workplace innovation, with KM playing a significant role. Alshawabkeh et al., (2020) studied the impact of KM on the success of projects. They collected 350 questionnaires from individuals in the manufacturing sector with knowledge of capital projects. The PLS model was used for the analysis, which resulted in a positive relationship between knowledge and project success. In the Czech Republic (Matošková, 2020), an investigation on KM sharing among manufacturing workers indicates that meetings effectively share knowledge. Raquel Merlo, (2017), in his systematic review of articles on KM technologies and enterprise culture, concluded that it is worth investing in KM models. Furthermore, this will aid in enterprise knowledge-sharing and decision-making. In South Africa, Boikanyo et al., (2016) explored the use of KM in 300 mining firms. The result from the senior management indicates that there is no knowledge transfer in their organizations. Similarly, knowledge sharing was uncommon in their institutions due to a lack of culture and environment. In the context of KM and efficiency, Adriaenssen et al., (2016) developed a 7-indicator model to test employees' productivity. The most substantial motivating element for knowledge workers is co-workers' operational and strategic impact.

3 METHODOLOGY

This study attempts to establish the most current trends in research and offer a conceptual approach for future research designs utilizing bibliometric indicators that conceptualize data associated with KM and SMEs innovation. The Scopus library research engine was deployed to filter articles to find the extensive literature on KM and the SMEs framework. Search strategy and database, according to Zahra & Nurmandi, (2021), Scopus is one of the most comprehensive citation databases, with a repository of abstracts that are subjected to rigorous evaluation by experts. The database of Scopus was considered for the reviews as previous scholars had adopted the Web of Science and similar databases for analysis (Donthu et al., 2020; Valeri, 2023). Selecting Scopus helps close the gaps that exist in the research. Again, journal publications in Scopus are accepted worldwide by institutions, academics, and other stakeholders.

The search produced a total of 88 documents on KM and SMEs innovation from 2017 to October 2022 from the Scopus database. Scopus is one of the most comprehensive databases of citations and abstracts for scientific journals, books, and conference proceedings. We only selected articles, conference papers, reviews, business management and accounting, economics, econometrics, social science, and finance journals. Again, only articles in management and written in English were added. After limiting the search filtering, the final total was 71 articles. These articles were then thoroughly read by three researchers to identify and eliminate: a) articles with content related to knowledge management rather than innovation in SMEs; b) articles with content unrelated to the purpose of this research investigation. The analysis was deployed on 33 final articles. The research analysis will use the VOS viewer software to display the graphical affiliation between KM and SMEs innovation (Merigó et al., 2016). According to Cui and Liu (2016), by adopting keyword analysis through the VOS viewer, research articles can be clustered, and deeper analysis shows the nexus between the investigation variables.
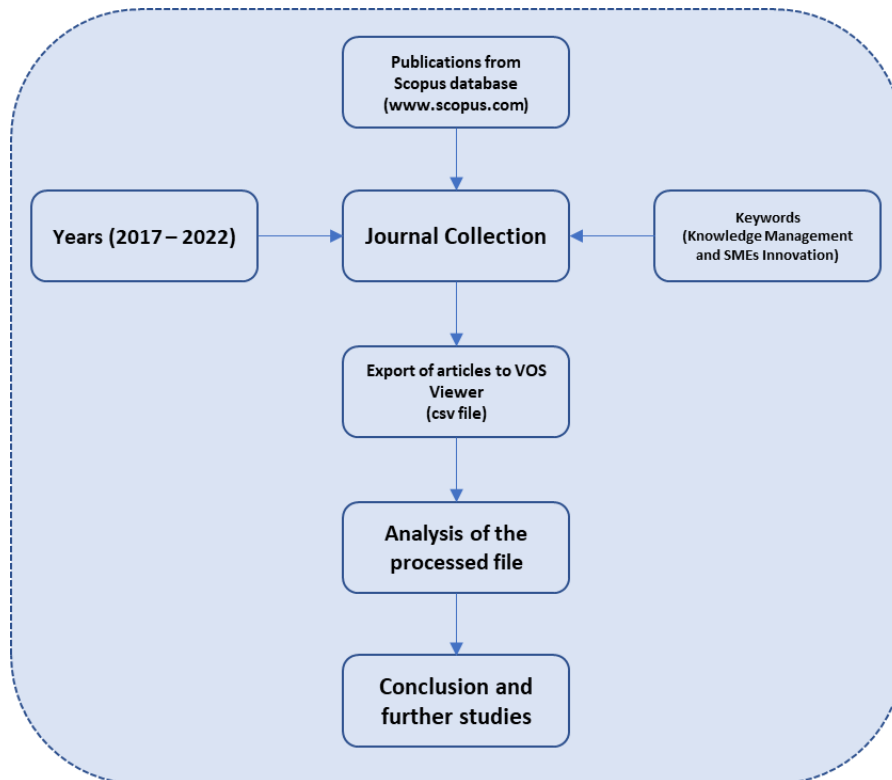
Fig. 1 – Method of data analysis. Source: own research

4 RESULTS

As shown in Figure 1, the researchers grouped the articles according to counties and the number of citations per country. Countries with fewer than three documents were eliminated from the analysis. According to Scopus data, the UK had 11 articles with 227 citations, followed by Pakistan (3 articles with 90 citations), Italy (5 articles with 85 citations), China (3 articles with 83 citations), and Spain (4 articles with 56 citations). Poland, France, and Canada had the least citations.
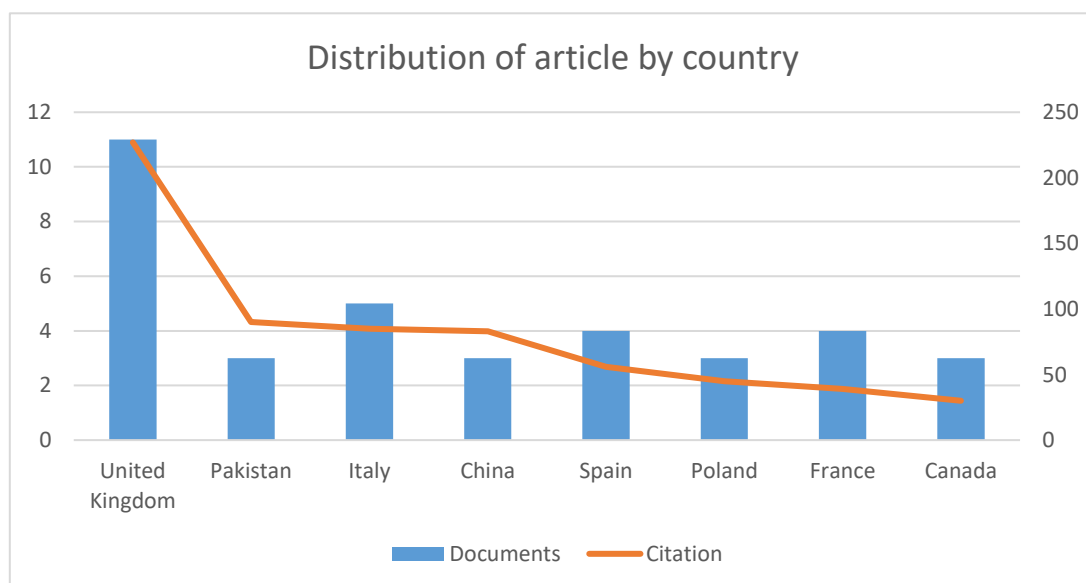
Fig. 2 – Tread Analysis from various countries. Source: own research

Tab. 1 – Country documents and citations. Source: own research

Countries	Documents	Citation
United Kingdom	11	227
Pakistan	3	90
Italy	5	85
China	3	83
Spain	4	56
Poland	3	45
France	4	39
Canada	3	30

The research did a keyword search through the VOS Viewer to understand the direction of previous authors' investigation. Keywords that have less than 12 occurrences were deleted from the search results. The figure below displays the keywords as entered by authors. The top 6 most keyword was "KM," "SMEs," innovation, organizational performance, knowledge sharing, and knowledge transfer. These keywords appeared most as used by authors in research. The authors' unpopular or less-used keywords include knowledge-based systems, human resource management, enterprise resource planning, big data, and decision-making. The keywords' graphical mapping shows areas of previous studies and recent years of research. Finally, keyword occurrence mapping shows research gaps for future studies.
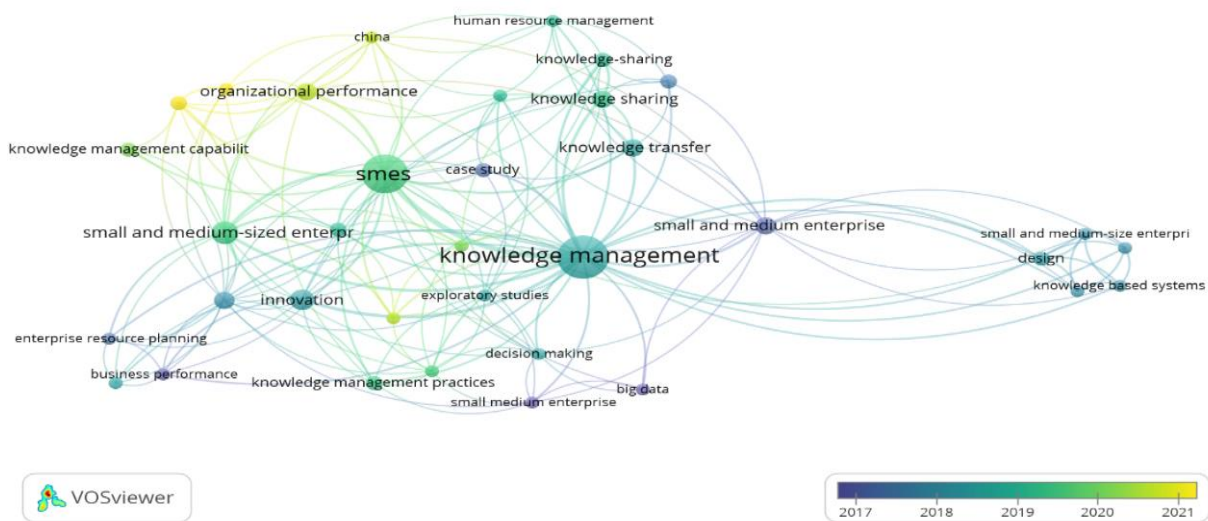
Fig. 3 – Word cloud of KM and SME's innovation. Source: own research

This section displayed the top journals with the most articles published by their authors during the investigation period. The red portion indicates the publications in the journal of KM with nine documents; the green portion accounts for the strategic management journal and research policy, each having six documents, respectively. The Technovation Journal, with five articles, followed this. The darker the colour, the closer the journal association.
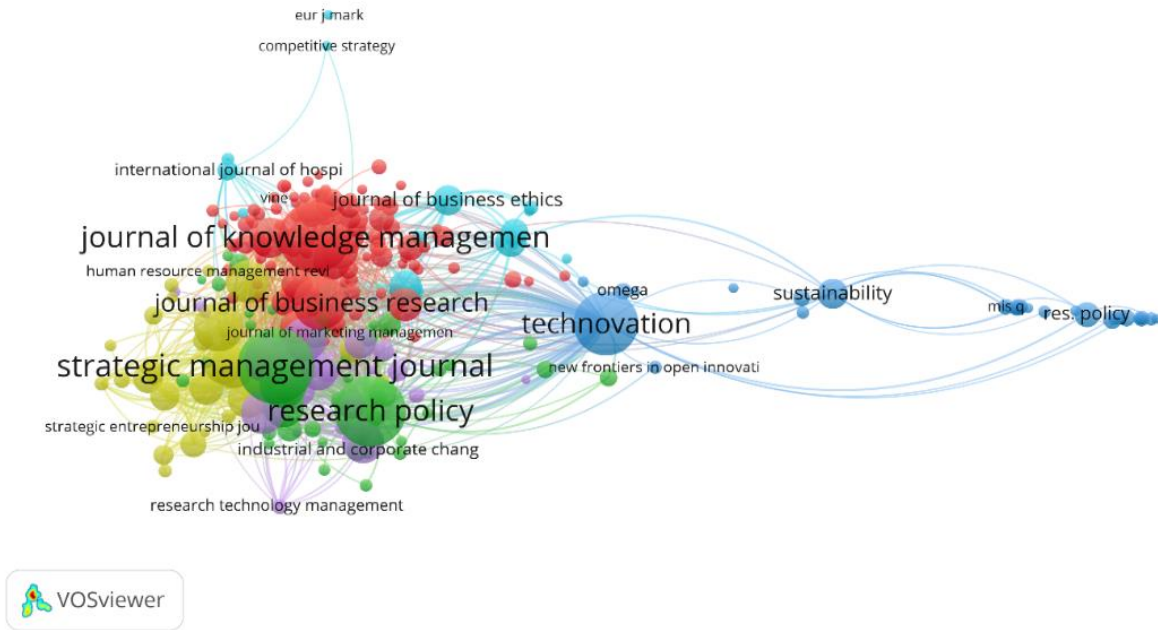
Fig. 4 – Top journal publications. Source: own research

This investigation section consists of the KM process dimensions identified in the various publications for the study period. For enterprises to develop an innovative product that meets customers' requirements, knowledge must be acquired, stored, distributed, and used (Shabbir & Gardezi, 2020; Tapissier et al., 2018). Knowledge acquisition is the process of exploiting and extracting individuals' ideas, thoughts, and inventions to convert a business into a dynamic organization. Knowledge is accessible via a variety of internal and external sources. The employees then convert these sources into new knowledge (Igartua-López et al., 2021). The definition of knowledge storage is techniques and systems for storing and managing information. Typically, they are IT-based solutions that help store and retrieve operational knowledge (O'Connor & Kelly, 2017, pp 156–179). Knowledge distribution refers to actions involved in exchanging explicit and tacit work-related information and individual experiences with others. The two components of knowledge sharing are knowledge giving and knowledge gathering. Knowledge donation is "a readiness to share one's knowledge and intellectual capital with others" (Jayawickrama et al., 2019).

In contrast, knowledge collection refers to "a willingness to consult with others, learn, and encourage others to contribute their knowledge and intellectual capital." (Vukašinović et al., 2018) Knowledge use refers to the application of knowledge to business choices or possibilities. Use is also recursive and creates continuous feedback that influences and relates to other knowledge activities (Corvello et al., 2014).
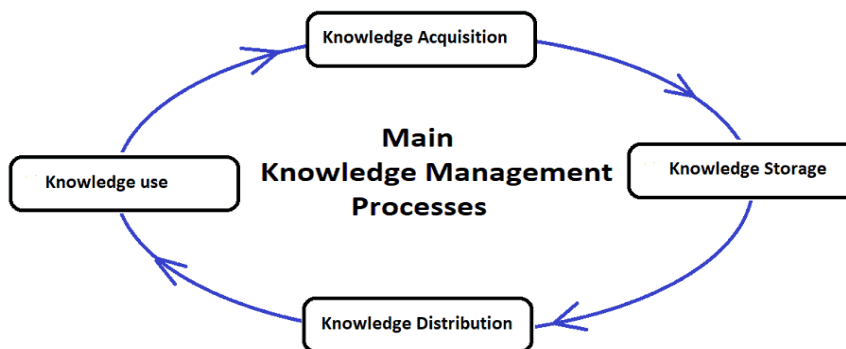
Fig. 5 – KM dimensions. Source: own research

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5   DISCUSSION

The research questions were responded to through the analysis of various publication trends. The top 6 most keyword was "knowledge management," "SMEs," innovation, organizational performance, knowledge sharing, and knowledge transfer. (Adriaenssen et al., 2016) explored knowledge management and performance. The authors developed a theoretical approach to knowledge worker's productivity, and practical tools for mangers. The findings demonstrated a seven conceptual model for workers knowledge productivity which will help the organizations to achieve an innovation. Similarly, (Oliinyk, 2022) developed a conceptual approach to implement knowledge management system in business organizations. Qader et al., (2022) explored the KM practices of 480 SMEs in the textile sector. The SEM analysis reveals that the KM process has a significant positive relationship with organizational performance. In the investigation of knowledge transfer, White et al., (2019) explored universities' and SMEs' partnership in process development, governance, implications, and responsibility. The findings of 12 semi-structured interviews indicate that governance, implication, responsibility, and process development are required to achieve innovation and partnership between universities and SMEs. In Iraq, Kareem et al., (2021) investigated enterprise efficiency through KM and accounting information systems. 236 SMEs participants' questionnaires were collected and analysed. The PLS model analysis indicated that accounting information systems and knowledge management had a material impact on firms' efficiency. Similarly, KM serves as a mediator between enterprise efficiency and accounting information systems. A study by Abbas et al., (2020) revealed sustainable innovation in the garment sector based on KM and firm innovation. The structural equation approach depicted that KM had a favourable material influence on enterprise learning. This contributes to achieving sustainable enterprise innovation. Within the Southern Italian communities, the nexus between KM and SMEs was investigated considering the influence of social media networks. The findings employing the case study approach imply that social media networks improve knowledge creation in SMEs (Scuotto et al., 2017). In addition, Crammond et al., (2018) investigated social media use and KM in SMEs enterprises in Scotland. The experiment used a mixed approach to develop a recommendation model for KM known as the RCIDTA (research, concept, institutionalize, develop, target, and assess), researched KM and innovation among SMEs in the Spanish community of Murcia. Employing the PLS in the data analysis of 903 institutions, the results revealed that KM positively influenced innovation but not enterprise performance. Byukusenge & Munene (2017) researched 250 SMEs on KM, innovation, and institutional efficiency in Rwanda. The bootstrapping approach exhibited the mediational influence of innovation on the nexus between KM and efficiency.

