Sustainability Reporting and the Use of KPIs in Sustainability Performance: A Study in German Large Listed Firms

Nguyen Thi Thuc Doan, Ph.D.

Doctoral Thesis Summary

Tomas Bata University in Zlín

Tomas Bata University in Zlín
Faculty of Management and Economics

Doctoral Thesis Summary

Sustainability Reporting and the Use of KPIs in Sustainability Performance: A Study in German Large Listed Firms

Výkaznictví a použití KPI v oblasti udržitelnosti: Studie velkých německých firem

Author: **Nguyen Thi Thuc Doan, Ph.D.**

Degree programme: P6202 Economic Policy and Administration

Degree course: 6202V010 Finance

Supervisor: prof. Ing. Boris Popesko, Ph.D.

External examiners: doc. Ing. Jaroslav Wágner, Ph.D.

prof. Ing. Rastislav Rajnoha, PhD.

Zlín, November, 2020

Key words: *sustainability reporting, corporate governance, firm value, key sustainability performance indicators (KSPIs).*

Klíčová slova: *podávání zpráv o udržitelnosti, řízení společností, pevná hodnota, klíčové ukazatele výkonnosti udržitelnosti (KSPIs).*

Full text of the Doctoral thesis is available in the Library of TBU in Zlín.

ABSTRACT

The requirement of transparent and accountable sustainability reporting has currently appeared as one of the most remarkable issues in business and among stakeholders. Therefore, the main aims of this dissertation consist of examining the impacts of sustainability reporting on firm value, investigating factors that affect firm's compliance in disclosing sustainability performance, and proposing KSPIs in specific industries and developing roadmap for implementation of these indicators. By using quantitative method, outcomes from the research partly confirmed the significant positive relationship between firm value and sustainability disclosure. With the same research method, sustainability disclosure has been found insignificant connection with all variables in board of directors' characteristics; however, it reveals significant positive links with firm size, firm age, and external assurance of sustainability reports. By combining quantitative and qualitative methods, proposed KSPIs which include economic, environmental, and social indicators are determined for automotive and financial services sectors. Furthermore, a roadmap for implementing KPIs for sustainability performance has been developed which comprise internal and external successful factors for implementation process. The dissertation results provide significant insights for German large listed firms and stakeholders to integrate sustainability reporting in their management, investment, and valuation decisions. The research also raises the awareness of management in these automotive and financial services industry on the use of KSPIs of other firms in the sector. Furthermore, findings from the dissertation contribute to the academic literatures on the association between sustainability disclosure and firm value as well as impacted factors, and on the use of KSPIs in large listed firms in automotive and financial services sectors.

ABSTRAKT

Požadavek transparentního a odpovědného podávání zpráv o udržitelnosti se v současné době jeví jako jeden z nejpozoruhodnějších problémů v podnikání a mezi zúčastněnými stranami. Proto hlavní cíle této disertační práce spočívají ve zkoumání dopadů podávání zpráv o udržitelnosti na hodnotu firmy, zkoumání faktorů, které ovlivňují dodržování předpisů při zveřejňování výsledků v oblasti udržitelnosti, a navrhování KSPI ve specifických průmyslových odvětvích a vypracování plánu implementace těchto indikátorů. Stejnou metodou výzkumu bylo shledáno, že zveřejňování informací o udržitelnosti má nevýznamnou souvislost se všemi proměnnými ve vlastnostech představenstva; odhaluje však významné pozitivní vazby na velikost firmy, stáří firmy a externí zajištění zpráv o udržitelnosti. Kombinací kvantitativních a kvalitativních metod jsou určeny navrhované KSPIs, které zahrnují ekonomické, environmentální a sociální ukazatele pro odvětví automobilových a finančních služeb. Dále byl vyvinut plán implementace KPI pro výkon udržitelnosti, který zahrnuje interní a externí úspěšné faktory procesu implementace. Výsledky disertační práce poskytují německým velkým společnostem a zúčastněným stranám významný pohled na integraci zpráv o udržitelnosti do jejich rozhodnutí o řízení, investicích a oceňování. Výzkum také zvyšuje povědomí managementu v tomto automobilovém a finančním odvětví o využívání KSPI jiných firem v tomto odvětví. Zjištění z disertační práce dále přispívají k akademickým literaturám o souvislostech mezi zveřejněním udržitelnosti a hodnotou firmy, jakož i ovlivněných faktorech a o využití KSPI ve velkých společnostech kótovaných na burze v automobilovém a finančním sektoru.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

1.1 Background of the study

Sustainability reporting has been considered as an important reporting topic for firms over the past decades. If a sustainability report achieves the transparency and accountability, whether being published independently or in annual financial reports, it can help firms measure and communicate the impact of their economic, environmental, social, and governance performance. Thereby, they can reinforce the trust of stakeholders on the corporate activities and performance. At the same time, this report can also be a tool to promote the firms' awareness toward their business risks and opportunities, then to be able to adjust into more proper operation and management strategies (Aktas, Kayalidere and Kargin, 2013). Due to the vital role of sustainability reporting, this dissertation aims are to further investigate the impact of sustainability reporting on firms and what factors may impact on sustainability disclosures. Another issue regarding sustainability performance is the need in determining key performance indicators (KPIs). To meet this need, determination of appropriate set of KPIs for sustainability and development KPIs implementation processes are the other purposes of this dissertation.

The thesis expects to contribute in both theoretical and practical perspectives. Initially this research is expected to provide further literature reviews for influence of sustainability reporting on firm value, and factors impacted to transparency of sustainability reporting. Aside theoretical contribution, results of investigating the impact of sustainability reporting on firm value is desired to can enhance firm stakeholders' perception on the advantages of sustainability reporting. Moreover, the findings in influenced factors to sustainability report disclosures can provide appropriate recommendation for key successful factors when preparing sustainability report according to GRI. Lastly, observed cases of German listed firm complying with GRI extend the literatures in sustainability performance indicators and key performance indicators using in sustainability activities. Moreover, the research can contribute by introduce valued approaches and framework concerning implementation process of sustainable performance measures for sustainability performance.

This thesis is structured into eight parts. The first section raises the research gaps which are reasons for performing the whole study. Section two summarizes literatures relating to the research issues, which then become sources for research design and hypotheses development in the following section. Section four provides the description of methodologies that are applied to solve research questions. Subsequently, results of investigating the impact of sustainability reporting on firm value; the influenced factors of sustainability report's transparency, and findings and analysis relating to KSPIs are shown and discussed in section five. Then, summaries, contributions and implications for theory and practice are revealed in the sixth section which is also the conclusion part.

2. LITERATURE REVIEWS

2.1 Overview of Sustainability Reporting

2.1.1 Definition and research field of sustainability reporting

Sustainability reporting is well defined by Global Reporting Initiative. Sustainability can be described as the ability that firms achieve their current needs without compromising future generations' ability to obtain their needs. Align with this approach, GRI (2017) defines that sustainability reporting is a process of supporting organizations in determining, comprehending, and communicating their economic, environmental, social, and governance performance which in turn helps organization in setting appropriate goals and managing change more efficiently. Relevant field for sustainability reporting according to this thesis focus is accounting. Sustainability accounting aims is generating reliable data and information for corporate sustainability decision-making by internal measuring firm sustainability performance. As sustainability reporting provides firm sustainability information for internal and external stakeholder, this can be considered as one of the communication tools for sustainability accounting.

2.1.2 Sustainability reporting historical background and regulations

Sustainability reporting has transformed significant during its development since 1960s. Awareness of non-financial information started around 1960s and 1970s both in the USA and Europe. Organisations at this time just focused on social information and prepared 'social balance sheets' (Fifka, 2015). During the 1980s, new investment approach, which was introduced by the UK and the US, concentrated not only on firm social but also firm ethical performance. In 1997, CERES and the United Nations Environment Program (UNEP) introduced the Global Reporting Initiative (GRI) which is currently a well-known guideline of sustainability reporting. Along with the development of sustainability reporting, regulations relating to it also have considerable growths. At first, the regulations focused on environmental disclosures, then on social and employee subjects. Beside these concerns, the later regulations cover most of the current issues of sustainability reports including human rights, diversity, and anticorruption. Instruments of sustainability reporting consist of standards, principles, guidelines, and methods. The most popular guidelines for firms include Global Reporting Initiatives (GRI), OECD guidelines, United Nations Global Compact (UNGC), ISO 26000, UN guidelines for business and human rights, International Integrated Council (IIRC). As this research focuses on German large listed firm, Directive 2014/95/EU, on non-financial information cannot be neglected. Directive 2014/95/EU can be called non-financial information directive which requires large companies to disclose non-financial and diversity information from 2018 forwards. Before this Directive, Germany did not require firms to mandatory report non-financial information.

2.2   Research on Sustainability Reporting

2.2.1 Impact of sustainability reporting on firm

Even though sustainable reporting has become compulsory in many countries, impact of sustainability application on firm value is still diverse. According to Ioannou and Serafeim (2014), firm value can be positively associated with sustainability disclosure driven by rule. With increases in mandatory sustainability reporting, investors are more likely to favour firms with better sustainability reporting when making investing decision (Cormier et al., 2009). Therefore, it can be argued that greater sustainability disclosure tend to have favourable impact on firm value. Along with favourable influences, Wu et al. (2010) discover the negative relation between environmental disclosures and firm performance and Qiu et al. (2016) find no connection between these two variables.

For Germany, earlier research on the influence of sustainability reporting on firm value is also investigated. Cormier and Magnan (2007) inspect the association between environmental reporting and firm value in Canada, France, and German. The authors observe 337 firms and use cost of equity as a representative of firm value. While no significant results are found in French and Canadian firms, environmental reporting is proved to reduce German firm costs of capital. The result implies that social and political environment in Germany makes environmental issues considerable impact on firm value. Verbeeten et al. (2016) carry a research on this association for 130 German firms in four years and find that different types of disclosed information have different impacts on firm value. While social disclosure has favourable influence on firm shares, environmental information reveals no connection with firm value (Verbeeten et al., 2016).

2.2.2 Sustainability disclosure and factors that influence firms' sustainability disclosure

This research initially focuses on features of board of directors, which are considered as key element of a successful and effective board. Research on board of directors characteristics and sustainability reporting have also been done previously and the association between them consist of positive, negative, and no connection. Choosing board characteristics in this research comprise board size, board independence, board gender diversity, board subcommittees, and board meetings. Supporter for the association between these board features and sustainability disclosure affirm that large board is likely to consist of experts from different fields which in turn can contribute to sustainability activities and reporting in broader angels and more diverse approaches (Giannarakis, 2014). As for independent directors, they can be more objective in assessing firm performance as they are self-sufficient from firm procedures (de Villiers et al., 2011). Female members meanwhile care more about social and ethical focus and are less self-centred than male directors (Liao et al., 2016). Moreover, when sustainability tasks are proper supervised by subcommittees, board of directors are able to better evaluate performance of management in these

tasks, so that information asymmetry tend to decrease in sustainability reporting (Berrone and Gomez-Mejia, 2009). Lastly, more sharing and disclosed information, more efficient allocated workload, proper management performance control, and greater perception from stakeholders can be seen as advantages of regular board meetings (Laksmana, 2008). For opponents, they state that large board tends to have more argument which leads to inconsistency and unsuccessful harmonization in decision making and communication (Said et al., 2009). Independent directors in the meantime are unfamiliar with company performances (Ozkan, 2006, Guest 2008). In addition, a number of female members in board of directors have insufficient knowledge and experience to effectively participate in board. Finally, there is a possibility that regular meetings are just a split of the agenda without adding more sustainability issues that need to be addressed (Dienes and Velte, 2016)

The next group of factors is firm features such as firm size, firm age, firm profitability, and firm industry also influence the disclosure of firm's sustainability performance. Both financial and non-financial information are demanded by investors in making investing decisions (Arnold et al., 2012). The association between these firm's features and sustainability reporting consist of positive, negative, and no impact results in previous research. As for firm industry, reviews on the impact of this firm factor on sustainability reporting are presented different from the other mentioned factors. This is because industry is usually divided to sensitive and friendly to environment groups, so that the research is carried out to investigating the influence of each industry type on nonfinancial disclosure. In addition, Kolk (2003) finds the difference in sustainability disclosure in diverse firm industries such as manufactures or services. Significant positive association can be found between sensitive environmental industries and sustainability reporting (Nikolaou and Tsalis, 2013). Along with significant influences of industries types on sustainability reporting, insignificant impacts are found by Larran and Giner (2002).

