



Tomas Bata University in Zlín
Faculty of Management and Economics

Doctoral Thesis

**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**
Degree programme: P6202 Economic Policy and Administration
Degree course: 6202V010 Finance
Supervisor: prof. Ing. Boris Popesko, Ph.D.

Zlín, November, 2020

© Nguyen Thi Thuc Doan

Published by **Tomas Bata University in Zlín** in the Edition **Doctoral Thesis Summary**.

The publication was issued in the year 2020.

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

Key words in Czech: *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.

ISBN 978-80-.....

ACKNOWLEDGEMENTS

Firstly, I would like to express my sincere gratefulness to my supervisor Prof. Popesko for the great support for my PhD study and related research. His expert supervision has helped me in all the time of research and writing of this thesis. Without the professor's clear guidance, I would have immense difficulty determining the direction of my research and accomplishing the thesis properly.

Beside my supervisor, I would like to thank the lecturers which delivered great lectures and useful knowledge during my doctoral study. Especially, my sincere thanks go to Prof. Pavelkova and Dr. Homolka for their insightful comments and encouragement which help me widen my research from various perspectives. In addition, I am so appreciate the meaningful evaluation from examination committee of Methodology Module which provided me comprehensive suggestions for my thesis development.

I also would like to send my big thanks to my PhD colleagues for the inspiring discussions, valuable feedbacks on my research, and priceless experience in publishing process. In particular, I am grateful to Dr. Le for his talented leadership in IGA Project in the first two years of my PhD program and his sharing in research experience.

Additionally, I am so grateful to Mrs. Bartosova and Mrs. Drabkova for their enthusiastic supports since my beginning days in Czech Republic. Their professional working styles have smoothed the journey to achieve my higher education. They have properly and effectively responses to my concerns in many aspects. And I am so thankful for learning a lot from them.

Last but not the least; I would like to thank all of my family members who have provided me great support in every perspective. I dedicate this research to all of them.

Thank you very much for all your encouragement.

ABSTRACT

The requirement of transparent and accountable sustainability reporting has currently appeared as one of the most remarkable issues in business and among stakeholders. This issue has been demonstrated by the growing legislation of mandatory reporting regarding non financial information around the world and especially in European countries recently. However, concerns about practical impacts of these reporting disclosures on firms and factors that may influence the reporting are still presented. Therefore, research regarding the impacts of sustainability reporting on firm value, and the factors that affect firm's compliance in disclosing sustainability performance are investigated. Furthermore, to facilitate the use of Key sustainability performance indicators (KSPIs) in management and control system, proposed KSPIs in specific industries and developing roadmap for implementation of these indicators are identified. In order to lessen the variation in nation culture, geography, and regulations in the whole observation, the research focuses on German large listed companies. Germany is selected as an observed country due to the validity of the mandatory reporting requirement in non financial information in 2017. In addition, Germany is considered as one of the leading nations in sustainability performance development in European countries. The research also concentrates on Global Reporting Initiative (GRI) and considers adherent level to this standard as a measure of sustainability disclosure.

The research is conducted on 97 large listed firms in Germany from 2013 to 2017 which form a total of 485 observations. The thesis consists of three research questions, in which quantitative research is applied for question one and two, and a combination of quantitative and qualitative research is implemented for research question three. Quantile regression and Logistic regression are utilized to test the developed hypotheses in research question one and two respectively. In the meantime, questionnaire surveys and semi-structured interviews are used to solve research question three.

Outcomes from the research partly confirmed the significant positive relationship between firm value and sustainability disclosure as raised in research question one. As for research question two, sustainability disclosure has 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. Related to research question three, proposed KSPIs which include four economic indicators, eleven environmental indicators, and three social indicators are determined for automotive sector. For financial services sector, the numbers of indicators in economic, environmental, and social categories are seven, three, and five respectively. Furthermore, a roadmap for implementing KPIs for sustainability performance has been developed with six steps and relevant description has been provided in each step. Internal and external successful factors for implementation process are also considered in the pathway.

The research expects to provide significant insights for German large listed firms, shareholders, and other stakeholders to integrate sustainability reporting in their management, investment, and valuation decisions. In addition, the research on KSPIs in automotive and financial services industries raises the awareness of management in these sectors on the use of KSPIs of other firms. So that, they can get vital comprehension on how to choose the appropriate KPIs regarding the current set of KSPIs that the industry is using. The research findings also 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. Tento problém prokázala rostoucí legislativa povinného vykazování nefinančních informací po celém světě, zejména v evropských zemích, v poslední době. Obavy z praktických dopadů těchto zveřejňovaných informací na firmy a faktory, které mohou ovlivnit vykazování, však stále existují. Proto se zkoumá výzkum týkající se dopadů podávání zpráv o udržitelnosti na hodnotu firmy a faktory, které ovlivňují dodržování předpisů při zveřejňování výsledků udržitelnosti. Kromě toho, aby se usnadnilo používání klíčových ukazatelů výkonnosti udržitelnosti (KSPI) v řídicím a kontrolním systému, jsou identifikovány navrhované KSPI ve specifických průmyslových odvětvích a vypracování plánu implementace těchto indikátorů. Aby se zmírnily rozdíly v národní kultuře, geografii a předpisech v celém pozorování, výzkum se zaměřuje na velké německé společnosti kótované na burze. Německo je vybráno jako pozorovaná země kvůli platnosti požadavku povinného vykazování nefinančních informací v roce 2017. Kromě toho je Německo považováno za jeden z předních národů v oblasti rozvoje udržitelnosti v evropských zemích. Výzkum se také zaměřuje na iniciativu Global Reporting Initiative (GRI) a považuje úroveň tohoto standardu za měřítko zveřejnění udržitelnosti.

Výzkum je prováděn u 97 velkých společností kótovaných na burze v Německu v letech 2013 až 2017, což představuje celkem 485 pozorování. Diplomová práce se skládá ze tří výzkumných otázek, ve kterých je kvantitativní výzkum aplikován na otázku jedna a dvě, a kombinace kvantitativního a kvalitativního výzkumu je implementována pro výzkumnou otázku tři. Kvantilní regrese a logistická regrese se používají k testování rozvinutých hypotéz ve výzkumné otázce jedna, respektive dvě. Mezitím se k řešení výzkumné otázky tři používají dotazníkové průzkumy a polostrukturované rozhovory.

Výsledky výzkumu částečně potvrdily významný pozitivní vztah mezi hodnotou firmy a zveřejněním udržitelnosti, jak je uvedeno v první výzkumné otázce. Pokud jde o výzkumnou otázku dva, zveřejnění informací o udržitelnosti má nevýznamnou souvislost se všemi proměnnými v charakteristikách představenstva; odhaluje však významné pozitivní vazby na velikost firmy, stáří firmy a externí zajištění zpráv o udržitelnosti. V souvislosti s výzkumnou otázkou tři jsou pro automobilový průmysl určeny navrhované KSPI, které obsahují čtyři ekonomické ukazatele, jedenáct environmentálních indikátorů a tři sociální ukazatele. U sektoru finančních služeb je počet ukazatelů v ekonomických, environmentálních a sociálních kategoriích sedm, tři a pět. Dále byl vyvinut plán implementace KPI pro výkon udržitelnosti se šesti kroky a v každém kroku byl poskytnut příslušný popis. V rámci jsou zohledněny také interní a externí úspěšné faktory procesu implementace.

Výzkum předpokládá, že německým velkým společnostem, akcionářům a dalším zúčastněným stranám poskytne významné informace o integraci zpráv o

udržitelnosti do jejich rozhodnutí v oblasti řízení, investic a ocenění. Výzkum KSPI v automobilovém průmyslu a odvětví finančních služeb navíc zvyšuje povědomí managementu v těchto odvětvích o využívání KSPI jiných společností. Proto mohou získat zásadní porozumění tomu, jak zvolit vhodné KPI týkající se aktuální sady KSPI, které průmysl používá. Zjištění výzkumu také přispívají k akademickým literaturám o spojitosti mezi zveřejněním udržitelnosti a hodnotou firmy, jakož i ovlivněnými faktory, a o použití KSPI ve velkých společnostech kótovaných na burze v automobilovém a finančním sektoru.

CONTENTS

ACKNOWLEDGEMENTS	2
ABSTRACT	3
ABSTRAKT	5
LIST OF TABLES	10
LIST OF FIGURES	11
LIST OF ABBREVIATIONS	11
1. INTRODUCTION	12
1.1 Background of the study	12
1.2 Research Gaps.....	13
2. LITERATURE REVIEWS	17
2.1 Overview of Sustainability Reporting	17
2.1.1 Definition and research field of sustainability reporting	17
2.1.2 Sustainability reporting historical background and regulations.....	19
2.2 Research on Sustainability Reporting	20
2.2.1 Impact of sustainability reporting on firm	21
2.2.2 Sustainability disclosure and factors that influence firms' sustainability disclosure	22
2.3 Key Performance Indicators (KPIs) and Sustainability Activities.....	29
2.3.1 The need of sustainability performance indicators	29
2.3.2 Measuring sustainability performance	30
2.3.3 Research on key performance indicators of sustainability activities	32
2.4 Sustainability Reporting and Global Reporting Initiative (GRI)	34
2.4.1 The popularity of GRI in sustainability reporting practices	34
2.4.2 Research of sustainability reporting involving GRI	35
2.5 Theoretical Reviews.....	38
2.5.1 Stakeholder theory	39
2.5.2 Legitimacy theory	39
2.5.3 Neo-institutional theory	40
2.5.4 Signalling theory	40
2.5.5 Agency theory	41
2.5.6 Measurement theory.....	41
2.5.7 Contingent theory.....	41
3. RESEARCH DESIGN AND HYPOTHESES DEVELOPMENT	43
3.1 Research Problems and Research Objectives	43
3.2 Research Questions and Hypotheses Development	44
3.2.1 Research question 1: In what way do sustainability reporting disclosures impact on firm value? 44	

3.2.2 Research question 2: What factors influence sustainability reporting of German large listed firm?.....	47
3.2.3 Research question 3: How do German large listed firms use KPIs in their sustainability reports?	53
3.3 Conceptual Framework	54
4. RESEARCH METHODOLOGY	56
4.1 Research methods	56
4.2 Data collection	58
4.2.1 Data collection for research question 1	58
4.2.2 Data collection for research question 2.....	59
4.2.3 Data collection for research question 3.....	60
4.3 Model Specification and Detailed Analyses	62
4.4 Variables measurement	64
5. RESULTS AND DISCUSSION.....	68
5.1 Association between Sustainability Disclosure (SD) and Firm Value	68
5.1.1 Descriptive analysis	68
5.1.2 Assumptions tests for Multiple Regression	69
5.1.3 Quantile Regression Results	71
5.1.4 Robustness test.....	75
5.1.5 Discussion	76
5.2 Factors impact on Sustainability Reporting Disclosures	79
5.2.1 Descriptive analysis	79
5.2.2 Diagnostics for Ordinal Logistic Regression	83
5.2.3 Logistic Regression Results	85
5.2.4 Complementary results	86
5.2.5 Discussion	89
5.3 The use of KPIs for sustainability performance	92
5.3.1 Sustainability disclosures in automotive industry.....	92
5.3.2 Sustainability disclosures in financial service industry	100
5.3.3 Identification of KPIs of sustainability performance in Automotive and Financial Services Sectors.....	107
5.3.4 Roadmap of the implementation of KSPIs in Automotive and Financial Services Sectors	118
6. CONCLUSION.....	128
6.1 Summary of research objectives, data collection and research methodology.....	128
6.2 Summary of the association between sustainability disclosure and firm value.....	129
6.3 Summary of the association between sustainability disclosure and factors that influence firm’s sustainability disclosure.....	131
6.4 Summary of the identification and implementation of KSPIs	132
6.5 Contributions to practice and theory	133
6.6 Limitations of the research.....	135

BIBLIOGRAPHY..... 137
APENDICIES..... 155
LIST OF PUBLICATIONS BY THE AUTHOR 165
AUTHOR’S PROFESSIONAL CURRICULUM VITAE 165

LIST OF TABLES

Table 2.1. Association between Sustainability Reporting (SR) and Board of Directors' characteristics	23
Table 2.2. Association between Sustainability Reporting (SR) and firm features ...	26
Table 4.1. List of German large listed firms in Automotive and Financial Services Sectors.....	60
Table 4.2. GRI adherent level ranking	65
Table 4.3. List of control variables measurements in Research question 1-Model 1 and Model 2	65
Table 4.4. List of environmental friendly (F) and sensitive (S) industries	66
Table 4.5. List of independent variables measurements in Research question 2.....	67
Table 5.1. Description of dependent and independent variables in Model 1 and 2..	68
Table 5.2. Correlation matrix	69
Table 5.3. Test for constant variance and normal distribution.....	70
Table 5.4. Value of Skewness and Kurtosis	70
Table 5.5. Quantiles of share prices	71
Table 5.6. Empirical results: P-value and coefficient estimates by quantiles.....	72
Table 5.7. Robustness test: P-value and coefficient estimates by quantiles	75
Table 5.8. Descriptive Statistics	79
Table 5.9. Linktest results for detecting specification error.....	84
Table 5.10. Correlation matrix	84
Table 5.11. Goodness-of-fit test result	85
Table 5.12. Empirical results for all observations.....	86
Table 5.13. Assumption tests for models in environmental friendly and sensitive sectors	87
Table 5.14. Regression results for industry separation into sensitive and friendly sectors	88
Table 5.15. Hypotheses testing results	91
Table 5.16. Number of disclosures and KSPIs in automotive companies	98
Table 5.17. Number of disclosures and KSPIs in financial services companies ...	105
Table 5.18. Cronbach's alpha and Average of Likert values for each disclosure in Automotive Industry.....	108
Table 5.19. Proposed KSPIs for German Large Listed Firms in Automotive Industry	111
Table 5.20. Cronbach's alpha and Average of Likert values for each disclosure in Financial Services Industry	112
Table 5.21. Proposed KSPIs for German Large Listed Firms in Financial Services Industry.....	115
Table 5.22. Factors that impact on the selection of KSPIs	116

LIST OF FIGURES

Figure 3.1. Research conceptual framework	55
Figure 5.1. Board size description	79
Figure 5.2. Board independence description	80
Figure 5.3. Board Diversity Description	81
Figure 5.4. Board Diversity trend.....	81
Figure 5.5. Board Committee Description	82
Figure 5.6. Board Meetings Description	83
Figure 5.7. The response repetition on number of KSPIs in automotive sector	117
Figure 5.8. The response repetition on number of KSPIs in financial services sector	117
Figure 5.9: Roadmap for implementing KPIs for sustainability performance.....	124

LIST OF ABBREVIATIONS

BODs	= Board of Directors
CERES	= Coalition for Environmentally Responsible Economies
CSR	= Corporate Social Responsibility
GRI	= Global Reporting Initiative
KPIs	= Key Performance Indicators
KSPIs	= Key Sustainability Performance Indicators
SD	= Sustainability Disclosure
TBL	= Triple Bottom Line
UNEP	= United Nations Environment Program
UNGC	= United Nations Global Compact

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; Stubbs, Higgins and Milne, 2012). In addition, shareholders presently pay more attention on environmental, social and governance information when making investment and voting decisions. This can be explained by firm sufficient sustainability information somehow revealing firm sustainability development and firm strategies' risks and opportunities. Therefore, the important issue that firms need to do is not simply making a sustainable report, but to ensure that the report is clear, transparent and accountable.

Despite of the fact that sustainability reporting has been attractive to many stakeholders, disclosures of sustainability information has raised great concerns in the literatures. Although with standardization attempt of sustainability reporting, inconsistencies still remain which lead to the reliability and quality issue of sustainability reports (Hahn and Kuhnen, 2013). These inconsistencies have been caused by sustainability reporting's focusing on different perspectives such as marketing (Duchon and Drake, 2009), or management strategies (Cho et al., 2012). In addition, it has potential threat that firm can use sustainability reporting for greenwashing purposes (Delmas and Burbano, 2011; Lyon and Maxwell, 2011) which may mislead actual firm sustainability performance, then directly impact users' perception. Meanwhile, the quality of disclosed sustainability performance does not always meet its user expectation. According to IFAC (2012), information relating to environment, social and governance is frequently disclosed in a incoherent manner which lead to ambiguous links between sustainability information and firm strategy, financial performance, operation, and risks and opportunities.

With the effort to improve disclosed quality of sustainability reporting, another issues emerge as so many guidelines and standards have been published which may distract firms' application. From 1993 to 2017, thirty five new standards were issued and eighteen standards were updated. Among these, more than 29 standards and guidelines have been published or amended for global application, another 8 standards are applied for European Union, and significant numbers of standards have been issued under European national level (Appendix 1). According to Carrots and Sticks (2016), nearly 400 sustainability reporting instruments, including governing bodies regulation and policy, organization self-regulation, voluntary

guidelines and other standards, have been identified. These standards are different in character, focus, and themes; some are compulsory while others are voluntary. Therefore, firms may get trouble when considering which guideline is the most appropriate to firm. It also may take time for firms to comprehend the whole guidance contents, then how to implement the advices successfully.

Even though there are abundance of sustainability reporting guidelines, framework in setting appropriate set of key sustainability performance indicators (KSPIs) are still in need. KSPIs have been revealed their benefits for investors in making appropriate decision relating to firms (IFAC, 2012), and other stakeholders in using firm's sustainability information (Saka and Oshika, 2014; Bebbington et al., 2009). According to Singh et al. (2012), sustainability information which includes environmental advantages and technical practicability leads to well informed assessment. However, currently, reviews and guidance on identifying proper set of KSPIs which can support in evaluating firm sustainability performance have not been profoundly explored (Hristov and Chirico, 2019). Most of available standards present and explain possible indicators that should be used to capture firm sustainability performance. Nevertheless, the considerable number of potential indicators in each theme may distract the focus of firms themselves and of the users of the information. Therefore, identifying suitable KSPIs are highly required which lead to the desire in improvement of current standards on the issue.

Along with the significance of sustainability reporting and its current issues, increasing requirement for mandatory disclosures facilitate attempt to solve these issues and to enhance sustainability reporting advantages. Although voluntary instruments rise significantly, the mandatory ones dominate existing sustainability reporting instruments. Indeed, among nearly 400 observed sustainability reporting instruments in 64 countries, two third are compulsory (Carrots and Sticks, 2016). In Europe, mandatory instruments emerge due to governments and EU Commission requirements. For instance, according to EU Directive 2014/95/EU, large European companies must disclose sustainability information relating to environment, social, human rights, employees, anti-corruption, and diversity. In comparison to other regions, Europe has higher number of nations that report sustainability performance and their sustainability reporting is more mature (Carrots and Sticks, 2016). Due to the enhancement of mandatory disclosure of sustainability reporting, especially in Europe, this research focuses on solving present issues that firms may encounter relating to sustainability reporting in this region.

1.2 Research Gaps

Despite the fact that sustainability reporting research is widely investigated, the perception of stakeholders on the benefits of sustainability reporting is still unclear and the need for further examination on sustainability reporting practices is desired. One of the current concerned areas of sustainability reporting is its association with market value (Kaspereit and Lopatta, 2016). Awareness of the public relating to corporate social and environment issues has required firms to disclose their efforts

and actions taken on these issues. Somehow these information transparencies meet the needs of many stakeholders including shareholders (Wang and Li, 2015). However, whether investing into sustainability reporting facilitates firm value is still questionable (Cahan et al., 2016). Possible reasons for the issues may come from different observations, variant measurements of sustainability performance in previous research. As a result, this research's purpose is to test the effect of sustainability disclosure on firm value which focuses on a specific country to reduce the inconsistent factors relating culture, geographic and legislation among different countries. The research also concentrates on large listed companies to achieve the consistency in firm size and regulation involving this type of companies.

With current focus on European countries due to the domination of mandatory regulation relating to reporting non-financial information, Germany is chosen as a research country in this study due to its initiative position in sustainability reporting development in Europe. Moreover, Germany is also one of the biggest industrial nations in Europe which is for the first time applying mandatory sustainability reporting standard. Research on first-time compulsory implementing can lead to advantages in investigating impact of regulation on sustainability reporting quality without considering previous regulations. The research focus on large listed firms in Germany as this firm groups are highly impacted by current regulations relating to Directive 2014/95/EU, and are committed to current corporate governance rules. Along with Directive 2014/95/EU, Germany Bundestag set the legislation to enhance firm transparency in non-financial perspectives. Mandatory reporting is applied to big companies which have more than 500 employees, and more than EUR 20 million of total balance sheets, or more than EUR 40 million of revenues. The regulation is expected to impact on around 550 companies in Germany alone (Kluge and Sick, 2016). These companies are required to publish their sustainability reporting from 2018 onwards.

The other concerned aspect regarding to sustainability reporting is its disclosures quality as greater disclosure lead to better information for report users and lower information asymmetry. As the final approach for every report is its ending users, hence, the better information for the users will assure the significant value of the report. Different from previous research, this research do not concentrate on how to measure the quality, or to evaluate the quality of sustainability reporting. This study pays more attention on factors that may impact sustainability reporting disclosures. These factors are considered in all aspects relating to firm management, firm features, and sustainability report characteristics. In order to take focus on the influenced factors and report transparency instead of assessing sustainability reporting quality, it is important to clarify how sustainability reporting disclosures is determined. Frequently, sustainability reporting have been prepared base on specific standards or guidelines. Firms in some countries may choose appropriate guidelines for themselves, but some other nations may issue mandatory standards which firms have to comply with. Recently, German large listed companies currently can choose suitable guidelines as their desires to prepare sustainability reports. The flexibilities

in choosing appropriate guidelines and in disclosing non-financial information may lead to significant differences among firms' sustainability reporting because each guidance may have different focus and framework from the others. Therefore, this research takes one prevail standard as the pioneer to determine the transparency of firm sustainability report. In this extent, the more likely firm complies with the standard, the higher possibility that firm sustainability reporting transparency is better.