A proposed conceptual model was made based on the links between KM, innovation, and enterprise performance indicators.
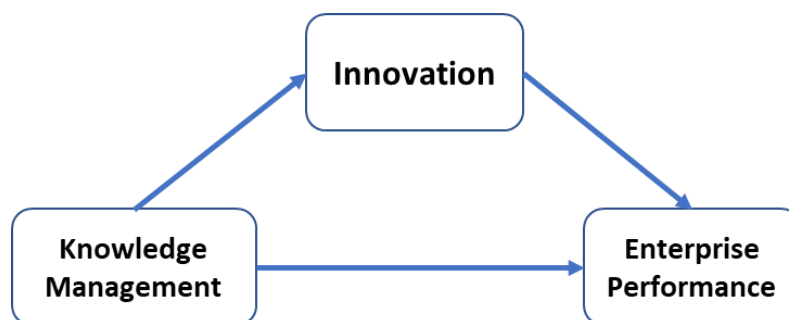

Fig. 6 – Conceptual model from review articles. Source: own research

5.1 Future research direction

These research directions highlight some key areas for further investigation in knowledge management and SMEs innovation. Researchers can delve deeper into these topics to address existing gaps and contribute to the development of effective strategies and practices for knowledge-driven innovation in SMEs.

Tab. 2 – Future research directions. Source: own research

Research areas	Directions
Knowledge sharing mechanisms	Explore innovative ways to facilitate knowledge sharing among SMEs, such as through social networks, collaborative platforms, or virtual communities. Investigate the impact of different knowledge sharing mechanisms on SMEs' innovation performance.
Knowledge creation and acquisition	Examine how SMEs can effectively create and acquire knowledge to fuel their innovation efforts. Investigate the role of external collaborations, open innovation practices, and absorptive capacity in enhancing SMEs' knowledge creation and acquisition processes.
Organizational culture and leadership	Investigate the influence of organizational culture and leadership styles on knowledge management and innovation in SMEs. Explore how specific cultural traits (e.g., risk-taking, experimentation, knowledge sharing) and leadership practices foster innovation within SMEs.
Technology-enabled knowledge management:	Study the role of emerging technologies (e.g., artificial intelligence, big data analytics, blockchain) in supporting knowledge management and innovation in SMEs. Explore how these technologies can facilitate knowledge sharing, capture, retrieval, and analysis to enhance innovation outcomes.
Knowledge transfer and retention:	Examine the challenges of knowledge transfer and retention within SMEs, particularly in the context of succession planning and employee turnover. Investigate strategies and best practices to preserve critical knowledge and ensure its effective transfer across generations.
Cross-sector collaboration:	Explore the potential benefits and challenges of knowledge management and innovation collaboration between SMEs and other stakeholders, such as larger organizations, research institutions, government agencies, or non-profit organizations. Investigate how such collaborations can foster innovation in SMEs.
Knowledge measurement and evaluation:	Develop robust frameworks and methodologies to measure and evaluate knowledge management practices and their impact on SMEs' innovation performance. Investigate key performance indicators and metrics that effectively capture the value and effectiveness of knowledge management initiatives in SMEs.
Contextual factors and industry-specific challenges	Investigate how contextual factors, such as industry characteristics, regional variations, and economic conditions, influence knowledge management and innovation in SMEs. Analyze industry-specific challenges and opportunities for knowledge creation, sharing, and innovation within SMEs.
Intellectual property and knowledge protection	Explore strategies for protecting intellectual property and managing knowledge assets in the context of SMEs. Investigate the role of intellectual property rights, confidentiality agreements, and other mechanisms to safeguard knowledge while promoting collaboration and innovation.
Capacity building and support mechanisms	Study the effectiveness of capacity-building programs, training initiatives, and support mechanisms aimed at enhancing SMEs' knowledge management capabilities and innovation performance. Evaluate the impact of government policies, incubators, accelerators, and other support networks on SMEs' innovation outcomes.

6 CONCLUSION

The investigation seeks to reveal the trend of studies on the affiliation between KM and innovation in literary work for 2017 – October 2022. The bibliometric analysis with a VOS viewer approach makes it easy to track co-citations, journal citations, co-authors, regions analysis, and keywords analysis. We collected 88 articles from our search on Scopus database, with 33 articles directly affiliated with KM and SMEs innovation. Therefore, three academics answered the research questions with each article read to determine the nexus and material influence on KM and SMEs innovation. What is nexus between KM and SMEs innovation?

What are the research directions and the gaps for further investigation? What is the role of the new framework for the body of researchers on KM, SMEs innovation, and its practical significance for policymakers and entrepreneurs?

The results demonstrated that most of the publications on KM and SMEs innovation for the investigation period are from authors in the United Kingdom, with 11 articles and 227 citations. Italian authors followed this with five documents and 85 citations, and Spain and France preceded with each accounting for four pieces and 56 and 39 citations each. The document analysis shows that the top journals for publication are the Journal of Knowledge Management, Strategic Management Journal, Research Policy, and Techno nation journal.

The keyword search on the research direction analysis demonstrated that experiments are carried out in KM, SMEs, knowledge sharing, knowledge transfer, and organizational performance. With this analysis, new investigations can be explored in the areas of big data, human resource management, KM capability, and KM process. Research investigations are needed in country comparison as KM differs from region to region. Again, longitudinal experiments on KM and innovation are lacking in literary work, which could help identify KM's long-term influence on enterprise innovation. Studies should also be conducted in Africa, Latin America, the Caribbean, and other parts of Europe, where SMEs are the leading contributors in the regions.

The limitations of this investigation on literary work on KM and innovation include the search database of only Scopus and the period of the research exploration. It is recommended that further experiments be carried out with databases such as Web of Science, google scholar, and other corroborated sources. The investigation period was limited to only 2017 - 2022; the next literary search can be increased to compare the outcome of this investigation results. Finally, VOS viewer was the analytical approach adopted in the document analysis. Future research academics should employ other bibliometric models in data analysis.

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INTEREST IN SHARED TRANSPORTATION AND POSSIBILITIES TO CHANGE STUDENTS' TRANSPORT BEHAVIOUR

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Abstract

Many cities are currently affected by negative externalities caused mainly by extensive use of car transport. A possible solution is to substitute cars used for commuting with trips by more environmentally friendly transport modes such as shared mobility services. Because of that fact, the research aimed on identifying the potential for changes in transport behaviour towards sustainable modes of transport. Using individual data collected through an electronic questionnaire from employees and students of a university in a mid-sized Czech city, this paper presents the results of a survey.

The research reveals key factors influencing the transport mode choice and the significant factors determining interest in alternative transport services, above all shared transport. The descriptive statistic and logistic regression shows that travel time is one of the key factors influencing mode choice, including shared modes. It is also evident that the potential for a modal shift towards shared modes is particularly high among older individuals, men (for motorized transport) and women (for non-motorized transport). The interest in using a sharing system is also increasing with growing interest in environmental issues.

The paper provides insights into the transport behaviour of students and employees that could provide a basis for the university to implement innovative solutions in relation to commuting. Especially in cooperation with city representatives, it is possible to provide a better offer for the development of shared modes of transport and to improve public awareness of possible alternatives.

Keywords: students, travel behaviour, sustainable mobility, transport, bikesharing, carsharing

1   INTRODUCTION

Transport represents an important part of everyone's life as individuals can meet their needs via transportation (Brůhová-Foltýnová, 2009). However, transport in cities is a major contributor to negative externalities, which are often associated in particular with car travel (ACEA, 2019; Šaradín et al., 2008).

The latest transportation trends in the Czech Republic are characterized in particular by an increase in the number of kilometres travelled by motorized modes of transport and a reduction in the use of non-motorized modes of transport and public transport (Ministerstvo dopravy ČR, 2022). The increasing number of journeys made by motorized modes of transport is thus gradually leading to environmental degradation (Kutáček et al., 2003). To reduce these negative effects, it is necessary to lower the amount of car traffic and/or increase the occupancy of vehicles (Dewan & Ahmad, 2006).

Transport and people's mobility has changed dramatically in the last few years. Significant changes have occurred in relation to transport systems and infrastructure. The term "smart transport" is used more and more frequently, as is the term "clean mobility", which aims to reduce emissions from transport. Over the years, several new transport services have emerged (thanks to digitization), such as carsharing or bikesharing, providing an alternative to the existing transport services, while also being environmentally friendly (Vejchodská et al., 2023).

In addition to the emergence of new transport services, existing transport modes are also evolving thanks to the involvement of ICT technologies (Durand et al., 2019; Hoeke et al., 2020). This development brings new challenges for transport planning, e.g., impact of ICT on accessibility, the growing use of online activities or how to make users' travel time more attractive or productive with smart technologies (Scheiner & Rau, 2020; van Wee, 2016).

Alternative modes of transport represent a more attractive commuting option, especially for present generations, who are becoming more likely to consider the environmental impacts of their commuting behaviour (Davis et al., 2012; Vávrová et al., 2023).

Even though shared transport services are an increasingly widespread transport alternative, especially in urban areas, their use in the Czech cities is low. Shared mobility as one of the possible alternatives is usually offered only in large cities such as Prague, Brno, Ostrava or in tourist areas (e.g., Pilsen, Olomouc, České Budějovice). Furthermore, there is currently no university-level shared transport system in the Czech Republic, unlike in some other countries (e.g., RWTH Aachen University, University Of Worcester, University of Tennessee Knoxville). There used to be the Uniqway system – a student carsharing service – operating at three universities in Prague, but the service stopped functioning after several years.

Using data from a mid-sized Czech university city allows us to focus on the common transport behaviour of students and university staff. In addition, it allows us to assess the key drivers of the current mode choice, the importance of sustainability for different groups of respondents and the barriers to using certain modes of transport. The aim of the research is find out the possibilities of changing transport behaviour towards more sustainable modes of transport. This paper attempts to answer the following research questions:

- What are the current modes of transport used by students and university staff in a mid-sized Czech city? Is it possible to detect differences between their transport behaviour?

- What factors influence the choice of means of transport? What is the role of the sustainability factor and its importance for people?

- What is the potential of alternative transport modes? What factors may be significant variables determining interest in using these alternatives?

2 LITERATURE REVIEW

A range of factors that influence the transport mode choice are discussed in the literature. One of the most frequently mentioned factors is distance and travel time (Almasri & Alraee, 2013; Ewing et al., 2004; Ko et al., 2019; Rasca & Saeed, 2022; Spinney et al., 2019) as people generally choose the mode of transport that is the quickest for them. At the same time, too much distance eliminates the use of some transport modes (typically non-motorized).

The financial aspect also significantly influences the transport mode choice: Rasca & Saeed (2022) examined the importance of ticket price in decision-making and identified a strong correlation between these two variables. Ko et al. (2019) mentioned the importance of monthly income. The results show that people with higher incomes are more likely to commute by car if their travel time is longer. On the other hand, Almasri & Alraee (2013) pointed out the necessity to consider the travel costs compared to the total personal income and the average monthly household income. Wealth is also associated with car ownership and accessibility, which can be important determinants of transport behaviour (Almasri & Alraee, 2013; Rasca & Saeed, 2022; Setiawan et al., 2015). Vejchodská et al. (2023) argued that car availability in households also influences the shift in car use after joining carsharing. The sale of a car thanks

to adopting carsharing is a factor leading to a decrease in overall car use while continuing availability of a car in the household is a factor increasing car use.

Another factor often mentioned by researchers is gender. Men in particular are often associated with higher car travel (Limtanakool et al., 2006; O'Fallon et al., 2004; Tyrinopoulos & Antoniou, 2013) and women, on the other hand, use public transport more often (Ko et al., 2019).

Other factors that are mainly indicated in the psychological literature and that play a significant role in transport-related decision making is habit and comfort (Aarts & Dijksterhuis, 2000; Bamberg & Schmidt, 2003; Setiawan et al., 2015; Verplanken & Wood, 2006). The results of the above studies show that people tend to use the transport modes to which they are used, and thus do not change their behaviour.

Age is also a factor associated with differences in transport behaviour (Almasri & Alraee, 2013; Garikapati et al., 2016; IFMO, 2013; Kuhnimhof et al., 2012; Wawer et al., 2022). Young people own fewer cars (Garikapati et al., 2016; IFMO, 2013) and tend to use alternatives to cars more often (Kuhnimhof et al., 2012; Wawer et al., 2022)

Factors such as safety, which is particularly associated with the availability of cycling infrastructure (Masoumi, 2019), and accessibility (Bieliński et al., 2020) have received less attention among researchers, although they may also contribute significantly to differences in transport preferences.

Regarding shared transport use, several other factors may be significant. In particular, the factor of ecological sensitivities is widely discussed – Efthymiou et al. (2013) mentioned that ecologically oriented individuals are more likely to use sustainable transport modes, such as shared mobility. For shared mobility, it is also essential to take into account geographical factors such as population density (Cervero, 2003; Hjorteset & Böcker, 2020). Münzel et al. (2020) additionally indicated that the level of education and the presence of a university in the city are important for a carsharing system, increasing its popularity. In the context of bikesharing, factors such as comfort, health, flexibility and finance have been mainly discussed (Fishman et al., 2014; Jones et al., 2016; Shaheen et al., 2010). Age is potentially another important factor influencing interest in shared transport modes (Kuhnimhof et al., 2011). Especially thanks to the initiative of young students, bikesharing system have been started at several universities (e. g. RWTH Aachen University, Worcester University, The University of Tennesee Knoxville) and thus contributed to the development of cycling and the improvement of the traffic situation in the city (Moraal, 2017). For this reason, understanding the needs and interests of young students may be an opportunity to improve transport in university cities.

3 METHODOLOGY

The paper is built on data collected using an online survey, which took place in Ústí nad Labem, a city located in the northwest of the Czech Republic with a population of around 92,000.

In our survey, we focus on the commuting of students and employees of the Jan Evangelista Purkyně University in Ústí nad Labem (hereinafter, the UJEP) and the possibilities of changing their transport behaviour. It is located in the city centre with limited parking possibilities and there are also no shared transport services in Ústí nad Labem yet. A questionnaire was created separately for students and employees in Google Forms and distributed by the university authorities. A pilot testing was done in April 2022 and the questionnaire was modified based on it. The final version of the questionnaire was sent to employees' and students' e-mail addresses in May 2022 and the period of data collection lasted for 5 weeks.

The total number of completed questionnaires was 1398. The questionnaire included several sections focusing on current transport behaviour and commuting to work/school. In addition, interest in using different transport modes for commuting to work/school, including shared transport modes, was surveyed. Attitudes towards sustainability and its impact on transport behaviour were also collected. One part of the questionnaire explored the impact of the coronavirus pandemic on changes in preferences related to transportation and activities and related avoidance of certain modes of transportation. The complete structure of the questionnaire was: (i) sociodemographic data, (ii) residential location and commuting to the university, (iii) interest in alternatives and sustainable mobility, (iv) transport experience during the pandemic, (v) shared mobility, barriers and interest in this kind of mobility services.

The data were analysed using descriptive statistics and logistic regression.

3.1 Sample description

Our sample can be divided into two groups: UJEP students (77.7% of the respondents) and UJEP employees (22.3% of the respondents). Table 1 presents information about the respondents' socio-demographic data. The sample is gender-balanced for the employees only. A dominance of females can be noted among the university students. One explanation for that may be the character of the study fields at the university and the dominance of female students generally.