The last factor that is observed in the research is external assurance status of sustainability report. Simnett et al., 2009 find a significant positive association between sustainability report quality and external assurance of the report. The higher quality is achieved when sustainability report is audited by Big Four audit firms (Simnett et al., 2009). However, the decision of using external assurance also depends on the cost-benefit approach. According to Braam and Peeters (2018), due to current spread of sustainability reporting assurance practice, relationships between external assurance and credibility of sustainability reporting are not fully confirmed.

In Germany, previous studies also discover the relationship between sustainability reporting with board of directors and firm features. Impacts of board of directors on sustainability reporting have been studied by Dienes and Velte (2016). The authors just find significant positive association between gender diversity and CSR reporting. Influences of firm characteristics are examined by Gamerschlag et al. (2010) who indicate that firm profitability is favourably associated with environmental disclosure, and firm size has positive effect on CSR information disclosure. Gamerschlag et al. (2010) examine 470 big listed German firms from 2005 to 2008 and find that

companies in sensitive environmental sectors like consumer and energy supplying provide more environmental disclosure than the services sector.

2.3 Key Performance Indicators (KPIs) and Sustainability Activities

2.3.1 The need of sustainability performance indicators

The need of sustainability performance indicators have been illustrated in previous research. Sustainability performance indicators can be used to discover the intensity of firm's implemented practices in supporting firms in sustainability activities (Kravchenko et al., 2019). In addition, assessing sustainability performance by using indicators can support in processing complicated information for meaningful understanding (Waas et al., 2014). Sustainability performance can be classified into lagging and leading indicators. While lagging indicators referred evaluating past sustainability performance, leading ones focus on assessing proposed activities. Lagging indicators can be seen as a superior proxy for corrective activities. Meanwhile, leading indicators can be used as recommendation for adjusting and improving solutions.

2.3.2 Research on key performance indicators of sustainability activities

Research on key sustainability performance indicators (KSPIs) is usually performed for specific industries. Kylili et al. (2016) review the use of KSPIs in building renovation to investigate the sustainability of built environment of previous studies. In the review, KSPIs are classified into eight categories including economic, environmental, social, technological, time, quality, disputes, and project administration which then link to detail indicators in each category. However, these detail indicators are inconsistent in definitions, methodology approach, and standards or regulations' compliance. Therefore, further research on these issues need to perform to generate harmonized more suitable well-defined key performance indicators for both national and international building practices (Kylili et al., 2016). Another study of KSPIs in carbon fiber recycling sector is carried out by Pillain et al. (2017). The authors' purpose is to identify and combine indicators that can be able to evaluate sustainability performance of this sector. By separately reviewing previous studies on environmental and socio-economic aspects, Pillain et al. (2017) discover three indicators consisting of global warming, human toxicity, and acidification in environmental aspect, and two resources influence indicators including supply risk due to geographical resources shortage and possible supply interruption due to geopolitical and other social factors in socio-economic aspect. For combining indicators, the authors concentrate on the combination of Material Flow Analysis and Life Cycle Assessment in previous reviews. Nevertheless, this focus reveals the need of further research in developing new KSPIs for evaluating the criticality of carbon fibers and socio-economic perspectives by implementing different combination methods (Pillain et al., 2017). Identifying KSPIs for oil and gas sector and cement industry are also carried by Elhuni and Ahmad (2017) respectively. These authors use

same method of Analytical Hierarchy Process to identify set of KPIs for sustainability performance. The KSPIs are also determined based on triple bottom line approach which includes economic, environmental and social indicators. The research has practical contribution by delivering recommendations and orientations for firms in the sectors to improve its sustainability performance, especially in environmental and social perspectives, then enhance firms' competitiveness (Elhuni and Ahmad, 2017).

2.4 Sustainability Reporting and Global Reporting Initiative (GRI)

Impact of GRI adoption on firm value has been examined in previous research. Kuzey and Uyar (2017) consider impact of sustainability reporting in accordance with GRI on firm value of 297 listed Turkish firms. Dummy variable has been applied to indicate whether firm applied GRI in reporting sustainability activities or not, and Tobin Q is represented for firm value. The research outcome reveals a positive connection between GRI-based sustainability reporting and firm value. This finding is consistent with previous studies in Australian market (Bachoo et al., 2013), and in Canadian market (Berthelot et al., 2012). Along with improving value, GRI-based sustainability reporting also reduces information asymmetry between management and shareholders. In another research on the association between sustainability disclosure and firm value in comparison between family and non-family companies in France, Nekhili et al. (2017) quantify CSR reporting by creating a content analysis index derived from items that are described in French Grenelle II Act consistent with GRI standards. Based on profound reviews, the authors propose that market value of sustainability reporting in family companies is likely to be higher than in nonfamily companies. The study result is in favour of the hypothesis which means family firm value is higher when reporting sustainability performance.

Factors that may influence firm compliance with GRI have been investigated in many studies. Fuente et al. (2017) examine the effect of board of directors on the sustainability reporting disclosures for 98 Spanish firms from 2004 to 2010. The authors base on firm adherence to GRI to indicate the level of reporting transparency. A range of CSR transparency index from 0 to 12 have been identify base on whether firm applies GRI or not, on which GRI adherent level firm achieves, and on whether sustainability report has external assurance (Fuente et al., 2017). After tested association between the CSR transparency indexes with board of directors' features including board independence, board size, board diversity, board subcommittees, and board activities, the research find significant connection between sustainability reporting disclosure with the independence, diversity, and specific committees of the board (Fuente et al., 2017). Other influential factors on firm adherence to GRI also consist of firm size, firm leverage, profitability, share structure, and industry. Legendre and Coderre (2013) discover that bigger firms tend to highly adopt international standard like GRI in reporting sustainability performance due to stakeholder pressure and firm operation legitimacy. Meanwhile, firm leverage and profitability have no impact on implementation GRI in disclosing CSR information (Fuente et al., 2017), or firm profitability just has positive influence on one aspect of

CSR, the environmental transparency (Gamerschlag et al., 2010). On the other hand, Legendre and Coderre (2013) prove that sustainability report in accordance with GRI standard is favourable associated with firm profitability. Regarding to industry factor, its effect in sustainability disclosure using GRI indicators is investigated by Nikolaou and Tsalis (2013) who confirm food and beverages and telecommunication sectors use more GRI indicators in their sustainability balance score cards than other economic-concentrated sectors.

The use of GRI in determining appropriate KPIs of sustainability performance are revealed in prior studies. Mertens et al. (2012) examine the use of KSPIs by fifty largest listed Dutch firms based on firms' disclosure practices. The uses of KSPIs of these fifty firms are compared based on a checklist of criteria which are identified from popular guidelines and frameworks such as GRI and the Dutch Accounting Standards Board RJ 400 standard. The checklist comprises forty six disclosure items in six categories including general, financial, employee, ethics, environmental, and other. Align in the checklist, the authors can analyse disclosed sustainability information and collect consistent information for further evaluation. Then, survey through online questionnaire and interview are performed to generate more detail information about the decision referring to the sustainability reporting. Regarding to current disclosure practices about seventy percent firms using GRI standards, and the same percentage also refers to number of firms having KSPIs on year-to-year comparison. In addition, the results reveal that sustainability report in accordance with GRI has high intention in using external assurance. Analysing the association between the link of sustainability to corporate strategy and the use of GRI and KSPIs, the research finds that if this link exists it is more likely that the firm applies GRI guidance and has KSPIs. Referring to the commitment of board of directors to sustainability, if the commitment exists in form of board of directors' statement in supervisory board report, the use of GRI and KSPIs in firm tends to increase. Lastly, investigation of firm characteristics on sustainability disclosure indicates that environmental sensitive sectors such as basic materials, consumer goods, oil and gas, and telecommunication have higher intention in applying GRI and using KSPIs. Furthermore, larger firms prefer implementing GRIs and KSPIs. Based on previous assessment, the authors recommend on promoting the use of KSPIs through regulation, a "comply-or-explain" system, or firm sectors' scheme.

2.5   Theoretical Reviews

Theoretical reviews are performed focussing on four main topics: sustainability reporting, firm value, corporate governance, and KSPIs. Stakeholder theory, legitimacy theory, and neo-institutional theory are considered as three prevailed related theories. As for firm value, signalling theory is represented as a main involved theory. Referring to corporate governance, agency cost theory is used as its major theory. Because the mentioned theories are somehow related to all the first three topics, this research firstly takes the focus of specific theory or a group of theories in consideration the impact on chosen topics. A brief review is presented for the theory

to other related topics within the content of the theory. Referring to key performance indicators, as part of management control system, KPIs have close connection with measurement theory and contingency theory.

3. RESEARCH DESIGN AND HYPOTHESES DEVELOPMENT

3.1 Research Problems and Research Objectives

The research focuses on sustainability reporting and the use of KPIs in sustainability reporting in German large listed firms due to four main reasons. Firstly, the necessity and requirement on disclosure of sustainability information are continuously increasing. Secondly, impacts of sustainability reporting application on firm performance and firm value generate conflict results. Thirdly, it is in need to determine factors that impact on sustainability reporting disclosures. And lastly, although it cannot be denied the necessity of implementing appropriate KPIs for sustainability performance reporting, firms still confront many difficulties in choosing suitable KPIs and apply them in firm performance measurement system.

3.2 Research Questions and Hypotheses Development

Main objective of the research is to examine the relation between firm and disclosures of sustainability performance, and to identify KPIs using in sustainable performance

3.2.1 Research question 1: In what way do sustainability reporting disclosures impact on firm value?

Objective 1: Investigating the impact of sustainability disclosures on German large listed firm value.

This thesis is in the same side of supporters' arguments and assumes the favorable association exists between sustainability reporting and firm value. Sustainability reporting may enhance firm value as it assists firm stakeholders including investors, employees, and other key stakeholders. According to Arnold et al. (2012), firms' investors have high demand on firm financial and non-financial information when dealing with investment decision. Therefore, the more information is disclosed, the more likely investors have sufficient information to infer proper investing decision. Indeed, transparent sustainability reports can provide broad information in firm main core aspects, so that investors can aware of risks and opportunities in investing firms, and can benefit from reduced information asymmetry in investing decisions.