In order to achieve the consistency in determination of sustainability reporting transparency, Global Reporting Initiative (GRI) is taken as a core guideline in this research due to its popularity and convenience. Nowadays, more and more companies are now partly or totally applying GRI guidelines in their sustainable reports. As indicated in KPMG survey in 2017, GRI is the most popular framework for sustainability reporting (KPMG, 2017). For the 250 largest companies around the world, 92% corporations disclose sustainability reports in which 74% are based GRI guideline (GRI Standards, 2017). GRI use adherent level to reflect the degree that firm applies GRI Sustainability Reporting Framework and GRI Standard in their sustainability reports. The higher of adherent level reveals greater disclosure of sustainability report. Better disclosure enhances transparency and provides more information for report users in their decision making. Therefore, this thesis uses GRI adherent level as a measure of how well firm disclose sustainability performance. The GRI adherent status includes GRI Standards, G4, G3 and G3.1, G2, Citing, and Non-GRI. These GRI adherent levels, which are determined based on a well defined checklist created by GRI, are able to gather from GRI Database.

Last but not least, determining key performance indicators (KPIs) for sustainability activities, which can assure the consistency with firm strategy and can be achievable, is also current major firm issues. The need to identify relevant key sustainability performance indicators is increasingly meaningful due to their ability to provide major information about economic, social and environmental issues. The use of KPIs for sustainability activities is declared as important tool for not only internal controlling system and managerial accounting but also external accountability issues (Mertens et al., 2012). The needs of universal reporting standard relating to KPIs for sustainability performance therefore are aware by information users. With the necessity in determination of appropriate set of key performance indicators for sustainability, and current regulations in the European countries, especially in Germany, the research orients sustainability reporting and application of KPIs on sustainability activities. Compulsory sustainability reporting is active in 2017, therefore, research relating to KSPIs is considered for German large listed firms in 2017. As the core sustainability reporting standard being used in this thesis is GRI, Sustainability reports of German large listed firms which comply with GRI in 2017 are collected for further investigating relating to KSPIs.

After solving the above research gaps, 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

impacted factors to transparency of sustainability reporting. These literatures focus on the observations of German large listed firms in the up-to-date period between 2013 and 2017. 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

As a vital aspect of corporate sustainability, sustainability reporting has attracted increasing awareness of corporations and stakeholders and sustainability reporting has transformed during its development. Fifka (2012) states that corporate reporting has changed its approaches since the 1970s. Since the 1990s, more complete reporting on corporate social responsibility (CSR) or sustainability has been paid attention to (Dienes, Sassen and Fisher, 2016). As a result, literatures cover many types of reporting practices such as social reporting, environmental reporting, triple bottom line reporting, CSR reporting, sustainability reporting. In order to clarify the term sustainability reporting, the following part provides definitions of this term in considering its relation with previous terms such as triple bottom line or CSR reporting.

Sustainability reporting is well defined by the 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 organizations in setting appropriate goals and managing change more efficiently. Sustainability reporting collects and discloses both financial and non-financial information including economic, social, environmental, ethical, and employee concerns. Sustainability reporting also identifies indicators and sustainability purposes based on firms' strategy. Sustainability reporting can be disclosed voluntarily or mandatorily to provide appropriate information about economic, environmental, and social aspects for the stakeholders. Lu (2017) finds sustainability reports present better CSR disclosures for stakeholders than annual reports. However, currently, more countries and organizations have required companies and members to comply with mandatory sustainability reports. This can be seen as one way to aware firms and make firms react to the impact of firms' activities on environmental and social issues.

The most common consistent names of sustainability reporting can be non-financial reporting, triple bottom line reporting, and corporate social responsibility reporting (GRI, 2017). Non-financial reporting consists of social and environmental aspects, employees and human rights, anticorruption and bribery measures, and the issues need to be reflected in firm business model, policy risks, and management and board of directors' policies (European Union, 2014). Meanwhile, triple bottom line (TBL), which refers to economic, environmental, and social perspectives, is considered as a well-known concept to describe sustainability. The focus on the three dimensions of TBL leads to the arguments on widening the approaches to be

consistent with sustainability concept such as considering corporate governance issues. In the meantime, CSR reveals its direct link to sustainability due to the combination of long-term profitability and social and environmental concerns (European Commission, 2014). Not only be responsible for the influences of firms on society, firms under CSR term also incorporate social, ethical, environment, consumer, and human rights issues to firms' strategy and business procedures. Consequently, CSR and sustainability concept and reporting are considered to be consistent (Hahn and Kuhnen, 2013).

Along with mentioned names, sustainability reporting can be found as a separate sustainability report, an annual report with sustainability sections, or an integrated sustainability reporting. An integrated sustainability reporting is a progression of preparing a report by combining financial reports and sustainability reports together. Intention for producing an integrated report is to entangle sustainability activities and strategy, which leads sustainability to an integral part of business performance (Mertens et al., 2012). As for separate sustainability reporting, the report is prepared to attract attention of stakeholders on sustainability issues (Mertens et al., 2012).

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. Thomson (2011) also confirms sustainability reporting as a part of sustainability accounting field. This thesis concentrates on the contribution of sustainability reporting on firm, on gaining awareness of stakeholders on sustainability benefits, and on attaining relevant KPIs of sustainability performance to support firm as well as internal and external stakeholders in their decision making. As a result, this focus is consistent with sustainability reporting aims in accounting field.

Previous researchers also confirm the accounting field of sustainability reporting (Coyne et al., 2010). Coyne et al. (2010) divide accounting research into relevant topics such as financial accounting, managerial accounting, auditing, taxation, accounting information system, and other which indicates research that does not belong to the previous topics. Sustainability reporting, according to Coyne et al. (2010) is classified to 'other' category. Subsequently, sustainability reporting is argued to be the universe of all possible accounting reporting which is classifies as GAAP reporting research field. In addition to accounting field, sustainability reports are also considered as marketing instruments. As increasing demand of third parties on non-financial information, and diverse stakeholders' awareness on industry focus, sustainability reports are used as marketing instruments to get attention of these external bodies and stakeholders (Freundlieb and Teuteberg, 2013).

2.1.2 Sustainability reporting historical background and regulations

Sustainability reporting has transformed significantly during its development since the 1960s. Awareness of non-financial information started around the 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). Social information firstly consisted of firm employee social benefits, and then extended to product quality and social commitment (Fifka, 2015). Attempts to report social activities began in France and the Netherlands, afterwards spread to Austria, Germany, and Switzerland. During the 1980s, a new investment approach, which was introduced by the UK and the US, concentrated not only on firm social but also firm ethical performance. The investment funds were created by this approach excluded firm from less ethical sectors such as alcohol and tobacco. After a severe Exxon Valdez disaster in 1989, the worst oil spill in the US, the Coalition for Environmentally Responsible Economies (CERES) issued the Valdez Principles, subsequently called the CERES principles which provide guidance on environmental reporting. Then, the first separate environmental report is published in the same year 1989. 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. The popular term using at this time referred to triple bottom line reporting which covers economic, environmental, and social perspectives. Also in the end of 1990s and beginning of 2000s, along with considerable growth of voluntary corporate sustainability reporting, this report itself changed the focus from disclosing environmental information to presenting more social and economic performance (Freundlieb and Teuteberg, 2013). Consistent with this shift, names of the report also changed from environmental reporting to corporate citizenship report, then, to corporate social responsibility report, and currently to sustainability report (Fifka, 2015). Even though currently, more and more organization issue their sustainability reports, emerge social and environmental issues such as poverty, corruption, equality, global climate changes, and waste require firms to implement more efficient practice of sustainability reporting. Furthermore, it is believed that firms tend to provide lagging information instead of information about firm future view (Simnett et al., 2009), and firms is likely to have self-regulated ability (Edelman Trust Barometer, 2009) which then can influence sustainability information reliability. In the meantime, demands for using sustainability information of firm stakeholders steadily increase (Ioannou and Serafeim, 2014). These realities triggers for the appearance of mandatory sustainability reporting in countries around the world.

Along with the development of sustainability reporting, regulations relating to it also have considerable growths. The development of these regulations has started since 1993 which are classified into voluntary and mandatory regulations (Appendix 1). 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). With the existence of high volume of guidelines, some of guidelines seek the harmonization by long-term cooperation with other guidelines bodies. For instants, strategic partnerships have been created between GRI and IIRC in 2013, GRI and ISO in 2011, GRI and UNGC in 2010, and GRI and OECD in 2010.

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. However, voluntary and semi-mandatory disclosures have been existed more than 30 years due to multinational firms (Herzig and Kuhn, 2017), and more and more firms are willing to provide sustainability information. Indeed, about 26 out of 30 German biggest firm traded in Frankfurt Stock Exchange disclosed non-financial information in 2010, (Fifka, 2014), and this number increase to 28 firms in 2016 (Kirchhoff, 2017). However, German firm sustainability reporting need further enhancement in both quality and quantity. While mandatory sustainability reporting legislation is confirmed to directly impact on reporting volume, insufficient evidence has showed for the improvement of reporting quality (Gulenko, 2018). Nevertheless, the issue of Directive 2014/95/EU is believed somehow contributes to accounting practices' harmonization and reporting transparency in European economy to avoid conflicts of interest and assure all stakeholders' welfare (La Torre et al., 2018). As a result, implementation of Directive 2014/95/EU can be seen as the first examination of mandatory sustainability disclosures on sustainability reporting quality.

2.2 Research on Sustainability Reporting

Corporate sustainability has recently emerged due to the integration of corporations long-term goals with healthy and sustainable development of global economy, environment and society. This makes corporate sustainability benefits not only firms themselves but also other stakeholders. Therefore, corporate sustainability is argued to be able to predict and decrease conflicts between firms, community and its stakeholders. With these impacts, more and more firms tend to implementing sustainability activities to attract the awareness of stakeholders regarding good effort firms are performing to improve social and environment issues, and boost human's well-being.

As sustainability reporting is broadly studied, following contents provide reviews of previous research relating to the topic. The review of previous research is performed in the global aspect and then in Germany. In order to set appropriate

focus for the review, current issues of this thesis are considered. These focuses consists of main themes relating to sustainability reporting, for instance, impact of sustainability reporting on firm, sustainability disclosure and factors influencing 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. Increase in mandatory sustainability reporting also attracts investors' awareness in this area (Cormier and Magnan, 2007). With increasing awareness, investors are more likely to favour firms with better sustainability reporting when making investing decision (Cormier et al., 2009). Eccles et al. (2011) confirm that well-performed sustainability firms achieve 4.8 percent higher share price over the long-term period than its competitors. Therefore, it can be argued that greater sustainability disclosure tend to have favourable impact on firm value. Beside investors, strong sustainability transparency including firm social performance such as gender diversity or payment equality can also catch attention and retain good employees (Cormier et al., 2011). This in turn positively influences firm value due to improved productivity, reduced distributional conflicts. Anam et al. (2011) affirm that transparency and disclosure facilitate evaluation quality of share price which lead to firm value enhancement. In addition, Momin and Parker (2013) demonstrate sustainability reporting as a tool to retain multinational organization reputation. Better reputation can be achieved due to the competitive advantaged created by environmental and social transparency. Clarkson et al. (2010) also find that the longer time firms try to enhance their environmental performance, the better economic benefits, and the more efficient resources usage firms can achieve. Positive influences of firm corporate sustainability reporting on financial value are also proved by Guidry and Patten (2010), Berthelot et al. (2012), and Qiu et al. (2016)

Along with favourable influences, sustainability reporting has been shown adverse or no relationship with firm value in previous research. Wu et al. (2010) discover the negative relation between environmental disclosures and firm performance. As for Mahoney et al. (2013), misleading and bias sustainability reporting exist due to firm's selected favourable sustainability performance disclosure. The failure in information transparency results in the assumption of a low quality firm as hidden information is likely to consider as bad news. This in turn can negatively impact on firm value. Further study has been carried by Jones et al. (2007) for the association between sustainability disclosure and firm value in long term. The authors also find unfavourable connections between these two variables. In the mean time, some studies have failed to find the relationships between corporate sustainability and firm value (Clarkson et al., 2010; Qiu et al., 2016).

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).

Different effects of corporate sustainability disclosure on firm value make it worthy to test the associate with more tailored features of the sample. Possible reasons for these diverse impacts can be the variance in research observation, different research methods and approaches. In order to tackle these issues, this research focuses the observations on one country, and on the same corporations' size. With lower impact from other side factors when carrying out the research in the same countries and same size of corporation, the examination on whether application and disclosure of sustainability programs affect firm may be more accurate for the research observations. Moreover, to avoid subjective opinion when evaluating sustainability report disclosures quality, this study applies firm's adherent level to GRI guideline which can be found directly from GRI database as a measurement for sustainability reporting.

2.2.2 Sustainability disclosure and factors that influence firms' sustainability disclosure

With detail analysis of sustainability reporting from previous research, it is perceived that its disclosure has not been as same as each other due to variety of factors. Following part reviews literatures that reveal the impact of different countries which firms belong to, of board of directors' characteristics, of firms' features, and of sustainability reports' characteristics on sustainability reporting.

Firstly, sustainability reporting can be formed differently among companies from developed and developing countries (Prieto-Carron et al., 2006). Currently, perception of sustainability reporting is likely to retrieve from research in developed countries. Sustainability performance in developed countries are significant prevail than those in developing countries, hence the number of existing research are also considerable varied between these two groups. Prieto-Carron et al. (2006) concern whether existing research on sustainability in developing countries are sufficient to demonstrate the main context in these nations. In a research of fifty six companies in Libyan, Pratten and Mashat (2005) find that information illustrated in these companies' sustainability reports are considerable less than in developed countries. These reports cover limited topics relating to employees and community connection

(Pratten and Mashat, 2009). In another developing country, Bangladesh, sustainability reports avoid presenting sensitive issues relating to environment and local community such as child labour and pollution (Belal, 2003). These reports mainly concentrate on perspectives of government, customers, employees, and investors (Belal, 2003). In comparison to sustainability reporting of firms from developed countries, the disclosure contents of those from developing countries seem imbalanced, and insufficient. In addition, sustainability is a trend in western countries and sustainability reporting grows more in developed countries.

Secondly, board of directors, as one of the key parts of corporate governance, can be seen as key factor that impact firm sustainability reporting. Corporate sustainability is not standing alone but often has an inter-linkage with corporate governance. Majeed, Aziz, and Saleem (2015) also emphasize the importance of corporate governance in achievement of a successful sustainability target. Whether firm is able to achieve a high quality sustainability report or not may greatly depends on the role of the board of directors, one of important elements of corporate governance (Liao et al., 2016). As representatives of stakeholders, board of directors is accountable for risk management, reporting (Desjardins and Willis, 2009), and sustainability issues (Huse et al., 2009). Luo, Lan, and Tang (2012) find out that boards of directors and managers are extremely carefully in deciding which information should be disclosed in sustainability reports. This research 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. Reviews on prior studies are summarised in Table 2.1 which also provides explanation on the impact of some major characteristics of board of directors on sustainability reporting. Reasons for choosing these characteristics can be found in the hypothesis development part.

Table 2.1. Association between Sustainability Reporting (SR) and Board of Directors' characteristics

Association between SR and		Authors and year published	Explanation
Board size	+	Siregar and Bachtiar, 2010; Frias-Aceituno et al., 2012; Giannarakis, 2014; Hu and Loh, 2018;	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)
	-	Said et al., 2009; Prado - Lorenzo and Garcia - Sanchez, 2010.	Large board tends to have more argument which lead to inconsistency and unsuccessful

Association between SR and		Authors and year published	Explanation
			harmonization in decision making and communication (Said et al., 2009)
	0	Giannarakis, 2014; Fuente et al., 2017.	
Board independence	+	Prado-Lorenzo et al., 2009; Zubaidah et al., 2009; Siregar and Bachtiar, 2010; de Villiers et al., 2011; Fuente et al., 2017; Hu and Loh, 2018.	Independent directors can be more objective in assessing firm performance as they are self-sufficient from firm procedures (de Villiers et al., 2011). Moreover, it is harder for firm management to influence independent directors as their careers and benefits are not reliant on firm management levels. As a result, independent directors are not likely to conspire with firm management to stay against firm stakeholders (Eng and Mak, 2003).
	-	Ozkan, 2006; Guest, 2008.	Independent directors are unfamiliar with company performances (Ozkan, 2006, Guest 2008).
	0	Michelon and Parbonetti, 2012; Frias-Aceituno et al., 2012.	
Board gender diversity	+	Miller and Triana, 2009; Prado-Lorenzo and Garcia-Sanchez, 2010; Frias-Aceituno et al., 2012; Gul et al., 2013; Boulouta, 2013; Liao et al., 2016; Fuente et al., 2017.	Female members in board care more about social and ethical focus and are less self-centred than male directors (Liao et al., 2016). In addition, with appearance of women in board, it is more likely that firm consistently complies with social regulations and stakeholder expectation (Miller and Triana, 2009). Female directors contribute to the quality of sustainability reporting by

Association between SR and	Authors and year published	Explanation
		facilitating the use of external assurance (Liao et al., 2016), preventing reporting misconduct (Boulouta, 2013), and reducing information asymmetry (Gul et al., 2013). Possessing different personality and style from male, female directors have a tendency to improve problem solving, enhance leadership efficiency, avoiding unwilling legal action and reputation reduction (Srinidhi et al., 2011).
-	Handajani et al., 2014	A number of female members in board of directors have insufficient knowledge and experience to effectively participate in board
0	Prado-Lorenzo et al., 2009; Khan, 2010; Prado-Lorenzo and Garcia-Sanchez, 2010; Giannarakis, 2014.	
Board subcommittees	Berrone and Gomez-Mejia, 2009; Fuente et al, 2017.	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).
Board meetings	Laksmana, 2008; Gul et al., 2011; Giannarakis, 2014.	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)

Association between SR and		Authors and year published	Explanation
	-	Dienes and Velte, 2016	There is a possibility that regular meetings are just a split of the agenda without adding more sustainability issues that need to be addressed
	0	Giannarakis, 2014; Fuente et al., 2017.	

(+) *Positive association*, (-) *Negative association*, (0) *No association*

Source: Author's compilation and classification based on previous research

Thirdly, 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 (Table 2.2). However, following reviews found no negative impact of firm size on sustainability disclosure, which means the bigger firm is, the better sustainability reporting is. Besides the explanation for large firms to disclose more sustainability information in Table 2.2, it is possibility that smaller firms hesitate to provide more detail information to protect themselves from tough competition, restricted resources, and insufficient capacity. 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; Svensson et al., 2009). Along with significant influences of industries types on sustainability reporting, insignificant impacts are found by Larran and Giner (2002).

Table 2.2. Association between Sustainability Reporting (SR) and firm features

Association between SR and		Authors and year published	Explanation
Firm profitability	+	Giannarakis, 2014; Gamerschlag et al., 2010 (with environmental disclosure);	26. In profitability firm, management have more choice to disclose

Association between SR and	Authors and year published	Explanation
	Tagesson et al., 2009; Khan, 2010; Qiu et al., 2016.	sustainability information as firm has more financial resource to cover the disclosures expenses (Tagesson <i>et al.</i> , 2009). Furthermore, profitable companies have more incentive to publish more information to prove their success in the capital market
	De Villiers and Van Staden, 2011; Li et al., 2013.	Spending on sustainability activities can cause shortage of resources including finance and managerial time for other core activities of firms. In addition, benefits from sustainability expenditures are not sufficient to earn expected increased revenue.
	Larran and Giner, 2002; Prado-Lorenzo et al., 2009; Siregar and Bachtiar, 2010; Qiu et al., 2016; Fuente et al., 2017.	
Firm size	Siregar and Bachtiar, 2010; Gamerschlag et al., 2010; Khan, 2010; Rahman et al., 2011; Sharif and Rashid, 2014.	Large firms usually have more resources to invest in sustainability activities, and expenditures for these activities seem to occupy small proportion in total firm costs when firm size is big (Siregar and Bachtiar, 2010).
	0 Khanna et al., 2004.	
Firm age	+ Godos-Diez et al., 2011; Bayoud et al., 2012.	Older firms seem to have greater knowledge, effective skills, superior capacity, and higher reputation (Agarwal and Gort, 2002). Accordingly, they have more abilities to effectively report

Association between SR and	Authors and year published	Explanation
		sustainability activities.
-	Rettab et al., 2009; Xianbing Liu and Anbumozhi, 2009; Marquis and Qian, 2014; Shamil et al., 2014.	As a research in China, old firms are seen to have conventional formation and slowly take action to the changes of current legislation; meanwhile, young companies have more motivations to set up their authority, then quickly comply with new practices such as sustainability reporting (Peng, 2004)
0	Hossain and Reaz, 2007.	