Tab. 1 – Descriptive statistics of socio-demographic traits (in %). Source: own research

	UJEP students (N = 1086)	UJEP employees (N = 312)	Total (1398)
Gender			
Male	30.57	46.47	34.12
Female	69.43	53.53	65.88
Age			
20 or less	18.05	0.00	14.02
21 – 30	63.44	8.97	51.29
31 – 40	10.22	27.56	14.09
41 – 50	7.37	34.29	13.38
51 – 60	0.92	16.99	4.51
60 or more	0.00	11.86	2.65
Missing	0.00	0.32	0.07
Average commuting distance to university (km)	54.66	43.00	48.83
Average commuting time to university (min)	61.58	38.96	50.27
Errands on trips to work/school	5.89	23.72	9.87
Arrangements on trips from work/school	32.78	59.62	38.77
Car always available	52.12	73.40	56.87
Bicycle always available	34.25	45.83	36.84
Monthly/yearly public transport pass	22.65	13.14	20.53

4   RESULTS

Figure 1 compares the commuting distances of students and employees to the university. It shows that students travel on average a longer distance than employees per journey. The average commute for students was over 45 km, with an average commute time of more than 60 minutes.
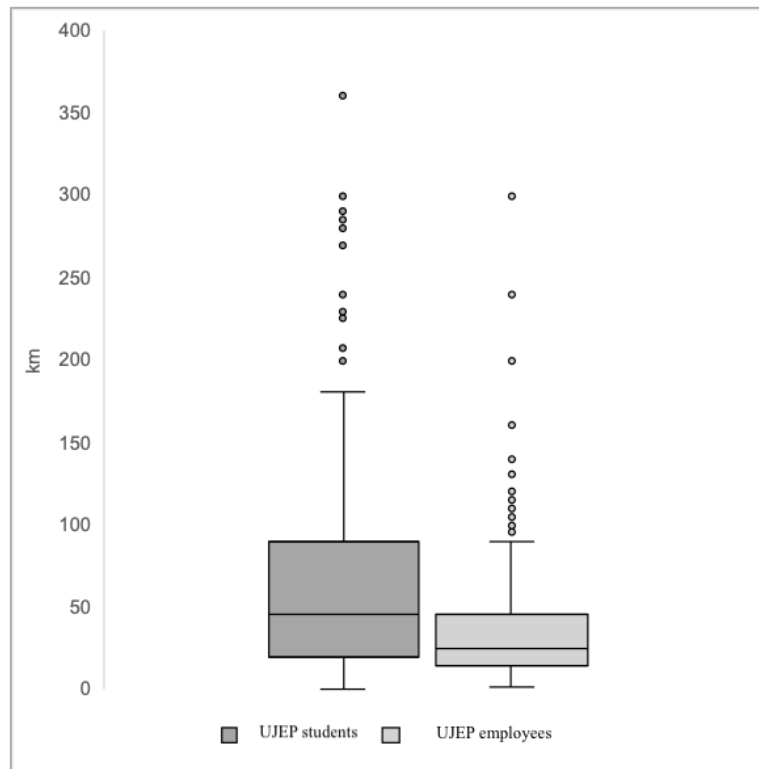
Fig. 1 – Average commuting distance (km). Source: own research

4.1 Transport mode choice

Respondents were also asked about the transport mode they most often use to commute to the university (see Table 2). Students and employees similarly identified the private car as the most commonly used mode of transport to travel to the university, with almost 35% of students and half of employees identifying driving a private car as the most common mode of transport. Students also found the train to be very common, with just under 33% identifying it as the most common transport mode.

Tab. 2 – Usual transport mode for commuting (in %). Source: own research

	UJEP students (N = 1086)	UJEP employees (N = 312)	Total (1398)
Usual transport mode			
Walking	14.83	19.23	15.81
PT	12.34	10.58	11.95
Bicycle	0.09	0.64	0.21
E-bicycle	0.00	0.64	0.14
Car (driver)	34.90	50.64	38.41
Car (passenger)	3.04	4.49	3.36
Train	32.60	10.90	27.75
Scooter	0.00	0.64	0.14
E-scooter	0.18	0.00	0.14
Intercity bus	1.84	2.24	1.93
Motorcycle	0.09	0.00	0.07
Missing	0.09	0.00	0.07

Figure 2 shows the respondents' interest in sustainable mobility topics. More than 80% of the students and employees regard sustainable mobility as an important topic.

466
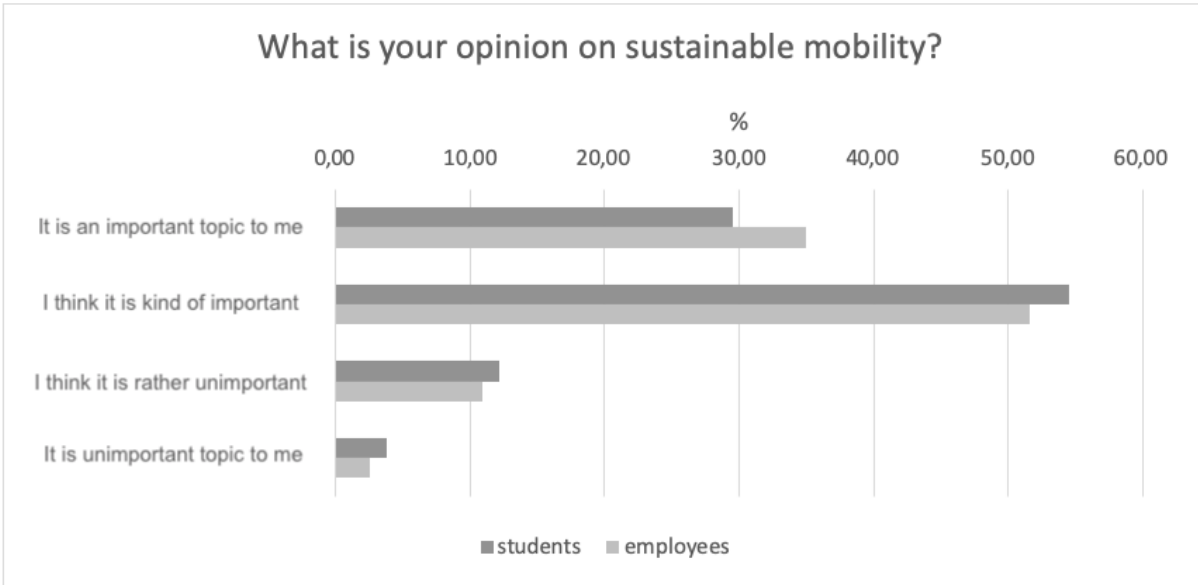
Fig. 2 – Importance of sustainability for respondents (in %). Source: own research

On the other hand, when ranking the individual factors and their importance in the transport mode choice, sustainability was ranked as the least important factor (see Figure 3). Thus, it is evident that although students and staff consider sustainability to be important, they do not adjust their modes of transport accordingly.
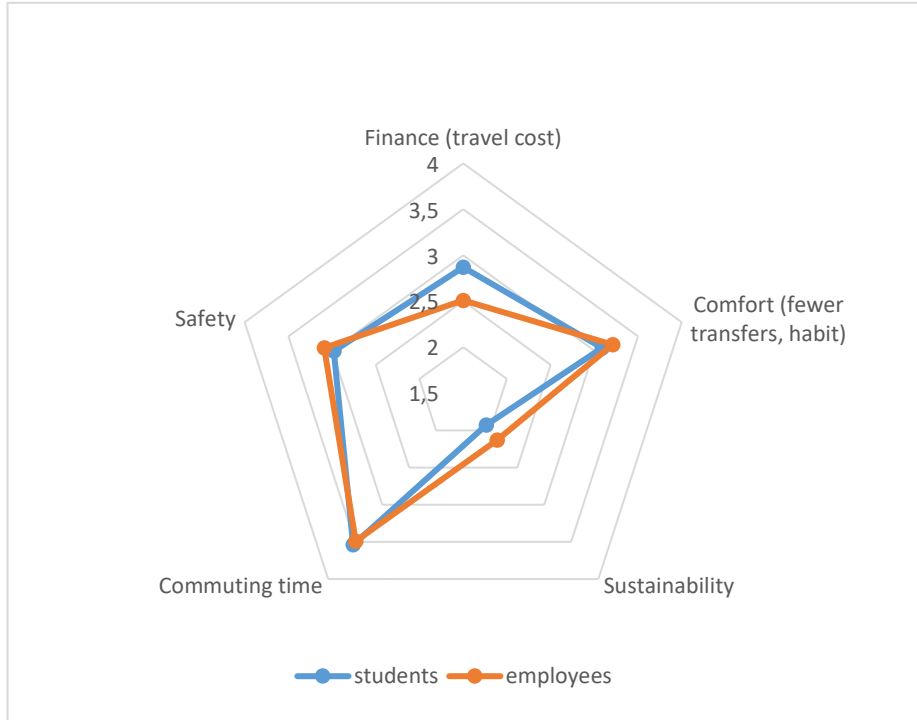
Note: 4 = absolutely important; 3 = important; 2 = rather important; 1 = rather unimportant; 0 = unimportant

Fig. 3 – Importance of various factors in transport mode choice. Source: own research

Respondents were also asked about their interest in using specific transport modes to commute to the university (Table 3). It can be seen that the students and employees have the highest potential for ridesharing with people that they know such as household members, colleagues or

friends. Of the students, more than 40% answered that they would be interested in using ridesharing for commuting. Of the employees, more than 26% indicated some interest.

Tab. 3 – Potential transport mode for commuting (in %). Source: own research

	UJEP students (N = 1086)	UJEP employees (N = 312)	Total (1398)
Interest in using transport mode			
Walking	8.47	12.50	9.37
Bicycle	22.74	22.44	22.68
E-bicycle	14.83	13.46	14.52
PT	11.51	8.65	10.87
Car	23.57	5.77	19.60
Train	12.06	10.90	11.80
Intercity bus	16.30	19.87	17.10
Motorcycle/scooter	10.31	8.65	9.94
E-scooter	15.56	9.94	14.31
Ridesharing with family member, colleague, friend	42.36	26.60	38.84
Carsharing	30.02	22.44	28.33
Bikesharing	12.34	10.90	12.02
E-bikesharing	12.25	9.29	11.59

Note.: Ridesharing refers to sharing trips to work/school by the driver's car, while the passengers contribute financially to cover a relevant part of the costs (Teal, 1987).

To be able to support shared mobility, it is important to analyse factors that influence the transport mode choice.

To determine the significance of each dependent variable on interest in ridesharing, (e)bikesharing and carpooling, ordinal logistic regression was applied.

According to the regression results (Table 4), gender and status (student or employee) are significant factors when it comes to interest in ridesharing. Women are less likely to participate in ridesharing than men. Similarly, respondents who are not students are more likely to be interested in ridesharing. Low significance can also be observed in relation to commuting time. Those with higher commute times are less likely to be interested in ridesharing.

Tab. 4 – Factors influencing willingness to use ridesharing. Source: own research

	Estimate	Std. error	Wald	df	Sig.	95% Confidence interval	
						Lower bound	Upper bound
Student (0=yes, 1=no)	0.555	0.167	11.101	1	<0.001***	0.229	0.882
Gender (0 = male, 1 = female)	-0.376	0.104	12.966	1	<0.001***	-0.581	-0.171
Age	0.006	0.006	1.304	1	0.254	-0.005	0.017
Commuting time	-0.002	0.001	2.502	1	0.114*	-0.003	0.000
Arrangements on trips to work/school	-0.204	0.172	1.414	1	0.234	-0.540	0.132
Arrangements on trips from work/school	0.113	0.107	1.113	1	0.291	-0.097	0.322
Interested in sustainable mobility	0.070	0.066	1.138	1	0.286	-0.059	0.199

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In the case of bikesharing and e-bikesharing, the regression analysis results are very similar (Tables 5 and 6). In both cases, gender, age and interest in sustainable mobility are identified as significant variables. Women are more likely to be interested in joining an (e)bikesharing system than men. The chances of joining (e)bikesharing are also higher with growing interest in sustainable mobility.

Tab. 5 – Factors influencing willingness to use bikesharing. Source: own research

	Estimate	Std. error	Wald	df	Sig.	95% Confidence interval	
						Lower bound	Upper bound
Student (0=yes, 1=no)	-0.187	0.239	0.611	1	0.434	-0.655	0.282
Gender (0 = male, 1 = female)	0.304	0.141	4.662	1	0.031**	0.028	0.581
Age	0.038	0.009	17.858	1	<0.001***	0.020	0.056
Commuting time	0.002	0.001	1.493	1	0.222	-0.001	0.004
Arrangements on trips to work/school	-0.274	0.232	1.401	1	0.237	-0.729	0.180
Arrangements on trips from work/school	0.254	0.151	2.836	1	0.092*	-0.042	0.550
Interested in sustainable mobility	0.869	0.106	66.837	1	<0.001***	0.0661	1.077

Note: * p < 0.1, ** p < 0.05, *** p < 0.01

Tab. 6 – Factors influencing willingness to use e-bikesharing. Source: own research

	Estimate	Std. error	Wald	df	Sig.	95% Confidence interval	
						Lower bound	Upper bound
Student (0=yes, 1=no)	-0.044	0.245	0.033	1	0.856	-0.525	0.436
Gender (0 = male, 1 = female)	0.487	0.141	11.903	1	<0.001***	0.210	0.764
Age	0.034	0.009	14.339	1	<0.001***	0.017	0.052
Commuting time	0.001	0.001	0.556	1	0.456	-0.002	0.004
Arrangements on trips to work/school	-0.024	0.248	0.009	1	0.923	-0.510	0.462
Arrangements on trips from work/school	0.243	0.153	2.525	1	0.112	-0.057	0.543
Interested in sustainable mobility	0.764	0.105	53.088	1	<0.001***	0.558	0.970

Note: * p < 0.1, ** p < 0.05, *** p < 0.01

Regarding carsharing, there is a small significance of the gender factor – women are less likely to be interested in carsharing than men (see Table 7). On the other hand, the factors of age, commuting time and interest in sustainable mobility are significant variables. As travel time increases, respondents are less likely willing to use carsharing. In contrast, with increasing age and growing interest in sustainable mobility, the chances of joining a carsharing system are rising.

Tab. 7 – Factors influencing willingness to use carsharing. Source: own research

	Estimate	Std. error	Wald	df	Sig.	95% Confidence interval	
						Lower bound	Upper bound
Student (0=yes, 1=no)	0.085	0.185	0.212	1	0.645	-0.278	0.449
Gender (0 = male, 1 = female)	-0.166	0.114	2.102	1	0.147*	-0.389	0.058
Age	0.024	0.006	14.297	1	<0.001***	0.012	0.037
Commuting time	-0.002	0.001	3.939	1	0.047**	-0.004	<-0.001
Arrangements on trips to work/school	-0.175	0.188	0.863	1	0.353	-0.544	0.194
Arrangements on trips from work/school	0.107	0.117	0.835	1	0.361	-0.122	0.335
Interested in sustainable mobility	0.366	0.075	24.070	1	<0.001***	0.220	0.513

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5 DISCUSSION

Our data show that the car is the dominant transport mode for both students and employees. It is also evident that students travel to university from longer distances than employees and use more often the train (33% of students). On the contrary a higher share of employees walk to the university. These results confirm findings of other researchers (Whalen et al., 2013) that mobility of university students is very high, and they are more flexible than other age groups in using different transport modes.

Data from our survey indicate that the highest potential among shared mobility is for ridesharing with colleagues, family members or friends. On the contrary, the bikesharing and e-bikesharing potential is the lowest. Specifically, those who would change the transport mode towards a shared mode are mostly older, men (for motorized transport) and women (for non-motorized transport). One of the main reasons for this finding could be the lack of developed cycling infrastructure and limited parking options in the city of Ústí nad Labem.

Interestingly, the factors explaining interest in different sharing services, differ among the type of service. Being a woman increases an interest in ridesharing and bikesharing, while men are more interested in carsharing, this finding is consistent with other studies (e.g. Fyhri & Fearnley, 2015). Students have a higher chance to start using ridesharing, while older respondents were more willing to start using bikesharing and carsharing. It is obvious that commuting time is one of the most important factors of the transport mode choice. Travel time was also proven to be a significant factor influencing interest in ridesharing or carsharing. One of the reasons for this may be that these modes of shared transport bring less flexibility and can increase overall travel time (Belz & Lee, 2012; Malodia & Singla, 2016).

Most of the employees and students indicated that sustainability is an important topic for them, but they ranked it as the least important factor regarding their transport mode choice. However, in the context of shared mobility, it seems that the interest in sustainable modes of transport is a significant factor affecting participation in a sharing system, especially in (e-)bikesharing and carsharing, what is confirmed also by foreign literature (Efthymiou et al., 2013; Shao et al., 2012).

6 CONCLUSION

This study brings new insights about a potential of new mobility services among university employees and students for commuting to the university. Using a case study of the university in Ústí nad Labem, we show that the current dominant transport mode for commuting to the UJEP is the car (55% of the employees and 45% of the students). The car user share is also high among those commuting from a short distance (living directly in Ústí nad Labem). The dominance of car causes an environmental burden and growing demand for parking, which is substantially limited in the city centre, decreases the quality of public spaces around campus and other university buildings and the quality of life of local inhabitants (Brůhová Foltýnová, 2009). To be able to deal with these mobility challenges, it is necessary to describe the students' and employees' transport behaviour and estimate the potential to change it towards more environmentally friendly modes of transport. One of the possible alternatives for cars is shared mobility (Moraal, 2017). Shared mobility can decrease the carbon footprint and decrease the usage of cars (Vejchodská et al., 2023).

We distinguish different types of shared mobility. Our research indicates that ridesharing has the highest potential followed by carsharing. The lowest interest is for bikesharing, as Ústí is not perceived as a cycling city. Even if the interest in shared mobility is relatively low, in absolute numbers it might be hundreds of people. Furthermore, it seems that providing more information about possible transport alternatives, with which some respondents have no experience, could also increase their interest. As was described by Efthymiou et al. (2013) the information and environmental awareness increase the willingness to use shared mobility.