Hypothesis 1: German large listed firm with more sustainability disclosures tends to have higher firm value.

3.2.2 Research question 2: What factors influence sustainability reporting of German large listed firm?

Objective 2a: Examining the influence of board of directors on disclosure of sustainability activities in German large listed firm.

As for German Corporate Governance Code (2015), it is recommended that the board should be structured with members as a group that has knowledge, ability and experience to complete the tasks (Article 5.4.1). In order to achieve the recommendation, it is more likely that if board has more members, the possibility to have more expert experience, more advanced ability and knowledge to solve problems will be higher. With these advantages, it is assumed to facilitate firms' performance in CSR disclosures which is measured by the adherent level of GRI guidelines in this research.

Hypothesis 2: More sustainability activities are likely to be disclosed in German large listed firms that have larger of board size.

In German Corporate Governance Code (2015), the supervisory board is recommended to include adequate number of independent members on board and to avoid including more than two former management bodies (Article 5.4.2). According to this recommendation, it is asserted independent member plays an important role in board composition. Therefore, it is supposed that higher number of independent member on board has better impact on GRI adaptation.

Hypothesis 3: More sustainability activities are likely to be disclosed in German large listed firms that have more independent board.

German Corporate Governance Code requires supervisory board to set target in board diversity in which female is one determined element. The Code provides further requirement in listed companies to include minimum of 30 percent female or male members (Article 5.4.1). Currently, all observed companies need to achieve the requirement of minimum female directors as the male members are always more than 30 percent. In line with the rule, the research confirms the critical roles of female director in board and assumes that they will have positive impact on facilitating firm to comply with CSR practices, and in this case is GRI guidelines.

Hypothesis 4: More sustainability activities are likely to be disclosed in German large listed firms that have more gender diverse board.

German Corporate Governance Code (2015) advises supervisory board to form subcommittees with adequate capacity to counsel the board (Article 5.3.1). Types and number of the committees shall be considered according to company's condition and number of members. As management bodies frequently have no intention to publish firm's environment issues, it is important for board to supervise and facilitate firm's legitimacy in environmental activities and reputation. Therefore, the more committees are available, the higher possibilities for members to comprehend company operations

and provide more appropriate advices. In relating to CSR disclosure, the following hypothesis is developed.

Hypothesis 5: More sustainability activities are likely to be disclosed in German large listed firms that have more subcommittees in board of directors.

German Corporate Governance Code (2015) requires board with codetermination to held the meetings separately, probably with or without management board member in necessary circumstances (Article 3.6). In addition, if there is meeting participated rate of only half or less, this should be noted in the Supervisory Board report (Article 5.4.7). Among the meetings, supervisory board chair person is recommended to frequently get in touch with management board to consult on firms issues relating to strategy, risk, business development and compliance (Article 5.2). With these regulations and recommendation, it is assumed that, the higher number of meetings to be hold, the higher possibilities that supervisory board achieves its tasks and responsibilities. Regarding to compliance with GRI guidelines, it is assumed as followed.

Hypothesis 6: More sustainability activities are likely to be disclosed in German large listed firms that have more supervisory board's meetings.

Objective 2b: Examining the influence of firm characteristics on disclosure of sustainability activities in German large listed firm

As for firm size, this feature is expected to have positive associate with sustainability disclosure. Rational of this expectation bases on the likelihood that the bigger firm is, the higher pressure it faces from its stakeholders in complying with management practices (Luo et al, 2012). Moreover, bigger firms usually have more resources for corporate social responsibility actions than SMEs (Siregar and Bachtiar, 2010). In regarding to the research, hypothesis relating to firm size is formed as followed.

Hypothesis 7: More sustainability activities are likely to be disclosed in German large listed firms that have larger size.

Next, firm age is supposed to be consistent with superior knowledge, better abilities, more effective skills and higher reputation (Agarwal and Gort, 2002). With these advantages, older firms are likely to be able to use their talent and resources to comply with management practices which may include the requirement on sustainability disclosures Furthermore, perennial companies which have greater experience in providing sustainability information to its stakeholder can have more insights to improve the report quality. Corresponding to this research, firm age is expected to affect positively on GRI adoption.

Hypothesis 8: More sustainability activities are likely to be disclosed in German large listed firms that were founded earlier.

Thirdly, association between firm performance and CSR transparency have been tested in many studies and the results are still mixed. However, this study supports the

positive influence of firm performance on CSR transparency. Reasons for the assumption includes profitability can afford expenditures in sustainability activities then can make management less hesitate to use sustainability information to attract more stakeholders. Therefore, it is expected to enhance GRI adherent level.

Hypothesis 9: *More sustainability activities are likely to be disclosed in German large listed firms that have greater profitability*.

Finally, Jenkins (2006) states that sustainability activities are different depending on which industries the firms belong to. In consistent with Jenkins, industry type is considered as one of the variables in research relating to sustainability (Svensson et al., 2009). In fact, amount of sustainability information to be disclosed are different depending on which type of firm industry. Manufacturing firms tend to provide more sustainability information than firms in service sector (Kolk, 2003). Along the lines of these research, this study proposes that firm under environmental pressure industries tends to enhance sustainability transparency, which lead to high adherent level of sustainability reporting practices.

Hypothesis 10: *More sustainability activities are likely to be disclosed in German large listed firms that belong to more environmentally sensitive sector*.

Objective 2c: Examining the influence of reporting features on disclosure of sustainability activities in German large listed firm.

External assurance feature are concerned as sustainability report itself cannot provide the assurance for information transparency quality (Junior et al., 2014). Therefore, assurance of these reports can be seen as a mechanism to enhance the reports' trustworthiness. Indeed, the quality of these report are better when the assurance are supplied by external bodies such as auditing companies (Simnett et al., 2009). Due to management intention in enhancing the stakeholders' perception on firm value and reputation, it is proposed that firms which recruit external assurance to audit their sustainability reports tend to have high compliance performance with sustainability reporting practices to achieve proper disclosure.

Hypothesis 11: More sustainability activities are likely to be disclosed in German large listed firms that have external assurance on their sustainability reports.

3.2.3 Research question 3: How do German large listed firms use KPIs in their sustainability reports?

Objective 3a: Examining the use of sustainability indicators in each sector.

Objective 3b: Identify sets of KPIs of sustainability performance in Automotive and Financial Services sectors.

Objective 3c: Outlining the roadmap that supports the implementation of the KSPIs.

4.   RESEARCH METHODOLOGY

4.1   Research methods

This research applies a mixed research approach which consists of both quantitative and qualitative methods. For quantitative methods using research question 1 and 2, descriptive statistics, assumptions' tests, and regression are executed. Both research question 1 and 2 involve in investigating the relationship between dependent variable and independent variables. At first, descriptive statistics provide simple summaries about the sample through minimum, maximum and standard deviation value of variables. Moreover, analysis of data set is also performed in descriptive statistics method. Then, tests for assumptions relating to regression modules are performed before running appropriate regression analysis. Depending on each type of regression, relevant tests are executed. One of the assumption tests is used in this research is muti-collinear as if there is correlation between independent, the condition of multi-collinear exists which can produce problems in interpreting the coefficients of the variables as several variables are providing duplicate information. Lastly, regression methods are utilized to determine the association between dependent and independent variables. In research question 3, quantitative method uses Likert questionnaire survey to gather the data and qualitative approach utilizes interview method. In research question 3, objective 3a and 3b, which are regarding the use of sustainability indicators and identification of KSPIs in automotive and finance sectors, will use questionnaire as part of their main methods. Objective 3c, with the goal of providing relevant roadmap for KSPIs implementation, utilize interview method to fulfil the aim.

4.2   Data collection

4.2.1 Data collection for research question 1

Research question 1 concerns about the impact of sustainability reporting on German large listed firm value within 2013 and 2017. The collected data process starts with Sustainability Disclosure Database. Within the research period from 2013 to 2017, 97 German large listed companies in each year have been selected which generate the total observation of 485 firms in five years. To collect data for dependent variable, share prices at year end and four-month after year end of each firm are gathered from eight German Stock Market including Frankfurt, Xetra, Stuttgart, Munich, Berlin, Dusseldorf, Hamburg, and Hannover Stock Exchange. Four-month after year-end stock prices are used to perform complementary test as sustainability report can be issued after financial year-end within the defined limit period of four month. Regarding to independent variable which reveals firm sustainability disclosures, GRI adherent levels are collected from Sustainability Disclosure Database. GRI adherent levels, which are considered as proxies for firm sustainability disclosures as discussed in hypothesis development part, are determined by combining report type and adherent level categories. Along with main variables,

control variables which include firm profitability, firm size, firm leverage, firm age and external assurance status of sustainability report are gathered from firm annual reports, firm website, and Sustainability Disclosure Database.

4.2.2 Data collection for research question 2

Research question 2 concerns about the impact of possible factors on sustainability reporting. The research also performs on German large listed firms within the same research periods from 2013 to 2017. Dependent variable in research question 2 which reveals firm sustainability disclosures is similar to independent variable in research question 1; therefore, the data collection process is the same. Research factors relating to board of directors comprise board size, board independence, board gender diversity, board subcommittees, and board meetings. At first annual reports or corporate governance reports within five years of each company are downloaded from companies' websites to gather relevant data regarding with number of board members, independent members, female members, meetings, and committees. Among these data, number of board members, female members, meetings, and committees are usually retrieved directly from firm reports. However, for number of independent members, it is trickier as not all firms stated the independent status of board members. With the undisclosed firm, further information referring to the member independent status is investigated in firm website, relevant stock exchange websites, and personal searching online. The independent status is confirmed if the searching information clearly declares that status, otherwise missing data is represented as a blank cell in the research data. Within 97 research firms, there are 13 cases that independent statuses cannot be confirmed and are presented as blank in the data. For firm features such as firm size, firm profitability, and firm age, the data are collected similar to research question 1. The last firm feature, industry and sustainability report character, external assurance are gathered from Sustainability Disclosure Database.

4.2.3 Data collection for research question 3

Research question 3 concerns about how German large listed firms use KPIs in their sustainability reports. This study only concentrates on the last year of research period in which each company sustainability report has been examined regarding to the implementation and measurement of sustainability indicators. In 2017, nine companies in automotive industry and thirteen companies in financial services industry are investigated (Table 4.1).

At first, the research uses desk study to identify sustainability indicators that are currently implemented in each company sustainability report. Firms' English-version sustainability reports in 2017 are downloaded from firms' websites. The indicators are grouped into economic, environmental, and social categories. In each category, relevant aspects and indicators for each aspect are determined. The identification is performed separately for companies in automotive and financial services industry as different industries may have different approaches in indicators' determination. Then current KSPIs using in observed firms and key indicators in each sector are transferred

18

into two online questionnaires for automotive industry and financial industry respectively to determine appropriate set of industrial KSPIs. The questionnaires use five point Likert scale to determine the appropriateness of these indicators to become KSPIs in which 1 presents for highly inappropriate and 5 for highly appropriate. The questionnaires are checked by professor and peers before sending to the potential participants. These questionnaires are sent directly to the company's email of each potential respondent in observed companies in two industries. A total of 108 questionnaires were sent successfully to appropriate participants. Among these, 41 participants belong to automotive industry and 67 participants belong to financial services sectors. The response rate for these questionnaires is about 22 percent for automotive industry and around 16.4 percent for financial services industry, which corresponding to 9 and 11 respondents from these two industries respectively.