(+) Positive association, (-) Negative association, (0) No association

Source: Author's compilation and classification based on previous research

Fourthly, sustainability report characteristics such as audited or integrated report seem impact the report disclosures. Assurance of sustainability report is considered as impact factor on the report disclosure as the report cannot be a self-evident illustration for its transparency quality (Junior et al., 2014). 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). According to Company Act, sustainability report credibility can be achieved when firm can balance attitude and association of stakeholders, and take external reporting standards and external assurance into account. In addition, without external assurance, credibility of sustainability report is proved to be inconsistent. 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. As for integrated reporting, it is taken into account as it can solve current issue of sustainability report which concentrated on non-financial information. Integrated report covers major information about firm strategy, performance, prospects and governance in commercial, social and environmental perspectives. Therefore, it is expected to approach and provide relevant information for larger group of stakeholders. Integrated report is believed to provide both favourable and unfavourable influences of firm activities on the economy, environment and community.

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 investigate influence of gender diversity, former manager existent, board meetings, board size, and board expertise on corporate social responsibility reporting of 35 German firms in 2011. The German firms are extracted from ranking data of CSR report from Institutes for Ecological Economy Research. The authors just find significant positive association between gender diversity and CSR reporting. In another study on impact of corporate governance on CSR reporting of German DAX30, Bassiouny and Bassiouny (2018) find no significant connection between foreign board of directors, board independence 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.

To sum up, even though past literatures cover wide issues regarding sustainability reporting, findings on impact of relevant factors on sustainability reporting still present considerable conflicts. Moreover, considering these research topics in Germany, it can be seen the research has not used up-to-date data and has not covered all three factors including corporate governance, firm features, and sustainability report characteristics to investigate the impact on sustainability reporting. Subsequently, this thesis aims to further examining the association with considering more relevant impacted factors and covering the current research period.

2.3 Key Performance Indicators (KPIs) and Sustainability Activities

2.3.1 The need of sustainability performance indicators

Growing in competitive environment requires every organization to enhance competitive advantages by applying appropriate performance indicators system to improve both external and internal operation performance. Major objectives of performance measures are presenting a base for corporation strategy's formulation and implementation, and encouraging management and other stakeholders to recognize and accomplish goals (Stamatovic and Zakic, 2010). Nonetheless, developing measurements to facilitate targets' success is not just matching list of benchmarks with setting targets. It requires more efforts which involve professional knowledge and judgment on strategic planning and operational work. Correct performance indicators can enhance performance, otherwise it can be costly, time-consuming and inefficient for companies. Therefore, proper collection of indicators that are employed for measuring organization performance is significantly importance for control and reward systems, and performance improvement.

Presently, it is necessary for firms to use both financial and non-financial indicators to evaluate how successful organization performs in achieving setting targets. Traditionally, performance indicators just involved financial measures which then revealed certain drawbacks such as short-term and lagged view of performance. With current business conditions, it requires firms to process best information to enhance competing position in the market. Therefore, it is in need for firms to use both financial and non-financial. Non financial measurements are not considered as the alternatives of financial indicators but are used with financial indicators to be able to supplement to each other.

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 Measuring sustainability performance

To identify relevant indicators for specific performance, it is in need to define the measurement of that performance in relation to its measurement system. In order to efficiently apply these performance measures, they should be complemented by adequate control procedures before improvement in performance is achievable. This requires a sound indicator monitoring system to be designed and implemented to facilitate management and reporting capability of information retrieved from performance indicators analysis. This system can describe and explain for the performance of organization, and should retain regular review on indicators to have correct adjustment to facilitate performance improvement (Castro, 2011). To have such fine system, it is necessary to devote time and efforts in developing indicators that can clearly portray expect targets. It is also noticed that proposing several superior indicators can be more useful than devising hundreds of indicators. Indeed, spending much on preparing enormous amounts of indicators cannot assure for targets achievement and performance enhancement in corporations (Castro, 2011). An adapted and familiar logic approach can be far more important as it can response to specific performance measurement needs of key users, and guarantee that information sources are available, reliable, and have adequate baseline measurement. While constructing performance measurement systems, it cannot be neglected challenges when collecting performance information to build performance indicators as it can impact on the system quality. These difficulties may include dependence on statistical estimations, unavailable information of outcome

indicators; hard-to-measure outcome; or time-consuming and expensive information retrieval.

Understanding roles of performance measurement and realizing main issues in designing performance management systems, more detail discussion relating to measuring sustainability performance are revealed. Sustainability activities are currently integrated more with corporate sustainability approach (Ferguson, 2009). Strategic management theory states that a firm's key success is to create competitive advantages which can lead to the firm's value creation. This value creation is measure by consumers' willing to pay a premium on the firm's products and services due to firm's actions on social activities. In addition, innovation opportunities can be created by implementing a sustainability program. And it is obviously that value creation and innovation can enhance the perception of shareholders on firm's performance and value. Moreover, based on stakeholder theory, Freeman (1984) suggested that firms orient their actions, activities and decision making not only base on the interest of shareholders but also on the interests of other stakeholders as customers, employees, suppliers and communities. Regarding to this, CSR was argued to be able to predict and decrease conflicts between firms, community and its stakeholders. This leads to the improvement of corporate profits and guarding firms against reputational risks. Due to these advantages, more and more firms nowadays implement sustainability activities. However, how to measure these performances appropriately still raises debates. Sustainability indicators are considered as an approach to quantify sustainability performance or to illustrate sustainability problems (Tahir and Darton, 2010). Necessity to find relevant sustainability measurement is increasingly meaningful due to their ability to provide major information about economic, social and environmental issues, and to analyse the relationships among these elements. These measurements facilitate evaluation of economic, environmental and social impacts, enhance transparency, and support sustainability development (Rodrigues et al., 2010). A sustainability measure can present organization's sustainability performance information, and motivate the performance or sustainability circumstances. This will help decision makers have a deeper understanding on how to attempt economic growth that is consistent to social and environment targets. Moreover, sustainability performance can be described by qualitative and quantitative indicators. Base on these approaches, Ferguson (2009) illustrated qualitative and quantitative sustainability measures on environmental, social, economic, governance, and stakeholder relations perspectives. Framework for applying sustainability performance measures are conferred in many theories and studies. The stakeholder framework introduced the single number of composite index measurement. Stakeholder framework includes five dimensions relating to major stakeholders issues including (1) employee relations which are revealed through firm engagement to employee related issues like health and safety, the provision of retirement benefits, and favorable union relations; (2) product quality which is evaluated in the extent to which firm provide quality, safe and innovative

products to consumers; (3) community relations which indicate by firm's activities in supporting communities as charities, volunteer programs; (4) environmental issues which relating to firm support for natural environment ;and (5) diversity issues such as priorities for women and minority employees or suppliers. However, it should be noticed the effects of subjectivity hidden assumptions in achieving this aggregation. Aside stakeholder framework, many other frameworks has been researched to give meaningful approaches to measure sustainability performance. Ferguson (2009) creates a corporate sustainability value-chain process which builds the connection from sustainable development issue to stakeholder salience, business benefit identification, value-drive clarification, and shareholder value and sustainability performance. Although each framework has different approach in designing and implementing sustainability measurements, all of them aware the significant impact of these indicators on shareholder value and sustainable performance.

Even though the need for identifying sustainability performance indicators is essential, challenges in determining and applying these indicators cannot be denied. Assessing all three economic, environmental, and social aspects may require a broad set of performance measurements. Moreover, with emerge of corporate sustainability, the establishment of sustainability rating agencies have significantly increased which results in hundred of sustainability reporting guidance (Visser, 2010). These guidelines have been written based on different approaches and provide different set of sustainability indicators (Visser, 2010) which can lead to the difficulties determine appropriate measurements. With the wide set of sustainability performance indicators and the divergence in sustainability reporting guideline, indentifying Key Performance Indicators (KPIs) of sustainability activities turns out to be significant.

2.3.3 Research on key performance indicators of sustainability activities

Key performance indicators play significant role in company performance and procedures. KPIs are described as a set of indicators focusing on the most important firm performance which are essential for firm success (Parmenter, 2015). These indicators support planning and controlling process, which in turn facilitate transparency and assist management decision making (Meier et al., 2013). In order to effectively promote these tasks, KPIs are required to be able to be understood by their users, be correlated with the outcomes, be actionable, and be balanced with sufficient financial and non-financial focus (Eckerson, 2009). According to Mate et al. (2014), overused KPIs can deteriorate the focus on main targets. In addition, KPIs should have apparent connections to business strategy and objectives. Relating to sustainability performance, KPIs are increasingly recommended by popular guidelines bodies like GRI (Vormedal and Ruud, 2009). These key sustainability performance indicators are now frequently applied in management process such as strategic planning, performance controlling, and decision making (Adams and Frost, 2008).

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). As for insurance sector, Beaubien and Rixon (2012) examine comparability ability of two large co-operatives in North America. They find that comparable benchmarks in cooperatives are created for investing companies to assess cooperatives performance. However, these benchmarks have weak ability to compare with other insurance cooperatives (Beaubien and Rixon, 2012). 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). KSPIs are also investigated in automotive industry as Amrina and Yusof (2011) state that products and operations in this sector have high influence to environment. At first, initial KPIs are determined by adopting triple bottom line which including economic, social, and environmental perspectives (Amrina and Yusof, 2011). Base on previous research, 41 indicators are identified and modified, which then followed by a survey on the adaptability of the initial KSPIs. However, this research just reaches the pilot study which improves contents of the questionnaires that will be used for later research; therefore contribution to the findings is still insignificant. 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).

To sum up, most of research relating to KPIs in sustainability performance involves identifying sets of KSPIs, or the roles of KSPIs. However, many issues still exist in the studies of KPIs for sustainability activities for instance lack of comprehensive evidences from management practices (Hristov and Chirico, 2019), or inconsistency in KSPIs definitions, methodology approaches, and regulations' compliance (Kylili et al., 2016). As a result, concerns about determine of well-defined industrial key sustainability performance indicators are still emerged. In addition, the research is mainly focus on sensitive industries; therefore, it is necessary to perform further research for environmental friendly sectors such as finance industry to have better understanding on how to form, apply, and assess appropriate set of KSPIs in these two types of industries.

2.4 Sustainability Reporting and Global Reporting Initiative (GRI)

2.4.1 The popularity of GRI in sustainability reporting practices

Among hundreds of guidance regarding to sustainable reporting, GRI has a long history in supporting firm in preparing sustainable reporting and becomes more popular guidelines practices for organizations around the world. GRI was founded in Boston in 1997 by two United States non profit organizations, the Coalition for Environmentally Responsible Economies (CERES) and the Tellus Institute. As an international independent organization, GRI has issued guidelines that can be implemented by many types of organizations such as multinational organizations, public agencies, SMEs, NGOs. GRI aims are to support companies, governments and other organizations to comprehend and disclose the impact of companies' operations on economic, environmental, social aspects, and other sustainability issues. GRI guideline developed its framework to make companies easier to access (Nikolaeva and Bicho, 2011). At the start of the twenty first century, GRI development leads CSR reporting towards the "triple bottom line" which is considered as a complete information system for corporate sustainability. Until now, GRI have issued five guidelines: GRI-G1, GRI-G2, GRI-G3, GRI-G4, and GRI-Standards. The later versions are reviewed, updated and in some cases replaced the previous ones, so it is expected to provide better and more appropriate guidelines than previous versions. In 2000, GRI issued the first global sustainability reporting Guideline, the GRI-G1, and then two years later, the second version, GRI-G2, was launched at World Summit on Sustainable Development. As increasingly demands in sustainability reporting guidance, GRI-G3 were issued with support of more than 3000 experts from business, civil society, and the labour movement in 2006. Till this time, GRI attracted awareness from many countries including developed and developing countries, and all types of organizations consisting of government, business, assurance providers, civil society, and financial markets. Until 2011, an

extension of GRI-G3, the GRI-G3.1, to further topics of gender, community, and human rights were unveiled. The guidance provide reporting framework guidelines for different sectors, for examples, Food Processing, NGOs, Mining and Metals, Airport Operators, Construction, Real Estate, Oil and Gas, Media, and Event Organizers. In 2013, GRI-G4 was released as the fourth generation version which comprises Reporting Principles, Standard Disclosures, and an Implementation Manual for preparation of sustainability reports by organization of any size or sector. The most current issue of GRI which was launched in 2016 is the GRI Standards. GRI Standards cover all main concepts and disclosures of GRI-G4 and are improved with more elastic structure, more comprehensible requirements, and more straightforward language. These standards facilitate organizations publicly reporting economic, environmental and social perspectives and reveal organizations contribution on sustainable progress. With these features, GRI is considered as the most important driver for the development of sustainability reporting (Vormedal and Ruud, 2009). Furthermore, Perez-Batres et al. (2012) confirm GRI as the most influential guideline on organization sustainability disclosure. Therefore, GRI Standards become reliable source for regulators and policy makers. Subsequently, EU Directive on non-financial disclosures also recommend for firms to comply with GRI guidelines when reporting sustainability activities.

Currently, companies' pressures on competition, mediation and companies' endeavours in corporate sustainability publics and media visibility encourage the implementing of GRI disclosures (Nikolaeva and Bicho, 2011). Approximate seventy five percent of firms' sustainability reports apply GRI guidelines, in which 88 percent of the companies have reported in line with GRI-G4, 10 percent have used GRI-Standard, and the rest have applied GRI-G3 (KPMG, 2017). Until 2017, 12,239 organizations have applied GRI standards, and 29,599 sustainability reports have been published (GRI Database, 2017). In the US market, 63 percent of 500 largest companies listed on the US stock exchange implement GRI indicators (Governance and Accountability Institute, 2012). With a research on 50 largest listed firms in the Netherlands, 71 percent of firms use GRI as their sustainability reporting guidelines, and 82 percent of survey respondents confirm GRI as a sufficient standard for sustainability reporting (Mertens et al., 2012).

2.4.2 Research of sustainability reporting involving GRI

One of the key benefits of GRI is enhancing credibility and providing reliable sustainability reporting frameworks for firms in every size, industry, and location. Indeed, GRI standards facilitate comparability across different companies and information disclosures about firm sustainability activities (Marimon et al., 2012). In order to achieve high quality sustainability report, six major aspects including balance, comparability, accuracy, timeliness, clarity, and reliability need to be covered. Failure to balance reporting in which revealing more positive events and hiding negative events is considered as greenwashing and becomes major sustainability reports' criticism (Adams and Frost, 2006) as the reporting

information is insufficient to provide a reasonable evaluation on firm overall performance. Meanwhile, comparability is an important factor for assessing firm progress and benchmarking firm performance (Dragomir, 2012). Information accuracy is also considered as one of the concerns of sustainability reporting (Cho et al., 2012). The timeliness requirement, in the meantime, facilitates communicating up-to-date information in a convenient manner. Frequency and periodicity are two main characteristics of timeliness which ensure the information accessibility and comparability. As for clarity, inadequate clarity of sustainability report is used as a mean to confuse stakeholders regarding to poor performance (Cho et al., 2015). Lastly, even though reliability is one of the important criteria of sustainability reports, it is proved that there is likely a reliability gap in these reports (Manetti and Becatti, 2009), hence, it is necessary to promote external assurance on these reports. To successfully obtain these aspects, it is suggested to comprise both favourable and unfavourable performances that may impact on stakeholders' decisions; present information that enable stakeholders to analyse firm performance over time and across other firms; provide timely, accurate and detailed information for evaluating firm performance and making informed decisions; deliver comprehensible, available and usable information for stakeholders; and gather, record, compile, analyse, and disclose information that can be examined, and establishing quality and materiality of the information. The enhancement of sustainability reports' quality in turn facilitates stakeholders' evaluation and decision making process referring to sustainability performance, and decreases information asymmetry between management and stakeholders (Dhaliwal et al., 2011). Moreover, GRI guideline is increasingly adopted due to firm expectation of improving CSR performance trustworthiness and GRI clearly recommendation on how to reporting sustainability activities. Due to possible impact on sustainability reporting quality, and in consistent with previous literatures, following paragraphs review involvement of GRI and firm value, GRI and corporate governance, and GRI and KSPIs.

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). Another research on the relationship between board gender diversity and sustainability disclosure consistent with the GRI is done by Handajani et al. (2014) in Indonesia. The authors find significant negative impact of gender diversity on the CSR disclosure (Handajani et al., 2014). 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. As for shareholder structure, Gamerschlag et al. (2010) find it positive effect on CSR disclosure when taking GRI standard as a data source for generating CSR transparency index of 130 German companies. 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. Furthermore, Branco et al. (2014) confirm that GRI adherent status has significant positive relationship with industry affiliation.

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.

In short, even though research of sustainability reporting involving GRI has been investigated by previous studies, there are difference in implementing research methods, and variances in studies' outcomes. In addition, sustainability reporting complying with GRI continues increasing due to the advantages of GRI guidelines and stakeholders' awareness on sustainability reporting, this research further investigates on the relationship between sustainability reporting in accordance with GRI and keys issues such as firm value, firm board of directors, firm characteristics, and sustainability reports' features. In addition, considering GRI guidelines in developing of KSPIs sets is also a focus of this research.

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.

2.5.1 Stakeholder theory

According to stakeholder theory, organizations operate in the same society with many other groups, therefore, it cannot be neglected the influences of organizations' operations on the others. Stakeholder theory considers the important role of organization's stakeholders rather than only focusing on the owners. It is necessary for firm to maintain appropriate connection with its stakeholders to be able to survive. Based on this theory, Freeman (1984) states firms' activities impact not only on firms themselves, but also on other stakeholders, therefore, firms should orient their actions, activities and decision making based on both interest of shareholders and other stakeholders such as customers, employees, suppliers and communities. When the interests of these groups are taken into account, it facilitates the improvement of risk estimation and then creates firm values for both investors and other stakeholders (Martinez-Ferrero and Frias-Aceituno, 2013). This theory has close link to sustainable reporting due to their same concerns about impacts on stakeholders and society at large. Sustainability reporting requires companies to disclose information about firms' activities relating to environmental, social, governance measured aspects, and how firms deal with risks arising from these activities. It can be seen as a tool to communicate with stakeholders from an accounting point of view in annual reports or separate reports. With disclosed information, firms can affirm their position on corporate social responsibility performance which can lead firms to good business practices compliances. This in turn can enhance the perception from the stakeholders on firms' performance and transparency which in turn can assure for the positive relationship between firms and stakeholders.

2.5.2 Legitimacy theory

Regarding to legitimacy theory, it is perceived that firms have hidden responsibilities with its society. Legitimacy process requires firm to identify indicators to measure its environmental and social performance to communicate with the society about firm adherent status with expectation regulations or standards (Deegan and Blomquist, 2006). Then legitimisation is obtained only when organization meets as a minimum the existing social values. To this extent, sustainability reporting is vital for firm to achieve expectation from society relating to firm commitment with social performance. Furthermore, with sustainability reports, companies release not only the environmental, social, and governance information but also their risks and the solution to deal with these risks. By achieving transparent and appropriate sustainability reports, firms have asserted their good performance in corporate social responsibility and good business practices compliances. Therefore, this can improve the perception of the stakeholders on firms' sustainability performance and transparency which in turn can encourage the positive relationship between firms and stakeholders.

2.5.3 Neo-institutional theory

Neo-institutional theory stated that firm's image, policies, and trust are significantly impacted by its culture and history (Scott and Meyer, 1994). Larrinaga-Gonzalez (2011) has a review in Neo-Institutional theory from sustainability reporting aspects. Larrinaga-Gonzalez (2011) declare that four organizational fields deserving focuses on sustainability reporting can consist of initial proceedings that may chance organizational activities, organizational fields that are changed by the first field, elements that impact the organizational changes to coercive, normative, and cognitive structures, and relationships incur due to competitive strengths and organizational structures in institutionalisation progression. The author also states that Neo-Institutional theory can be practically used in sustainability reporting by supporting in clarifying the development of sustainability reporting and determining the consequences of sustainability reporting's institutionalisation (Larrinaga-Gonzalez, 2011). In the meantime, ethical motivation is one of the reason for firm to implement sustainability reporting and this leads to a significant change in corporate attitude. With main aim on enhancing environmental, social information disclosures in firms, sustainability reporting needs the underlying inspiration of the theory to meet the homogenizing goal in reporting.

2.5.4 Signalling theory

Signalling theory concerns about firm stakeholders' behaviour to disclosed information (Bergh et al, 2010). Three involved elements of this theory include signallers who are represented by firm managers, signals which are information delivering by the signallers, and receivers who are represented by firm stakeholders (Connelly et al., 2014). According to Bergh et al. (2014), signals can influence stakeholders' decision making and decrease the gap between received information and desired information of stakeholders. Anam et al. (2011) confirm that providing more signals leads to transparency improvement. This in turn facilitates appropriate assessment on firm share price, and then enhances firm value. With current emerge in sustainability development, it is more likely that firm has higher attempt to produce sustainability information through sustainability reports or annual reports. The information can be seen as a signal for investors (Berthelot et al., 2012) as sustainability reporting requires more efforts to achieve. Companies disclose sustainability information to raise stakeholders' awareness on how firms perform in economic, environmental, and social perspectives. Additionally, with published sustainability information, firms desire to differentiate themselves from worse performers, so that, they can avoid the cost of adverse selection. In fact, Cahan et al. (2015) indicate a positive association between sustainability performance and favourable perception from stakeholders. A positive connection between sustainability performance and firm value is also found when sustainability information is properly reporting (Cahan et al., 2015)

2.5.5 Agency theory

Jensen and Meckling (1976) introduce agency theory which separates the ownership and management in corporations. This theory reveals the tendency of individuals' manner in maximizing their own interests. Therefore, conflicts of interest between stakeholders and managers may incur, especially when managers have more information while controlling the enterprises. Information asymmetry can create opportunities for managers to usurp firm possessions, and to earn their interest over the shareholders' expenses. Therefore, with the existence of good corporate governance, it is expected that these conflicts can be reduced. Regarding to board of directors' characteristics, agency theory confirms the vital role of independent members due to their essentials for controlling measurement system in obtaining superior sustainability reporting (Dienes and Velte, 2016). Base on agency theory, independent board members roles are investigated relating to earnings quality (Ebrahim, 2007), external audit quality (DeFond et al., 2005), and management fraud avoidance (Farber, 2005). As for board meetings, agency theory is also involved in disclosure improvement which reduces information asymmetry between internals and externals information users. In order to reduce information asymmetry, sustainability reporting is considered as an important role.