Especially the university should play a role as an innovator and support sustainability including sustainable mobility and might play a role of local leader supporting sustainable mobility. It is still a concept which is not fully understood and applied in post-communistic countries including the Czech Republic (Brůhová Foltýnová et al., 2020). The UJEP should consider supporting better conditions for alternatives and together with city representatives provide a better offer for new mobility services, e.g., cycling infrastructure with better parking conditions for bicycles, showers, or an application for sharing rides, etc.

The motivation (pull) measures should be combined with restrictive (push) measures, regulating the use of cars. This might be achieved in close cooperation with the city representatives, ideally integrated into the Sustainable Urban Mobility Plan as a main city-level strategic plan in the sector of transport (for this new planning approach, see, e.g., Jordová & Brůhová-Foltýnová, 2021).

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A LITERATURE REVIEW: IMPLEMENTING A SAFETY MANAGEMENT SYSTEM IN THE AVIATION INDUSTRY

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Abstract

The aviation industry comprises many domains, so the stakeholders encompass everything from air transport and aerodrome operators, air traffic management, maintenance, aircrew, and training management. Thus, all mentioned would not be without an aircraft and its parts designed and manufactured. All the above areas must abide by the legal requirements of the International Civil Aviation Organization (ICAO). Concerning ICAO Annex 19, implementing a Safety Management System (SMS) is crucial to ensure safety and prevent accidents and incidents in aviation. In Europe, for the members of the European Union, the European Union Aviation Safety Agency (EASA) embodied SMS requirements into Commission Regulation (EU) 748/2012, where EASA Part-21 was updated in March 2023 for design (DOA) and production (POA) organisations. This requires Management of change of the organisation from a prescriptive approach to a performance-based approach and getting acquainted with safety culture and just culture. The context of the institutions such as ICAO and EASA are described, a general understanding of SMS is provided, and the introduction of the four pillars of SMS is presented. This literature review aims to give a foundation for the current state of knowledge on this topic and address the gaps, which conclude that implementing SMS in DOA and POA holders is an up-to-date regulatory requirement in EASA Part-21 requirement, which has yet to be studied by managerial aspects.

Keywords: aviation industry, safety management system, safety culture, just culture

Abbreviations: ICAO - International Civil Aviation Organization, EASA - European Union Aviation Safety Agency, JAA- European Joint Aviation Authorities, FAA- Federal Aviation Administration of the United States, PMS - Production Management System, QMS - Quality Management System, SMS - Safety Management System, DOA – Design Organisation Approval, POA – Production Organisation Approval, GAMA - General Aviation Manufacturers Association, ASD - Aerospace and Defense Industries Association of Europe, AIA - Aerospace Industries Association of America, AIAB - Aerospace Industries Association of Brazil, AIAC - Aerospace Industries Association of Canada, TCCA – Transport Canada Civil Aviation, SM ICG - Safety Management International Collaboration Group, EC – European Commission, SSP – State Safety Programme, GASP – Global Aviation Safety Plan, EPAS – European Plan for Aviation Safety, MNG - Management

1 INTRODUCTION

The aviation industry is very complex concerning the socio-technic system due to offering a vast portfolio of products and services, which must lead to airworthiness, the fact that an aircraft is in safe working conditions and safe to fly. This means that during the whole lifecycle of the plane, for all types of operations and in all environments, the aircraft's structure must remain unchanged (EC, 2023). That is why the Safety Management System (SMS) foundation is seen as an indispensable element. Over the years, it has evolved from different sectors, e.g., the food or chemical industries, to comply with legal instruments such as regulations and directives. It is integral to the aviation industry, which has a long tradition and a global representation in the production and operation of various aircraft types. There are public institutions such as the

International Civil Aviation Organization (ICAO), which is a United Nations specialised agency, then in Europe, the European Union Aviation Safety Agency (EASA), and Competent Authority (CA) of member states, e.g., the Civil Aviation Authority of the Czech Republic (CAA/ÚCL), which are at the top of the hierarchy in the monitoring and implementation of legislation within the aviation industry. Furthermore, some associations cooperate with manufacturers, academic institutions, and R&D organisations or lobby the regulatory authorities on behalf of the association members with regulatory authorities like the General Aviation Manufacturers Association (GAMA). These organisations are involved in the rulemaking and oversight of approved manufacturing sites holding EASA Part-21 design (DOA) and production (POA) organisation certificates because every aircraft must first be certified (EC, 2023).

The aviation system (see Fig. 11) can be outlined as a system approach due to interdependencies and interrelation within different spheres. The airlines, airports and aircraft manufacturers are considered the main elements in the sector under regulatory authorities. The inner system is enclosed by and coupled with the political and legal environment, social system, and economic and ecological field. The result of aviation regulation is firstly to assure the highest possible level of safety and secondly to protect society from the negative externalities of aviation (Wittmer et al., 2011). The SMS is a complex topic which is implemented to establish, foster and perform a positive safety culture according to the International Industry Standard SM-0001 (ASD, AIA, AIAB, AIAC, GAMA, 2022) for the entire aviation industry (ICAO, 2018) as required by Annex 19 (ICAO, 2016).
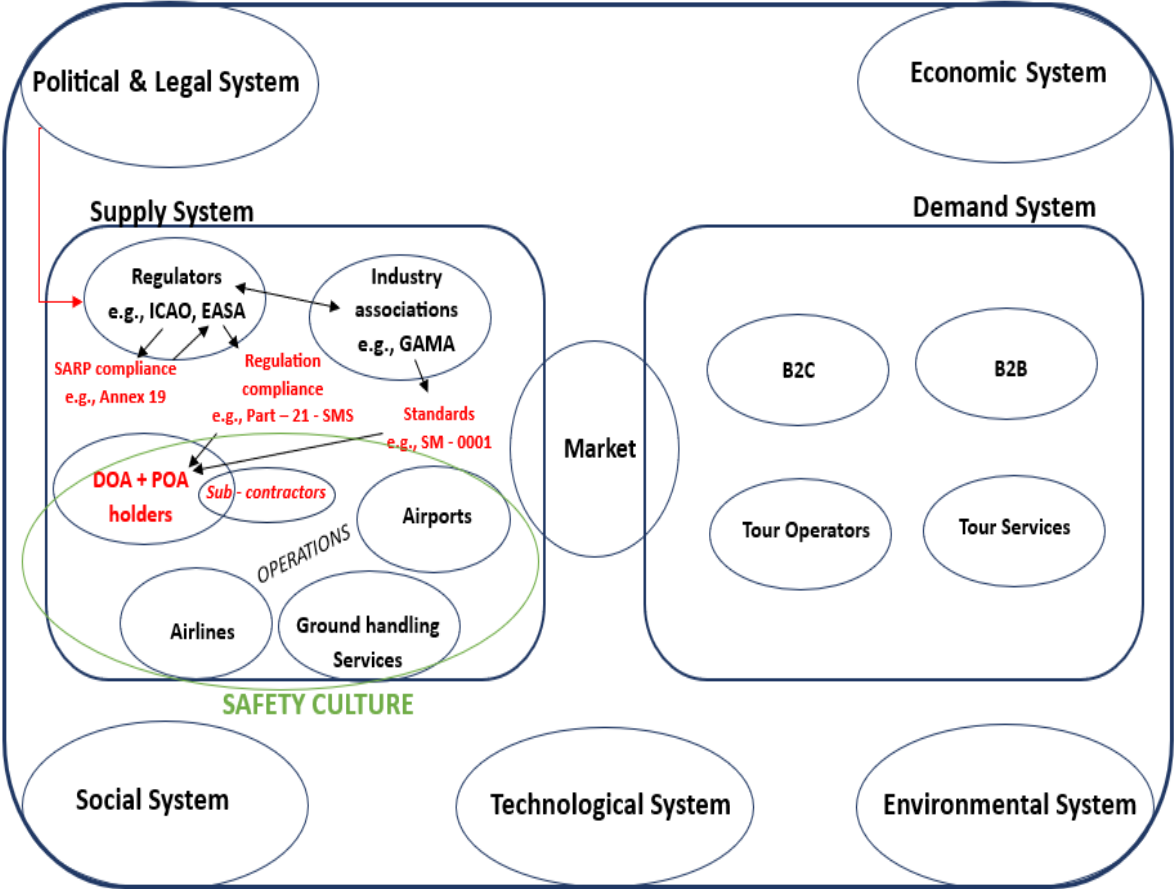

Fig. 11 – The aviation system. Source: own adaptation based on (Wittmer et al., 2011)

The first section of the literature review is a more general level looking at the relationship between regulatory authorities and the development of SMS. Then, the second part defines the use of terms safety, safety culture and just culture. In addition, it is narrowed down to the current study, which is limited to operations and begins to be implemented in aircraft manufacturers with a transition period. Moreover, in the last section, before the conclusion, is a discussion of arguments which justify clearly stated research which aims at SMS implementation in POA and DOA organisations (Saunders et al., 2019).

2   METHODOLOGY

This paper mainly focuses on publicly available information regarding the SMS in aviation on the website of ICAO, EASA, and other aviation authorities. The research is also focused on governing documents such as regulations and supporting standards for the implementation of requirements of ICAO Annex 19, presenting outcomes in a timeline frame. Then the online scientific literature research tools are used to perform analysis on key terms. The literature review was conducted from Web of Science and Scopus databases, and only minimal articles deal with the topic of SMS in design or production organisations due to new implementation in the companies. A tool called VISME was used for a timeline of important dates of regulation development. Then the qualitative data were imported to Atlas.ti Trial Version, where sources were organised and analysed. The outcome is presented in clear visualisation. The comparative analysis provides an overview of regulatory bodies for new standards due to implementation support.

3   RESULTS

3.1 Regulatory bodies

According to Ashford (1995), safety has been seen as a driving force to meet public expectations to level off or, better, to decline the number of accidents or fatalities in a rapidly expanding aviation industry. The potential underestimation of manufacturers and operators applying new technologies and requirements under the patronage of that time bodies such as the European Joint Aviation Authorities (JAA) and Federal Aviation Administration of the United States (FAA) to introduce a solid and consistent policy. These complex factors of formalised rules include reducing harm, standardisation, transparency, control, predictability, and a reduction in favouritism (Dekker, 2014).

ICAO

The Convention on International Civil Aviation in 1944, known as the Chicago Convention, was the first impulse to establish the core principles of international air transport, established and led by the International Civil Aviation Organization, adding up to 193 state members (ICAO, 2023). ICAO international Standards and Recommended Practices (SARPs) are grouped into 19 Annexes, where each Annex deals with a particular subject area (SKYbrary, 2023).

EASA

The European Union Aviation Safety Agency, established in 2002, ensures confidence in safe air operations in Europe and worldwide by proposing and formulating rules, standards, and guidance; by certifying aircraft, parts, and equipment; and by approving and overseeing organisations in all aviation domains (EASA, 2023). Transposition of ICAO Annex 19 SMS standards ("Opinion No 07/2016", 2016). The EASA aimed to further increase aviation safety by introducing safety management in the scope of Part-21 design and manufacturing

organisations. A proposal was to further increase aviation safety by introducing safety management in Part – 21 Design and Manufacturing and Part – 145 Maintenance. ("Terms of Reference for rulemaking task RMT.0251(b) (MDM.055-MDM.060)", 2017). In addition, EASA issues the European Plan for Aviation Safety (EPAS), where strategic priorities are set to achieve effective implementation of management systems in the industry (EASA, 2023).

FAA

The Federal Aviation Administration begin operation in the late fifties of the 20th century and has a mission to continue to provide the safest, most efficient aerospace system in the world (FAA, 2023). The Safety Management System policy and requirements issued by the Federal Aviation Administration is in Order 8000.369C, and this document is intended to help FAA organisations incorporate SMS and/or ICAO State Safety Program (SSP) requirements into their organisations (FAA, 2020).

UK CAA

In December 2020, the UK left the European Union aviation system, meaning that EU law no longer applies to the UK, and there is a UK - EU Transition to the UK Civil Aviation Regulations for their types. As an ICAO Member State, they fulfil their obligation by Global Aviation Safety Plan (GASP). The UK timeline for aircraft manufacturers is July 2024, with a transition period to July 2026 (UK CAA, 2023).

SM ICG

The purpose of the Safety Management International Collaboration Group (SM ICG) is to promote a common understanding of safety management principles and requirements and to facilitate their application across the international aviation community, where permanent members are the EASA, the FAA and the Transport Canada Civil Aviation (TCCA) (SM ICG, 2022).

The ICAO and cooperation with other bodies bring together a group of experts who introduced the development (see Fig. 12) of SMS documentation used for enhancing aviation safety. The evolution of SMS comes from consolidating SARPs, contained in six different Annexes, into a single new Annex 19.

The embodiment of Annex 19 to the regulations and then into practice is supported by standards (see Tab. 2).

Tab. 2 – An overview of regulations and standards. Source: own research

Authority	Regulation	Involvement	Supporting standard
ICAO	Annex 19	SSP	Safety Management Manual Doc 9859
EASA	Commission Regulation (EU) No 748/2012 Initial Airworthiness	PART - 21	SM – 0001 Issue B
FAA	Code of Regulation Title 14	PART - 21	ORDER 8000.369C
UK CAA	UK Regulation (EU) (748)./2012	PART - 21	CAP 795

SMS Development

Timeline ICAO and EASA, selected events

Performance beyond compliance

Part - 21

Standard SM - 0001 Issue B

ICAO Annex 19 Second Edition

Effectiveness

ICAO Annex 19 First Edition

Transition period

SMS Effective SARPS

Detailed guidance to implement SMS requirements

ICAO SARPs

EASA Embodiment of SMS in Regulation (EU) 748/2012

Result of the ICAO High-level Safety Conference

Overarching existing SM provisions

| 2001 | 2009 | 2013 | 2016 | 2022 | 2023 | 2025 |

→ **SARPs**
- overarching sources:
Annex 1 - Personnel Licensing
Annex 6 - Operation of Aircraft
Annex 8 - Airworthiness of Aircraft
Annex 11 - Aircraft Traffic Services
Annex 13 - Aircraft Accident and Incident Investigation
Annex 14 - Aerodromes
-> consolidation of SARPs safety, contained in six different Annexes into a single new Annex 19

→ **RUELES FOR AIRWORTHINESS AND ENVIRONMENTAL CERTIFICATION**

Regulation (EU) No 748/2012 Annex 1 PART 21,
Certification of aircraft and related products,
parts and appliances and design and production
organisation
Subpart G - POA - PMS-QMS and SMS
Subpart J - DOA - Design Assurance and SMS

Made with VISME

Fig. 12 – SMS Timeline. Source: own research based on ICAO, EASA public information

3.2 SAFETY MANAGEMENT SYSTEM

The definition of the Safety Management System, according to Annex 19, is a systematic approach to managing safety, including the necessary organisational structures, accountability, responsibilities, policies, and procedures, where safety is the state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level (ICAO, 2016).

Earlier SMS generations have focused on operating a relatively autonomous safety system from the production processes to balance protection and production. Modern SMS approaches pursue implementing a performance-based framework that emphasises integrating safety with other business processes in fulfilling quality and safety requirements; that is why it is stated to focus SMS integrated with other management systems to deliver synergistic results, not only in safety but also in productivity, quality and environment (Malakis et al., 2023).

The Quality Management System (QMS) obligation needed to be revised in Part-21 due to insufficient focus on safety performance. That is why Production Management System (PMS) was developed, where SMS was introduced as a complement to QMS (EASA, 2023).

There are four pillars with twelve elements of SMS (see Fig. 13) that aviation organisations need to implement to improve safety performance by establishing and fostering a positive safety culture. A positive safety culture should be present at all levels and reflected in an active and visible management commitment and by individuals' awareness of their role and influence on safety, including values, behaviours, and attitudes. All this aligns with the just culture concept, which is essential to encourage individuals to report safety-related information. (ASD, AIA, AIAB, AIAC, GAMA, 2022). This is based on EU No 376/2014, meaning a culture where individuals are not punished for actions, omissions, or decisions commensurate with their experience and training but where gross negligence, wilful violations and destructive acts are not tolerated.

SAFETY POLICY & OBJECTIVES	SAFETY RISK MANAGEMENT	SAFETY ASSURANCE	SAFETY PROMOTION
☐ Management commitment	☐ Identification of hazards	☐ Safety performance monitoring	☐ Education
☐ Accountability and responsibilities	☐ Risk Assessment	☐ Safety performance measurement	☐ Training
☐ Key personel	☐ Risk Mitigation	☐ Management of change	☐ Communication
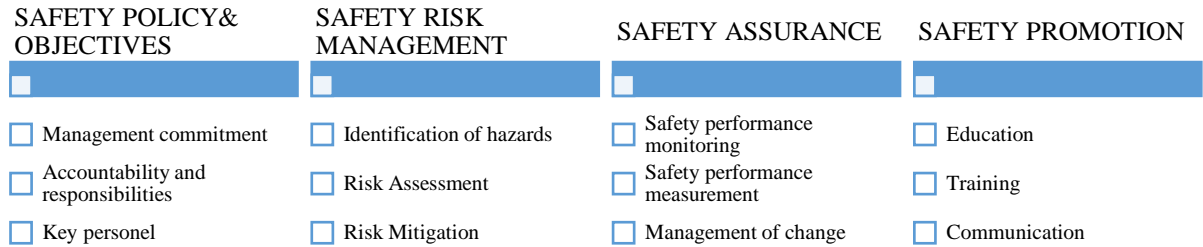
Fig. 13 - SMS four pillars. Source: own adaptation based on (EASA, 2018)

An analysis of selected articles (see Tab. 3) shows disproportionality between operation and production types of organisations with a strong focus on operation. They are mainly oriented in operation research due to applicable requirements since 2013 and data availability. While articles focused on production are less covered because SMS was only optional for DOA and POA organisations from authorities. Regarding the research, most articles focus on all four pillars of SMS: safety policy, safety risk management, safety assurance and safety promotion, so more in-depth research is needed for each element. Nevertheless, it can be concluded that the overview, regardless of where it is used and applied, represents a clear direction for ensuring safety.