Table 4.1. List of German large listed firms in Automotive and Financial Services Sectors

No.	Automotive Sector	Financial Services Sector
1	Audi AG	Allianz SE
2	BMW Group	ARAG SE
3	Daimler	Commerzbank
4	Durr	Deutschbank
5	ElringKlinger	Deutsch Borse AG
6	MAN Group	DVB Bank
7	Schaeffler Gruppe	DZ Bank
8	Porsche	Hannover Ruck
9	Volkswagen	HypoVereinsbank (HVB)-UniCredit AG
10		KfWBankengruppe
11		Landesbank Baden-Wurttemberg
12		Postbank
13		Talanx

Source: Author's compilation and classification

Invitations for semi-structure interviews are also sent to previous bodies after obtaining the outcomes of the research question 1, 2 and the questionnaires. At first, the research expects to receive at least two acceptances for interviews in each industry, however, at last, only one interviewee from automotive industry agreed for Skype interview. Therefore, potential interviewees were expanded to audit and accounting firms which performed external auditing for observed firms and NGOs regarding sustainability reporting and performance. After all, two more acceptances from one audit firm and one NGO are reached. The interview contents consist of three main questions which are predetermined open-ended, then six sub questions are raised to gain more detail information and explanation relating to the research issues. The first question investigates the need to use KPIs for sustainability performance. The second

question explores the effective and efficient use of KPIs for sustainability performance. And the last question focuses on the roadmap for implementation of KSPIs. These interview questions are checked by professors and peers before starting the interviews. All interviews are recorded and transcribed, and then the outcomes are transferred to the contents analysis. In order to protect interviewees' privacy, all interviewees are anonymous by number from 1 to 3.

4.3 Model Specification and Detailed Analyses

Regarding to regression, at first, research question 1 uses Multiple Regression to test the hypothesized relationship. The study aims is to find out the relation between one dependent variable and more than one independent variable. Moreover, independent and dependent variables in this study were all numerical; hence, Multiple Regression is an appropriate method for examining the hypothesized relationship. However, in order to assure the validity of the model, tests for all assumptions of linear regression are performed. If the assumptions are met, Multiple Regression will be confirmed to be used, and the equations for research question 1 are formulated as followed:

Model 1:

$$Firmvalue_{it} = \beta_0 + \beta_1 SustianbilityDisclosure_{it} + \beta_2 Firmperformance_{it} + \beta_3 Firmsize_{it} + \beta_4 Firmage_{it} + \beta_5 Firmleverage_{it} + \varepsilon_{it}$$

The complementary test for impact of sustainability disclosures on firm value, which is collected four-month after year end, are formulated as followed:

Model 2:

$$Firmvalue_{i(t+4)} = \beta_0 + \beta_1 SustianbilityDisclosure_{it} + \beta_2 Firmperformance_{it} + \beta_3 Firmsize_{it} + \beta_4 Firmage_{it} + \beta_5 Firmleverage_{it} + \varepsilon_{it}$$

In which: i represents number of observations, t represents the year of data from 2013 to 2017, (t+4) represents the data at four-month after the year end within research period, β_0 is constant; $\beta_{1,2,3,4,5}$ represent estimated coefficients of the explanatory variables, and ε is as error term.

Nevertheless, if the assumptions are not met, Quantile Regression will replace Multiple Regression. Quantile Regression is chosen a substitute as it does not make any assumption regarding neither to normal distribution nor constant variance. Quantile regression fits particular centiles of the observations, and can possibly explain the whole conditional distribution of the observation (Koenker and Bassett, 1978). The quantile level presents the proportion of the population that relates to a quantile. In order to describe the whole conditional distribution of the response, optimal grid of quantile values should be chosen. If Quantile regression is used, the chosen process will be presented base on the data and the updated model will be as followed.

The regression model for quantile level τ of the response:

$$Q_\tau(y_i) = \beta_0(\tau) + \beta_1(\tau)x_{i1} + \ldots + \beta_p(\tau)x_{ip}$$

In which, y is dependent variable, x is dependent variable, i is the number of observation, τ is quantile level, and p is the interactions.

In research question 2, Ordinal Logistic Regression is applied to test the hypothesized relationship as this study aims to find out the relation between one ordinal dependent variable and more than one independent variable. The dependent variables have twenty ranked levels from 0 to 19 while independent variables include continuous variables and dummy variables.

Model 3:

$$Logit[p_{it}/(1 - p_{it})] = \beta_0 + \beta_1 Boardsize_{it} + \beta_2 Boardindependence_{it}$$
$$+ \beta_3 Boarddiversity_{it} + \beta_4 Boardcommittees_{it} + \beta_5 Boardmeetings_{it}$$
$$+ \beta_6 Firmsize_{it} + \beta_7 Firmage_{it} + \beta_8 Firmperformance_{it} + \beta_9 Industry_{it}$$
$$+ \beta_{10} Externalassuance_{it} + \varepsilon_{it}$$

Where i represents number of observations, t represents the year of data from 2013 to 2017, p_i represents probability of an outcome <=i in which i=0...19, β_0 is constant; $\beta_{1,\ldots,10}$ represent estimated coefficients of the explanatory variables, and ε is as error term.

As for research question three, a combination of desk study, questionnaire survey and semi-structure interview are applied. The use of sustainability indicators retrieved from desk study are analysed and compared among companies in the same sectors, and between two sectors to see the effects of firm operations, strategies, and industry on disclosed sustainability indicators. Among these indicators, only current utilized KSPIs, and key indicators are then transferred to questionnaires to obtain management perception on the appropriateness of potential key performance indicators of sustainability performance. From the survey, underlying factors associated with the selection of proposed KSPIs are also explored. After interviews' contents are transcribed, content analysis is applied for further comprehension. Main themes and topics are identified to provide discussion and analysis regarding to research issues such as the needs of KSPIs, successful factors for implementing KSPIs, and roadmap for KSPIs. As a result, some main trends and main frameworks are determined to provide recommendation in identifying KSPIs and implementing KSPIs in reality.

4.4   Variables measurement

In Model 1 and 2, to examine the association between firm value and sustainability disclosure based on GRI guideline, this study applies Ohlson (1995) model which confers current firm share price to firm value. As for independent variable, GRI adherent level is considered as a proxy of firm sustainability disclosure.

Table 4.2. GRI adherent level ranking

GRI Type	Adherent level	Rank	GRI Type	Adherent level	Rank
Non-GRI		0		B	10
Citing GRI		1	G3.1	B+	11
G3	Undeclared	2		A	12
	C	3		A+	13
	B	4	G4	Undeclared	14
	B+	5		Core	15
	A	6		Comprehensive	16
	A+	7		GRI-referenced	17
G3.1	Undeclared	8	Standards	Core	18
	C	9		Comprehensive	19

Source: Author's compilation and classification

Table 4.3. List of independent variables measurements in Research question 2

Variables	Descriptions
Board size	Number of board members
Board independence	Proportion of independent members on board
Board diversity	Proportion of female members on board
Board committees	Number of board committees
Board meetings	Number of board meetings
Firm size	Logarithm of total assets
Firm age	Difference between current year and founded year
Firm performance	Net Income/ Total assets (ROA)
Industry	1: environmentally sensitive industry, 0: otherwise
External assurance	1: Yes, 0: No

Source: Author's compilation and classification

Model 3 investigate the impact of potential factors on sustainability disclosure. Sustainability disclosure in model 3 acts as a dependent variable, but the measurement is exactly the same as in model 1 and 2. Three groups of potential factors include board of directors' characteristics, firm features, and sustainability report characters. As for board characteristics, board size, board independence, board diversity, board committees, and board meetings, the measurements of these variables are examined and seem to be similar in previous studies. Firm features which include firm performance, firm size, firm age, and firm industry. The previous three variables are measured as in model 1. However, for industry variable, the research divides the

industries into environmentally sensitive industry and environmentally friendly industry according to the hypothesis development.

In model 4, all the examined factors indicated are based on five point Likert scale in which 1 represents for highly disagree, and 5 represents for highly agree. After the survey, each independent variable value falls within the range from one to five points. As for independent variable, the sum of points is calculated potential indicators by taking total points of all investigated indicators divided by total number of these indicators. The sum can be performance as the factors associated with KSPIs are considered for all indicators in economic, environmental, and social aspects.

5. RESULTS AND DISCUSSION

5.1 Association between Sustainability Disclosure (SD) and Firm Value

Table 5.1. Empirical results: P-value and coefficient estimates by quantiles

	SD	Firm performance	Firm size	Firm age	Leverage	Constant
0.5	0.002***	0.000***	0.000***	0.000***	0.123	0.000
	0.687	1.759	20.346	0.125	-0.156	-43.764
0.55	0.003***	0.000***	0.000***	0.000***	0.179	0.000
	0.914	1.740	20.930	0.126	-0.185	-42.754
0.6	0.002***	0.000***	0.000***	0.000***	0.271	0.000
	0.969	1.648	21.220	0.147	-0.149	-43.477
0.65	0.028**	0.001***	0.000***	0.000***	0.418	0.004
	0.869	1.845	22.037	0.138	-0.137	-42.115
0.975	0.006***	0.765	0.142	0.847	0.047**	0.627
	11.112	1.430	67.340	-0.093	-2.778	83.271
0.99	0.000***	0.186	0.000***	0.282	0.000***	0.130
	5.963	2.331	188.323	-0.169	-3.411	-89.976

  * Significance at the 10% level.
 ** Significance at the 5% level.
*** Significance at the 1% level.
 Source: Author's own processing

The regression results in Table 5.1 demonstrate significant positive relationship at 1% and 5% between firm value and firm's sustainability disclosures in quantile levels of 0.5, 0.55, 0.6, 0.65, 0.975, and 0.99. This means that the more sustainability information is disclosed by firms with share prices range from 38.26 to 75.27 Euros and from 224.49 to 712.02 Euros, the higher of these firms' values are. In addition, the influence of sustainability disclosures on share prices tends to get stronger when the share prices increase in these quantile levels. However, this relation in the other

quantile levels is insignificant. Therefore, a mix result of significant positive and insignificant connection between firm value and sustainability disclosures is found in this research.

Concern raising regarding to these findings is why significant relations can be found only in the middle and most upper share price ranges and not in the other ranges. Within significant ranges, only six in twenty five quantile levels and 124 observations, which occupy around twenty five percent of the research population, are observed. These ranges include share prices from 38.26 to 75.27 Euros and from 224.49 to 712.02 Euros which cover the average share price of 68.53 Euros of the population. In these twenty five percent of the whole observation, thirteen companies belong to DAX 30 in the research period. These companies include Adidas, BASF, Beiersdorf, Continental, Daimler, Deutsch Boerse AG, Duetsch Post DHL Group, HeidelbergCement, LANXESS AG, Merck, ProSiebenSat1 Media SE, SAP, and Vonovia. DAX 30 is a German stock market index including thirty biggest listed companies based on market capitalization and liquidity. DAX 30 is considered as a strong measure of German and European economic health. Due to the importance of DAX 30, companies belong to this index are likely attracted the investors. As a result, efforts in searching appropriate information for investing decision in these companies increase. Among the information, sustainability performance information cannot be neglected and can be used by many investors in making investing decision. With the considerable high number of DAX 30 companies in a small proportion of observation, the importance of sustainability disclosures can be explored which also become possible explanation for the significant association between sustainability disclosures and firm value in these share price ranges.