2.5.6 Measurement theory

Measurement theory presents a coherent model for measurement process. The driving force in this theory development maintains well-established in the social and behavioural sciences (Tarski, 1954). Measurement theory provides apparent descriptions of measurement formations related to elements to be measured. The descriptions include a stereotype field of measured items such as processes or events, a qualitative evaluation between the items through their degrees or quantities, and a qualitative illustration of the effects of items on equivalent of instantiate quantities of the measured feature (Cropley, 1998). An important part of measurement theory is the interaction between measured item and a measuring tool (Cropley, 1998). According to measurement theory, a set of measurements are a better approach than single indicator to measure firm performance. Indeed, single measurements are not completely revealed all perspectives of performance (Van der Stede et al., 2006), while multi-item measures can reflect diverse dimensions of the performance (Henard and Szymanski, 2001). Vaerenbergh et al. (2014) confirm that multi-item measures have stronger association with work and job satisfaction than single measurements. Measurement theory has close link with measurement control system, thus has significant influence on the determination of appropriate KSPIs.

2.5.7 Contingent theory

Another theory which can be considered to have direct link to key performance indicators is contingency theory. As stated by contingent theorist, a single management control system cannot suit with all businesses. It is in need to adjust the system with the business features such as strategy, structure, firm size and

management awareness of environmental instability. Once the management control system is structured to fit its business contingency factors, it can in turn facilitate positive performance (Chenhall, 2003). With intention to implement and disclose sustainable performance indicator into firm operation systems, firm seems to change its emphasis on not only internal financial performance but also external aspects like society and environment. This intention leads to the change in management control system to fit with firm new aims and strategy.

To sum up, base on the light of stakeholder, legitimacy, neo-institutional theories, firms can affirm their position by facilitating and reporting corporate sustainable performance. This can lead firms to good business practices compliances, enhance the perception from the stakeholders on firms' performance and transparency which in turn can assure for the positive relationship between firms and stakeholders. In addition, disclosed information in sustainability reports can be seen as a signal to firm stakeholders regarding to firm attempts in more ethical and social performance and in reducing information asymmetry. This in turn can enhance stakeholders' perception on firm images and then value. In agency theory perspective, efficient and effective corporate governance should be invested to lessen potential conflicts between management and stakeholders. As a result, these above theories support for proper sustainability reporting and superior corporate governance in order to enhance firm value. To facilitate sustainable activities and the disclosure quality of sustainability information in annual reports, it is necessary to determine appropriate KPIs. According to measurement theory, the KPIs should be formed as a group of indicators rather than the single measurement to reveal all aspects the performance. In addition, contingency theory stated that every business has unique feature, therefore, KPIs, as part of management control system, need to be appropriate adjusted to achieve positive performance and expected targets.

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. Mandatory requirements in publishing sustainability reports emerge in European countries due to the implementation of the EU Directive 2014/95/EU referring to disclosure of non-financial reporting and diversity information. The EU Directive 2014/95/EU influences approximate 6000 companies which have more than 500 employees among Europe (European Commission, 2017). These companies start applying the Directive from the beginning of 2018. In consistent with the EU Directive 2014/95/EU, German law has been validated the requirement on publishing sustainability reports since the beginning of 2017. Main purposes of the legislation are to enhance firms' commitment to sustainability development and to boost transparency in social and environmental perspectives. The transparency is also desired by other stakeholders such as investors, and consumers who can have better evaluate their risks base on sustainability information. Therefore, research on sustainability reporting is still emerged.

Secondly, impacts of sustainability reporting application on firm performance and firm value generate conflict results. Even though many studies on relationship between sustainability reporting implementation and firm performance have been carried out, the results on the influence are still mixed among positive, negative, and no relations. The reasons for the conflicts can due to the differences in previous studies observations. These researches are performed in different countries and period of times, focus on different industry and firm size, and apply different approach to measure the impact of sustainability reporting. Thus, with the concentration on German large listed firm from 2013 to 2017, and with the focus on GRI sustainability reporting, the influence of application of sustainability reporting on German large listed firms' performance and value is necessary to see what benefits or problems firms may confront when disclosing sustainability reports.

Thirdly, it is in need to determine factors that impact on sustainability reporting disclosures. German firms still have much flexible in choosing suitable guidelines and how to publish their sustainability information. This may lead to variance in sustainability reporting disclosures with chosen guidelines among firms. The disclosure of the report reveals the level of information transparency which may impact on the understanding and perception of stakeholders. With the identify of impact factors, firm may know which factors should be improved to enhance sustainability reporting process, which then firm themselves can obtain key successful factors for preparing great sustainability reports. Hence, this research also

focuses on the examination of factors that impact on sustainability reporting disclosures.

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. Indeed, the large amount of current guidelines for sustainability reporting, which have different recommended sets of sustainable performance, may make firms confuse when choosing relevant measurement for their sustainability performance. For instance, even though new regulation on mandatory sustainability reporting in Germany has suggested firm to use suitable guidelines to prepare sustainability reports, a new guidance for these large German and other European firms has been introduced by European Commission since 26 June 2017. As a result, determining appropriate KPIs for sustainability performance is also another task of the research.

To sum up, based on the research problems, 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. With this main objective, the research is expected to contribute to scientists and firms' insights into the impact of sustainability reporting on firm value. Outcome from the study will indicate whether sustainability disclosure can impact on value of firm or this mandatory disclosure is just what firm needs to comply with to meet the need of other stakeholders. Moreover, scientists and firms may get more knowledge on factors influencing firm sustainability disclosure from the expected results of the research. Finally, the use of KSPIs and a framework of implementing KPIs for sustainability performance provide firms and researchers in the field awareness on how firms currently use their KSPIs and how should they effectively use their KSPIs in achieving firm goals and strategies. The last outcome is also the own contribution that this research can contribute to studies on KPIs for sustainability performance. As mentioned in the literature reviews, GRI becomes increasingly popular among firms; therefore, GRI will be the major guidance that is used in the research. From main objectives, following research questions and detailed objectives are indicated in research questions and hypotheses development part.

3.2 Research Questions and Hypotheses Development

The first question relates to the impact of sustainability reporting disclosures on firm value. Next second question examines the factors that impact sustainability reporting disclosures. Lastly, research question three concerns the use and identification of KPIs for sustainability performance.

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

Previous studies have been done in sustainable development fields; however, our understanding of social activities impact on financial performance is still uncertain, with research results being mixed. While supporters reveal positive association

between sustainability reporting and firm value (Cormier et al., 2009; Guidry and Patten, 2010; Clarkson et al., 2010; Anam et al., 2011; Berthelot et al., 2012; Momin and Parker, 2013), opponents argue that sustainability negatively affect firm shares (Jones et al., 2007; Wu et al., 2010; Mahoney et al., 2013). Meanwhile, no relationship between the two variables is found by Clarkson et al. (2010), and Qiu et al. (2016).

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. As a result, sustainability reports which cover proper economic, environmental, and social perspectives can be argued to have positive links with firm market value and can be seen as major driver of firm shares (Cormier et al., 2009). Furthermore, base on firms' transparency on employees, human right, diversity, and equity, potential and existing employees are aware of firm code of ethics, working environment which then influence quality employees recruitment and retention decision (Cormier et al., 2011). Quality sustainability reporting also attempts to create better care, and firm reputation in other key stakeholder perception. Indeed, sustainability information can facilitate ability to forecast earnings of financial analysts (Dhaliwal et al., 2011). Enhancement of sustainability transparency obtains greater awareness from media and better conduct from regulators (Aerts and Cormier, 2009). Therefore, it is likely that shareholders will better evaluate firm and lead to the increase in share value.

In order to avoid the subjective measurement by assessing directly firm sustainability reports, this research applies more objective source from GRI to identify firm adherent status in reporting sustainability performance. In previous research, sustainable disclosures are measured based on score by analyzing contents of firms' sustainable reports. These analyses, of course, can be subjectively impacted by authors' opinions, which then may influence on the quality of the research outcome. In this research, score indication is not applied to evaluate the disclosure performance. The study based on GRI guideline and GRI database to collect the GRI adherent levels which indicate which disclosure items from the guideline have been stated. The greater adherent levels are likely to reveal that more disclosures have been revealed in the sustainability reports. With current five version of GRI from G1 to G4 and GRI Standard, this research just focus on the most updated versions which include only GRI-G3, GRI G4, and GRI Standard. The research period is within five years from 2013 to 2017. 2013 is chosen as the starting

point for the research period as this is the point of time when GRI-G4 is first issued. From 2013, firms seem not apply GRI-G1 and G2 anymore; however, GRI G3 has still been applied commonly. Therefore, within the research period, the compliance statuses with GRI among firms have wide ranges as in each version there are several levels of adherences. In addition, as the later versions are reviewed and amended to be more appropriate with implementing practices, it is assumed that later versions provide more proper guidelines than previous versions.

In the light of mentioned theories, sustainability reporting can be considered as a mean to perform the firms' commitment with stakeholders and society regarding to environmental and social issues. Once sustainable reporting achieves outstanding performance, it can reveal high responsibility of firm to other parties, and can assure for sustainable development. This in turn can enhance firm's reputation and images. Base on this argument and with research question concerning about whether there is connection between sustainability reporting and firm value, this research assumes that firm sustainability reporting which adheres to GRI guidelines tend to provide better disclosures on sustainability activities, then can enhance its value.

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

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

Along with GRI adherent level variable which represent for firm sustainability disclosure level, the research also identifies relevant control variables. The first control variable to be considered in this research is firm profitability. This research proposes the positive relationship between firm profitability and firm value following the previous studies of Shamki and Rahman (2012) and Thinggaard and Damkier (2008). Possible reason for this relationship come from the fact that firm steady increased profitability is considered as favourable information for investors' perception about firm future and investors' decision making process, thus it can be seen as one factor to enhance firm value Thinggaard and Damkier (2008).

Next control variable to be considered is firm size. With the advantages in dealing with stakeholders, in increasing market share, and in employing economic scale, it is likely for large firm to have higher value (Serrasqueiro and MacasNunes, 2008). In addition, the bigger firm is, the easier it can access to internal and external resources to facilitate its growth, therefore, it is expected to directly impact on firm value. This study assumes that there is a positive relation between firm size and firm performance as bigger size seems to have more resources to take economic advantages and economic scale.

Firm age is the third control variable, which is believed to be aligned with knowledge, abilities, skills and reputation (Agarwal and Gort, 2002). Most of studies suggested that the age of firm is positive related with its performance due to its ability to enhance reputation (Baker and Kennedy, 2002). Coad et al. (2013) find that firms improve with age due to the increasing in productivity, profits, lower debt

ratios, and higher equity ratios. Therefore, firm age is expected to affect positively on firm value.

Last control variable to be taken into account in this research is firm leverage. According to trade-off theory, there is an optimal debt ratio at which firm can maximize value by using debt. The first advantage of debt is tax deductibility on interest payment. In addition, using debt can lessen the agency conflict as the borrowing can limit the free cash flow available in the business. Therefore, managers have no incentive to use cash inefficiently and riskily (Jensen and Meckling, 1976). As a result, debt usage has been considered as internal governance mean to control managers' self-interest (Grossman and Hart, 1980). Nonetheless, if debt is highly acquired, firm can face costs of financial distress which may adversely impact on firm performance (Modigliani and Miller, 1963). Moreover, agency cost instead of being saved, now can emerge the conflict on the interests between shareholders and debt holders (Jensen and Meckling, 1976). Based on these theories, the research assume that the higher level of debt, the riskier firms enter, therefore, leverage is assumed to have negative impact on firm value.

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

To answer this question, the research focuses on three aspects. The first group of factors relates to board of directors, one of the most important areas of corporate governance. The second perspective concerns firm characteristics, and the last area considers sustainability reporting features.

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

As one of elements of corporate governance, supervisory board is vital in governing company procedure which including sustainability reporting. Corporate governance is considered as an appliance to govern organizations by creating the connection among firm's managers, board of directors, shareholders and other stakeholders. Corporate governance's aims consist of assuring appropriate acts of firm' managers on shareholders' interests, and minimizing interests' struggles between inside and outside mechanism (Garay and Gonzalez, 2008). Thus, good corporate governance plays an important role in balancing firm stakeholders' interests which can lead to an effective orientation in providing quality disclosures about firm sustainability performance and business development. Main role of board of directors is to control firm's activities and to encourage the achievement of all stakeholders' interests. if supervisory board can balance firm and stakeholders' interests, corporate governance is more likely to achieve its effective performance. Therefore, it is argued that board of directors can influence firm sustainability reporting applications (Harjoto and Jo, 2011).

To facilitate board tasks in sustainability disclosure, good corporate governance codes can be seen as an important approach (Lim et al., 2007). German Corporate

Governance Code, which includes detail recommendation in many aspects, orients manager and supervisory board to ensure firm's going concern status and its ecological value formation consistent with social market value. The Code has three versions in 2013, 2014, and 2015 within the research period from 2013 to 2017, however, there are no significant different among the recommendations regarding to board of director that are considered in the research. These main recommendations indicate the necessity for the board to determine and publish the objectives for its composition in Corporate Governance Report (Article 5.4.1). These objectives include the identification of sufficient number of independent members on board, the target number of females on board (Article 5.4.1). Furthermore, based on the firms' conditions and number of members, the board of directors are required to form appropriate committees (Article 5.3.1). Regarding to compensation, board members shall be paid according to their tasks and company's situation (Article 5.4.6). As the approach of German Corporate Governance Code also focuses on the ethical and social perspectives, the above recommendation will be taken into account when testing the relationship between board of directors and sustainable reports disclosure. And with regard to German Corporate Governance Code objectives, the results is expected that firms that comply with the Code also have intention to comply well with social responsibility activities which in turn can lead to better sustainability disclosure. Base on German Corporate Governance Code, these mentioned characteristics of board of directors are taken into account when examining the influence to sustainability reporting.

Following sections will provide reviews on previous researches relating to the relationship between supervisory board and sustainability transparency. The hypotheses will be developed based on the mentioned theories such as agency, stakeholder, and legitimacy theories, and based on the content of German Corporate Governance Code version 2015.

Board size and sustainability disclosure

Board size is one of the key elements in board structure. Frias-Aceituno et al. (2012) state that large board facilitate the implementing of sustainability practices, sustainability disclosures and corporate investment. Moreover, large board comprises expertise in variety of majors which then can provide more proper recommendation for firm sustainability activities (Giannarakis, 2014). According to agency theory, it can be said that a bigger board size seems better solve agency problems as management activities can be supervised by more people. In addition, increasing number of board members can assist supervising management due to the reduction of CEO domination.

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.

Board independence and sustainability disclosure

German Corporate Governance Code (2015) states the independent status of a member is not satisfied if the member has personal or business connection with the firm, its management, its major shareholders, or an enterprise that may cause conflicts of interests. Since the board of directors plays a vital role in corporate governance, its independent characteristic cannot be neglected. Many studies argue that independent directors are unfamiliar with firm activities which in turn can negatively impact on firm performance (Guest, 2008). However, the important of independent board cannot be neglected as it has significant contribution in firm's activities, especially on firm information transparency. Zubaidah et al. (2009) declare that independent board will better manage management manner and better secure shareholders' interests.

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.

Board diversity and sustainability disclosure

Board diversity can be exposed via terms of age, background, gender, or ethnicity. This research focuses on board gender diversity as impact of German Corporate Governance on the requirement on the present of at least 30 percent of female members on board. With different approaches to convey and communicate opinions of female directors, broader talent can be implemented in company's activities (Huse and Solberg (2006). In addition, female members are more hard-working and concentrate more on inspection than male members (Adams and Ferreira, 2009). Smith et al. (2006) confirm the important position of female directors as they can comprehend the market better than male members, improve corporate reputation in the awareness of community, and enhance firm perception on business environment.

German Corporate Governance Code requires supervisory board to set the target in board diversity in which female is one determined element. The Code latest version 2015 provide 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.*

Board subcommittees and sustainability disclosure

Supervisory board is responsible for supervising and providing regularly advice for management in controlling all activities of the companies. Therefore, the board is required to include members with knowledge and experiences in different fields. To be able to counsel effectively in specific issues, board committees are formed with appropriate members who have capacity in that matter. Indeed, 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. However, the Code (2015) proposes to include Audit Committee and Nomination Committee in board's committees (Article 5.3.2 and 5.3.3).

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. With the appearance of audit committee as in the code recommendation, it is more likely that firm has more effort in voluntary disclosure and improve transparency quality. Moreover, as members in one committee can become members in other committees, their understanding in wide ranges of firm's activities can support them in effectively solving firm issues. 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.*

Board meetings and sustainability disclosure

Board activities can be illustrated by term of board meetings. Considering the impact of board meetings on firm performance and CSR disclosure, opponents argue that the more number of meetings does not mean that more sustainability issues are addressed as it can be the split of agenda into many meetings (Dienes and Velte, 2016), therefore, it does not add any value for sustainability performance or reporting. However, supporters state that more frequent meetings can provide occasions for board members to share information, to distribute more effective workload, and to assign appropriate committees tasks (Laksmana, 2008).

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

The research identifies the impact of following firm size, firm age, firm performance, and industry type on disclosure of sustainability activities in German large listed firm. Arnold et al. (2012) state that investors need both financial and non-financial information for their decision making. However, they may need different sources of information in evaluating different company as each company has different strength, weakness, opportunities, or strategies. These may be impacted by firm features such as type, size, or age. Therefore, these firm factors are considered to impact the amount of information being reported to meet the investors' needs.

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). Significant positive relationships between firm size and sustainability disclosure are proved by Sharif and Rashid (2014), Bayoud et al. (2012), and Khan (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. Positive impact of firm age on sustainability disclosures are found by Godos-Diez et al. (2011), and Bayoud et al. (2012).

Corresponding to these researches, 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. Sidegar and Bachtiar (2010) and Rahman et al. (2011) find no connections between these two variables. However, positive impacts of firm performance on CSR disclosure are revealed by Gamerschlag et al. (2010), Tagesson et.al (2009), and Marquis and Qian (2014). Even though the results are still conflict, this study supports the positive influence of firm performance on CSR transparency. Reasons for the assumption include 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. Campbell (2003) finds that environmental information tend to be provide more in environmental sensitive firms. Manufacturing firms tend to provide more sustainability information than firms in service sector (Kolk, 2003). Consistent to these results, Gamerschlag et al. (2010) discovers that companies in consumer and energy supplying industries disclose more sustainability facts and figures while those in services industry provide less information. 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.

The only reporting feature that is considered in this research is whether the report has external assurance or not. Integrated reporting featured are not examined in this research as in the research period, number of firms providing integrated sustainability reporting are still considerably low. External assurance feature are concerned as sustainability report itself cannot provide the assurance for information transparency quality (Junior et al., 2014). Furthermore, there is existing credibility gap in sustainability reports which weaken application ability of shareholders and other stakeholder from these reports (Manetti and Becatti, 2009). Therefore,

assurance of these reports can be seen as a mechanism to enhance the reports' trustworthiness. Indeed, the quality of these reports are better when the assurance are supplied by external bodies such as auditing companies (Simnett et al., 2009). The contribution of external audits on improving sustainability reporting credibility is also confirmed by Junior et al. (2014). Better reports make it easier for report users to access firm information which in turn facilitates the perception of investors and other stakeholders in firm reputation. 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?

This research question focuses on how German large listed firms measure performance of sustainability activities and how these indicators are disclosed. In addition, with a wide set of indicators in each aspect, the research aims is to identify the key performance indicators which can illustrate the main objectives of firm. Benefits of KSPIs have been confirmed by previous research (Saka and Oshika, 2014; Bebbington et al., 2009) regarding to improve firm evaluation (Singh et al., 2012). Nevertheless, guidance on determination appropriate set of KSPIs has not been intensely investigated (Hristov and Chirico, 2019). As a result, this thesis attempts to clarify research question 3 to solve the current issues. The analysis will be carrying out in specific sectors as different sector has different features which may lead to the variant usage of indicators and key performance indicators for sustainability activities. Chosen analysis sectors in this research include automotive industry and financial sectors. Automotive sector is selected as this is one of the most essential and tactical sector in manufacturing industry not only in Germany but also around the world. Additionally, automotive industry is also the largest industry in Germany and leading industry in the world. German automotive industry is recognized as the world leader due to superior values of improvement, reliability, safety, and design. According to VDA (2017), automotive sector occupied approximately 20% of total German sector revenue. Meanwhile, automotive sector belongs to the most resource demanding sector, therefore, its impacts on environment cannot be neglected (Amrina and Yusof, 2011). This in turn raises the needs to solve current problems in sustainable indicators and KPIs in automotive industry to take the advantages of proper indicators and KSPIs and to lessen the negative influence on environment of this sector. As for German finance industry, it cannot be denied the fundamental role of this sector in the economy function. With excellent financial economy, Germany is placed at the largest national economy in Europe with an AAA ranking. However, German financial industry has not yet fully

focused on contributing to a smooth persistence of the energy transition and reduction of greenhouse gas emission. Moreover, previous studies on KSPIs mainly focus on environmental sensitive industries and overlook the role of environmental friendly sectors in achieving sustainability goals. Consequently, it is necessary to further investigating in this sector to obtain more proper set of KSPIs. In accordance to research question 3, followings are its detailed objectives:

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.