Tab. 3 – An overview of SMS components and organisations of the reviewed articles. Source: own research

| | OPERATIONS | PRODUCTION | SMS | | | |
			SAFETY POLICY	SAFETY RISK MNG	SAFETY ASSURANCE	SAFETY PROMOTION
(Kešeľová et al., 2021)	X		X	X	X	X
(Blišťanová et al., 2021)	X			X		
(Szabo & Koblen, 2020)		X			X	
(Stroeve et al., 2022)	X		X	X	X	X
(Reader, 2018)	X		X	X	X	X
(Batuwangala et al., 2018)		X	X	X	X	X
(Ulfvengren & Corrigan, 2015)	X		X	X	X	X
(Tirpáková et al., 2021)	X		X	X	X	X

These above-stated articles were qualitatively analysed to determine word frequencies (see Fig. 14) with a result of crucial words such as safety, management, and system. However, also it appears there is a design and production, which is going to be more developed.

Fig. 14 – Word Frequencies. Source: Atlas.ti Trial Version

4 DISCUSSION

Implementing SMSs is particularly critical for organisations involved in airworthiness, including initial and continuing airworthiness. However, not all organisations in the aviation industry have implemented SMS, and there are challenges associated with their implementation. The research on the regulatory framework for SMS, by comparison of various significant aviation authorities, finds out that most authorities were focused on the operational environment of aviation, such as air transport operators and air traffic services. It is caused by operational context as nonfulfillment with a safety standard, and a concurrently what happen by human mistake might have a direct or sudden outcome. In contrast, design and production have a more latent impact on safety non-compliance (Batuwangala et al., 2018).

Nevertheless, safety is a very relevant topic, demonstrating that both airlines and manufacturers must continue to promote and improve it (Alcaide et al., 2022). Bråthen et al. (2020) focuses on the method of Cost-benefit analysis of safety case regulations which were implemented in transportation. The authors named the main benefits of introduced improvements factors in the aviation sector and their main cost element, such as an investment to comply with regulatory requirements.

A qualitative study on the implementation of SMS conducted by Gerede (2015) showed that there are concerns regarding the implementation due to management involvement because regulations are seen as bureaucratic paperwork, causing uneconomical recurring tasks and increasing costs unnecessarily. The top management has the authority to set out aims and targets and how resources are to be allocated within an organisation. All these factors play a role in the successful implementation of the SMS.

The undivided attention to mandate SMS for aircraft manufacturers comes from events when the Boeing 737 Max crashed in 2019 and was grounded. Therefore, The Federal Aviation Administration stated to implement the SMS in the design and production of aircraft aspects (Shepardson, 2020). There are many seminars and workshops related implementation of SMS. In one of them, David Malins, CEO of DM Aviation Consulting, pointed out as an example of how not to do SMS, meaning how accumulating problems that were well understood on the shop floor or even at the middle management level can be silenced by signals from the top that change would be unacceptable, usually for cost or time reasons (Learmount, 2022).

The aviation industry's Safety Management Systems should ensure safety and reduce incidents and accidents. However, measuring safety in the aviation industry can be challenging to capture the actual state of an evolving safe system. The regulatory framework for SMS implementation has been established, but further research and development are required, not for the system to remain on paper but to enhance the actual effectiveness of SMS in design and production organisations as it is valuable in many areas for instance:

- Continuous Improvement
- Accident Prevention
- Risk Assessment and Mitigation
- Human Factors
- Economic Impact
- Change Management
- Organizational Culture
- Safety Performance Indicators
- Training and education
- Technological Advancements
- Industry Case Studies.

5 CONCLUSION

The relevant resources of the literature review provided a summarised context of the SMS in the aviation industry, which looked at the relationship between regulatory authorities and the development of SMS. Then, the terms safety, safety culture and just culture were outlined. In addition, it narrowed down current research, which is limited to operations and just began to be implemented in aircraft manufacturers with a transition period.

Based on this literature review, it discovers that many changes have taken place in regulatory requirements. That is why further in-depth research in the design and production organisations in the aviation industry will be gradually examined. That means that implementation of each SMS component (safety policy, safety risk management, safety assurance and safety promotion) contributes to the research in management aspects, seeing the transformation of a prescriptive approach to a performance-based approach, which should establish and foster positive safety culture and just culture. The present literature review filled a gap in the research and pointed the way for future studies, such as the determination and impact level of SMS implementation in aviation design, and production organisations will be deeply examined. From an academic perspective, this will advance knowledge in selected topics.

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TYPOLOGY OF ONLINE GROCERIES BUYERS BASED ON THE INFLUENCE OF COVID-19 PANDEMIC

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Abstract

With the COVID-19 pandemic, consumer behaviour in the online grocery shopping market significantly changed as consumers reduced their entry into brick-and-mortar stores and started using the online alternative. Many consumers kept this habit and buying groceries online became regular activity for them. Therefore, it is important to know how is the market structured and what segments there are. This article aims to create a typology of online grocery buyers in the Czech Republic based on the influence of COVID-19 pandemics. Quantitative research was used for conducting primary data, which were obtained through an online questionnaire survey. The researched population consisted of residents of the Czech Republic, who are over 18 years old and are buying groceries online. The sample was determined based on a quasi-representative quota sampling technique according to the gender and age structure. A total of 266 respondents participated in the research. All data were analysed using IBM SPSS Statistics program. Respondents expressed their agreement with 10 statements concerning attitudes toward the online groceries shopping with the influence of Covid-19 pandemic. Based on how they evaluated these statements they were divided into segments, according to their common characteristics, using factor and cluster analysis. Three buyer segments were identified: "Permanent Buyers", "New Loyal Buyers" and "New Occasional Buyers". Permanent Buyers were ordering groceries via the internet even before the pandemics. New Loyal Buyers started to buy groceries online at the time of pandemics and they strongly prefer the online alternative even now. New Occasional Buyers were most affected by the COVID-19 pandemics in terms of shopping groceries online, but they did not adopt this way of shopping and place orders very rarely.

Keywords: *Online Groceries Market, Segmentation, Cluster analysis, Marketing research, Questionnaire survey*

1 INTRODUCTION

Online shopping is becoming more and more popular every year. In the Czech Republic, online stores have become a big competitor to regular brick-and-mortar stores. When shopping online, consumers can often find a much wider range of products and more cost-effective offers.

Buying groceries online via the internet is no exception. Even before the COVID-19 pandemic, online grocery shopping was possible through some retailers in the Czech market, but it was not that widely used. Suddenly, during the COVID-19 pandemic, the situation and related consumer behaviour in the online grocery shopping market changed. It was especially health concerns and many restrictions that prompted consumers to reduce their entry into brick-and-mortar stores and start using the online alternative (Tyrväinen & Karjaluoto, 2022). The transition to the online environment began to grow massively. Businesses in the groceries market were pushed to use online tools much more, they started to adapt and to offer the online selling options. Some of them responded more flexibly and launched online grocery stores from the beginning of pandemics, while others joined later or are even joining and expanding the online food selling now in 2023.

Many consumers have adapted the online grocery shopping and are still heavily using the advantage of this alternative as they have found many benefits in it, such as: time saving, possibility to choose the place and time of delivery or minimum stress associated with shopping in a bricks-and-mortar store (Candra et al., 2021).

Online grocery market has significantly evolved and changed. It can be stated that it is a diverse market and not all buyers behave the same way. The aim of this article is to create a typology of online grocery buyers based on the influence of COVID-19 pandemics. To find out, what buyer segments are on this market, how did their shopping behaviour change during pandemics, if they like online groceries shopping, what are the most important factors for them when making an order and lastly what barriers of online grocery shopping they perceive.

2 LITERATURE REVIEW

The COVID-19 pandemic has caused a significant growth of e-commerce, especially in the category of online groceries shopping (Wu & Mu, 2023). Many consumers began to make more intensive use of the opportunity to buy food online at that time (Baarsma & Groenewegen, 2021).

Available research and studies confirm that Czech Republic is no exception and online grocery shopping has increased significantly during the pandemic (Svatosova, 2022). Some Czech consumers were used to buy groceries online even before. But due to COVID-19 this sector of ecommerce has gained many new buyers, who were not familiar with this way of shopping before (Bartók et al., 2021). Zámková at al. (2022) are describing in their study that new segments on this market emerged aal of a sudden. And many retailers were not prepared for such high customer interest. The online grocery shopping market has started to evolve rapidly and has seen many changes (Svatosova, 2022). Hence it is important find out how COVID-19 affected the online grocery market in terms of what segments are on this market now, in 2023. If the new segments of buyers remained or returned to traditional in store groceries shopping. Typology in this article aims to define these buyers' groups and their future outlook.

2.1 Online Grocery Market in the Czech Republic

The largest retailers that were present in the online grocery market before the pandemic, such as Rohlik.cz, Košík.cz and iTesco.cz, achieved high turnover, especially in these difficult times (Cushman & Wakefield, 2021). They started to gradually expand their services and product range to attract as many new customers as possible. Over time, other retailers started to enter this market as well. In the Czech online grocery market, we can currently find large groceries chains such as Globus, Albert, Makro, eCOOP and most recently also Billa and Kaufland. However, some are limited in their online offer and certain categories of goods are missing. Further growth of retailers with online groceries offerings is expected in the future (Mediaguru, 2021).

As stated before, grocery e-commerce sector is currently the most dynamic. Between 2018 and 2021, online food sales in the Czech Republic grew 106% annually and they account for 4.2% of total grocery sales (Mediaguru, 2021). In 2021, Czechs were buying groceries online at a higher rate than the European average (Czech Statistical Office, 2021). More than a third of Czechs shop for food online, 16% of them at least once a month according to a survey conducted by the research agency Ipsos. Results showed that 36% of the respondents order groceries using online platform, with 10% of them ordering every week. About 16% of Czechs buy groceries online once a month. Tesco is the most popular online food retailer, followed by Rohlík.cz (Acomware, 2022). In 2023, groceries accounts for 8% of the assortment of all Czech e-shops

and are the third largest segment after the clothing and accessories category and the home and garden category (Czech Ecommerce, 2023).

2.2 Market segmentation

Not all consumers have the same attitudes, characteristics, requirements, and ways to satisfy their needs. Therefore, companies need to find out how market segments differ from each other with respect to their products and brands or respond differently to elements of marketing communication. Subsequently, they must decide which segments to focus their efforts on (Pelsmacker, 2018). Market segmentation, deciding on target groups or segments to focus on, are important components of strategic marketing planning and the basic building blocks of a communication strategy. Understanding the purchase motivators and the behaviour of a target group is an essential element of successful marketing. Ideally, marketing segmentation should lead to the creation of internally homogeneous groups, in which should members of one segment respond equally to marketing stimuli, thus differ from members of other segments (Solomon et al, 2016).

As mentioned, the aim of segmentation is to define several market segments that significantly differ from each other. However, it is necessary to determine appropriate segmentation criteria first (Cahill, 2006). In this article, consumer attitudes in the groceries market are analysed. Segmentation criteria are in this case based on attitudes and consumer behaviour in general. These criteria are called behavioural. As Kotler and Armstrong (2018) state, using behavioural criteria, consumers are divided into segments based on their knowledge, attitudes, degree of loyalty, frequency of use or reaction to the product. Many marketers believe that behavioural segmentation is the best starting point when building new segments.

After defining appropriate segmentation criteria, various analytical techniques, such as cluster analysis, conjoint analysis, multidimensional scaling, and automatic interaction detection, are used to subsequently identify consumer segments based on these criteria (Cahill, 2006).

2.3 Typology of Online Groceries Buyers

Several authors have focused their studies on creating a typology of online grocery shoppers. In the Czech market, Bauerová et al. (2023) defined five main segments of online grocery shoppers in their study. These are "Quality-oriented Shoppers" who focus on quality and freshness, "Influential Utilitarians" for whom the speed of buying process is the most important, "Loyal Traditionalists" who are not heavy internet users and prefer regular brick-and-mortar stores, "Satisfied Conditional Loyalists" who significantly prefer online groceries shopping, and "Movable Eco-sympathizers" who focus on sustainable characteristics of online delivery. Previous research has also focused on the segmentation of online grocery shoppers in the UK market. The authors defined a total of five segments, ranging from those who like to shop for groceries online and use this option frequently, as it brings many benefits and they strongly prefer online shopping to traditional brick-and-mortar stores ("Intensive Urbanites" and "Online Omnivores" segments) to those who are reserved about online grocery shopping, use it rather sporadically and prefer to shop in brick-and-mortar stores. As the online option brings many barriers for them, such as the inability to select products themselves, check the quality, or having to pay higher prices ("Resisting and Responsible" segment) (Brand et al., 2019). In Finland, the authors focused on defining and describing a segment of adapters of online grocery shopping due to the COVID-19 pandemic. The research results show the typical adopter who started shopping for groceries online due to the pandemic is less than 45 years old, with higher household earnings, and ones with concern over their own health. They value simplicity of ordering, wide product ranges to choose from and fast delivery (Eriksson & Stenius, 2021). Asgari et al. (2023) presented online groceries buyer typology based on their attitudes and

intentions to continue grocery shopping after the COVID-19 pandemic. Results show that buyers with more experience in using online grocery shopping platforms before pandemics are more likely to continue purchasing their groceries online. In addition, individuals with positive attitudes toward technology and online grocery shopping in terms of convenience, usefulness, and easiness were likely to adopt online grocery shopping in the future as well. On the other hand, pro-driving buyers that are very demanding were less likely to choose online grocery shopping over the in-store shopping.

There is no other previous study that focuses directly on the influence of the COVID-19 pandemic when conducting typology of online groceries buyers. Therefore, this study aims to fill this research gap in this field and to find out several different segments of buyers in the online groceries market in the Czech Republic based on the influence of COVID-19 pandemic.

3   METHODOLOGY

The aim of the research is to segment buyers in the Czech online groceries market and to create buyer typology based on their attitudes toward the online groceries shopping with the influence of Covid-19 pandemic. For the elaboration of this article, primary data were used. Quantitative research was used for conducting primary data, which were obtained through an online questionnaire survey. The questionnaire was distributed using e-mail and social networks, mainly to specified Czech Facebook groups concerning online shopping or grocery shopping. This method was chosen to secure a larger sample of respondents resulting in better explanatory power of the obtained information. A questionnaire consisting of 8 questions was created for the purpose of online interviewing. The questionnaire also included two filter questions. The first one focused on whether respondents buy groceries for their household. The second filter question asked whether respondents had purchased groceries online at least once in the last five years.

The research population consisted of residents of the Czech Republic, who are over 18 years old. The sample was determined using a non-probability sampling method – a quota sampling technique according to the gender structure. The gender ratio was set at 70 % women and 30 % men. The quotas were set in this way because previous research has shown that women are more likely to buy food than men. KPMG conducted a survey in 2020 on "Shopping habits in the Czech Republic". The sample included 70% of women and 30% of men who make household food purchasing decisions (Půrová, 2020). Structure according to age was also monitored.

Period of data collection was from 6. 2. 2023 to 1. 3. 2023. Data analysis was performed using the IBM SPSS Statistics and Microsoft Excel software. To evaluate the obtained data, the classification of the first and second degree was used. In addition, factor and cluster analysis were applied to perform the segmentation and to create buyer typology in the Czech online groceries market.

3.1 Factor Analysis

Factor analysis is used to reduce data by creating a smaller number of new variables (factors) from many original ones. For factor analysis to be used, several conditions must be met. The first of them is an internal consistency of the battery, which serves to verify whether the entire battery of items is continuous and whether these items are related to the battery. As a result of the consistency analysis is considered the value of Cronbach's Alpha which should be between 0.76 to 0.9. Another condition for its application of the factor analysis is the value of the KMO index, which must be greater than 0.6, but ideally greater than 0.7. In the next step the attention is focused on Bartlett's Test of Sphericity. This test indicates whether factor analysis can be

used – if there is a correlation between the variables. To apply this test, it is necessary to define a null and alternative hypothesis:

H_0: *Correlation between variables does not exist.*

H_1: *Correlation between variables exists.*

Among the basic approaches to factor analysis are principal component analysis and common factor analysis. The number of factors that will be created can be determined a priori, based on eigenvalues higher than one (Kaiser's rule), scree plots, percentage of variance or significance tests. Output of the factor analysis and the basis for interpreting the factors is a factor matrix. The initial unrotated factor matrix shows relationships between the factors and individual variables, but mostly factors cannot be easily interpreted using the unrotated solution. Therefore, rotation is used to transform the factor matrix into simpler and easier to interpret matrix. Varimax procedure is the most used method of rotation, it results in orthogonal factors (Malhotra, 2010).