By replacing year-end share price by four-month after year-end share price in the main model, the significant positive association between firm value and firm sustainability disclosures extents to the lower quantile of 0.45, however, the relation turns to insignificant in the upper level of 0.99. These results again partly confirm properly disclosing sustainability performance tends to improve shareholders' wealth. In overall, the associations between independent and dependent variables get stronger when the quantile levels increase or firm share prices enhance.

5.2   Factors impact on Sustainability Reporting Disclosures

The logistic regression results for the association between sustainability disclosure and impacted factors are illustrated in table 5.12. The first group of independent variables which refer to board of directors' characteristics consist of board size, board independence, board diversity, board committees, and board meetings. The regression results found no significant connection between these factors with firm sustainability disclosures. This means number of member on board, proportion of independent members on board, proportion of female members on board, number of committees, and number of meetings do not impact on how German large listed firms disclosure their sustainability performance. These results are inconsistent with the hypotheses two, three, four, five, and six which relate to these examined factors.

The second independent variables groups relate to firm's features which consist of firm size, firm age, firm performance, and firm industry. While positive significant relations at one percent are discovered between sustainability disclosure and firm size and firm age, no connection are revealed between sustainability disclosure and firm performance and firm industry. The significant outcomes indicate that the bigger and older of firm is the more sustainability activities are disclosed in German large listed firms. These findings are consistent with hypotheses seven and eight. In the mean time, the insignificant results relating to firm performance and firm industries point out that   firm profitability and whether firm belongs to environmental friendly or sensitive sectors have no engage with how German large listed firms report their sustainability performance. These outcomes are inconsistent with hypothesis nine and hypothesis ten.

Table 5.2. Empirical results for all observations

SD	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Board size	-0.04	0.04	-0.88	0.38	-0.13	0.05
Board independence	0.01	0.00	1.39	0.16	0.00	0.02
Board diversity	-0.02	0.01	-1.26	0.21	-0.04	0.01
Board committees	-0.14	0.14	-0.99	0.32	-0.41	0.14
Board meetings	0.00	0.02	0.00	0.99	-0.04	0.04
Firm size	0.50***	0.20	2.42	0.02	0.09	0.90
Firm age	0.01***	0.00	2.61	0.01	0.00	0.01
Firm performance	-0.05	0.03	-1.49	0.14	-0.11	0.01
Industry	-0.47	0.30	-1.60	0.11	-1.06	0.11
External assurance	3.67***	0.56	6.58	0.00	2.57	4.76
_cons	-0.67	0.79	-0.85	0.39	-2.22	0.88

Significance at the 10% level.
**Significance at the 5% level.*
***Significance at the 1% level.*
Source: Author's own processing

The last independent variable which involves firm sustainability report' feature is external assurance. Significant positive association between firm sustainability disclosures and external assurance on sustainability reports is shown in the regression result. This outcome specifies that when German large listed firms have their sustainability report audited by the third parties, it is more likely that their sustainability performance has better transparent. This result is align with hypothesis eleven which stated more sustainability activities are likely to be disclosed in German large listed firms that have external assurance on their sustainability reports.

This research finds significant positive relations between sustainability disclosure with firm size, firm age and external assurance on sustainability reports. These considerable results are consistent with hypothesis seven, hypothesis eight and hypothesis eleven. For all the rest of variables, no significant connection is found with sustainability disclosure which reveals the inconsistency with hypothesis two, three, four, five, six, nine, and ten. In addition, complementary analysis is implemented for two groups of industries: the sensitive and friendly with environment. The results for further regression maintain the same for board independence, board committees, board meetings, and external assurance on sustainability reporting. However, for board size and firm performance, significant negative associations appear in friendly industries of German large listed firms. Meanwhile, this negative relation incurs for board diversity in sensitive industries. Referring to firm size and firm age, whilst firm size turns to insignificantly related to sustainability disclosure in sensitive sectors, firm age is insignificant connected with sustainability disclosure in friendly sectors. Last change occurs with firm performance when this variable turns out to have significant negative association with sustainability disclosures. All significant effects of independent variables in the complementary regression are opposed to the stated sign of hypotheses involving to these variables.

5.3   The use of KPIs for sustainability performance

5.3.1 Identification of KPIs of sustainability performance in Automotive Sectors

In 2017, nine large listed automotive firms are recorded in the GRI Sustainability Disclosure Database. They include Audi AG, BMW Group, Daimler, Durr, ElringKlinger, MAN Group, Porsche, Schaeffler Gruppe, and Volkswagen. In total, one hundred and nine disclosures were used from which forty eight key sustainability figures and twenty seven KSPIs are identified. Economic area consisted of seven topics: economic performance, market presence, indirect economic impacts, procurement practices, anti-corruption, anti-competitive behaviours, and alternative drive-train technologies. Among the topics, alternative drive-train technologies was only utilised by BMW which also considered the disclosures within this topic as KSPIs. Thirty two disclosures were revealed in economic perspective from which nineteen disclosures were classified as key sustainability figures, and thirteen were KSPIs. Environmental field included eleven topics which cover materials, energy, water, biodiversity, emissions, effluent and waste, environmental compliance, supplier environmental assessment, products and services, transport, and environmental protection. Thirty eight disclosures were revealed in environmental perspective from which nineteen disclosures were classified as key sustainability figures, and nines were KSPIs. As for social category, twenty topics which consisted of employment, labour/management relations, occupational health and safety, training and education, diversity and equal diversity, non-discrimination, freedom of association and collective bargaining, child labour, forced and compulsory labour,

security practices, rights of indigenous people, human rights, local communities, supplier social assessment, public policies, customer health and safety, marketing and labelling, customer privacy, socioeconomic compliance, and customer satisfaction were covered. Thirty nine disclosures were revealed in social perspective from which ten disclosures were classified as key sustainability figures, and five were KSPIs.

Table 5.3. Proposed KSPIs for German Large Listed Firms in Automotive Industry

Categories		
Economic	**Environmental**	**Social**
1. Revenues (4.33) 2. Operating profit (4.11) 3. Research and development expenditure/ratio (4.22) 4. Expenditures on donations (4.22)	1. Materials used by weight or volume (4.00) 2. Recycle input materials used (4.33) 3. Energy consumption within the organization (4.78) 4. Fuels consumption (4.22) 5. Volume of water withdrawal by source (4.33) 6. Direct GHG emissions (4.33) 7. Nitrogen oxides (NO_x), sulfur oxides (SO_x), and other significant air emissions (4.22) 8. CO_2 emissions (4.33) 9. Water discharge by quality and destination (4.44) 10. Volume of waste by type and disposal method (4.67) 11. Environment protection expenditures and investment (4.44)	1. Average hours of training per year per employee (4.44) 2. Diversity of governance bodies and employees (4.00) 3. New suppliers that were screened using social criteria (4.33)

Source: Author's own processing

Based on the list of disclosures and KSPIs, at first, twenty seven KSPIs identified from the list above are transferred to the questionnaires. Among these twenty seven indicators, two indicators which related to alternative drive-train technologies in economic category and two indicators involving sharing renewable energy purchases from third parties and sharing of production-relevant purchasing volume in the CPD supply chain program in environmental category are specific for only BMW. Therefore, these four indicators are eliminated from twenty seven KSPIs. Then, all disclosures which are identified as key sustainability figures are also used in the questionnaires. As twenty key figures are also the KSPIs, these figures are extracted out of the total of forty eight key figures. Therefore, only twenty eight key figures which are not KSPIs are added up with the current twenty three KSPIs to makes the

total of fifty one indicators to be used in the questionnaires. These consist of twenty one economic, twenty environmental, and ten social indicators.

According to research result, the Cronbach's alphas range from 0.78 to 0.82, which are within the recommended alpha value. As a result, the data collected from questionnaire surveys are valid for further analysis. This research uses five-point Likert scale to examine the appropriateness of each observed disclosure to become KSPIs by obtaining the opinion from key persons and managers in nine German large listed firms in automotive industry. Likert point number 1, 2, and 3 represent for highly inappropriate, inappropriate, and neutral respectively, while point number 4 and 5 indicate appropriate and highly appropriate. Therefore, the proposed KSPIs are identified when the disclosure has an average of Likert point of equal or above 4 point. Disclosures which have average value from 4 point are presented in following table.

5.3.2 Identification of KPIs of sustainability performance in Financial Services Sectors

In 2017, thirteen large listed financial service firms are recorded in the GRI Sustainability Disclosure Database. They include Allianz SE, ARAG SE, Commerzbank, Deutsche Bank, Deutsche Boerse, DVB Bank, DZ Bank, Hannover Ruck, Hypo VereinsBank, KfW Bankengruppe, Landesbank Baden-Wurttemberg, Postbank, and Talanx. In total, one hundred and eleven disclosures were used from which forty key sustainability figures and twenty two KSPIs are identified. Economic area consisted of seven topics: economic performance, market presence, indirect economic impacts, procurement practices, anti-corruption, anti-competitive behaviours, and responsible investors. Thirty two disclosures were revealed in economic perspective from which fifteen disclosures are classified as key sustainability figures, and eights are KSPIs. Environmental field included ten topics which cover materials, energy, water, biodiversity, emissions, effluent and waste, environmental compliance, supplier environmental assessment, travel, and environmental protection. Thirty disclosures were revealed in environmental perspective from which seventeen disclosures were classified as key sustainability figures, and threes were KSPIs. As for social category, twenty two topics which consist of employment, labour/management relations, occupational health and safety, training and education, diversity and equal diversity, non-discrimination, freedom of association and collective bargaining, child labour, forced and compulsory labour, rights of indigenous people, human rights, human rights grievance mechanisms, local communities, supplier social assessment, public policies, marketing and labelling, customer privacy, socioeconomic compliance, customer satisfaction, customer relation, labour practices grievance mechanisms, and social engagement were covered. Forty nine disclosures were revealed in social perspective from which eight disclosures were classified as key sustainability figures, and elevens are KSPIs. GRI frameworks also have further guidance for some particular industries in which financial sector is one of the sectors that has specific industry guidance. As a result, another three aspects which belong to financial service sector disclosure were

presented in observed firms. These aspects comprised products portfolio, audit, and active ownership. Twelve sustainability disclosures were presented in these aspects, however, none of them were considered as key data or KSPIs.

Based on the list of disclosures, at first, twenty two KSPIs identified from the list above are transferred to the questionnaires. Among these twenty indicators, all three indicators in social engagement aspect are only implemented for particular programs and campaigns in Deutsche Bank, so that they are not relevant for the other firms. Therefore, these three indicators are eliminated from twenty KSPIs. Then, all disclosures which are identified as key sustainability figures are also used in the questionnaires. As twelve key figures in some companies are used as KSPIs in the others, these figures are extracted out of the total of forty key figures. Therefore, only twenty eight key figures which are not KSPIs are added up with the current nineteen KSPIs to makes the total of forty seven indicators to be used in the questionnaires. These consist of sixteen economic, twenty environmental, and eleven social indicators.