In order to facilitate the implementation of KSPIs, underlying factors that are associated the selection of appropriate set of KSPIs are also investigated. The first two most factors that are assumed to have significant connection on the selection are company strategy and business model as it is important to know how chosen KSPIs impact on these factors (Mertens et al, 2012). Every key sustainability indicator should achieve specific targets which obviously should be aligned with the company strategy and business model. Therefore, KSPIs can be use efficiently when have closed connection to these themes. In addition, to be successfully applied, KPIs should be comparable, achievable, and measurable (Wayne, 2009). Hence, the selection of KSPIs should also pursue the comparability, achievability, and measurability. Last but not least, KPIs are varied for different industries in which firm operates due as every industry has its own boundary and dominant economic features. As a result, firm strategy; business model; comparability, achievability measurability of KSPIs; and industry specific are assumed to have positive associated with the selection of appropriate KSPIs.

3.3 Conceptual Framework

Conceptual framework covers three aspects which are also three main objectives of the research. The first aspect concentrates on the investigating the impact of sustainability reporting on German large listed firm value. The expected results will clarify the influence of sustainability reporting on German large listed firms and provide insights on whether firms get certain benefits when disclosing sustainability information. The second aspect of the research is to determine factors that affect the disclosures of sustainability reporting. These factors are considered in three areas: board of directors' characteristics which consist of board size, board independence, board gender diversity, board subcommittees, and board meetings; firm characteristics which include firm size, firm profitability, firm age, and firm sector; and sustainability report features which only emphasise on external assurance aspect. Findings in this aspect can provide proper suggestion for key successful factors when preparing sustainability report according to GRI. For the first two aspects, sustainability reporting disclosures are determined based on sustainability

reporting of German large listed firms and GRI standards. The last aspect of the framework is referring to the use of KPIs in sustainability reporting. At first, German large listed firm sustainability reports will be examined to comprehend the way these firm uses sustainable indicators and KPIs. Then, sets of KPIs will be determined for automotive and finance sectors based on the survey from managers in these firms. Lastly, interviews will be performed to generate part of the roadmap of KSPIs implementation. Expected contribution of this part is to establish an appropriate set of KPIs using in sustainability activities in specific industry and the perception of KSPIs from management and users. The conceptual framework is described as followed:

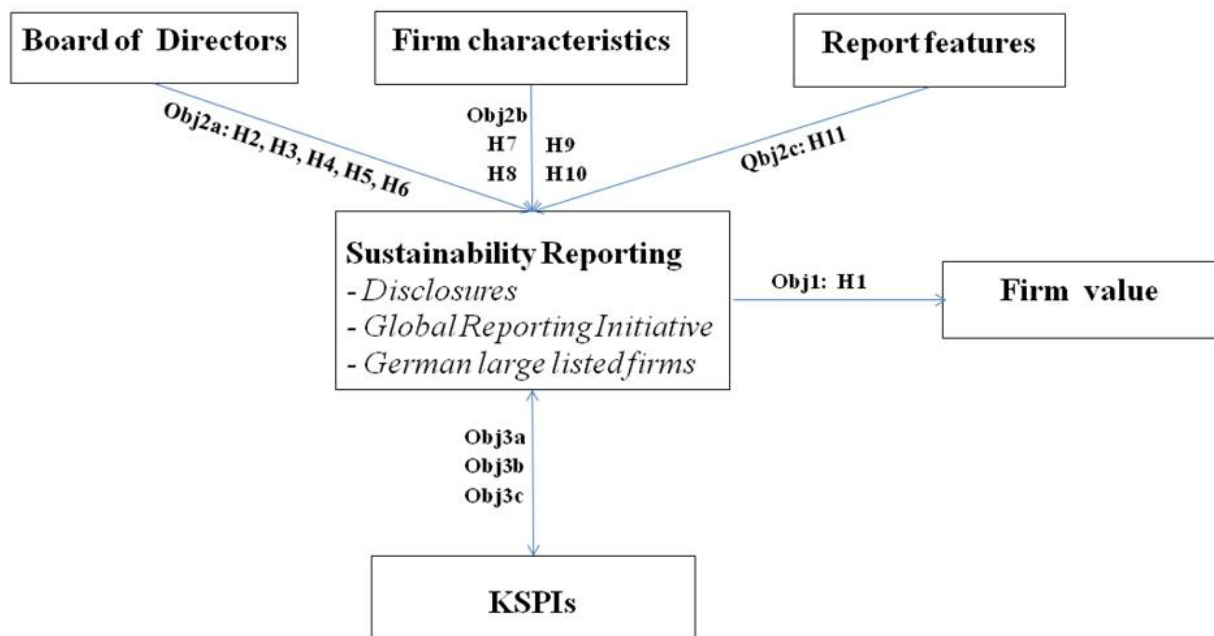


Figure 3.1. Research conceptual framework
 Source: Author's compilation and classification

4. RESEARCH METHODOLOGY

4.1 Research methods

This research applies a mixed research approach which consists of both qualitative and quantitative research methods. Mixed research method is not only aware of the significance of usual quantitative and qualitative research but also suggest third paradigm approach which presents the most comprehensive, balanced, informative, and practical research outcomes (Johnson et al., 2007). In addition, Brannen (2005) declares the necessity of using more than one method in completely clarifying the research questions. Quantitative methods investigate the impacts of particular situations which refer to independent variables on a result which is called dependent variable in numerical expression. These methods are effectively applied when the research context is controlled, and research proceedings are without indeterminate effect. Fundamental conclusions from quantitative methods are outlined from direct examinations, connections revealed from statistical analysis, or in real experiments. Outcomes from quantitative methods are likely to foresee and reliable. Meanwhile, qualitative methods can create important comprehension by presenting admission to possible critical information which is deduced by the examiner. Qualitative methods are best applied when the research context is not well defined or situational. Conclusions from these methods are not likely the same with others, and hard to predict. In connected with the thesis research questions, research question 1 and 2 aims is investigating the impact of sustainability reporting on firm value, and the influence of potential factors on sustainability disclosures. These examinations intend to reveal associations between dependent and independent variables, therefore, quantitative methods can be seen as the most appropriate for finding the outcomes. Regarding to research question 3, exploring specific sustainability reports, discovering perception and thinking of involved bodies in firm operations on potential KPIs related issues are required to determine the use of sustainability KPIs. As a result, qualitative methods can be seen as one of proper approaches.

Quantitative and qualitative methods can be used sequentially or simultaneously in a single research in this thesis. When quantitative methods are chosen as the main methods for clarifying research question, qualitative methods are usually used with quantitative methods in two circumstances: improving quantitative research by influencing the creation of quantitative data set, or explaining unexpected quantitative outcomes. For the first circumstance, participants can be contacted to bring out a clarification and if possible considered tool to test the stated reasons. The second situation incurs to enhance researchers' understanding of how data should be produced by considering how variables are identified, and how the data are gathered. Better understanding on the data creation leads to the increase of quantitative research accuracy and relevance. Along with this combination, quantitative and qualitative methods can be used together at the same time, for example the mixing of questionnaire and interview methods. Questionnaires can be implemented to

clarify a sub research question, and to provide further information for more meaningful interviews. The combination of these two methods is use for research question 3 in which questionnaire surveys are used to identify potential set of KSPIs for automotive and finance, and semi-structured interviews are utilized to explore the use of KSPIs in corporations.

For applied quantitative methods in 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. Correlation coefficients express the degree or strength of the linear relationship between two random variables. Therefore, correlation coefficient analysis should be conducted in order to test the relationship between independent and dependent variables. 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. Questionnaire illustrates proof of patterns among big observations, whereas interview presents more detail about interviewee judgements, attitudes, and behaviours (Kendall, 2008). Questionnaires can be implemented in form of structured quantitative questionnaire in which interviewees can choose preset answers such as multiple choices, dropdown, checkbox, or scales, or in form of qualitative questionnaire in which participants type or write their own opinions in the answer boxes. Interviews also have several types, for instance, semi-structured interview which consists of predetermined initial set of open-ended questions following by more detail questions for further explanation, or in-depth interview which refers to concentrated interview to investigate participant opinions about a specific idea or situation. The interview can be seen as a knowledge transmission from interviewees to interviewer, so that, interviewer should stay objectively and avoid influence the interviewees' responses. 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

As different methods are utilized in the research, data collection approaches are various according to implemented methods in answering the research questions. Therefore, data collection is described separately for each research question.

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 research period starts in 2013 as this is the time GRI issued its updated guideline version (GRI-G4). At this time, the previous versions such as GRI-G1 and G2 has not been implemented any longer, therefore, the chosen research period covers the most current GRI guidelines which consist of GRI-G3, G3.1, G4 and GRI Standards. As in 2018, German corporate are force to issue mandatory sustainability report, hence, 2017 is the last year for firm to make their own decisions on publishing sustainability performance. Before the regulation becomes active, the previous periods tend to reveal the most changes in corporate behaviour, so that, this research period is significant to capture the changes.

The collected data process starts with Sustainability Disclosure Database. This database covers all types of organizations' sustainability reports which being published since 1999. Currently, about 65 percent of the reports in the database comply with GRI Guidelines, the rest do not adhere to GRI but have sustainability disclosures. Sustainability Disclosure Database collects information from organizations' reports and classifies them according to organization size, type, listed or non-listed, sector, country, adherent level, external assurance, integrated and more categories. These classifications facilitate the data collection process in this research by focusing on relevant categories. For example, large firms and multinational national enterprises firms are selected from organization size to represent for large firms, then German and listed firms are selected from country and listed/non-listed group. 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 (Federal Law Gazette, 2017). With this regulation, it is likely that stakeholders may not receive the sustainability report at the end of the year, but four months later. Therefore, complementary test is applied to test whether sustainability disclosures influence firm share price at the time sustainability reports are finally issued.

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. Sustainability report types consist of GRI reports which include reports complying with GRI frameworks, Citing-GRI which indicates the sustainability reports basing on GRI but without GRI Content Index, and Non-GRI which illustrates the sustainability reports with no reference being adherent to GRI guidance and GRI Standards. GRI frameworks that are valid in the research period comprise GRI-Standards, GRI-G4, GRI-G3.1, and GRI-G3. As for adherent level, this item reveal the extent that sustainability report comply with GRI Framework and GRI Standards. For GRI-Standards report, adherent levels include in accordance – Core, in accordance – Comprehensive, and GRI – Referenced. GRI-G4 has the same first two levels, but the last one is called Undeclared. For GRI-G3 and GRI- G3.1, different adherent levels are applied which consists of A+, A, B+, B, C+, C, and Undeclared. The measurement of the independent variable base in this combination is discussed in the value measurement section.

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. In more detail, firm profitability, firm size, and firm leverage are measures based on relevant items from firm Statement of Financial Position and Statement of Comprehensive Income, external assurance status is collected from Sustainability Disclosure Database, and firm founded year which is used to calculate firm age is searched on the firm website.

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. Following paragraph illustrates data collection of independent variables which divided to board of directors' characteristics, firm features, and sustainability report character factors.

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).

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	Deutschebank
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-Wuerttemberg
12		Postbank
13		Talanx

Source: Author's compilation and classification

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. Among twenty two companies, Durr, ElringKlinger, and DVB Bank are not in accordance to GRI Frameworks. The indicators are grouped into economic, environmental, and social categories. In each category, relevant aspects and indicators for each aspect are determined. For example, one of aspect of economic category is economic

performance in which revenue and cost are determined as relevant indicators. 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 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. These emails are found on companies' websites and through the popular email format of each company. The respondents include key persons and managers in departments of sustainability, operation, finance, human resources, integrity and legal affairs, research and development, customers and brands production (for automotive sector), and purchasing and supplier (for automotive sector). At first, 45 surveys were sent to potential participants in automotive sector, and 78 surveys to financial services sector. However, four emails from automotive and eleven emails from financial services industries were failed to deliver. As a result, 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.

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

Research question 1 and 2 apply correlation analysis and regression to explore the relationship between sustainability reporting and firm value, and between potential influenced factors and sustainability reporting. This section illustrates the correlation analysis and appropriate regression for models using in research question 1 and 2. Then descriptions on how to analyze collected data in research question 3 are presented at last part.

Both research question 1 and 2 utilized Pearson Correlation analysis as part of the assumption tests. This analysis is implemented to test the relation between independent and dependent variables, and multi-collinear through correlation coefficient. Correlation coefficients reveal the degree or strength of the linear relationship between two random variables. In the meantime, multi-collinear is a situation where there are strong correlated between independent variables. The existence of multi-collinear can become problematically when interpreting the coefficients of the variables as duplicate information are created by some variables. A correlation coefficient of +1 illustrates the completely positive connection of two variables, while a correlation coefficient of -1 indicates the completely negative relation. If correlation coefficient is 0, it means there is no linear relationship between the two variables. In order to avoid the multi-collinear, two criteria that should be complied is that: (i) correlation is equal or less than 0.9; and (ii) tolerance of each variable is more than 0.2 or variance inflation factor (VIF) of each variable is less than 10 (Field 2005). Tolerance is defined as the possibility that independent variable cannot interpret the dependent variable in research model. Therefore, the lower of tolerance value is the higher possibility for multi-collinear to be incurred. Meanwhile, VIF is the inverse of tolerance, hence, the impact on multi-collinear is opposite from tolerance.

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:

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

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:

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

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:

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

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:

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

Where i represents number of observations, t represents the year of data from 2013 to 2017, p_i represents probability of an outcome $\leq i$ in which $i=0\dots19$, β_0 is constant; $\beta_{1,\dots,10}$ 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. With five point Likert scale, Cronbach's alpha, which reveals the internal consistent of a scale, is initially applied to check the reliability of the scale (Cronbach, 1951). Internal consistent illustrates how examined items approach the same concept. The reliability check can ensure the validity and demonstrate the measurement error in a scale. The accepted value of Cronbach's alpha is suggested from 0.7 (Bland and Altman, 1997). The lower value than this thread may lead to the revise or discard of examined scales. After Cronbach test is performed, management perception rates are calculated for each indicator. Less appropriate potential KSPIs are removed from the list of proposed KSPIs in each industry. The perception rates are measured based on the means of presented indicators. The mean values can be classified into five ranges including 0-1 range (highly inappropriate), 1.01-2 range (inappropriate), 2.01-3 range (neutral), 3.01-4 range (appropriate), and 4.01-5 range (highly appropriate). Only the appropriate and highly appropriate potential KSPIs are selected to become proposed set of KSPIs. 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. GRI adherent level is ranked based on GRI compliance status of firm sustainability reports (Fuente et al., 2017, and Prado-Lorenzo et al., 2009). Four GRI versions which comprise GRI-G3, GRI-G3.1, GRI-G4, and GRI-Standards are involved in the research period from 2013 to 2017. Since later versions are reviewed and amended to be more appropriate to implementing practices, it is likely that later versions provide more proper guidelines than previous versions. In each version, there are several adherence levels which determine how well firms followed GRI guidelines such as A+, A, B+, B, C in GRI-G3 and G3.1, or core and comprehensive in GRI-G4 and Standards. As a result, a ranking can be identified to measure GRI compliance status of observed firms. In addition to mentioned levels above, in each category, there is undeclared status which mean even though firm sustainability reporting follows specific indicated version, it is unclear which adherent level the

report tag along. For GRI-Standard, undeclared status is called GRI-Referenced. These undeclared statuses place in the lowest level in each version. Aside the above four GRI versions, from GRI database, there are also GRI citing firms which refer to GRI guideline but have no GRI Content Index, and Non-GRI companies which does not follow in above categories. These two types of sustainability reports take the lowest rank of the GRI compliance status (Table 4.2).

Table 4.2. GRI adherent level ranking

GRI Type	Adherent level	Rank	GRI Type	Adherent level	Rank
Non-GRI		0	G3.1	B	10
Citing GRI		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

Along with dependent and independent variables, the model employs four more control variables which consist of firm performance, firm size, firm age, and firm leverage. These variables are measured based on earlier research (Al-Najjar, 2014; Chen, 2007; Gurcharan, 2010; and Coad et al., 2013).

Table 4.3. List of control variables measurements in Research question 1-Model 1 and Model 2

Variables	Description
Firm performance	ROA: Net income/Total assets
Leverage	Total Debt/Total assets
Firm size	Logarithm of total assets
Firm age	Difference between current year and founded

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 (Liao et al., 2015; Guest, 2008; Hasan and Butt, 2009). 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.

Table 4.4. List of environmental friendly (F) and sensitive (S) industries

Industry	Type	Industry	Type
Agriculture	F	Healthcare products	F
Automotive	S	Household and personal products	S
Aviation	S	Logistics	S
Chemicals	S	Media	F
Commercial services	F	Metal products	S
Computers	S	Real Estate	F
Conglomerates	F	Retailers	F
Construction	S	Technology hardware	F
Construction materials	S	Telecommunications	F
Energy	S	Textiles and Apparel	S
Energy Utilities	S	Tourism/ Leisure	F
Equipment	S	Water Utilities	F
Financial services	F	Others	F
Food and Beverage products	S		

Source: Author's compilation and classification

The classification is based on the NAICS Codes, which provide lists of environmentally sensitive industries. For German large listed firms in the sample, there are totally 27 industries in which according to NAICS Codes, 14 industries are identified as in the pressure groups (Table 4.4). These consists of Automotive (Codes: 42311, 42114), Aviation (481), Chemicals (325), Computers (334), Constructions and Construction materials (237), Equipment (335), Food and beverage products (311, 312), Household and personal products (321, 326, 337), Logistics (481, 482, 484), Metal products (331), Textiles and Apparel (313, 314), and Energy and Energy Utilities (237). Thus, value 1 is applied for environmentally sensitive sector and value 0 otherwise. The last independent variable to be measured is external assurance. This variable can be illustrated by Yes which means the sustainability report is audited by an external body, or No which means the sustainability report is not audited. The Yes/No status can also be found in GRI

report List database. As a result, dummy variables with 0 for No and 1 for Yes will be used to demonstrate the external assurance performance of firm. As a result, this study summarizes these measurements of independent variables in Table 4.4.

Table 4.5. 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

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

5.1.1 Descriptive analysis

Table 5.1. Description of dependent and independent variables in Model 1 and 2

Variable	Obs	Mean	Std. Dev.	Min	Max
Firm value	480	68.53	87.22	0.54	728
SD	485	9.21	7.11	0	19
Firm performance	485	3.83	5.12	-25.13	50.71
Firm size	485	3.99	0.87	1.78	6.23
Firm age	485	79.98	63.01	5	349
Leverage	485	64.23	18.52	0.50	126.07

Source: Author's own processing

Observation of share price is 480 instead of 485 firms as Zalando was listed from 2014 so its share price in 2013 was not available and Metro Group were transformed to Metro AG in 2017 which made the information regarding share price before 2017 unavailable. The other financial and sustainable information of Metro Group were collected from its reports attached in GRI Database. The unavailable share data are leaved blank in the research data. Year-end share prices of observed firms in the research period are significant diverse with the highest and lowest share prices standing at €728 and €0.54 respectively. The highest share price belongs to Audi in 2017, and from 2013 to 2016, Audi share prices were also significant higher than the rest of observed firms. In 2013, Audi share price was 1.6 more than that in the second-high-share price firm, Mainova. However, in other years, Audi share prices were more than twice Mainova shares. Among 463 observations, around 33% firms have share prices beyond the average price of €68 and all firms' share prices fluctuate during the research period. The lowest price belonged to SolarWorld which declared bankrupted in 2018. As regard to GRI application, from 2013 to 2017, GRI-G4 has been applied the most which has 193 sustainability reports based on it. In the meantime, earliest version GRI-G3 and lasted version GRI-Standards has 35 and 39 reports following them correspondingly. Citing GRI has been utilized the least by only 11 firms. Regarding firm performance, the highest ROA belonged to SolarWorld in 2014 due to the significant reduction on financial liability as a result of financial restructuring. Except this highest ratio, firm performance value in the dataset is lower than 28%. This research focuses on large firms to lessen the impact of firm size; however, the size of firms referring to total assets was diverse from 59.7 million Euros to 1,709 billion Euros in which the average value to total assets was around 62 billion Euros. As for firm age, the researched firms are quite old with

average firm age of nearly 81 years old, and the oldest firm reached 349 years old. The last variable involves the level of debt using in firms. While Carl Zeiss Meditec had the lowest leverage of 0.5% in 2016, Porsche is the only firms that maintained low debt level (lower than 3.3%) in all five observed years. Aside these considerable mentioned low rates, all the other leverages were more than 20%. The highest leverage and also the only leverage higher than 100% belongs to Solar World in 2013. This high leverage led to the financial restructuring in 2014 as mentioned above.