3.2 Cluster Analysis

The purpose of the cluster analysis is to group respondents into segments (clusters) based on their similarity. Objects with smaller distance between them are more similar to each other than objects at larger distances. The most used measure of similarity (dissimilarity) is the Euclidean distance (Hendl, 2009).

Clustering procedures are divided into hierarchical and non-hierarchical. For hierarchical clustering the development of treelike structure is characteristic. Hierarchical methods are agglomerative or divisive. Agglomerative methods are more commonly used in marketing research, they include linkage methods, variance methods and centroid methods. Most frequently used is variance method, more precisely Ward's procedure. The non-hierarchical methods are also called as K-means clustering (k= number of clusters). As main disadvantages of the non-hierarchical clustering can be considered a fact, that the number of clusters must be pre-specified, and that the selection of cluster centres is arbitrary. It is possible to combine hierarchical and non-hierarchical methods, to firstly use hierarchical clustering and then to continue with the non-hierarchical procedure - where the number of clusters is set according to the results of hierarchical clustering (Everitt et al., 2011).

The final number of clusters is validated based on the results of the ANOVA test. To apply this test, it is necessary to define a null and an alternative hypothesis:

H_0: *The average values of individual variables for the monitored clusters are identical.*

H_1: *The average values of individual variables for the observed clusters are not identical.*

If the significance value is for all clusters less than 0.05, when testing on 5 % significance level, the null hypothesis is rejected, and the given number of clusters (segments) can be considered definitive and confirmed (Hendl, 2009).

3.3 Structure of Respondents

A total of 266 respondents have met the conditions of filter questions and therefore participated in the research. The structure of respondents was defined according to the gender, age, highest achieved education, net monthly income of household and number of household members. As can be seen in Table 1, gender composition of respondents was 73,4% of women and 26,6% of men, according to the previously set quota. Considering the age, most numerous group were respondents in the age category 26 - 35 years old (27,1%), followed by respondents in the age category 36 to 45 years old (23,3%) and 46 to 55 years old (18%). In terms of highest achieved

education level, respondents with college degree prevails (45,1%), closely followed by respondents with high school diploma (44,4%). Next identification characteristics was net monthly income of household, the biggest part of respondents has household income ranging from 50 001 to 60 000 CZK (27,1%), from 40 001 to 50 000 CZK (20,3%) and 60 001 and more CZK (21,1%). Last characteristic was the number of persons in the household. Most respondents come from household consisting of three (36,1%) or two (31,6%) members.

Tab. 1 – *Structure of Respondents*. Source: Own research

		Percent
Gender	Male	26,6%
	Female	73,4%
Age	18 - 25	11,3%
	26 - 35	27,1%
	36 - 45	23,3%
	46 - 55	18,0%
	56 - 65	12,0%
	66 - 75	8,3%
Highest education level	Compulsory education	0,8%
	High school without diploma	9,8%
	High school diploma	44,4%
	College degree	45,1%
Net monthly income of household	0 - 10 000 CZK	3,0%
	10 001 - 20 000 CZK	4,5%
	20 001 - 30 000 CZK	7,5%
	30 001 - 40 000 CZK	16,5%
	40 001 - 50 000 CZK	20,3%
	50 001 - 60 000 CZK	27,1%
	60 001 and more	21,1%
Number of household members	One	8,3%
	Two	31,6%
	Three	36,1%
	Four	21,1%
	Five and more	3,0%

4   RESULTS

Results are structured into three sections. In the first section, buyer attitudes toward the online groceries shopping with the influence of Covid-19 pandemic are analysed. Then in the second part, using factor and cluster analysis interviewed buyers are divided into several segments (clusters) based on their expressed attitudes. In the last section, factors and barriers influencing buyer segments are analysed.

4.1 Buyer Attitudes toward Online Groceries Shopping

Respondents were asked to evaluate a total of 10 statements concerning attitudes toward the online groceries shopping with the influence of Covid-19 pandemic. For the evaluation, a Likert

scale from 1 to 5 was used (1 = strongly disagree, 5 = strongly agree). These statements were partially derived from the available literature concerning online groceries shopper's typology (Bauerová et al., 2023 and Brand et al., 2021). However, there is no other previous study that focuses directly on the influence of COVID-19 pandemic when conducting typology of online groceries buyers. Therefore, part of the statements are the author's assumptions.

As shown in Table 2, respondents agreed in the biggest extend with the statements that when buying groceries online, they order for the amount by which they do not have to pay for shipping and that they have never had to deal with any problems when buying groceries online (both average values 3,8). Respondents also mostly agreed with claims that when buying groceries online, they usually buy larger quantities so that they do not have to place orders too often (average value 3,5), that COVID-19 pandemic has influenced them to start buying groceries online, or to buy inline more than before (average value 3,3) and lastly that they like to buy groceries online (average value 3,2). On the contrary, participants in the survey more likely disagree with claims that nowadays they buy groceries in brick-and-mortar stores less frequently than before the COVID-19 pandemic (average value 2,0) and if it wasn't for the COVID-19 pandemic, they would not have tried online grocery shopping (average value 2,4).

Tab. 2 – Average Values of Agreement with the Claims Concerning Online Groceries Shopping with the

Influence of Covid-19 Pandemics. Source: Own research

	Average value
When I buy groceries online, I order for the amount by which I don't have to pay for shipping.	3,8
I have never had to deal with any problems when buying groceries online (e.g., poor quality goods, missed delivery date, incomplete order, etc.).	3,8
When buying groceries online, I usually buy larger quantities so that I don't have to order too often.	3,5
The COVID-19 pandemic has influenced me to start buying groceries online, or to buy more than before.	3,3
I like to buy groceries online.	3,2
The COVID-19 pandemic has changed my grocery shopping habits in terms of where I shop, how I pay, how often I shop.	2,9
I spend more money when I buy groceries online than when I buy groceries in a brick-and-mortar store.	2,7
I used to buy groceries online even before the COVID-19 pandemic.	2,4
If it wasn't for the COVID-19 pandemic, I wouldn't have tried online grocery shopping.	2,4
Nowadays, I buy groceries in brick-and-mortar stores less frequently than before the COVID-19 pandemic, I prefer buying them online.	2,0

Notes: Measured on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

4.2 Buyer Typology Based on the Attitudes toward the Online Groceries Shopping

First, factor analysis was performed for these 10 statements concerning attitudes toward the online groceries shopping with the influence of Covid-19 pandemic (see the subchapter 4.1) in order to reduce their number to only a few factors so that it would be easier to apply ongoing cluster analysis. In the first step of the factor analysis, conditions for its application were verified. Firstly, the internal consistency of the battery was confirmed.

Cronbach's Alpha is a measure used to confirm internal consistency (reliability) of a set of scale items. It is a way of measuring the strength of that consistency. Resulting coefficient ranges from 0 to 1. Minimum value between 0,6 and 0,8 is recommended, coefficients that are less than 0,5 are usually unacceptable (Goforth, 2015).

The value of Cronbach's Alpha is 0,629, which can be considered as a satisfactory result. The first condition for the application of factor analysis was met (see Table 3).

Tab. 3 – Internal Consistency of Battery. Source: Own research

Cronbach's Alpha	Number of Variables
0,629	10

Next, the value of the KMO Index was verified. In this case its value was equal to 0,722, which is also acceptable result, that means the second condition was also met (see Table 4). Lastly, it was needed to verify the result of Bartlett's Test of Sphericity, which indicates whether factor analysis can be used or not. However, the null hypothesis and alternative hypothesis had to be defined first:

H0: Correlation between variables does not exist (sig > 0,05)

H1: Correlation between variables exists (sig < 0,05).

All testing was performed at a 5% level of significance. The resulting significance value was equal to 0,001, the null hypothesis was rejected, and the alternative hypothesis was accepted (see Table 4). It can be confirmed that there is a correlation between the variables, so it is possible to use the factor analysis.

Tab. 4 – KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity. Source: Own research

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0,722**
Bartlett's Test of Sphericity	Approx. Chi-Square	293.,413
	df	45
	Sig.	**0,001**

The factor analysis was performed, based on the principal component method, Varimax rotation and Kaiser's rule, which states that the value of "Eigenvalues" is greater than 1. Original 10 statements were reduced to three new factors (see Table 5). These three factors explain more than 60 % of variance of the whole battery.

As can be seen in Table 4, some statements belong to more than one factor at a time. However, they have been assigned to those factors with which they have the highest correlation. The first new factor was given the name "Benefits and Volume of Online Purchases". It includes a total of four original claims which indicate that consumers usually buy larger quantities when shopping for groceries online, that they like to use the advantage of free delivery and they did not have any problems when buying groceries online. The second factor was called "Preference for Online Purchases" and includes two original statements. These claims mainly express interest in buying groceries online and preferring the online purchases before shopping in regular brick-and-mortar stores. Last factor was marked as "Positive Impact of the COVID-19 Pandemic on Online Purchases" and includes four original claims that indicate how COVID-19 pandemic influenced people to buy groceries online, that they started to order groceries online and that the pandemic changed their grocery shopping habits.

Tab. 5 – Rotated Component Matrix with Newly Formed Factors. Source: Own research

	Benefits and Volume of Online Purchases	Preference for Online Purchases	Positive Impact of the COVID-19 Pandemic on Online Purchases
When I buy groceries online, I order for the amount by which I don't have to pay for shipping.	0,793		
When buying groceries online, I usually buy larger quantities so that I don't have to order too often.	0,789		
I spend more money when I buy groceries online than when I buy groceries in a brick-and-mortar store.	0,550	0,379	
I have never had to deal with any problems when buying groceries online (e.g. poor quality goods, missed delivery date, incomplete order, etc.).	0,543		
Nowadays, I buy groceries in brick-and-mortar stores less frequently than before the COVID-19 pandemic, I prefer buying them online.		0,853	
I like to buy groceries online.		0,749	
If it wasn't for the COVID-19 pandemic, I wouldn't have tried online grocery shopping.			0,737
The COVID-19 pandemic has influenced me to start buying groceries online, or to buy more than before.			0,726
I used to buy groceries online even before the COVID-19 pandemic.		0,380	-0,626
The COVID-19 pandemic has changed my grocery shopping habits in terms of where I shop, how I pay, how often I shop.	0,419	0,449	0,553

Afterwards, a cluster analysis was performed using three newly formed factors. First, hierarchical clustering was done using the Ward's method and the Euclidean square distance of similarity measure. The number of clusters was set to three based on the largest distance between clusters. Next, these three clusters were created not only using the hierarchical clustering as in the beginning, but also through the non-hierarchical clustering method, specifically using K-Means method. Results of both approaches were compared. The non-hierarchical approach (K-means) was chosen for the final clustering, as more logical, equally sized and easier to interpret clusters were created. Finally, these four clusters were validated using ANOVA test in order to confirm wheatear the average values of individual variables for observed cluster are identical or not. A significance less than 0,05 was desirable, when testing at a 5% level of significance. In all cases resulting significance value was lower than 0,05. It follows that the number of clusters could be considered as definite and confirmed. The newly created clusters were given a name according to the expressed level of agreement with three

reduced factors (see Table 6) and according to the evaluation of 10 original statements concerning attitudes toward the online groceries shopping with the influence of Covid-19 pandemic (see Table 7).

Tab. 6 – Correlation between Reduced Factors and Consumer Segments. Source: Own research

	New Loyal Buyers	Permanent Buyers	New Occasional Buyers
Benefits and Volume of Online Purchases	-0,6133844	0,0067569	0,5612055
Preference for Online Purchases	0,9685024	0,4470944	-0,5933973
Positive Impact of the Covid-19 Pandemic on Online Purchases	0,431532	-0,9693993	0,7995003

The first segment was called "New Loyal Buyers" and includes 78 respondents (29,3%). The second segment was entitled "Permanent Buyers". This segment includes 104 respondents (39,1%). The third cluster was given a name "New Occasional Buyers" and incorporates 84 respondents (31,6 %). The structure of buyer segments in the online groceries market is visible in Figure 1.
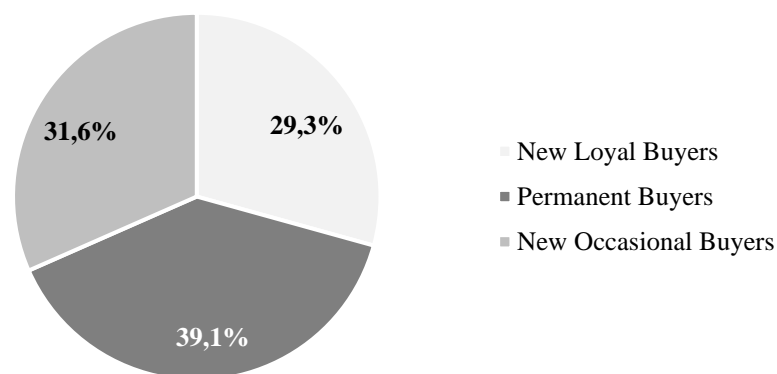

Fig. 1 – Structure of Buyer Segments in the Online Groceries Market. Source: Own research

Unlike other segments, **Permanent Buyers** were least influenced by the COVID-19 pandemic in terms of starting to buy groceries online. They were used to buy groceries online even before the pandemics. They also did not agree with the statement that pandemics changed their grocery shopping habits. They rather agree with the claim that they like to buy groceries online and that they did not have to deal with any problems regarding shopping for groceries on the internet. These buyers usually place order for the amount by which they do not have to pay shipping. This segment was called Permanent Buyers as they were buying groceries online even before the pandemics, they are not new to this market.

New Loyal Buyers were strongly influenced by COVID-19 pandemics as they started to buy groceries online or were buying more frequently at that time. They also agreed with the claim that pandemics changed their grocery shopping habits. This segment is characterized by the fact that out of all other segments they agreed in the biggest extend with statements that they like to buy groceries online and that they now prefer to buy them online as they shop in brick-and-mortar stores less often. They were marked as New Loyal Buyers because these customers started to shop for groceries online with the pandemics and currently, they prefer this online alternative over regular stores. They are loyal customers on the online grocery market.

New Occasional Buyers were most effected by the COVID-19 pandemics in terms of online grocery shopping. Out of all segments, they agreed most with the claims that pandemics influenced them to start online grocery shopping and that if it wasn't for the pandemics, they wouldn't have tried buying groceries online. They were not used to buy groceries online before the pandemics. This segment does not really like to buy groceries online. When they do order online, they usually buy larger quantities so that they do not have to order too often, and they tend to order for the amount by which they can get free shipping. These buyers prefer regular brick-and-mortar stores for grocery shopping, they started to order online with the pandemics, but they do not order regularly, therefore this segment was called New Occasional Buyers.

Tab. 7 – Average Values of Agreement with the Claims Concerning Online Groceries Shopping by Buyer Segments. Source: Own research

	New Loyal Buyers	Permanent Buyers	New Occasional Buyers	Total
When I buy groceries online, I order for the amount by which I don't have to pay for shipping.	3,3	3,7	4,4	3,8
I have never had to deal with any problems when buying groceries online (e.g. poor quality goods, missed delivery date, incomplete order, etc.).	3,2	3,9	4,1	3,8
When buying groceries online, I usually buy larger quantities so that I don't have to order too often.	3,2	3,3	4,1	3,5
The COVID-19 pandemic has influenced me to start buying groceries online, or to buy more than before.	4,0	2,2	4,1	3,3
I like to buy groceries online.	3,6	3,4	2,6	3,2
The COVID-19 pandemic has changed my grocery shopping habits in terms of where I shop, how I pay, how often I shop.	3,5	1,9	3,5	2,9
I spend more money when I buy groceries online than when I buy groceries in a brick-and-mortar store.	2,7	2,3	3,1	2,7
I used to buy groceries online even before the COVID-19 pandemic.	2,6	3,5	1,3	2,4
If it wasn't for the COVID-19 pandemic, I wouldn't have tried online grocery shopping.	2,5	1,5	3,4	2,4
Nowadays, I buy groceries in brick-and-mortar stores less frequently than before the COVID-19 pandemic, I prefer buying them online.	3,5	1,7	1,2	2,0

4.3 Factors and Barriers Influencing Buyer Segments

In this subchapter factors and barriers influencing three newly created buyer segments are analysed. Respondents were asked to evaluate a total of 11 factors concerning online groceries shopping. For the evaluation of factor importance, a Likert scale from 1 to 5 was used (1 = unimportant, 5 = very important). Average values of importance of selected factors concerning online groceries shopping by buyer segments are visible in the Table 8.