Table 5.4. Proposed KSPIs for German Large Listed Firms in Financial Services Industry

Categories		
Economic	**Environmental**	**Social**
1. Net revenue (4.45) 2. Operating profit (4.27) 3. Pre-tax profit and loss (4.00) 4. Consolidated profit and loss (4.27) 5. Total assets (4.27) 6. Expenditures on donations (4.00) 7. Return on equity (4.00)	1. Energy consumption within organization (4.27) 2. Direct GHG emissions (4.45) 3. Environment protection expenditures and investment (4.27)	1. New employee hires and employee turnover (4.27) 2. Length of employment (4.09) 3. Average hours of training per year per employee by gender, and by employee category (4.27) 4. Employees receiving regular performance and career development reviews. (4.18) 5. Diversity of governance bodies and employees (4.00)

Source: Author's own processing

As the Cronbach's alphas range for financial services surveys are from 0.83 to 0.85. These value are within the recommended range, hence, the questionnaire response data are reliable for further analysis. Similar to automotive sector, proposed KSPIs in financial services sectors are also determined when correspondent disclosure has an average of Likert point of equal or more than 4. The average values of Likert points regarding the appropriateness of observed disclosures to become KSPIs for financial service sectors are from 2.55 to 4.45. Disclosures which have average value from 4 point are presented in following table.

As for eleven responses from financial services industry, the narrower range from 1 to 12 is determined for the number of KSPIs. Nine and ten KSPIs have highest frequency which is repeated in six answers. Eight KSPIs has the second highest repetition with four responses. Seven, eleven, and twelve KSPIs are chosen by three respondents for each number. Then five and six number of KSPIs receives two responses for each. Lastly, number of KSPIs from one to four just appears one in the responses. To sum up, based on the results from two industries, it is more likely that the respondents identify that the suitable number of KSPIs are from seven to ten, in which nine KSPIs appear as the most expected number.

5.3.3 Roadmap of the implementation of KSPIs in Automotive and Financial Services Sectors

The process starts with material analysis which involves the evaluation of key internal and external stakeholders to understand their perceptions on firm sustainability performances and to know which areas they are concerned and want firm to perform better. Once material analysis is performed and critical sustainability issues are identified, it is necessary for firm to determine corporate sustainable strategy. This step requires firm to identify its current sustainability position, vision and mission. Align with indicated vision and mission, firm needs to outline the ways to obtain the vision. This action is considered as firm's corporate sustainability strategy. Next step engages the identification of goals and respective objectives. These goals should have direct links to indicated strategy as they represent what needs to be completed to execute the strategy. With each goal, objectives which consist of detailed actions and timelines for obtaining the goal should be determined. Then, establishing an appropriate set of KSPIs which reflect what firm needs to achieve is performed. These KSPIs must have close connection with firm vision, mission, strategy, goals, and objectives. Succeed of KSPIs application are also reflected through how firm use the information from KSPIs. The information is presented via firm reporting system for internal and external user. These frequently prepared reports are not only fulfil the voluntary or mandatory disclosures but also provide meaningful information for internal managers to have more proper decisions and lead the firm in the right direction. The last step in the pathway relate to assessment which approach both sustainability performance and KSPIs implementation process.

Along with main steps in the roadmap to use KSPIs, to facilitate the effective and efficient implementation, external and internal successful factors should be considered. Internal factors consist of high commitment from top managers which are revealed through appropriate training and communication relating to sustainability development to improve employees' understanding on sustainability performance and relevant KSPIs, and raising awareness of sustainability issues of stakeholders.
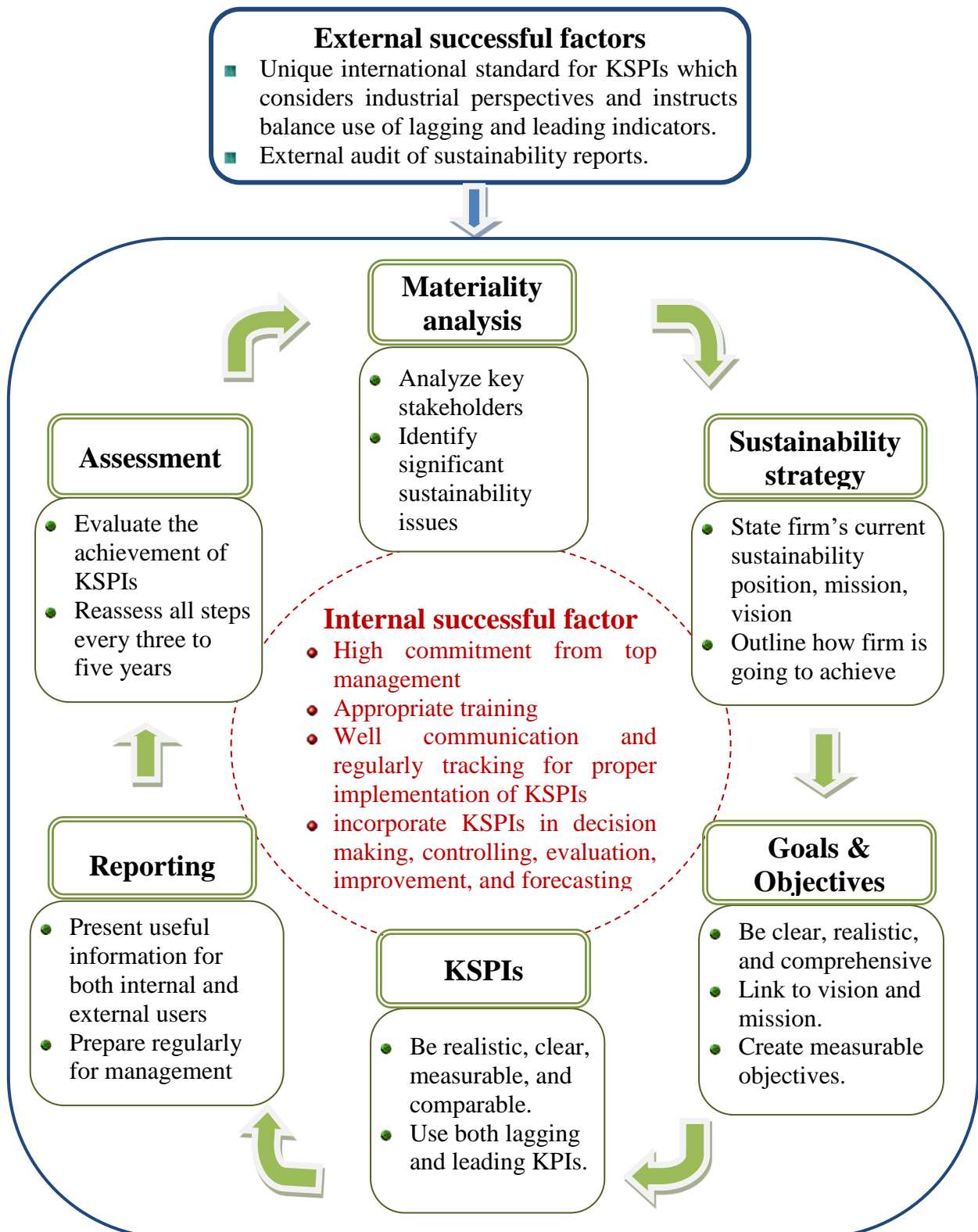
Figure 5.1: Roadmap for implementing KPIs for sustainability performance

Moreover, it is necessity for firm to track the KSPIs application process and incorporate information retrieved from KSPIs implementation and outcomes to regular management activities. This in turn facilitates the improvements of firm sustainability performance and main core business activities. Regarding to external

successful factors, development of a common standard which can be used as an international sustainability reporting standard play an important role in supporting firm achieve better performance in sustainability development. The standard will add more value if it can approach sector differentiation and provide practical instructions on leading and lagging indicators application. Furthermore, in order to encourage proper implementation of KSPIs, it is also recommended to use external audit to people involved the process more accountable and sincere in obtaining setting targets

6.   CONCLUSION

6.1   Summary of the dissertation outcomes

Quantile Regression is applied to investigate the associate between firm value and sustainability disclosure. In order to cover as much as observed data as possible, this research approaches more detail quantile levels. Among these quantiles, significant favourable connections between firm value and firm's sustainability disclosures are only revealed in quantile levels of 0.5, 0.55, 0.6, 0.65, 0.975, and 0.99, but not for the rest. The outcomes can be interpreted that firm values tend to be higher when sustainability information is disclosed by firms with share prices range from 38.26 to 75.27 Euros and from 224.49 to 712.02 Euros. Moreover, the impact of sustainability disclosures on firm values seems to get stronger when the share prices rise in these quantiles. For all the other ranges of quantiles, no significant impact is shown between dependent and independent variables. As a result, mix results of significant positive and insignificant connection between firm value and sustainability disclosures is found in this research. Complementary research is performed by replacing year-end share price by four-month after year-end share price in the main model. Significant favourable link between firm value and firm sustainability disclosures extents to the lower quantile of 0.45, but disappear in upper level of 0.99. Relations between firm value and all control variables maintain the same with main model. In short, the results partly accept hypothesis 1 which states that German large listed firm with more sustainability disclosure tends to have higher firm value.

Logistic regression is used to investigate the association between sustainability disclosure and impacted factors. For the impacted factors relating to board of directors' characteristics, insignificant relationships are found between sustainability disclosure and board size, board independence, board diversity, board committees, and board meetings. As for second group of influenced factors which involve firm features, connections between sustainability disclosure and firm size and firm age are significant positive, however, the connections with firm performance and firm industry are insignificant. Referring to external assurance of sustainability reports, which is the last impacted factor, significant favourable relation are explored with sustainability disclosure. While these results are inconsistent with the hypotheses two, three, four, five, six, nine and ten, they are consistent with hypotheses seven, eight and eleven. Complementary research is performed by dividing the data into two groups which consist of 260 firms in environmental sensitive industry and 225 firms

in environmentally friendly industry. With the data separation, sustainability disclosure is significant unfavourable connected with board size in environmental friendly sector, and with board diversity in environmental sensitive sector. Regarding to firm features, firm age has no longer impact on sustainability disclosure in environmental friendly industry, firm size has no longer impact on sustainability disclosure in environmental sensitive industry, and firm performance appears to have significant negative impact on sustainability disclosures of German large listed firms in environmental friendly industry. As for external assurance factor, no change incurs with the divided data.

The identification of proposed KSPIs in automotive and financial services industries is based on the results of the questionnaire surveys that were separately designed for these industries. Based on the results of nine respondents from automotive industry, and eleven respondents from financial services industry, Cronbach's alphas values fall in the recommended alpha value of equal or above 0.7; hence, the collected data are reliable for further analysis. As for average Likert points, proposed KSPIs are determined when the disclosure has an average of Likert point of equal or above 4 point. This level indicates for the sufficient appropriateness of the disclosure to become KSPI. The average values of Likert points in automotive sector range from 2.33 to 4.78, in which four proposed KSPIs belong to economic category, eleven proposed KSPIs belong to environmental aspect, and three proposed KSPIs belong to social category. As for financial services sector, the average values of Likert points regarding the appropriateness of observed disclosures to become KSPIs are from 2.55 to 4.45, in which seven proposed KSPIs belong to economic aspect, three proposed KSPIs belong to environmental aspect, and five proposed KSPIs belong to social category. The focus on sets of proposed KSPIs is different between automotive and financial services sector. While firms in automotive sector pay more attention on environmental aspect, firms in financial services sectors put more efforts on economic and social categories. Different in operation nature of in these two industries can explain for the variance in KSPIs focus.