5.1.2 Assumptions tests for Multiple Regression

Table 5.2 shows correlation results and VIF value of all variables in the main model. As no correlation is above 0.9 and no VIF value is more than 10, it can be stated that no multi-collinear issue incurs in the model (Field, 2005). Therefore, independent variables are not correlated which also means changes in one variable are not linked with changes in another variable. The correlation matrix also demonstrates significant associations between firm value and GRI adherent level, firm performance, firm size, and firm age of sustainability reports. The only insignificant connection is between firm value and firm leverage.

Table 5.2. Correlation matrix

Variables	1	2	3	4	5	6	VIF
1. Firm value	1						
2. SD	.148*	1					1.1
3. Firm performance	.117*	-.017	1				1.24
4. Firm size	.177*	.302*	-.188*	1			1.45
5. Firm age	.122*	.031	.022	.039	1		1.00
6. Leverage	-.060	.100*	-.430	.513	.011	1	1.60

* Significance at 10% level

Source: Author's own processing

Table 5.3 summarizes the results of assumption tests using estat imtest command in STATA which test for heteroskedasticity, skewness, and kurtosis due to Cameron and Trivedi (1990). Firstly, heteroskedasticity or heteroscedasticity is a problem regarding to inconstant variance among residuals which are drawn from a population. Heteroskedasticity result in the assumption test refers to null hypothesis which assumes that the variances of residuals or error terms are equal. The null hypothesis is rejected if p-value is significant. The rejection of null hypothesis means that heteroskedasticity exists and constant variance assumption is violated. In following table, p-value of heteroskedasticity result is not significant which mean null hypothesis is accepted. Therefore, assumption relating to constant variance of residuals is satisfied.

The next two items are skewness and kurtosis, which are used to test the normal distribution assumption. Skewness assesses the point that a variable's distribution is symmetrical. If the distribution of variable's responses extends to the left or the right tail of the distribution, the distribution is skewed. A symmetrical data will have a skewness of 0 which also indicate a normal distribution. According to Hair et al. (2014), the normal distribution can be satisfied when skewness is within -1 to +1. If skewness value is more than +1 or lower than -1, skewed distribution exists. Kurtosis is a measure of the combined size of two tails, or whether the distribution has most response in the centre. In general, if kurtosis value is more than +1, the distribution is too peaks, and when this value is less than -1, the distribution is too flat (Hair et al., 2014). Therefore, when a distribution reveals skewness and kurtosis value out the range from -1 to +1, it is considered as non-normal distribution (Hair et al., 2014). In addition, similar to heteroskedasticity, p-value can be used to determine the existence of non-normal distribution. While Skewness and Kurtosis measures the departure from normality distribution, p-value reveals the statistically significant of the departure. The test is based on null hypothesis which assumes the data is normal distributed. If p-value is significant, null hypothesis is rejected which mean normal distribution assumption is met. Regarding to the research results, all values of kurtosis are out of the recommended range and p-value is significant. This means that the dataset is considered as non-normal distribution. As for skewness, while some variables such as GRI level, firm size and leverage have skewness value within the range from -1 to +1, they cannot represent for the normal distribution of the whole data of the main model. This is confirmed by the significant p-value at 0.4% level. Therefore, normal distribution assumption is not met which leads to the replacement of Multiple Regression by Quantile Regression.

Table 5.3. Test for constant variance and normal distribution

Source	chi2	Df	P
Heteroskedasticity	26.81	20	0.141
Skewness	17.41	5	0.004
Kurtosis	6.12	1	0.013
Total	50.33	26	0.003

Source: Author's own processing

Table 5.4. Value of Skewness and Kurtosis

Variable	Firm value	SD	Firm performance	Firm size	Firm age	Leverage
Skewness	4.24	-0.32	1.07	0.01	1.11	-0.30
Kurtosis	26.99	1.34	22.29	3.22	5.11	3.83

Source: Author's own processing

5.1.3 Quantile Regression Results

Due to the violation of linear regression assumptions regarding to normal distribution, Quantile Regression is utilized to investigate the associate between firm value and sustainability disclosure. Quantile level reveals part of the population that involves in that quantile level. In order to avoid the missing data in analysis, this research attempt to cover as much as observed data as possible by considering more detail quantile level.

Table 5.5. Quantiles of share prices

Percentile	Centile	95% Confidence Interval		Number of obs.
0	0.54	0.54	.54*	1
0.01	3.96	1.23	4.84	8
0.025	5.98	4.21	7.28	14
0.05	7.73	6.72	9.24	19
0.075	9.33	7.83	11.31	22
0.1	11.19	9.30	12.84	25
0.15	13.74	12.12	15.81	31
0.2	16.45	14.60	20.06	34
0.25	21.28	17.56	24.66	36
0.3	25.27	22.31	28.89	38
0.35	29.59	25.41	33.60	40
0.4	33.96	29.95	36.97	42
0.45	37.66	34.69	44.37	42
0.5	44.86	38.26	50.34	43
0.55	50.53	45.57	58.11	42
0.6	58.84	51.10	66.32	42
0.65	68.08	59.37	74.27	40
0.7	75.08	69.68	84.29	38
0.75	87.50	76.23	92.10	36
0.8	93.91	88.50	101.36	34
0.85	103.57	99.04	128.96	31
0.9	143.59	114.79	157.94	25
0.925	156.97	141.95	184.25	22
0.95	191.38	160.01	271.11	19
0.975	304.41	224.49	409.90	14
0.99	637.18	337.27	712.02	8
1	728.00	728.00	728*	1

* Lower (upper) confidence limit held at minimum (maximum) of sample

Source: Author's own processing

Table 5.5 illustrated the used quantile level of share prices, the share prices, and number of observations in each quantile. For instance, at quantile level of 0.01, the average share price value is 3.96 Euros, a ninety five percent confidence interval of this quantile covers the share prices from 1.23 Euros to 4.48 Euros, and this share-price range consists of 8 observations. Effort in avoiding missing data in regression

leads to data overlap in two continuous quantiles. For example, share-price range at quantile level of 0.01 is from 1.23 Euros to 4.48 Euros, and share-price range at 0.025 quantile level is from 4.21 Euros to 7.28 Euros. Therefore, share prices from 4.21 Euros to 4.48 Euros, which include four observations, repeat in both of these quantiles. As the regression is performed separately for each quantile, these overlaps do not cause potential issues and the interpretation of the result will be based on the range of share price in specific quantile. In the list of percentile, quantile point 0 and 1 represent the lowest and the highest share price and only comprise one observation in each quantile. Therefore, these two points are eliminated from the regressions which means two observations are missing in the analysis.

Table 5.6 provides the p-value and coefficient estimate of each independent variable in associated with firm value. The sign of coefficient will reveal the negative or positive relations between dependent and independent variables. In addition, the changes of coefficient estimates in different quantiles can illustrate the changes of the importance of independent variable on dependence variable. P-values are presented statistical significance of coefficient estimate at three levels of ten percent, five percent, and one percent.

Table 5.6. Empirical results: P-value and coefficient estimates by quantiles

	SD	Firm performance	Firm size	Firm age	Leverage	Constant
0.01	0.396 -0.040	0.000*** 0.179	0.163 0.880	0.000*** 0.019	0.288 0.013	0.923 0.330
0.025	0.976 0.005	0.777 0.186	0.459 1.373	0.148 0.021	0.796 0.033	0.801 -2.265
0.05	0.914 0.019	0.370 0.521	0.208 2.546	0.129 0.024	0.764 -0.039	0.961 -0.463
0.075	0.663 -0.053	0.035** 0.770	0.003*** 4.568	0.002*** 0.044	0.057* -0.162	0.988 0.103
0.1	0.653 -0.055	0.013** 0.795	0.000*** 4.974	0.000*** 0.054	0.015** -0.185	0.982 -0.142
0.15	0.525 -0.060	0.000*** 0.845	0.000*** 7.125	0.000*** 0.067	0.000*** -0.268	0.761 -1.416
0.2	0.573 0.085	0.000*** 1.056	0.000*** 9.892	0.000*** 0.085	0.000*** -0.290	0.121 -10.094
0.25	0.373 0.150	0.001*** 1.050	0.000*** 13.075	0.000*** 0.104	0.000*** -0.316	0.007 -18.609
0.3	0.155 0.269	0.000*** 1.243	0.000*** 14.827	0.000*** 0.135	0.001*** -0.313	0.000 -25.958
0.35	0.243 0.285	0.003*** 1.159	0.000*** 15.410	0.000*** 0.147	0.023** -0.270	0.002 -28.720

0.4	0.209 <i>0.337</i>	0.000*** <i>1.550</i>	0.000*** <i>16.101</i>	0.000*** <i>0.166</i>	0.043** <i>-0.263</i>	0.002 <i>-31.026</i>
0.45	0.150 <i>0.530</i>	0.004*** <i>1.617</i>	0.000*** <i>19.359</i>	0.000*** <i>0.138</i>	0.169 <i>-0.237</i>	0.006 <i>-37.995</i>
0.5	0.002*** <i>0.687</i>	0.000*** <i>1.759</i>	0.000*** <i>20.346</i>	0.000*** <i>0.125</i>	0.123 <i>-0.156</i>	0.000 <i>-43.764</i>
0.55	0.003*** <i>0.914</i>	0.000*** <i>1.740</i>	0.000*** <i>20.930</i>	0.000*** <i>0.126</i>	0.179 <i>-0.185</i>	0.000 <i>-42.754</i>
0.6	0.002*** <i>0.969</i>	0.000*** <i>1.648</i>	0.000*** <i>21.220</i>	0.000*** <i>0.147</i>	0.271 <i>-0.149</i>	0.000 <i>-43.477</i>
0.65	0.028** <i>0.869</i>	0.001*** <i>1.845</i>	0.000*** <i>22.037</i>	0.000*** <i>0.138</i>	0.418 <i>-0.137</i>	0.004 <i>-42.115</i>
0.7	0.104 <i>0.709</i>	0.010*** <i>1.602</i>	0.000*** <i>24.388</i>	0.017** <i>0.100</i>	0.367 <i>-0.164</i>	0.021 <i>-37.686</i>
0.75	0.435 <i>0.426</i>	0.010*** <i>2.034</i>	0.000*** <i>27.281</i>	0.028** <i>0.102</i>	0.590 <i>-0.120</i>	0.027 <i>-44.695</i>
0.8	0.313 <i>0.661</i>	0.032** <i>1.930</i>	0.000*** <i>32.274</i>	0.258 <i>0.062</i>	0.109 <i>-0.424</i>	0.161 <i>-33.630</i>
0.85	0.660 <i>0.458</i>	0.389 <i>1.177</i>	0.000*** <i>43.286</i>	0.588 <i>0.047</i>	0.011** <i>-1.056</i>	0.738 <i>-13.095</i>
0.9	0.204 <i>1.279</i>	0.773 <i>0.372</i>	0.000*** <i>59.577</i>	0.011 <i>0.215</i>	0.000*** <i>-1.807</i>	0.523 <i>-20.116</i>
0.925	0.860 <i>2.362</i>	-0.310 <i>-1.209</i>	2.320 <i>54.921</i>	1.020 <i>0.234</i>	-2.250 <i>-2.446</i>	0.610 <i>53.183</i>
0.95	0.588 <i>4.493</i>	0.583 <i>-2.692</i>	0.675 <i>28.040</i>	0.635 <i>0.365</i>	0.306 <i>-2.886</i>	0.388 <i>207.231</i>
0.975	0.006*** <i>11.112</i>	0.765 <i>1.430</i>	0.142 <i>67.340</i>	0.847 <i>-0.093</i>	0.047** <i>-2.778</i>	0.627 <i>83.271</i>
0.99	0.000*** <i>5.963</i>	0.186 <i>2.331</i>	0.000*** <i>188.323</i>	0.282 <i>-0.169</i>	0.000*** <i>-3.411</i>	0.130 <i>-89.976</i>

* 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 5.6 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.

As for firm performance, a positive significant link between firm value and firm size is found in most of the quantiles level from 0.01 to 0.8. However, insignificant connections between these two variables are shown in quantile levels of 0.025, 0.05, and quantile levels above 0.8. The results indicate that when firm share prices fall into the range from 1.23 to 4.84 Euros and from 7.83 to 101.36 Euros, the higher the firm's profitability is the higher firm value is. In overall, this relation is stronger when the share prices rise.

Similar to firm performance, positive significant relationships are revealed between firm value and firm size. The associations are found in wider range of quantile levels which start from 0.075 to 0.9, and include 0.99. The outcomes show that when firm share prices fall into the range from 7.83 to 157.94 Euros and from 337.27 to 712.02 Euros, the bigger the firm is the higher of firm value is. In comparison to previous variables, the impacts of firm size on firm value are much stronger. Additionally, when firm value increases the influence of firm size on it also gets stronger. Nevertheless, this positive relation between firm value and firm size is insignificant in the other quantile levels.

In the same patterns of firm profitability and firm size, firm age is positively associated with firm value for the quantile levels of 0.01 and from 0.075 to 0.75. These findings demonstrate that when firm share prices fall into the range from 1.23 to 4.84 Euros and from 7.83 to 92.10 Euros, the older the firm is the higher the firm's value is. The impacts of firm age on firm value are stronger when quantile levels increase to 0.4. However, the influence's pattern is unclear for the later quantiles. Beside the indicated quantiles level, insignificant relationship between firm age and firm value is found.

Different from the impact patterns of previous independent variables, leverage has significant negative relationship with firm value. Similar to previous outcomes, this significant connection are revealed in some level of quantiles, e.g.: from 0.075 to 0.4, from 0.85 to 0.9, and from 0.975 to 0.99. These effects express that when firm share prices fall into the range from 7.83 to 92.10 Euros, from 99.04 to 157.94 Euros, and from 224.49 to 712.02 Euros, the more debt firm hires the lower the firm's value is. The association between these two variables decrease when firm value increases.

To sum up, the results partly accept hypothesis 1 which states that German large listed firm with more sustainability disclosure tends to have higher firm value. For control variables, significant positive associations between firm performance, firm size, firm age and firm value are revealed in the quantile from 0.075 to 0.75, and slightly different in other quantiles for associations of each control variable and firm

value. Leverage has significant negative connection with firm value in lower quantiles range with starts from 0.075 to 0.4, and in 0.85, 0.9, 0.975, and 0.99.

5.1.4 Robustness test

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. For control variables, firm performance, firm size, and firm age remain the same positive significant association with firm value in similar quantiles as in the main model. Firm leverage also maintain significant negative link with firm value in compatible quantiles. In overall, the associations between independent and dependent variables get stronger when the quantile levels increase or firm share prices enhance.

Table 5.7. Robustness test: P-value and coefficient estimates by quantiles

	SD	Firm performance	Firm size	Firm age	Leverage	Constant
0.01	0.719	0.000***	0.263	0.003***	0.164	0.957
	-0.023	0.205	0.862	0.017	0.019	0.207
0.025	0.507	0.331	0.446	0.364	0.525	0.893
	-0.078	0.186	1.207	0.012	0.047	-0.970
0.05	0.993	0.390	0.212	0.203	0.858	0.978
	0.001	0.458	2.332	0.019	-0.021	-0.249
0.075	0.897	0.090*	0.031**	0.010***	0.148	0.939
	-0.021	0.800	4.600	0.047	-0.158	-0.707
0.1	0.724	0.002***	0.000***	0.000***	0.006***	0.872
	-0.040	0.924	5.170	0.059	-0.189	-0.960
0.15	0.883	0.000***	0.000***	0.000***	0.000***	0.413
	-0.014	1.029	7.029	0.063	-0.226	-3.790
0.2	0.947	0.007***	0.000***	0.000***	0.000***	0.320
	-0.010	0.798	10.456	0.079	-0.337	-6.659
0.25	0.690	0.000***	0.000***	0.000***	0.000***	0.000
	0.051	0.876	13.777	0.096	-0.294	-19.621
0.3	0.389	0.002***	0.000***	0.000***	0.012**	0.004
	0.191	1.174	14.586	0.126	-0.274	-25.077
0.35	0.189	0.001***	0.000***	0.000***	0.027**	0.003
	0.366	1.476	16.362	0.162	-0.297	-31.749
0.4	0.247	0.001***	0.000***	0.000***	0.004***	0.003
	0.319	1.498	18.798	0.155	-0.373	-30.748

0.45	0.057* 0.506	0.000*** 1.631	0.000*** 20.308	0.000*** 0.132	0.010*** -0.323	0.000 -35.814
0.5	0.058* 0.525	0.000*** 1.709	0.000*** 23.220	0.000*** 0.124	0.037** -0.264	0.000 -45.379
0.55	0.034** 0.610	0.000*** 1.634	0.000*** 23.929	0.000*** 0.121	0.128 -0.200	0.000 -47.913
0.6	0.032** 0.791	0.001*** 1.860	0.000*** 23.191	0.002*** 0.117	0.343 -0.151	0.001 -46.470
0.65	0.054* 0.896	0.015** 1.617	0.000*** 22.956	0.008*** 0.123	0.381 -0.173	0.024 -38.978
0.7	0.328 0.420	0.005*** 1.731	0.000*** 24.062	0.012** 0.105	0.528 -0.113	0.032 -34.044
0.75	0.614 0.289	0.012** 1.957	0.000*** 25.077	0.040** 0.103	0.523 -0.148	0.162 -29.250
0.8	0.442 0.660	0.132 1.688	0.000*** 31.502	0.098* 0.118	0.340 -0.315	0.241 -36.483
0.85	0.397 0.837	0.632 0.608	0.000*** 45.966	0.122 0.130	0.003*** -1.136	0.595 -16.843
0.9	0.312 1.154	0.881 -0.218	0.000*** 62.147	0.026** 0.204	0.000*** -1.931	0.699 -13.819
0.92 5	0.514 2.057	0.794 -1.153	0.048** 54.724	0.192 0.345	0.073* -2.316	0.670 44.524
0.95	0.636 4.250	0.710 -2.365	0.575 36.481	0.520 0.484	0.314 -3.229	0.490 193.093
0.97 5	0.023** 10.875	0.774 1.642	0.172 74.749	0.844 -0.113	0.032** -3.585	0.521 131.225
0.99	0.554 1.559	0.419 -2.311	0.000*** 211.087	0.973 -0.008	0.000*** -5.167	0.802 -24.372

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.

Source: Author's own processing

5.1.5 Discussion

The results on association between firm value and firm sustainability disclosure are mixed. The outcomes are partly consistent with hypothesis 1 when revealing significant positive relationship between these two variables in some ranges of quantile levels. This indicates that German large listed firms which have proper sustainability disclosure are likely to have higher share price than others in indicated ranges of quantiles. However, beside quantile ranges that significant connections are

found, insignificant relations are revealed. The later outcome shows that German large listed firm's sustainability disclosures have no impact on firm value. Although the findings are mixed, they are not conflict to each other as different results are allocated for different quantile levels or for different ranges of share prices.

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.

Different from previous research, this research reveals diverse associations between firm value and sustainability disclosure in regarding to share price ranges instead of only one direction impacts, and shows the strength of these associations when share prices change. Previous studies are more likely to provide one way relationship between firm share price and sustainability disclosures. For example, Guidry and Patten (2010) and Berthelot et al. (2012) explore just significant positive relations; in the mean time, Lorraine et al. (2004) discover only significant negative connections; Clarkson et al. (2010) and Qiu et al. (2016) merely find no link between these two variables. By dividing the data into different quantiles, this research examines the impact of sustainability disclosures on share prices in different share price ranges and discovers different associations in different share price ranges. In addition, with unique coefficient from regression results, previous studies rarely show how strong sustainability disclosures impact on share prices when the value of these share prices change. In this research, coefficients retrieved in different quantiles can provide the movements of influence's strength of sustainability disclosures on firm value. This influence tends to get stronger when share price increases.

The significant positive and insignificant outcomes between firm value and sustainability disclosure are also consistent with previous research. Positive relationships between these two variables are affirmed by Anam et al. (2011) who declare that sustainability disclosure provide more suitable information for assessing firm share price and is more likely to enhance firm value. In perspective of firm's employees, sustainability performance in diversity and equality improve employee perception on superior working environment, hence encourage their dedicated performance which in turn positively influence firm value (Cormier et al., 2011). Furthermore, sustainability transparency in environmental and social enhance firm reputation and facilitate effective use of firm resources (Momin and Parker, 2013; Clarkson et al., 2010). These enhancements can then directly favourable impact on firm value. Regarding to insignificant association between firm value and sustainability reporting, it can be confirmed by Clarkson et al. (2010) and Qiu et al. (2016).

Regarding to control variables, the mix results are also presented in each variable. Aside the insignificant in some ranges of quantile levels, it can be partly confirm that the relations between control variables and dependent variables are consistent with the assumption stated in the hypothesis development part. In more details, firm profitability, firm size, and firm age are found to have significant positive relations with firm value while firm leverage is negatively associated with firm value. This means the higher profit firm gains, the larger and the older firm is the more likely firm share price increase. As for firm leverage, the more debt firm hires the lower firm value is. However, these significant associations are shown when firm share prices are within specific ranges and outside these share prices' ranges the associations turn to insignificant. Different from the narrow ranges of independent variable, the significant ranges of control variables are much wider. Indeed, within total twenty five quantile levels, seventeen ranges are found to have significant relations between firm performance and firm value; for firm size, firm age, and firm leverage, these figures are twenty, sixteen, and twelve ranges respectively. This means the impacts of control variables on firm value appear in more German large listed firms in comparison to the impact of independent variable on firm value. These impacts can be interpreted that indicated financial information are used more frequently than sustainability information in supporting investment decision.