For all the segments, freshness and quality of delivered groceries is the most important factor when shopping online. **New Occasional Buyers** evaluate all factors with highest marks, compared to other segments. They are the most demanding. They marked as very important

several factors: clarity of the e-shop website, reliability of the courier, store communication or prices of the products. Width of product range or option to choose delivery time are also important factors for these buyers. For **Permanent Buyers**, prices of products and store communication are also very important factors. Option to choose delivery time or courier behaviour are not that important factors for them as for other segments. **New Loyal Buyers** are characterized by the fact that they evaluate all the factors as less important than do other segments. Prices of products are least important for these buyers, as well as price of the delivery. They are no that demanding. They require freshness and quality, good store communication and clear website.

Tab. 8 – Average Values of Importance of Selected Factors Concerning Online Groceries Shopping by Buyer Segments. Source: Own research

	New Loyal Buyers	Permanent Buyers	New Occasional Buyers	Total
Freshness and quality of delivered groceries	4,6	4,9	5,0	4,8
Store communication (e.g., about the progress of an order, when having a complaint)	4,5	4,5	4,6	4,5
Clarity of the e-shop website	4,4	4,4	4,8	4,5
Reliability of the courier (e.g., delivery at the ordered time)	4,2	4,2	4,7	4,4
Prices of products	3,7	4,5	4,5	4,2
Width of product range	4,0	4,2	4,4	4,2
Simplicity of ordering	3,9	4,2	4,3	4,1
Option to choose the delivery time according to my own preferences	4,1	3,9	4,4	4,1
Price of delivery	3,8	4,2	4,3	4,1
Speed of delivery	3,8	3,9	4,3	4,0
Courier behaviour	3,8	3,3	3,8	3,6

Subsequently, respondents were asked to select which barriers they perceive to be the most significant when buying groceries online. In this case, they were allowed to choose up to three barriers. Perceived barriers of online grocery shopping by buyer segments are available in the Table 9.

The majority of **New Occasional Buyers** consider the inability to choose groceries themselves (to check freshness, quality or expiration) to be the most significant barrier when shopping for groceries online. A second biggest barrier marked by these buyers is that groceries are more expensive when ordering online than in brick-and-mortar stores. Followed by having to pay for the delivery. **Permanent Buyers** consider the difficulty to complaint about goods and request for payment in advance to be the biggest barriers. Inability to choose groceries themselves is a barrier for many of these buyers. But compared to other segments, this barrier was marked significantly fewer. They have no concerns about data misuse, none of them identified this possibility as a barrier. For most of **New Loyal Buyers** the biggest barrier is also inability to choose groceries by themselves. Other important barriers for this segment are difficulty to complaint about goods and the fact that not everything is available in the online store, so they must go to brick-and-mortar store. In comparison to other segments, many of these buyers marked unavailability of delivery to selected location to be a significant barrier.

Tab. 9 – Perceived Barriers of Online Grocery Shopping by Buyer Segments. Source: Own research

	New Loyal Buyers	Permanent Buyers	New Occasional Buyers	Total
Inability to choose groceries yourself, e.g., to check freshness, quality or expiration date	41,0%	28,8%	73,8%	46,6%
Difficult to complain about goods	33,3%	51,9%	14,3%	34,6%
Payment in advance required	15,4%	40,4%	16,7%	25,6%
Not everything I want to buy is available in the online store, so I have to go to a brick-and-mortar store	33,3%	23,1%	16,7%	24,1%
Groceries are more expensive when ordering online than in brick-and-mortar stores	15,4%	21,2%	35,7%	24,1%
Having to pay for delivery of the purchase	10,3%	19,2%	23,8%	18,0%
Unavailability of delivery to the selected location	30,8%	11,5%	9,5%	16,5%
Concern about misuse of personal data	10,3%	0,0%	14,3%	7,5%

5 DISCUSSION

Results of the research show that buyer behaviour on the online groceries market changed with the COVID-19 pandemic as respondents agreed with the statement that pandemic has influenced them to start buying groceries online. This finding is also confirmed by the fact that respondents more likely disagreed with the claim that they were used to buy groceries online even before pandemic. It can be stated that with pandemics individuals started to buy groceries online or they were buying them more intensively. In addition, according to the findings, when shopping for groceries online, respondents usually order for the amount by which they do not have to pay shipping and they rather buy larger quantities so that they do not have to order too often.

Key part of this article was creation of the buyer typology on the Czech online grocery market. Based on the attitudes toward the online groceries shopping with the influence of COVID-19 pandemic, three buyer segments were identified, namely "New Loyal Buyers", "Permanent Buyers" and "New Occasional Buyers".

Permanent Buyers were least influenced by the Covid-19 pandemic in terms of starting to buy groceries online, as they were ordering groceries via the internet even before the pandemics. Their buying behaviour was not affected by this period. In addition, they like to shop for groceries online. Prices of products and store communication are very important factors for them. For this segment, biggest barriers when purchasing groceries online are difficulty to complaint about goods and request for payment in advance.

New Loyal Buyers were strongly influenced by COVID-19 pandemics as they started to buy groceries online or were buying more frequently at that time, pandemic changed their shopping habits. Compared to other segments, they like to buy groceries online most and they now prefer to buy them online as they shop in brick-and-mortar stores less often. Prices of products are least important for these buyers, as well as price of the delivery. They require freshness, quality, good store communication and clear website. They consider the biggest barrier to be inability to choose groceries by themselves.

New Occasional Buyers were most effected by the COVID-19 pandemics in terms of online grocery shopping. Out of all segments, they were most influenced by the pandemic to start online grocery shopping. If it wasn't for the pandemics, they maybe would not have tried buying groceries online. This segment does not really like to buy groceries online. They usually buy larger quantities so that they do not have to order too often, and they tend to order for the amount by which they can get free shipping. They are the most demanding. They marked as very important several factors: clarity of the e-shop website, reliability of the courier, store communication or prices of the products. They consider the inability to choose groceries themselves and groceries being more expensive than in brick-and-mortar stores to be the most significant barriers when shopping for groceries online.

In contrast to other previously published studies, typology which was executed in this paper is specific because it is focuses directly on the influence of COVID-19 pandemic. To create typologies of shoppers on online groceries market, authors consider different perspectives, but some similarities are noticeable. Bauerová et al. (2023) also focused on creating typology of online groceries buyers on the Czech market. Segment of "New Loyal Buyers" can be compared to their segment "Satisfied Conditional Loyalists", as both segments significantly prefer online grocery shopping over the brick-and-mortar stores. Some similarities can be also found between "New Occasional Buyers" and "Loyal Traditionalists" both preferring traditional in-store shopping and recognize many barriers of online groceries purchases. Similar conclusions were reached by Brand et al. (2021), who defined five segments of online groceries shoppers. Mainly their segments "Intensive Urbanities" and "online Omnivores" are similar to "New Loyal Buyers" and "Permanent Buyer". As both being regular customers of online stores, they like the online option more as they see many benefits in it. In contrast they defined "Resisting and Responsible" segment which is very alike to "New Occasional Buyers". Both segments are reserved about online grocery shopping, use it rather sporadically and prefer to shop in brick-and-mortar stores. The online option brings many barriers for them, such as the inability to select products themselves, check the quality, or having to pay higher prices. Eriksson & Stenius (2021) defined segment of typical adapters of online grocery shopping due to the COVID-19 pandemics. According to their results, this segment value simplicity of ordering, wide product ranges to choose from and fast delivery. Similarly, "New Occasion Buyers" marked as very important factors clarity of the e-shop website, reliability of the courier, store communication or prices of the products.

This study has potential limitations, these are mostly connected with sample and selection bias. From the age perspective, the sample does not reflect the general population perfectly. Higher educated respondents prevail, the share of respondents with compulsory education and high school without diploma is lower than in general population in the Czech Republic. Additionally, there was no access to geographic scope of respondents, therefore it is possible they were not evenly distributed from the geographic point of view. Furthermore, the sample of respondents is not large enough to consider applying the results to the whole population. Another possible limitation can be based on lack of previous research studies that focus on buyer typology on the online groceries market when considering the influence of COVID-19 pandemic. Future research will be focused on overcoming these limitations and examining the typology of online groceries buyers more deeply and from other perspectives as well.

6   CONCLUSION

The aim of this article was to create a typology of online grocery buyers based on the influence of COVID-19 pandemics. Quantitative research was used for conducting primary data, which were obtained through an online questionnaire survey. A total of 266 respondents participated

in the research. Using the factor and cluster analysis, three buyer segments were identified: "New Loyal Buyers", "Permanent Buyers" and "New Occasional Buyers".

Results of the research show that buyer behaviour on the online groceries market changed with the COVID-19 pandemic. It has been confirmed that there are buyers that shopped for groceries online even before pandemic. But many individuals started to order groceries online for the first time with the pandemic. If it was not for this period, some of them would have not tried this option. The "new-commers" are divided into two segments, those who adapted the online groceries shopping and prefer this option over the regular brick-and-mortar stores. And those who tried online shopping but are ordering irregularly and preferring traditional in-store shopping as they can check the quality, freshness and can get lower prices of products. It is important that companies in this market focus especially on the "Occasional Buyers" segment, try to attract them and overcome their barriers. It is suggested to offer these buyers high quality products, better price offers, wide range of products and easy process of ordering.

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THE IMPACT OF MICROFINANCE FOR SUPPORTING REFUGEE ENTREPRENEURSHIP IN EUROPE: AN ECONOMIC AND SOCIAL DEVELOPMENT PERSPECTIVE

A K M Zakaria

Abstract

The main aim of this research paper is to analyse the effectiveness of microfinance in supporting refugee entrepreneurs in Europe. Refugees are often not economically strong enough in their host countries to start new businesses; they mostly depend on government funds. However, they aspire to become entrepreneurs to improve their economic conditions and reduce their dependency on government assistance. At the same time, it will enable them to contribute to the host country's economy. This paper focuses on the theoretical background of microfinance programs and their importance in poverty reduction. It reviews existing literature on microfinance programs and demonstrates how they could contribute to the host country's social and economic development. To create refugee entrepreneurs, the primary need is to provide financial support, but they often have limited access to the traditional banking system. Therefore, microfinance programs can be a viable solution to this problem. However, the main objective of this research is to determine if they are receiving sufficient support from microfinance institutes. In this research, secondary data collected from the European Microfinance Network Survey Report 2022 were used. This paper emphasizes job creation by providing more business loans than personal loans. According to secondary data, banks and NGOs are focusing on existing business development and job creation. In this research, we can see that MFIs have a great impact on creating new jobs, but unfortunately, they have less focus on refugee entrepreneurs. Nevertheless, this group has the potential to be a valuable target.

Keywords: *microfinance, refugee entrepreneurs, entrepreneurs, micro-credit, Grameen bank*

1 INTRODUCTION

Microfinance is a powerful tool for providing financial support to low-income entrepreneurs, especially in developing countries. It not only grants financial access to low-income entrepreneurs but also serves as an effective means to alleviate poverty within society. Low-income entrepreneurs often face difficulties in accessing traditional banking support due to their limited financial history. In this situation, microfinance can be one of the great ways to provide them with financial support to start their businesses. The Grameen Bank stands as a great example of a microfinance institution established in Bangladesh to support millions of small entrepreneurs in rural areas. Until November 2019, the Grameen Bank had 9.25 million members, the majority of whom were women, accounting for 97% of the total membership (Lamichhane, 2020).

At this moment, the refugee issue is one of the biggest challenges in Europe. In recent years, many refugees have arrived in Europe from different countries such as Syria, Lebanon, Afghanistan, and Ukraine. According to Caliendo et al. (2023), in 2022, during the Russia-Ukraine war, over 7 million refugees from Ukraine sought asylum in Europe, with more than 4 million of them being of working age and possessing varying skill sets. These refugees are geographically dispersed across the continent, with neighboring European countries experiencing the highest number of refugees on their territory.

Workforce overflow can be a problem for a country in the short run as it can decrease the return on investment due to low-wage labor and less efficient production. However, it can also increase the price index because of a huge number of refugees entering a country in a short period of time (Akgündüz, Van Den Berg, and Hassink, 2015). But if we consider the long run, this large workforce can be a blessing for a country, and the country will gain positive experience in economic development. After a few years, with proper training and education, they can become skilled workers; productivity will increase, and they will be more innovative in the competitive labor market. Some of them will even start their own small businesses after gaining proper industrial experience and knowledge. They will fulfill the lack of a skilled workforce and contribute to the national economy (Murard and Sakalli, 2020).

According to Hinz and Daub (2022), creating successful refugee entrepreneurs requires dedicated start-up incubator programs that will help create social and economic impact. Through these programs, refugee entrepreneurs can develop their entrepreneurship skills, such as language skills, business modeling, and communication skills. They can also address personal problems and build local networks (Freudenberg and Halberstadt, 2019; Nijhoff, 2021). Along with these challenges, refugee entrepreneurs commonly face financial problems because they are not eligible to obtain traditional bank loans due to their poor previous banking history. In this situation, microfinance can be a good solution to address this problem.

The main purpose of this research paper is to use microfinance as a tool to support refugee entrepreneurs in Europe. They are often isolated from the main community and lack the necessary resources to start their own businesses. The paper is structured as follows: Chapter one discusses the current situation of refugees in Europe and its short-run and long-run economic impact on the host country.

2   LITERATURE REVIEW

Microfinance has been widely recognized as an effective tool for poverty reduction and economic development, especially in developing countries. Its aim is to provide financial support to unemployed or low-income individuals or groups who want to start small businesses. Many micro-entrepreneurs face financial difficulties when attempting to start their own businesses because it is challenging for them to obtain financial support from traditional banks. Microfinance is comparatively more accessible than the traditional banking system and is more popular among entrepreneurs for obtaining loans to start small businesses. There are individual and group-based lending models, and among these models, one of the widely recognized group-based lending models is the Grameen model, established in Bangladesh by Nobel Laureate Professor Mohammad Yunus. The main objective of the Grameen Bank is to promote social and economic development in poor villages, especially among women. According to Chowdhury and Somani (2020), the primary focus of the Grameen Bank is to offer small loans to underprivileged individuals at low interest rates, without requiring any collateral. They also provide medium and large loans to trustworthy borrowers who have already repaid previous loans. Additionally, the Grameen Bank offers scholarships for the education of the children of its members. Hasan et al. (2019) demonstrate the positive impact of microfinance on women's empowerment in Bangladesh by conducting a survey among 100 women in Tangail.

2.1 Theoretical Framework for Understanding Microfinance

Microfinance is one of the financing modes whose aim is to provide financial services such as loans, savings, insurance, and remittances (Zainuddin & Yasin, 2020). They also provide non-financial support such as healthcare, education, food supplements, financial literacy, and business training. Microfinance is an effective way to reduce poverty and increase economic

development in low-income countries. However, microfinance alone is not enough to fight against poverty and empower the poorest people; it also requires some non-financial support to achieve its main goal (Sylvester, 2011). Microcredit is one of the fundamental branches of microfinance. Nowadays, it is a very popular funding method among small entrepreneurs and low-income individuals in some developing countries, including but not limited to Bangladesh, India, Indonesia, the Philippines, Sri Lanka, Thailand, Cambodia, Bolivia, and Brazil. The Grameen Bank microfinance model was introduced in China during the early to mid-1990s (Ma, 2020).

Microcredit was established in Bangladesh by Professor Mohammad Yunus in 1976. It became popular for providing small loans to very poor people, especially women in developing countries. However, microcredit programs started to be used in developed countries since the 2000s, especially in Mediterranean countries to address the 2008 economic crisis and the high unemployment problems. After the fall of the Berlin Wall, Central and Eastern European countries such as Poland, Romania, Bulgaria, and Slovakia began using microcredit programs to reduce unemployment problems and promote social inclusion (Morón Rodríguez, 2013).

2.2 Microfinance versus Economic and Social development

Microfinance has been known worldwide as a tool for the economic development of a country, especially in developing countries where small entrepreneurs have limited access to funds to start their businesses. By initiating new businesses, they improve their financial condition and create new jobs. So, microfinance is a financial institution that primarily supports the creation of new small entrepreneurs, and these entrepreneurs contribute to the economic development of a country. According to Okun's Law, when the unemployment rate decreases by 1%, the gross national product (GNP) increases by 3% (Khan, 2010, p. 46). Okun's gap version states that every 1% increase in the unemployment rate causes a 2% decrease in potential gross domestic product (Al-kasasbeh, 2022; Chamberlin, 2011).

The Business and Industry Advisory Committee to the Organization for Economic Cooperation and Development (OECD) stated in 2003, "Policies to foster entrepreneurship are essential for job creation and economic growth." Schumpeter (1934) wrote "The Theory of Economic Development," in which he demonstrated that entrepreneurs play a crucial role in economic development. Entrepreneurial activities and small to medium-sized businesses (SMEs) have been critical to the development of many developed economies and have consistently shown significant potential for economic growth (Afolab, 2015). But a question has arisen - how to measure this development? The Theory of Change (ToC) describes how the expected changes were anticipated and how changes have occurred (Mayne, 2017).

Unfortunately, Theory of Change (ToCs) is not a widely used method to measure development. It provides us with a roadmap for implementing our projects by outlining the underlying assumptions, strategies, and activities expected to lead to desired outcomes.