As for the semi-structure interviews, main concern regarding the pathway for implementing KPIs for sustainability performance has been solved. Based on viewpoints of interviewees, final common roadmap with six steps was developed with relevant description in each step. These steps are summarised as followed:

Step 1 : Perform materiality analysis
Step 2 : Formulate company sustainability strategy
Step 3 : Identify company goals and objectives
Step 4 : Develop appropriate set of KPIs for sustainability performance
Step 5 : Report for internal and external stakeholders
Step 6 : Evaluate the outcomes and implementation processes

The roadmap also considers suitable internal and external factors that impact the effectiveness and efficiency of KSPIs implementation processes. Internal factors include high commitment from top management, appropriate training, well communication and regularly tracking KSPIs application, and incorporate KSPIs in

decision making, controlling, evaluation, improvement, and forecasting. External factors comprise the development of a unique internal sustainability development standard and recommendation on using external audit.

Further discussion on have appropriate set of KSPIs referring to characteristics, implementation process, and aspect which firm should base on to identify KSPIs is performed. Generally, KSPIs are required to link to company's strategy; value creation; core processes; and clear, realistic, and comprehensive goals. The KSPIs themselves should be clear, measurable, comparable, and use both lagging and leading indicators. The usefulness of these KSPIs are also examined and are advised to achieved by using KSPIs data for decision making, progress tracking, and forecasting. In addition, data collection process should be designed before implementation to ensure the reasonable and achievable gathering. Lastly, standardized implementing process is recommended to facilitate sustainability performance and continuous improvement.

6.2 Contributions to practice and theory

This research is expected to provide useful contributions for both practice and theory. Firstly, sustainability reporting has been required for large firms since the beginning of 2017 according to EU Directive 2014/95/EU, therefore, large firms and related bodies such as shareholders, government and NGOs are more likely to be interested in the impact of sustainability reporting on firms and factors that may influence firms' sustainability reporting. This research examines these two issues and covers German large listed firm within up-to-date period from 2013 to 2017. As a result, findings from this study provide significant insights for these bodies to integrate sustainability reporting in their management and valuation decisions. Indeed, the outcomes improve firm stakeholders' understanding on how firm share value being affected by the disclosures of sustainability information. With the acknowledgement of the impact of sustainability reporting on firm value, firm can adjust its implementing process to be able to achieve both firms' financial and non-financial aims. Furthermore, focusing on GRI guideline may provides firm clearer perception on how compliance to specific instruction can influence on firm value. This in turn leads to firm's decision on choosing appropriate standards and approaches in performing sustainability activities and reporting sustainability performance to be best accomplish firm goals. Firm management can also enhance sustainability disclosures when recognizing the impact of main factors, for instance, board of directors, firm's characteristics, and report's features on sustainability reporting. Shareholders on the other hand, can base on these factors to evaluate how well firm tends to disclose its sustainability information, and incorporate the impact of sustainability disclosure on firm value into investment decision making. For standards setters, this research provides deeper perception on what firms take effort to perform, and on how these efforts affect their financial value. Upon this, they can assist and

encourage firms to follow sustainability development by making more appropriate and supporting principles.

Beside these two issues, the research on KSPIs in German large listed firm in automotive and financial services industries raises the aware of management in these firms on the use of KSPIs of other firms in the same industry. They can compare their concentration with the industry focus to analyse which KPIs are relevant to their firms, and which one they have not yet approached. For firms that have not set the KPIs for sustainability performance can get vital insights on how to choose the appropriate KPIs in referring to the current set of KSPIs that the industry is using. Additionally, the development of roadmap of KSPIs implementation which can be applied for variety of firms in different industries enhances firm comprehension and insights on how to efficiently and effectively implement KPIS for sustainability performance. This framework provides the overall steps and critical success factors which then firm can develop to the full implementation process according to firm's natures, core business, vision, mission, strategy, and goals.

The research findings contribute to the academic literatures on the association between sustainability disclosure and firm value as well as impacted factors, and on the use of KSPIs in large listed firms in automotive and financial services sectors. Different from previous research, the study examines the connections between sustainability disclosure and firm value in diverse quantiles. The association results are variation among these quantiles and provide meaningful patterns on the significant impacts of sustainability disclosure on firm value. Regarding to the relationship between sustainability disclosure and factors that may impact on sustainability disclosures, the study covers various perspectives which relate to corporate governance, firm characteristics, and sustainability report features. Findings of the first two associations add more literatures on the German large listed firm in the most current period to the requirement of mandatory disclosure of non-financial information. Lastly, research on KSPIs in automotive and financial services industries provide the literatures on the use of KPIs for sustainability performance in two sectors which have different operation natures. The differences in the application of KSPIs in German large listed firms in these two industries are also revealed in the outcomes of the research.

6.3 Limitations of the research

The first limitation of this research is related to the approach to determine sustainability disclosure. With the focus on just GRI, the research may neglect another firms that using other standards and guidelines frameworks which are also recommended by European Commission such as UN Global Compact, OECD guidelines, or ISO 26000. Future research can be performed to compare sustainability disclosures in firms whose sustainability reports are based on altered guidelines. In addition, connections between sustainability disclosures and firm performance, value,

and potential impacted factors can also be examined to see the divergences when firms adhere to dissimilar guidance.

Another limitation refers to the concentration on just board of directors but not the other factors of German Corporate Governance. GRI provides requirement on how to disclose the establishment and composition of firm governance which can illustrates the consistence with firm purpose and the relation of firm purpose and economic, environmental and social scopes. Meanwhile, German Corporate Governance Code advices and regulates firms on how to form a good corporate governance. The Code focuses on not only the obligation on compliance with law, but also ethics and responsibility behaviours. Therefore, there are close links between GRI guidelines and German Corporate Governance Code. However, in this research, just some components of the board expose the impact on sustainability disclosure. This result reveals a limitation as the study has not examined the compliance of the other components of the Code. Therefore, the result may not depict all significant links between GRI guidance and the Code. Due to this limitation, further research on investigating the connection between the compliance with the combination of BODs and other components in German Corporate Governance Code and sustainability disclosure which based on GRI adherent level can be performed.

The third limitation involves the data collected from questionnaires which focuses on management and key person in firms. As target audience for compulsory reporting is not only firms themselves but also other stakeholders, for examples, firm's shareholders, NGOs, governments, or analysts. Therefore, the concentration on firm management provides the perception on the use of KSPIs just on the side of internal perspective which reveals what and how firms will do but not what others users of sustainability reports expect to see. Further research should approach participants from others perspectives to be able to evaluate the variation among internal and external views on the use of KSPIs.

Future research can also be done by expanding the study on the application of KSPIs to other industries to investigate the consistency and divergence of KSPIs' usage in different groups of sectors. Moreover, the research period can be extended to after the EU Directive 2014/95/EU being active. With the data collected after the mandatory requirement on sustainability reporting, association between sustainability reporting and firm before and after the requirement can be compared. In addition, examining similar issues in another country in the Europe or in other developing countries can reveal the difference in sustainability reporting between countries in Europe and between countries in different cultures and development stages. Last but not least, the roadmap of implementation sustainability development KPIs in this thesis has just produced relevant steps for application process. The more important issue which needs further clarification is how to implement each step successfully. Future research can expand the contents relating to the framework by providing instructions on how firm can efficiently and effectively perform in each step to successfully achieve the whole process.

BIBLIOGRAPHY

[1] AGARWAL, R. and GORT, M. Firm production life cycles and firm survival. *American Economic Review.* 2002, vol. 92, pp.184-190. https://doi.org/10.1257/000282802320189221

[2] AKTAS, R., KAYALIDERE, K. and KARGIN, M. Corporate Sustainability Reporting and Analysis of Sustainability Reports in Turkey. *International Journal of Economics and Finance.* 2013, vol. 5, issue 3, pp. 113-125. https://doi.org/10.5539/ijef.v5n3p113

[3] ARNOLD, M. C. and BASSEN, A. and FRANK, R. Integrating Sustainability Reports into Financial Statements: An Experimental Study. *SSRN Electronic Journal.* June, 2012. http://dx.doi.org/10.2139/ssrn.2030891

[4] BACHOO, K., TAN, R. and WILSON, M. Firm value and the quality of sustainability reporting in Australia. Australian Accounting Review. 2013, vol. 23, issue 1, pp.67-87. https://doi.org/10.1111/j.1835-2561.2012.00187.x

[5] BERRONE, P. and GOMEZ-MEJIA, L. R. The pros and cons of rewarding social responsibility at the top. *Human Resource Management.* 2009, vol. *48, issue* 6, pp.959–971. https://doi.org/10.1002/hrm.20324.

[6] BERTHELOT, S., COULMONT, M. and SERRET, V. Do investors value sustainability reports? A Canadian study. *Corporate Social Responsibility Environment Management.* 2012, vol. 19, issue 6, pp.355-363. https://doi.org/10.1002/csr.285

[7] BRAAM, G.J.M. and PEETERS, R. Corporate Sustainability Performance and Assurance on Sustainability Reports: Diffusion of Accounting Practices in the Realm of Sustainable Development. *Corporate Social Responsibility Environment Management.* 2018, vol. *25,* pp.164–181. https://doi.org/10.1002/csr.1447

[8] CORMIER, D. and MAGNAN, M. The revisited contribution of environmental reporting to investors' valuation of a firm's earnings: an international perspective. *Ecological Economics.* 2007, vol.62, issue 3-4, pp. 613-626. https://doi.org/10.1016/j.ecolecon.2006.07.030

[9] CORMIER, D., AERTS, W., LEDOUX, M. J. and MAGNAN, M. Attributes of social and human capital disclosure and information asymmetry between managers and investors. *Canadian Journal of Administrative Sciences.* 2009, vol. 26, issue 1, pp.71-88. https://doi.org/10.1002/cjas.89

[10] DE VILLIERS, C., NAIKER, V. and VAN STADEN, C. J. The effect of board characteristics on firm environmental performance. *Journal of Management.* 2011, vol. 37, issue 6, pp.1636–1663. https://doi.org/10.1177/0149206311411506

[11] DIENES, D. and VELTE, P. The Impact of Supervisory Board Composition on CSR Reporting. Evidence from the German Two-Tier System. *Sustainability.* 2016, vol.*8,* issue 63. https://doi.org/10.3390/su8010063

[12] ELHUNI, R.M. and AHMAD, M.M. Key Performance Indicators for Sustainable Production Evaluation in Oil and Gas Sector. *Procedia Manufacturing*. 2017, vol. 11, pp.718 – 724. doi: 10.1016/j.promfg.2017.07.172

[13] FIFKA MS. Zustand und Perspektiven der Nachhaltigkeitsberichterstattung. *Corporate Social Responsibility: Springer*. 2015, pp. 835–848. https://doi.org/0.1007/978-3-662-43483-3_54

[14] FUENTE, J.A., GACIA-SANCHEZ, I.M. and LOZANO, M.B. The role of the board of directors in the adoption of GRI guidelines for the disclosure of CSR information. *Journal of Cleaner Production*. 2017, vol. 141, pp.737-750. https://doi.org/10.1016/j.jclepro.2016.09.155

[15] GAMERSCHLAG, R., MOLLER, K. and VERBEETEN, F. Determinants of voluntary CSR disclosure: empirical evidence from Germany. *Review of Managerial Science*. 2010, vol. 5 , issue 2, pp.233-262. https://doi.org/10.1007/s11846-010-0052-3.