Due to the requirement for deadline to publish sustainability reports in German, complementary test is performed with the use of four-month after year end share price; however, no substantial difference is revealed in comparison to the results in main model. Significant favourable connection with firm value are also revealed relating to sustainability disclosure, firm performance, firm size, and firm age; and negative association is found with firm leverage. Significant ranges are also quite similar to the main model with the variance of only one level lower or upper in each variable. Possible reason for the indifference can be that firms did not wait until the required deadline to publish their sustainability reports, therefore the difference cannot be observed at the deadline share price.

5.2 Factors impact on Sustainability Reporting Disclosures

5.2.1 Descriptive analysis

Table 5.8. Descriptive Statistics

Variables	Minimum	Maximum	Mean	Std.
SD	0	19	9.21	7.11
Board size	3	21	13.27	5.00
Board independence	0	100	60.71	28.70
Board diversity	0	75	22.05	10.94
Board committees	0	9	4.07	1.57
Board meetings	2	84	18.45	9.97
Firm size	1.78	6.23	3.99	0.87
Firm age	5	349	79.98	63.01
Firm performance	-25.13	50.71	3.83	5.12
Industry	0	1	0.55	0.50
External assurance	0	1	0.36	0.48

Source: Author's own processing

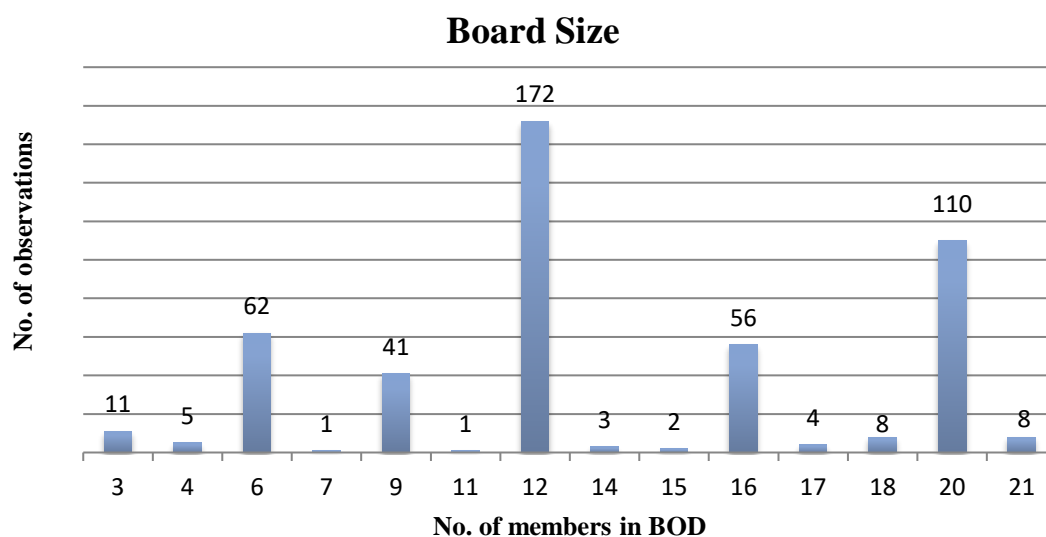


Figure 5.1. Board size description

Source: Author's own processing

Significant variances incur in all factors of Board of Directors' (BODs) characteristics which include board size, board independence, board diversity, board committees, and board meetings. Fourteen board sizes are observed in the data which consist of three, four, six, seven, nine, eleven, twelve, fourteen, fifteen, sixteen, seventeen, eighteen, twenty or twenty one members in the board. Among these board sizes, the twelve-member board is the most popular which occupies

more than thirty five percent of all board sizes in the observations. This board size is also approximate to average board size of the data which includes thirteen members. The second well-liked size which accounts for nearly twenty three percent of the population, comprise twenty members in the board. Board sizes of six, nine, and sixteen members are found in thirty seven firms with total observation of one hundred and fifty nine.

Thirty ranges of proportions of independent members on BODs are found in observed firms. These ranges extend from zero percent to one hundred percent, in which the most popular proportions include 25%, 33.5%, 50%, 66.67%, 75%, and 100%. The first proportion means that twenty five percent of member on BODs are independent, and the later proportions can be interpreted similarly. Observations which have all independent members are quite high in comparison to other ranges. In the mean time, seven observations are found with no independent member. Firms with no independent member confirmed their needs for the internal expertise to supervise firms’ activities and decided to violate the Code recommendation. For firms that achieve 100% of independent members, it is stated in the corporate governance reports that all members are satisfy the independent criteria according to Article 5.4.2 of the Code. Other ranges which are not illustrated in the graphs cover less than ten observations in each range. However, these thirty ranges have not covered on firms in the research as some reports did not declare the independent status of the members on BODs and the information cannot be found precisely in other channels. In order to maintain the accuracy of the data, seventy five observations are stated as missing and are leaved as a blank data.

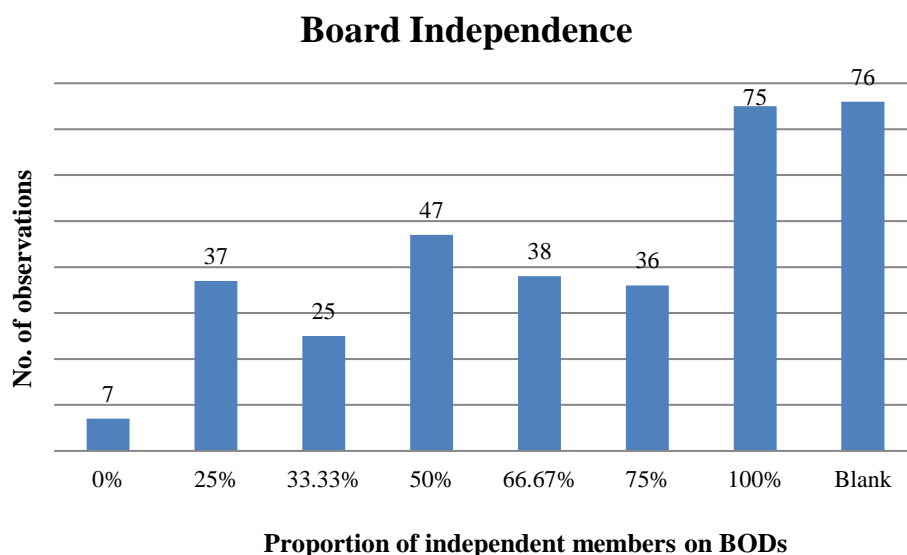


Figure 5.2. Board independence description
Source: Author’s own processing

Thirty three series of female proportions in BODs are found in the population, in which 16.67%, 25%, and 33% are the most popular proportions of female members on board. These percentages means that proportion of female members in BODs are

16.67 percent, 25 percent and 33 percent respectively. The 16.67 percent is found in firms which have six or twelve members in the board, which indicates that there is only one or two female in BODs. Some of the proportions only involve in one type of board size, for instance, zero percent and 8.3 percent of women on BODs are only found in twelve-member board size, while 20 percent, 30 percent and 35 percent of female members on board are discovered in twenty-member board size. Even though, numbers of observations that have no female on board are quite high, this figure decreased within the research period which started with thirteen observations in 2013 and ended with just three observations in 2017. Other proportions of female members on BODs that are not presented in the graph cover less than five observations in each range.

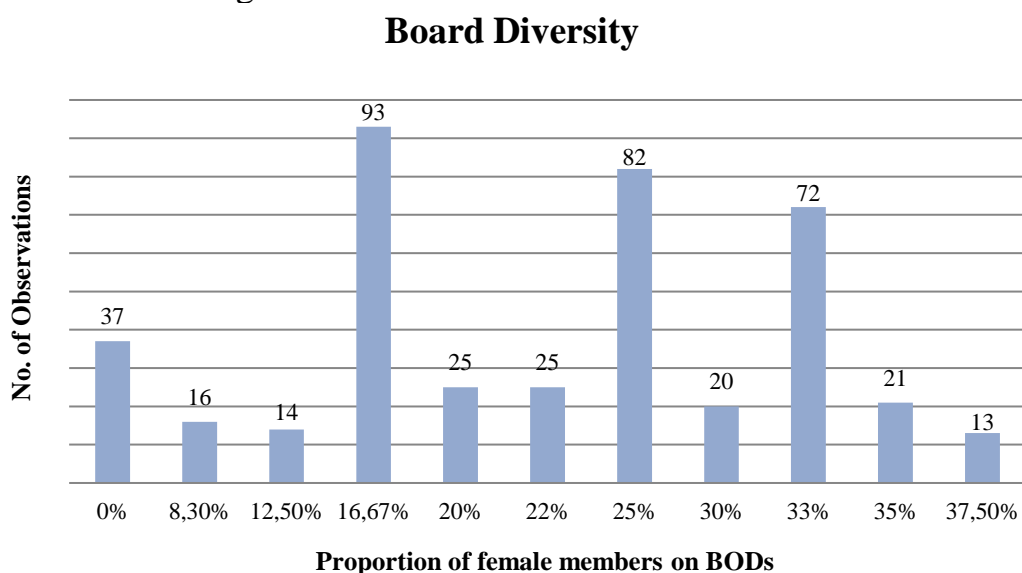


Figure 5.3. Board Diversity Description
Source: Author's own processing

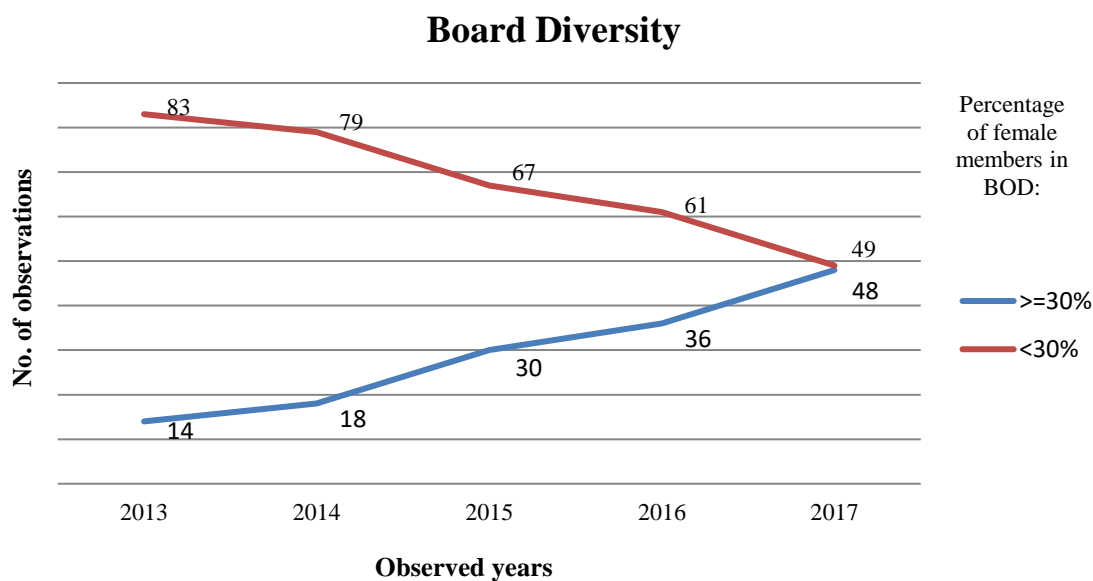


Figure 5.4. Board Diversity trend
Source: Author's own processing

One of the requirements of German Code of Corporate Governance relating to gender diversity is to achieve a minimum of 30 percent female or male members (Article 5.4.1). Therefore, 30 percent is taken as a breaking point to divide the data into less than 30 percent and more than or equal 30 percent. It can be seen that opposite trends incur in these two groups of data. While most firms in 2013 have less than 30 percent of females on board, in 2017 firms those have less than 30 percent and vice versa are nearly the same.

The average numbers of committees on BODs is equivalent to four committees. This is also the most popular number of committees which are found in more than thirty five percent of the observations. Other number ranges of committees spread evenly on both sides of this peak number. The lowest number of committees in the population is zero which appears in two firms within the research period and in one firm in 2013. The highest number of committees appears only one time in 2015 when the firm set a special committee on the acquisition of other firm.

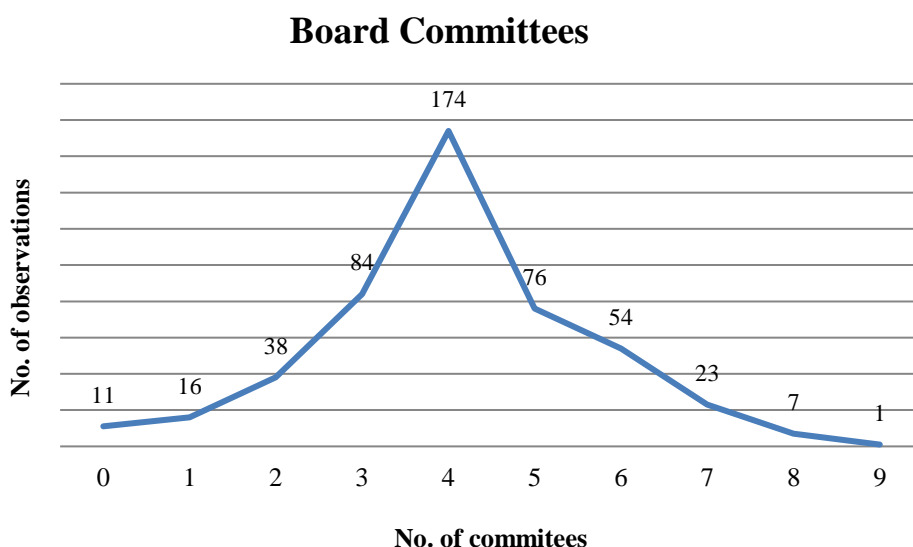


Figure 5.5. Board Committee Description
 Source: Author’s own processing

There are totally fifty figures relating to numbers of meetings of BODs in the observation which stretch from two to eighty four meetings. The graph just presents the observations that have more than five meetings. While the average number of meetings is around eighteen, the most popular ones are from twelve to fourteen. In addition, some observations have significant high number of meetings which reach eighty two and eighty four meetings per year. However, these figures just appear once within the research period in all firms.

For four variables of firm’s features, the description of the first three which include firm size, firm age, and firm performance are the same as in research question one as the same data are collected for these variables. The last variable of firm industry is divided into two groups which consist of 225 observations belonging to environmental friendly sectors and 260 observations belonging to environmental sensitive sectors. As for external assurance of sustainability reports,

nearly sixty four percent of observations did not have their reports audited by the third parties.

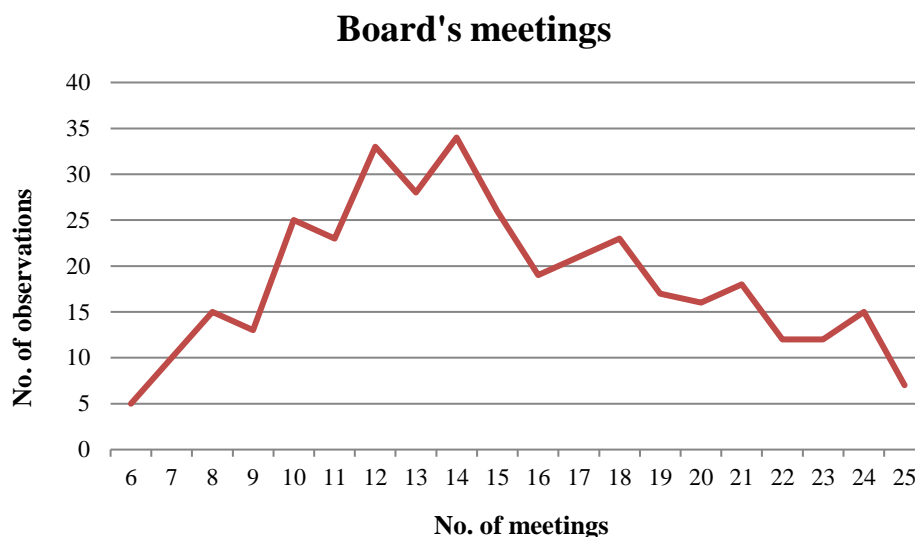


Figure 5.6. Board Meetings Description
Source: Author’s own processing

5.2.2 Diagnostics for Ordinal Logistic Regression

To reassure the validity of logistic regression analysis, it is necessary to check whether research models are satisfied with the assumption of logistic regression or not. As if the assumptions are violated, problems relating to biased coefficient estimates or huge standard errors can cause unreasonable statistical inferences. The diagnostics for ordinal logistic regression concentrate on identifying potential problems in research models if any, and on evaluating the models’ fit. These diagnostics therefore cover issues relating to specification error, multi-correlation, and goodness of fit.

Specification error involves in assumption of linear combination between logit of the outcome variable and the independent variables. This assumption presumes applied logit function is appropriate and all relevant variables are included. This research use ‘linktest’ command in Stata to identify a specification error. Linear predicted value ($\hat{\mu}$) and linear predicted value squared ($\hat{\mu}^2$) are retrieved from the test. Significant linear predicted value indicates meaningful predictors are chosen. However, if linear predicted value squared is also significant, it indicates that the model has a specification error. Therefore, in order to assure the satisfaction of the first assumption, linear predicted value should be significant while linear predicted value squared is insignificant. As revealed results in following table, it can be seen that the variable linear predicted value is significant with p-value of 0.00 and linear predicted value squared is insignificant (p-value = 0.72). As a result, it can be concluded that the research model comprise all of the relevant variables and it does not have specification error.

Table 5.9. Linktest results for detecting specification error

SD	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
_hat	1.09	0.29	3.78	0.00	0.53	1.66
_hatsq	-0.03	0.08	-0.37	0.72	-0.19	0.13
_cons	-0.01	0.15	-0.08	0.94	-0.31	0.29

Source: Author's own processing

Multicollinearity arises when two independent variables are linear combination of each other. This means the assumption regarding to nonlinearity combination among independent variable is infringed. Therefore, Pearson correlation and VIF test is performed to detect multicollinearity problem that may incur in the model. Table 5.10 illustrates the correlation among variables in regression model and VIF value. According to the results, no correlation goes beyond 0.9 which means there is no multicollinearity in the model (Field, 2005). In addition, VIF value of all variables is less than 10. This confirms the independent variables do not violate the multicollinearity assumptions. Therefore, all considered independent variables are included in the estimated model. The correlation matrix also discloses the significant relation between sustainability disclosure and board size, board diversity, number of board committees, number of board meetings, firm size and external assurance. In addition, number of women, committees, and meetings on board are significant associated with number of members on board.

Table 5.10. Correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	VIF
1. SD	1											-
2. Board size	.195*	1										2.36
3. Board independence	.072	.017	1									1.13
4. Board diversity	.117*	.252*	.232*	1								1.21
5. Board committees	.173*	.564*	.152*	.207*	1							2.2
6. Board meetings	.175*	.366*	.008	.206*	.637*	1						2.1
7. Firm size	.294*	.662*	-.025	.202*	.462*	.480*	1					1.93
8. Firm age	.031	.061	-.017	-.014	-.085*	-.045	-.003	1				1.04
9. Firm performance	-.016	-.160*	.060	.048	-.109*	-.148*	-.191*	.020	1			1.1
10. Industry	-.002	.077*	.038	-.141*	-.171*	-.290*	-.093*	.108*	.075*	1		1.26
11. External assurance	.473*	.324*	.132*	.166*	.291*	.227*	.262*	-.026	.025	.048	1	1.22

* Significant at 10%

Source: Author's own processing

Goodness-of-fit test provide information on whether research model fits the data well or not. This research uses Pearson chi-square goodness-of-fit test which examines the significant different between observed and expected value of a given phenomena using cells defined by the covariate patterns. When p-value of Pearson chi-square goodness-of-fit test is significant, it indicated that there is no significant difference between observed and expected value. This also means the model does not fit the data well. Therefore, insignificant p-value is expected to assure for the goodness-of-fit model. Table 5.11 illustrates the result of Pearson chi-square goodness-of-fit test, with a p-value of 0.348, it can be said that the research model fits the data well.

Table 5.11. Goodness-of-fit test result

number of observations	408
number of covariate patterns	403
Pearson chi2(392)	402.35
Prob > chi2	0.348

Source: Author's own processing

In overall, the assumptions of logistic regression are not violated through above tests. Consequently, logistic regression is applied to test the relationship between sustainability disclosure and factors that may impact in sustainability disclosure.

5.2.3 Logistic Regression Results

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 5.12. 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.

5.2.4 Complementary results

Jenkins (2006) states that sustainability activities are different among firms depending on which industries the firms belong to. Environmental information tends to be provided more in environmental sensitive firms (Campbell, 2003; Hackston and Milne, 1996). Even though industry variable is found to be insignificant related to sustainability disclosure in logistic regression results, this research desires to test whether different behaviour incur among independent and dependent variables if firm belongs to environmental sensitive and friendly sectors. Therefore, the data is

divided into two groups, the first set includes 260 firms belong to environmental sensitive industry and the other set consists of 225 firms that are in environmentally friendly industry. At first, assumption tests are also performed for two models in two groups. The assumption test results in Table 5.13 reveal no violation in the assumptions relating to specification error, multi collinearity, and model fitting, therefore, logistic regression are utilized to analysis the relation between sustainability disclosures and impacted factors for these two datasets.