Inputs		Activities		Outputs		Outcomes		Impact
Financial resources		Outreach and identification		Trained entrepreneurs		Increased entrepreneurship		Long-term self-sufficiency
Expertise and support		Training and capacity building		Microfinance loans disbursed		Income generation		Empowerment and resilience
Infrastructure	>	Access to microfinance	>	Mentoring relationships established	>	Employment creation	>	Reduced dependency
		Mentor ship and coaching		Business networks established		Poverty alleviation		
		Networking and market linkages				Social integration		

Fig. 1 – MF impact on refugee entrepreneurs in Europe. Source: own research

Microfinance can be considered an effective tool for promoting the social development of refugees in Europe. Refugees are often regarded as a minority group in their host countries. They typically receive fewer facilities and rely on financial aid. In some cases, they may face neglect from the broader community and encounter social discrimination and barriers. Microfinance programs can support refugee entrepreneurs by providing seed capital for their small businesses. With their own small businesses, they can generate extra income, which can help them become more self-sufficient and reduce their dependency on financial aid, ultimately leading to an improved standard of living. The common objectives of microfinance institutions (MFIs) include poverty reduction, gender empowerment, fostering economic growth, promoting social inclusion, and achieving social development (De Koker and Jentzsch, 2013).

In Bangladesh, the Grameen Bank's microcredit program serves as a great example of social development through microfinance. Millions of impoverished families have received microloans and started their small businesses, with a particular focus on empowering women. After launching their small businesses, these disadvantaged women began contributing to their family's expenses and improved their living standards. According to Chowdhury and Somani (2020), in 1997, Grameen Bank initiated a project called the Village Phone Program, through which Grameen Bank, in collaboration with Grameenphone, provided mobile phones to impoverished women in rural villages.

2.3 Impact of Microfinance on Poverty Reduction

Microfinance has a positive impact on reducing poverty. It is well-known for providing financial support to poor people who are unable to provide collateral, especially in developing countries. Microfinance organizations can enhance their capabilities by applying a low-interest rate on the loans they provide, enabling them to strengthen their capacity. According to Brannen (2010), microfinance has a significant impact on reducing poverty, advancing children's education, improving health outcomes for women and children, and empowering women.

Imtiaz et al. (2014) demonstrated the positive impact of microfinance in reducing poverty through their research. They collected data from 200 clients, which constituted 15% of the total clients of Khushhali Bank Ltd, Faisalabad. In their study, they employed the Foster-Greer-Thorbecke (FGT) technique to analyze the impact of microloans on poverty reduction. The research assessed the poverty levels of these 200 clients before and after receiving the loans. After conducting the calculations, they discovered a positive impact of microfinance in reducing poverty in Pakistan.

2.4 Microfinance and Refugee Entrepreneurship in Europe

In recent years, especially after the Russia-Ukraine war, the European Union has received many Ukrainian refugees in EU countries. Some of them possess skills, while others are non-skilled individuals, including children, seniors, and women. The Global Entrepreneurship Monitor revealed that men are twice as likely as women to engage in entrepreneurial activities (Vlerick Leuven Gent Management School, 2005, as cited in Wauters and Lambrecht, 2006). Some of these refugees have a business mentality and previous experience in Ukraine. Additionally, there are many refugees from Syria, Iraq, and Afghanistan who have been residing in various European Union countries for an extended period, relying on government funds for support. While government assistance is essential for their living expenses, many of these adults are capable of contributing to the labor market of the host countries. By engaging in work and business activities, they can achieve a better quality of life and also support the national economy of their host countries.

Many immigrant people have the mindset to start their own businesses because they seek greater economic and social success. At the same time, they aspire to create new jobs and serve their own community. The economic opportunities model suggests that ethnic entrepreneurs cater to the specific demands and requirements of their ethnic community by providing specialized products or services tailored to that particular group. The entrepreneurial model, also referred to as the theory of the entrepreneurship instinct, proposes that certain immigrants, similar to individuals in Belgium, are attracted to the benefits of self-employment, such as independence, self-fulfillment, and other advantages associated with being one's own boss. As a result, they aspire to pursue self-employment opportunities (Wauters and Lambrecht, 2006).

However, starting a new business is not easy for them, particularly for refugee entrepreneurs, as they face numerous difficulties in new countries. These challenges include a lack of funds, required documents, and language barriers. Additionally, they do not have easy access to obtaining financial support from traditional banks. In this scenario, microfinance can play a crucial role in providing them with financial support to start their own businesses in Europe. Consequently, the host country stands to benefit from this large number of people. Refugees will become less reliant on government support, reducing government expenditure on refugees. Simultaneously, refugee individuals can enjoy an improved lifestyle, contribute through taxes and value-added tax (VAT), and not only help themselves but also contribute to the betterment of their own community.

According to Wauters and Lambrecht (2006), an initial survey questioned newcomers about their willingness to pursue entrepreneurship in their host society. The study revealed a substantial proportion of refugees who expressed a strong interest in venturing into entrepreneurship.

Tab.1 - Do you consider to start ever as a self-employed person in Belgium. Source: Wauters and Lambrecht (2006, p.515)

	Refugees (N=223)		Immigrants (N=189)	
	%	Cumulative %	%	Cumulative %
Definitely	18.83	18.83	16.93	16.93
Probably	17.49	36.22	6.88	23.81
Maybe	38.12	74.44	46.56	70.37
Rather not	14.35	88.79	16.40	86.77
Definitely not	11.21	100.00	13.23	100.00

Table 1 shows that only 25% of the refugees indicated that they were not inclined or definitively uninterested in exploring this option. Almost 19% of refugees show a very strong interest in being self-employed in Belgium, which is even higher than the percentage for other immigrants, which is almost 17%. More than half of the refugees said 'probably' or 'maybe,' totaling 55.61%. They are interested in being self-employed if they get a better chance or support from the government. Among other immigrants, these two categories total 53.44%, which is 2.17% less than the percentage for refugees immigrants. The author omitted the 'don't know' and 'no answer' categories from the above-mentioned table.

3   METHODOLOGY

Europe is considered to have both Eastern and Western regions. This paper presents a secondary data analysis of microfinance programs in Western and Eastern European countries. The data were collected from the European Microfinance Network Survey Report 2022. This dataset from the European Microfinance Network covers 30 European countries and 156 microfinance institutes. The purpose of this study is to demonstrate the social and economic contributions of microfinance institutes in the Europe. Microfinance institutions operate their services in both areas, but in one part, banks are more active, and in the other part, NGOs are more active, although they have differences in interest rates. After analyzing this secondary data, we will gain insights into the social and economic contributions of MFIs.

Following a comprehensive literature review in Chapter 2, the main research question for this study emerged as follows: What is the impact of refugee entrepreneurs on the host country's economy, and how much support are they receiving from microfinance institutes to improve their economic conditions?

4   RESULTS

The European Microfinance Network Survey Report 2022 presents the activities and contributions of microfinance institutes, but it divides them into East and West Europe. There are many banks, cooperatives, NBFI (Non-Bank Financial Institutions), and NGOs providing their financial services to refugees and other customers. They are having a positive financial impact on society, especially for the poor and unemployed people, they are a blessing. We analyze how they are supporting poor people, especially immigrant and refugee communities, in achieving a better life.

Tab. 2 - Growth rates of the number of active micro-borrowers between 2020 and 2021. Source: Pytkowska

(2023, p.27)

		2020-2021 growth N=69	
		Business Loans	Personal Loans
Institutional type	All MFIs	5%	8%
	Bank	n/a	n/a
	Coop	2%	1%
	NBFI	-0.3%	9%
	NGO	16%	11%
Region	East	7.7%	8.2%
	West	3%	9%

In Table 2, we can observe the growth rates of active micro borrowers between 2020 and 2021. Personal loans increased by 8% in 2021, while the growth rate for business loans was 5%. This indicates that people are more inclined to borrow from MFIs to meet their personal needs. For

NBFI, the growth rate of business loans is negative at -0.3%, but the growth rate for personal loans is 9% in 2021. NGOs increased their business loans more than personal loans, with rates of 16% and 11%, respectively. When comparing East and West Europe, we can see that in both parts, the number of personal loan recipients increased. However, in the Western part, it is higher, and the difference between the growth rates of personal and business loans is significant.
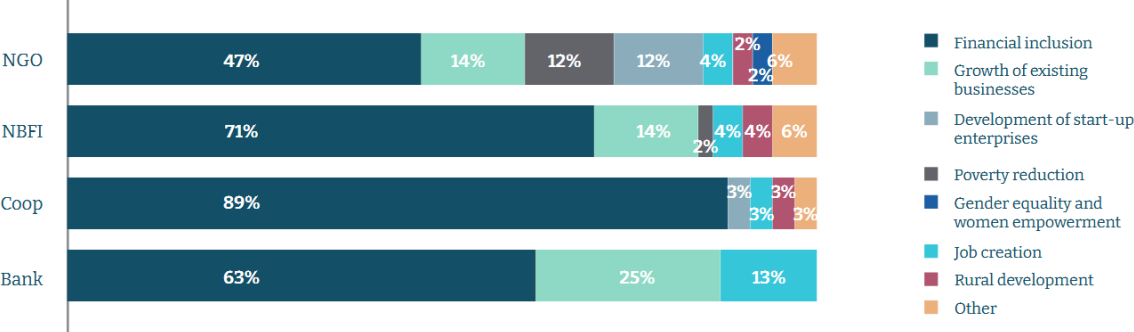

Fig.2 - Distribution of MFIs by institutional type and the primary goal of operations (N=145). Source: Source: Pytkowska (2023, p.29)

The bar chart above shows that most of the microfinance institutes share the same goal, which is financial inclusion. Approximately 89% of cooperatives have financial inclusion as their primary objective. However, Banks, NGOs, and NBFI also prioritize the growth of existing businesses and job creation. For Banks, 25% of them primarily aim for the growth of existing businesses, and they do not focus on poverty reduction, rural development, or women's empowerment. In contrast, NGOs are deeply concerned with these factors.
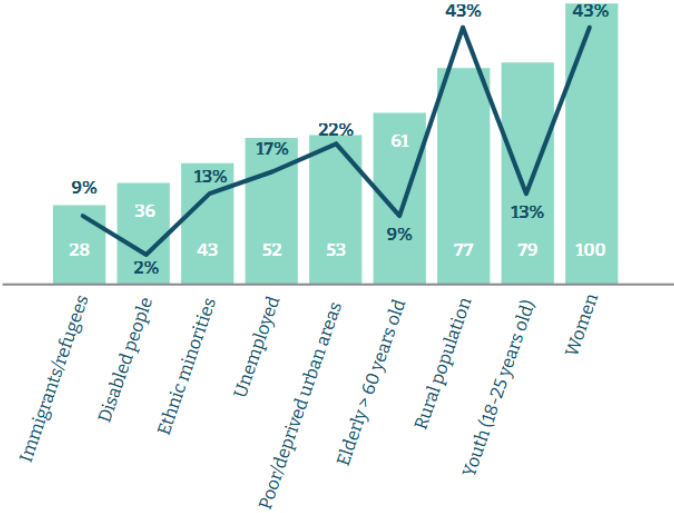

Fig. 3 - Target groups (N=109 MFIs; N=78 MFIs providing # of borrowers by target group). Source: Pytkowska (2023, p.31)

Women are the most frequently targeted group, making up almost half of the borrowers at 43%. The second target group for microfinance institutes is young people aged 18-25. MFIs have a very limited focus on refugees and immigrants. Only 28 MFIs target refugees and immigrants, even though they constitute 9% of all borrowers. This bar chart illustrates that European MFIs are not primarily aiming to serve refugees and immigrants; instead, they primarily target women, young people, and rural populations.
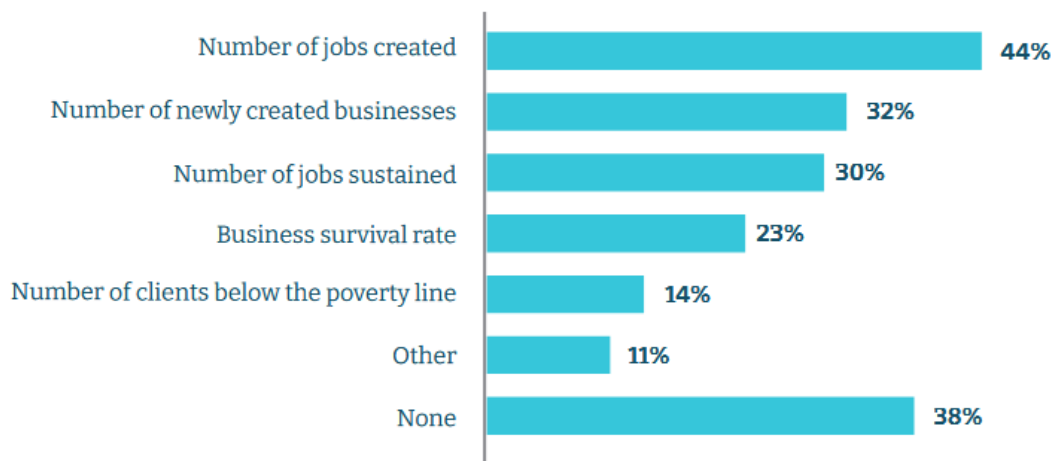
Fig. 4 - Distribution of MFIs by engagement in impact measurement (N=104). Source: Pytkowska (2023, p.33)

When we consider the impact of microfinance in Europe, the chart above allows us to visualize and measure its effects. It shows that 44% of MFIs' clients have improved their situations by creating jobs, which is almost half of the total clients. Additionally, there has been an increase in the number of businesses created for start-up clients (32%) as well as the number of sustained jobs (30%). Furthermore, only 14% of clients live below the poverty line. It is clear that microfinance institutes have a significantly positive impact on their clients' overall quality of life.

5   DISCUSSION

After analyzing this data, it is evident that microfinance institutes can support impoverished individuals in improving their living standards, contributing significantly to societal development. However, MFIs do not appear to prioritize refugee entrepreneurs when it comes to starting their businesses. Within their target groups, women and young people still remain at the top of the list. Nevertheless, refugee entrepreneurs could represent another crucial target group.

Currently, due to growing client demand, most MFIs are offering more personal loans compared to business loans. In the long term, when new businesses are established, they have a more positive impact on society by creating new jobs. While personal loans can provide immediate benefits, such as an improved lifestyle or meeting immediate needs, they do not yield long-term benefits. For instance, in Bangladesh, many MFIs provide micro-credit to the poor population, with the majority of loans intended for opening small businesses or creating a sustainable source of income. Consequently, MFIs achieve favorable results in terms of loan repayment, with very high repayment rates. Managing loan repayment is one of the biggest challenges for microfinance institutes.

Microfinance institutes play a vital role in transforming the lives of impoverished people, but there is also a significant opportunity for MFIs to provide more support to refugee entrepreneurs. The number of refugees in Europe is increasing day by day, and they require assistance in starting their businesses and reducing their dependency on government aid. While serving refugees presents certain challenges, there are substantial possibilities for microfinance institutes. MFIs can offer increased support to refugee entrepreneurs, thereby creating new jobs and fostering sustainable economic and social development.

6   CONCLUSION

Entrepreneurs can play a pivotal role in driving economic growth. All entrepreneurs are considered determined individuals who strive to achieve their goals. They not only bring financial stability to their families but also contribute to their society, region, local community, state, and nation.

Refugees face certain limitations. Starting a small business is more challenging for them compared to local residents due to their legal residency status, isolation from the local community, and limited financial resources. However, they possess entrepreneurial spirit and a strong desire to start businesses promptly. They also grapple with language and cultural barriers and often lack access to mentors. In some cases, they may also have limited financial knowledge. Nevertheless, the primary obstacle to their business aspirations is a lack of financial resources. Microfinance institutes can address this challenge by providing microloans to initiate small businesses. An important advantage is that they do not require collateral or a good credit history, which traditional banks often demand from their clients.

Refugee entrepreneurs can create new job opportunities for their communities and others in the host country, thereby contributing to the reduction of unemployment issues in society. This leads to increased financial stability and improved quality of life within their communities. Moreover, the growth of employment and gross domestic product (GDP) are positively interconnected. Simultaneously, refugee entrepreneurs require financial support to initiate their businesses, and Microfinance Institutions (MFIs) can assist them in this regard.

Refugee entrepreneurs can foster a more conducive business environment and inspire others to embark on entrepreneurial journeys. Some will enter the market, some may face setbacks and exit, but this process creates a competitive marketplace. The dynamics of entry, exit, and changing market shares enhance productivity and contribute to economic growth. Entrepreneurs are known for taking risks and introducing innovative ideas into their businesses. They also play a crucial role in transforming non-competitive markets into competitive ones.

Microfinance institutes can serve as a valuable financial resource for refugee entrepreneurs to kickstart their new businesses. They enable the emergence of new entrepreneurs, helping them increase their earnings, reduce their reliance on government funds, enjoy better lifestyles, empower refugee women, and engage with local communities.

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