[16] German Corporate Governan ce Code. [online] 2015 [viewed 2017-05-17]. Available from: https://www.dcgk.de/en/code.html

[17] GIANNARAKIS, G. The determinants influencing the extent of CSR disclosure. *International Journal of Law and Management*. 2014, vol. 56, issue 5, pp.393–316. https://doi.org/10.1108/IJLMA-05-2013-0021

[18] GRI Standard. *GRI and sustainability reporting*. 2017 [viewed 2017-05-17]. Available from: https://www.globalreporting.org/information/sustainability-reporting/Pages/gri-standards.aspx

[19] IOANNOU, I. and SERAFEIM, G. The Impact of Corporate Social Responsibility on Investment Recommendations: Analysts' Perceptions and Shifting Institutional Logics. *Strategic Management Journal.* March 2014. https://doi.org/10.1002/smj.2268

[20] JENKINS, H. Small Business Champions for Corporate Social Responsibility. *Journal of Business Ethics*. 2006, vol. 67, issue 3, pp.241–56. https://doi.org/10.1007/s10551-006-9182-6

[21] JUNIOR, R.M., BEST, P.J. and COTTER, J. Sustainability reporting and assurance: a historical analysis on a world-wide phenomenon. *Journal of Business Ethics*. 2014, vol.120, issue 1, pp.1–11. https://doi.org/10.1007/s10551-013-1637-y

[22] KOENKER, R. and BASSETT, G. W. Regression Quantiles. *Econometrica.* 1978, vol.46, pp.33–50. https://doi.org/10.1007/s10687-015-0232-2

[23] KOLK, A. Trends in sustainability reporting by the fortune global 250. *Business Strategy and the Environment*. 2003, vol. 12, issue 5, pp. 279-291. https://doi.org/10.1002/bse.370

[24] KRAVCHENKO, M., PIGOSSO, D.C. and MCALOONE, T.C . Towards the ex-ante sustainability screening of circular economy initiatives in

manufacturing companies: Consolidation of leading sustainability-related performance indicators. *Journal of Cleaner Production*. 2019, vol.41. https://doi.org/10.1016/j.jclepro.2019.118318

[25] KUZEY, C. Cemil and UYAR, A. Determinants of sustainability reporting and its impact on firm value: Evidence from the emerging market of Turkey. *Journal of Cleaner Production*. 2017, vol. 143, pp. 27-39. http://dx.doi.org/10.1016/j.jclepro.2016.12.153

[26] KYLILI, A., FOKAIDES, P.A., AMPARO, P. and JIMENEZ, L. Key Performance Indicators (KPIs) approach in buildings renovation for the sustainability of the built environment: A review. *Renewable and Sustainable Energy Reviews*. 2016, vol. 56, pp.906–915. http://dx.doi.org/10.1016/j.rser.2015.11.096

[27] LAKSMANA, I. Corporate board governance and voluntary disclosure of executive compensation practice. *Contemporary Accounting Research*. 2008, vol. 25, issue 4, pp. 1147-1182. https://doi.org/10.1506/car.25.4.8

[28] LARRAN, M. and GINER, B. The use of the Internet for corporate reporting by Spanish companies. *International Journal of Digital Accounting Research*. 2002, vol.2, pp.53-82. https://doi.org/10.4192/1577-8517-v2_3

[29] LEGENDRE, S., and CODERRE, F. Determinants of GRI G3 application levels: the case of the Fortune Global 500. *Corporate Social Responsibility and Environmental Management*. 2013, vol. 20, issue 3, pp.182-192. https://doi.org/10.1002/csr.1285

[30] LIAO, L., LIN, T. P. and ZHANG, Y. Corporate board and corporate social responsibility assurance: Evidence from China. *Journal of Business Ethics*. 2016 http://dx.doi.org/10.1007/s10551-016-3176-9

[31] LUO, L., LAN, Y. and TANG, Q. Corporate incentives to disclose carbon information: evidence from the CDP Global 500 Report. Journal of International Financial Management and Accounting. 2012, vol. 23, issue 2, pp.93-120. https://doi.org/10.1111/j.1467-646X.2012.01055.x.

[32] MERTENS, G., MAAS, K., STROOTMAN, R. and MELIEFSTE, S. *KPIs and sustainability performance, An empirical analysis concerning the use and development of KPIs on sustainability performance reporting for the largest stock listed firms in the Netherlands.* 2012 [viewed 2018-04-12]. Available from: https://www.eumedion.nl/nl/public/kennisbank/publicaties/2012_kpis_and_su stainability_performance.pdf

[33] NEKHILI, B. M., NAGATIB, H., CHTIOUIC, T. and REBOLLEDOD, C. Corporate social responsibility disclosure and market value: Family versus nonfamily firms. *Journal of Business Research*. 2017, vol. 77, pp.41–52. http://dx.doi.org/10.1016/j.jbusres.2017.04.001

[34] NIKOLAOU, I.E. and TSALIS, T.A. Development of a Sustainable Balanced Scorecard Framework. *Ecological Indicators*. 2013, vol.34, pp. 76 – 86. https://doi.org/10.1016/j.ecolind.2013.04.005

[35] OHLSON, J. A. Earnings, Book Values, and Dividends in Equity Valuation. *Contemporary Accounting Research*. 1995, vol. 11, issue 2, pp.107-120. https://doi.org/10.1506/7TPJ-RXQN-TQC7-FFAE

[36] OZKAN, N. Do corporate governance mechanisms influence CEO compensation? An empirical investigation of UK companies. *Journal of Multinational Financial Management*. 2006, vol. 17, issue 5, pp.349-364. https://doi.org/10.1016/j.mulfin.2006.08.002

[37] PILLAIN, B., GEMECHU, E. and SONNEMANN, G. Identification of Key Sustainability Performance Indicators and related assessment methods for the carbon fiber recycling sector. *Ecological Indicators*. 2017, vol. 72, pp. 833–847. http://dx.doi.org/10.1016/j.ecolind.2016.08.056

[38] QIU, Y., SHAUKAT, A. and THARYAN, R. Environmental and social disclosures: Link with corporate financial performance. *The British Accounting Review*. 2016, vol. 48, pp.102-116. http://dx.doi.org/10.1016/j.bar.2014.10.007

[39] SAID, R., ZAINUDDIN, Y.H. and HARON, H. The relationship between corporate social responsibility disclosure and corporate governance characteristics in Malaysian public listed companies. *Social Responsibility Journal*. 2009, vol. 5, issue 2, pp. 212-226. https://doi.org/10.2139/ssrn.2276763.

[40] SIMNETT, R., VANSTRAELEN, A. and CHUA, W.F. Assurance on Sustainability Reports: An International Comparison. *The Accounting Review*, 2009, vol 84, issue 3, pp.937-967. https://doi.org/10.2308/accr.2009.84.3.937

[41] SIREGAR, S.V. and BACHTIAR, Y. Corporate social reporting: empirical evidence from Indonesia stock exchange. *International Journal of Islamic and Middle Eastern Finance and Management*. 2010, vol. 3, issue 3, pp. 241-252. https://doi.org/10.1108/17538391011072435

[42] SVENSSON, G., WOOD, G., SINGH, J. and CALLAGHAN, M. Implementation, communication and benefits of corporate codes of ethics: an international and longitudinal approach for Australia, Canada and Sweden. *Business Ethics: A European Review*. 2009, vol. 18, issue 4, 389-407. https://doi.org/10.1111/j.1467-8608.2009.01571.x

[43] VERBEETEN, F., GAMERSCHLAG, R. and MOLLER, K. Are CSR disclosures relevant for investors? Empirical evidence from Germany", *Management Decision*. 2016, vol. 54, issue 6, pp. 1359-1382. https://doi.org/10.1108/MD-08-2015-0345

[44] WAAS, T., HUGE, J., BLOCK, T., WRIGHT, T., BENITEZ-CAPISTROS, F. and VERBRUGGEN, A. Sustainability assessment and indicators: tools in a

decision-making strategy for sustainable development. Sustainable Times. 2014, vol. 6, pp. 5512-5534. https://doi.org/10. 3390/su6095512

[45] WU, J., LIU, L. and SULKOWSKI, A. Environmental disclosure, firm performance, and firm characteristics: An analysis of S and P 100 firms. *Journal of Academy of Business and Economics*. 2010, vol.10, issue 4, pp73-83. http://dx.doi.org/10.2139/ssrn.1861008

LIST OF PUBLICATIONS BY THE AUTHOR

Nguyen, T.T.Đ., (2020). An Empirical Study on the Impact of Sustainability Reporting on Firm Value. *Journal of Competitiveness*, 12(3): 119-135.

Nguyen, T.T.Đ. (2020). The Relationship between Board of Directors and Sustainability Reporting: an Empirical Study in German Large Listed Firms. *ACTA Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 68(1): 211-218.

Nguyen, T.T.Đ., (2017). Identifying Material Aspects and Boundaries for Sustainability Reporting: Case Studies in Czech Corporations. International Bata Scientific Conference for Ph.D. Students and Young Researchers.

Nguyen, T. T. Đ (2017). Impact of GRI-G4 compliance on firm performance: an empirical study on sustainability reporting in German and FRENCH firms. International Conference: Finance and Performance of Firms in Science, Education and Practice.

Nguyen, T.T.Đ., & Nguyen, T. T. T. (2015). Impact of board characteristics on firm performance: an empirical study on listed companies in Ho Chi Minh Stock Exchange (HOSE). International Conference on Accounting.

Nguyen, T.T.Đ (2011). Value Relevance of Accounting Information and Financial Ratios: An Empirical study on Vietnamese Stock Exchange. Banking Technology Review, 62.

AUTHOR'S PROFESSIONAL CURRICULUM VITAE

PERSIONAL INFORMATION

Full name   : Nguyen Thi Thuc Doan

Mobile phone   : +420 704 475 506

Email   : dnguyen@utb.cz

EXPERIENCES

2005 - current   ***Accounting Lecturer***

Organization: Banking University Ho Chi Minh City, Vietnam

Roles: Teaching and researching

Teaching languages: Vietnamese and English

Teaching modules: Principles of Accounting, Managerial Accounting, Financial Accounting and Reporting

2011-2016   ***Associate Lecturer for CPA program***

Organization: CPA training centre – Talentlink

Roles: Teaching Financial Accounting and Reporting module.

EDUCATION

2008 - 2010   Master of Business (Accounting), Monash University, Melbourne, VIC, Australia

2001 - 2005   Bachelor of Economics (Accounting), University of Economics, Danang, Vietnam

PROFESSIONAL MEMBERSHIP

CPA membership since 2012

Nguyen Thi Thuc Doan, Ph.D.

Sustainability Reporting and the Use of KPIs in Sustainability Performance: A Study in German Large Listed Firms

Výkaznictví a použití KPI v oblasti udržitelnosti: Studie velkých německých firem

Doctoral Thesis Summary