Table 5.13. Assumption tests for models in environmental friendly and sensitive sectors

Specification error	Environmental friendly sectors		Environmental sensitive sectors	
	Coef.	P>z	Coef.	P>z
SD				
_hat	1.02	0.00	0.82	0.00
_hatsq	-0.01	0.93	0.08	0.46
_cons	0.00	0.99	-0.05	0.82
Multi collinearity (VIF)				
Board size		2.6		2.28
Board independence		1.22		1.22
Board diversity		1.13		1.31
Board committees		2.84		1.75
Board meetings		2.23		1.66
Firm size		2.55		1.73
Firm age		1.16		1.06
Firm performance		1.41		1.05
External assurance		1.36		1.29
Goodness-of-fit test				
Number of observations		188		215
Number of covariate patterns		183		210
Pearson chi2(392)		194.92		147.4
Prob > chi2		0.1828		0.998

Source: Author's own processing

The logistic regression results for the association between sustainability disclosure and impacted factors in two groups of industries are shown in Table 5.14. Firstly, relating to board of directors' factors, significant negative relation at ten percent is found between sustainability disclosure and board size in German large listed firms which belong to environmental friendly sector. This indicates that the

more members on board, the less sustainability performance German large listed firm disclose. Meanwhile, in environmental sensitive sector, significant negative relationship at five percent is found with board diversity. This suggests that the more female members on board are, the worse sustainability disclosure is. Aside significant variables, all others have insignificant impact as in the main model. Therefore, these outcomes are partly different from the main model for the whole dataset.

Referring to firm's features variables, when separating the data into two groups of industries, while firm age has no longer impact on sustainability disclosure of firms in environmental friendly industry, firm size has no longer impact on sustainability disclosure of firms in environmental sensitive industry. In addition, firm performance appears to have significant negative impact on sustainability disclosures of German large listed firms in environmental friendly industry. The later result points out that the more profit German large listed firms earn, the less sustainability activities are disclosed in these firms.

Table 5.14. Regression results for industry separation into sensitive and friendly sectors

Variables	Environmentally friendly industry		Environmentally sensitive industry	
	Coef.	P-value	Coef.	P-value
Board size	-0.140*	0.057	0.060	0.367
Board independence	0.008	0.241	0.012	0.161
Board diversity	-0.006	0.760	-0.058**	0.014
Board committees	-0.282	0.157	0.051	0.827
Board meetings	0.018	0.513	-0.040	0.348
Firm size	0.936***	0.004	0.228	0.491
Firm age	-0.001	0.709	0.014***	0.001
Firm performance	-0.179**	0.015	0.007	0.886
External assurance	2.907***	0.000	4.769***	0.000

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.

Source: Author's own processing

Lastly, dividing the data into two sets does not affect the regression result regarding with external assurance. For both environmental friendly and sensitive sectors, external assurance is found to have significant positive impact at one percent on sustainability disclosure.

5.2.5 Discussion

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.

Positive association between firm size and sustainability transparency are in accordance with research outcomes of Sharif and Rashid (2014) and Rahman et al. (2011). This association can be explained that large firm has more resources, capacity, intention as well as pressure in complying with CSR practices (Siregar and Bachtiar, 2010). The resources and capacity involve all aspects of human, finance and technology. With these resources and capacity, the intention to disclosure more sustainability information emerges due to these firms' efforts in remaining and enhancing their reputation and value. Aside the intention, in some perspectives, German large listed firms face with pressures on publishing sustainability performance which are caused by current requirements on mandatorily providing non-financial information. Nonetheless, this significant positive association between firm size and sustainability disclosure turn to insignificant in sensitive industry when the data is separated into two groups of industries. This change may incur since not only big firms but also smaller firms take the same focus on their sustainability performance in industry sensitive where their operations are highly involved in environmental and in some cases even social issues.

As for firm age, favourable relation is found between this variable and sustainability disclosure. This finding is consistent with previous studies of Godos-Diez et al. (2011) and Bayoud et al. (2012). When firms have long history, they may gain more knowledge, skills, experience to be able to efficiently implement sustainability practices. In term of German large listed firms, the longer time these firms operate in Germany, the more likely they get acquainted with German business environment which set a high focus on sustainability development. This

concentration of German business environment can form a consistent shape for the firms themselves. As a result, these older firms tend to perform well in sustainability activities, in which reporting can be considered as one main phase. However, when separating the data into two groups of industries, firm age has no longer impact on sustainability disclosure of firms in environmental friendly industry. The reason for this can be raised through the nature of environmental friendly sector. Unlike sensitive group, which have more activities that may negatively impact on environment and communities, friendly group, which have more stable activities involving the environment, may not need to gain more experience and capacity in implementing sustainability practice. Therefore, whether firm operate in Germany for long or short period, the disclosures may not have significant different

In term of external assurance, the significant positive connection with sustainability disclosure is in line with Junior et al. (2014) and Simnett et al. (2009). It is in high demand for firm to disclose reliable environmental and sustainable information as this is the essential component in good corporate governance and responsibility. Moreover, stakeholders are more aware of the honesty of CSR activities that firm has performed and will engage. This honesty can somehow ensure by the assurance from external bodies. Due to the importance and necessity of external auditing on sustainability report, its favourable impact sustainability disclosure is confirmed in this research in both main and complementary models.

Insignificant association between sustainability disclosure and board size, board independence, board gender diversity, board committees, board meetings, firm performance and firm industry are also found in prior studies (Fuente et al., 2017; Giannarakis, 2014; Michelon and Parbonnetti, 2012; Frias-Aceituni et al, 2012; Qui et al., 2016, Larran and Giner, 2002). Nevertheless, when dividing the data into friendly and sensitive sectors, results reveal the negative significant at ten percent coefficient in board size in friendly sectors. This outcome means that the greater of number of board member is the worse of firm's sustainability disclosure is. The significant connection between board size and sustainability disclosure is consistent, however, the impact between two variables is opposite from the hypothesis two. This result is consistent with previous research such as Prado-Lorenzo and Garcia-Sanchez (2010) and Said et al. (2009). Possible reasons for the adverse influence can be the bigger board size is the less coherent in decision making is, moreover, it seems to be incapable for large board size to determine firm strategies to prevent company from inappropriate CSR practices (Said et al., 2009).

The separation of industries in complementary research also leads to the significant negative connection between firm sustainability disclosures and board diversity in sensitive sector. In the most current version of German Corporate Governance Code, the Code recommends firms to set clear targets for proportion of female on board and require board to have at least thirty percent of female members on board. However, in reality, many firms violate from the recommendation as they do want these targets impairing the flexibility in choosing board members. In addition, many firms hesitate with this change as in their opinion; this alter does not

impact on the efficiency of board operation. Especially, with higher environmental and social problems concerning in firm operation in sensitive industry, the focus on these issues of females members (Liao et al., 2016) may deflect the main business objectives and strategy. Therefore, the appearance of females in board of directors can be seen as a distracted factor in sensitive sectors.

With complementary regression, no changes have been made to the insignificant results of board independence, board committees, and board meetings. Independent directors who are usually external experts may not have full comprehension on firm social and environmental activities in relation to firm operations. In addition, the independent status cannot confirm for the fact that these directors will always stand up to protect the other stakeholders and against the other members in BODs in conflict or controversial situations. Therefore, independent members on board cannot assert for the significant impact on firm sustainability performance and disclosures. As for board committees, these committees are formed to pursue specific targets and designed functions. Due to the high orientation on delegated tasks in each type of committees, the neglect on sustainability activities may arise which lead to the null relation of board committees and sustainability disclosure. In term of board meetings, more meetings may cover more topics; however, it cannot be assured these topics contain sustainability transparency issues. Lacking of concentration on sustainability disclosure of course cannot set the link between board meetings and this issue.

Table 5.15. Hypotheses testing results

Hypotheses	Outcomes
Investigating the impact of sustainability reporting on German large listed firm value	
H1: German large listed firm with more sustainability disclosure tends to have higher firm value.	Partly Accepted.
Examining the influence of board of director on disclosure of sustainability activities in German large listed firm	
H2: More sustainability activities are likely to be disclosed in German large listed firms that have higher number of board members.	Rejected
H3: More sustainability activities are likely to be disclosed in German large listed firms that have more independent board.	Rejected.
H4: More sustainability activities are likely to be disclosed in German large listed firms that have more than 30 percent female members.	Rejected

Hypotheses	Outcomes
H5: More sustainability activities are likely to be disclosed in German large listed firms that have more subcommittees in supervisory board.	Rejected
H6: More sustainability activities are likely to be disclosed in German large listed firms that have more supervisory board's meetings.	Rejected
Examining the influence of firm characteristics on GRI compliance status of sustainability reports in German large listed firm	
H7: More sustainability activities are likely to be disclosed in German large listed firms that have larger size.	Accepted.
H8: More sustainability activities are likely to be disclosed in German large listed firms that were founded earlier.	Accepted.
H9: More sustainability activities are likely to be disclosed in German large listed firms that have greater profitability	Rejected.
H10: More sustainability activities are likely to be disclosed in German large listed firms that belong to more environmentally sensitive sector.	Rejected.
Examining the influence of reporting features on GRI compliance status of sustainability reports in German large listed firm.	
H11: More sustainability activities are likely to be disclosed in German large listed firms that have external assurance on their sustainability reports.	Accepted.

Source: Author's own processing

5.3 The use of KPIs for sustainability performance

5.3.1 Sustainability disclosures in automotive industry

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. Within these nine companies, Audi, BMW, Porsche, and Volkswagen produce wide range passenger cars, luxury cars, or sport cars. Daimler manufactures cars, trucks, buses and coaches. MAN Group is one of Europe manufacturers of trucks, buses and coaches, special-purpose vehicles and diesel and gas engines. All the other firms are main suppliers of car components and technologies. Durr supplies a wide range of products relating to painting, final assembly and air pollution control applications, testing system, conveyor technology, filling technology, and sealing and gluing

technology for automotive. ElringKlinger is one of the main suppliers for lightweight and elastomer technology, sealing system, e-mobility components, and shielding systems which are used in passenger cars and commercial vehicles. And Schaeffler manufactures high-tech bearings for automotive and industrial and offers components such as clutch systems, transmission components, torsion dampers, valve train systems, camshaft phasing units, and electric drives for both vehicles and drive trains. Following paragraphs describe the disclosures of sustainability performance of nine observed firms in automotive industry. The description of each firm covers the implemented guidelines, disclosed aspects, presented key sustainability figures, and used key sustainability performance indicators.

Audi has disclosed its responsibility reports in accordance to GRI guidelines since 2012. In 2017, Audi issued Sustainability Report and complied with GRI-Standards, the most updated version currently. GRI-Standards have two options to disclose: Core option and Comprehensive option. Core option contains the important aspects such as economic, environmental, social, and governance performance of sustainability report. Meanwhile, Comprehensive option is built on Core option and adds more information about organization's strategy, governance, ethics, and integrity. The sustainability report of Audi in 2017 was consistent with Core option. The topics and disclosures which were presented in Audi sustainability report are appropriately consistent with GRI-Standards guidelines. Audi provided quite detail the material topics which are significant to the organization's economic, environmental, and social impacts; and essential for stakeholders' decisions and evaluations (Figure 2). Audi also built a sustainability program which combines strategic sustainability goals with solid measures. This in turn became proper explanation for management approach in later presented disclosures. In Audi sustainability report, seven key performance indicators and eighteen key sustainability figures were reported. While the KSPIs focused on economic field, the key figures were related to all three economic, environmental, and social areas. In Economic category, Audi focused on six topics: economic performance, market presence, indirect economic impacts, procurement practices, anti-corruption and anti-competitive behaviour. As for Environmental category, eight topics which include materials, energy, water, biodiversity, emissions, effluents and waste, environmental compliance, and supplier environmental assessment were covers. Social category comprised of twelve topics: employments, labour/management relations, occupational health and safety, training and education, diversity and equal opportunity, human rights assessment, local communities, supplier social assessment, customer health and safety, marketing and labelling, customer privacy, and socioeconomic compliance.

BMW Group has disclosed its responsibility reports in accordance to GRI Frameworks since 2005. In 2017, BMW Groups prepared Sustainable Value Report according to GRI- Standards at Comprehensive adherent level and United Nation Global Compact (UNGC) standard. BMW sustainable value report also had a detail identified material aspects and boundaries. Different from the report presentation as

in Audi's, BMW report did not subsequently follow the economic, environmental and social topics' disclosure. Instead it disclosed the topics based on the company's materiality process. Even though the disclosure's subsequence is diverse, the main topics and indicators were consistent with GRI guidelines, and could be divided into triple-bottom line topics. Economic category did not include market presence and procurement practices topics as in Audi, however, it introduced new topic such as alternative drive-train technologies. Environmental topics excluded the biodiversity and environmental compliance, but remained all the other topics. Social perspective did not consist of labour/management relations, marketing and labelling, and socioeconomic compliance; however, it added two more topics: customer satisfaction and non-discrimination. Along with GRI framework, BMW was committed to apply UNGC in 2001; therefore, information on BMW's compliance with UNGC was integrated into GRI Content Index. BMW reported twenty key performance indicators which involved in four main perspectives: business activities, products and services, production and value creation, and employees and society. In addition, another twelve key sustainability figures were presented in the report. All three economic, environmental and social indicators were presented in these key performance indicators and key figures.

Daimler has disclosed its responsibility reports in accordance to GRI guidance and other standards such as UNGC, Integrity Code, Environmental and Energy guidelines, and supplier sustainability standards since 2004. In 2017, Daimler issued Sustainability Report in line with GRI-Standards Framework following Comprehensive options. The report illustrated the topics regarding to economic, environmental, and social categories subsequently. Daimler had the same focus economic and environmental topics as in Audi, except for the last aspect supplier environmental assessment. Society category in Daimler was different from Audi and BMW when excluding local communities, supplier social assessment, marketing and labelling aspects and including freedom of association and collective bargaining, child labour, forced or compulsory labour, security practices, rights of indigenous peoples, and public policies. All these topics and disclosures had direct connection with material field of action. Although Daimler did not provide specific KSPIs, it presented twenty seven key figures in all three main economic, environmental, and social perspectives. In overall, Daimler sustainability report properly revealed all aspects and indicators which provide appropriate information for reporting users.

Duerr has disclosed its sustainability reports in adherent to UNGC since 2012. In 2017, this was the first time Duerr's Sustainability Reports declared non-financial information is in accordance with Section 315b of Germany's Commercial Code. Material non-financial aspects which included employees; customers; business partners and suppliers; shareholders; media; governments, authorities, and schools; and NGOs were raised. Three main topics were stated in the report comprise innovation, integrity, and employees. Innovation topic took research and development expenditures and employees as main indicators. Integrity aspect identified the communication and training about anti-corruption, confirmed cases of

corruptions, child and force labour, non-discrimination, and supplier social assessment. Employees' aspect concentrated on training and people development, health and safety at work, and employee satisfaction and retention. Within these topics, relevant indicators relating to economic and social perspectives were determined. For Duerr, environmental perspective was not considered as materiality as Duerr is an engineering company which has "low vertical depth of production". However, some environmental disclosures were revealed in Duerr sustainability report, for instance, energy consumption; recycle waste; CO₂, SO₂, and NO_x emissions. For key sustainability performance indicators, Duerr did not clearly declared the information. To sum up, disclosed sustainability information in Duerr are considerable limited in comparison to the previous three companies.

ElringKlinger has issued its sustainability reports in accordance ElringKlinger guideline since 2012. In 2017, ElringKlinger disclosed sustainability information to comply with compulsory disclosure of non-financial information of EU standard. Even though ElringKlinger declared its sustainability report based on GRI-Standard with Core option in its sustainability report, no GRI content index was found, and the report was not likely adherent to GRI framework. Therefore, Non-GRI compliance was classified for ElringKlinger sustainability report in 2017. The first disclosures in the company report referred to research and development expenditures and employees. Then, disclosures regarding to environmental and quality topics were explored. CO₂ emission, energy consumption, energy intensity, biodiversity, water and waste water, materials were main topics in environmental category. Regarding to social perspective, employment, health care management and occupational safety, training and further education, and diversity and equal opportunity were main involved aspects. There were no specific key sustainability performance indicators in ElringKlinger's report and the disclosed information is not sufficient as in the first three companies.

MAN Group has issued its sustainability reports in accordance to GRI standards and UNGC since 2011. In 2017, MAN Group prepared its GRI report which reveals Corporate Responsibility at MAN in line with GRI – G4 referring to Core option. MAN described in detail the material GRI aspects that impact MAN internally, externally, or both. MAN GRI report focused more on environmental and social disclosure rather than economic category. As a result, only economic performance was the only aspect that is involved in the report. As MAN still followed GRI-G4 in 2017, anti-corruption and anti-competitive behaviour topics were classified as social aspect. However, for GRI-Standards, the most updated standard of GRI, these two aspects are changed to economic topic. In order to maintain the consistency the analysis of disclosed indicators, the classification in this research is in line of the GRI-Standards. Regarding to environmental category, most of the topics were covered in MAN GRI report except for biodiversity. In addition, two more aspects were added to environmental perspectives include product and services, and transport. These aspects came with two indicators: the mitigation of environmental impacts of products and services, and significant impacts of transport respectively.

In comparison to environmental perspective, disclosure in social group ignored some main aspects such as human rights, labour/management relations, and local communities. In the report, MAN pointed out thirteen key sustainability performance indicators which relates to all three main categories. In short, MAN GRI reports reveal more information than Duerr and ElringKlinger, however, its effort is not yet as much as Audi, BMW, and Daimler.

Porsche has disclosed its responsibility reports in accordance to GRI Framework since 2013. In 2017, Porsche prepared integrated sustainability report which complies with GRI-Standards at Core adherent level. The report did not present disclosures in economic, environmental, and social perspectives subsequently. The topics were disclosed depends on the materiality identifications without mentioning relevant categories, however, due to the indicator codes, it is easier to determine which perspective the indicators belong to. The key topics in Porsche report comprised long-term economic stability, long-term customer relations, responsibility in the supply chain, compliance, digital transformation, vehicle safety, fuel consumption and vehicle emissions, materials and sustainable materials, new mobility concepts, energy and emissions during production, resource consumption during production, environmental compatible logistics, attractiveness as an employer, staff development, cooperate co-determination, and occupational health and safety. In these topics, digital transformation and new mobility mentioned their material aspects but no disclosure revealed. In addition, some indicators were repeated in indicated aspect, for instance, “other indirect GHG emissions” appears in both fuel consumption and vehicle aspect and energy, emissions during production aspect, and environmental compatible logistics. Disclosures in these topics were classified into triple bottom line categories in this research for further analysis. In overall, sustainability disclosures in Porsche report covered a wide range of topics in economic, environmental, and social perspectives. In addition, twenty three key sustainability figures which relate to three categories were recorded in Porsche sustainability report.

Schaeffler Gruppe has issued its sustainability reports in accordance to GRI guidelines and UNGC to since 2016. UNGC principles were applied in certain topics such as human rights, occupational standards, environmental protection, and anti-corruption measures. In 2017, Schaeffler had its sustainability report adherent with GRI-Standards on the basic of core option. Moreover, the company also prepared a separate non-financial report (NFR) in complying with German CSR Directive Implementation Law. Company performance regarding to economic, environmental, and social perspectives was described in detail. The performance was illustrated into four fields: sustainable management, customers and products, environment and energy, and employees and society. Under each field, relevant topics, GRI indicators, UNGC disclosures, and NFR’s context were determined. Firstly, responsibility in the supply chain, human rights, and corporate governance were three main topics in sustainable management. Secondly, green products, digitalization and industry 4.0, customer relations, product responsibility were

covered in customers and products field. Thirdly, integrated management systems, commitment to climate protection, environmental management, and logistics were discussed aspects of environment and energy category. Lastly, diversity, employee advancement and development, health management, and corporate citizenship were disclosed in employees and society perspective. Schaeffler was developing the KSPIs at the report period and presented twenty seven key sustainability figures sustainability report in 2017. In brief, the company report had sufficient and apparent disclosures relating to three main perspectives of triple bottom line.

Volkswagen has disclosed its responsibility reports since 2001 and has followed different versions from GRI-G1 to GRI-Standards of GRI guidelines. Furthermore, the company also illustrated how it applied UNGC requirements, achieves Sustainable Development Goals and satisfied German Sustainability Code criteria. In 2017, Volkswagen complied with GRI-Standards applying Comprehensive option. Similar to the other companies which followed GRI guidelines, Volkswagen focused on three main categories: Economic, Environmental and Social. Each area consisted of several aspects with corresponding indicators which were used to measure the performance in each aspect. In Economic category, economic performance, market presence, procurement practices, anti-corruption, and anti-competitive behaviour aspects were observed. Indicators using in these aspects were also parallel to those in Audi and BMW. However, In Volkswagen, more aspects and indicators were applied than in Audi and BMW alone. For instance, Volkswagen and Audi focused on market presence and procurement while Volkswagen and BMW had same aspects of indirect economic. As for Environmental category, all aspects and indicators which were disclosed in both Audi and BMW were covered in Volkswagen. Social category included all mentioned topics as indicated in previous companies except for customer satisfaction. In the report, Volkswagen highlighted six key sustainability performance indicators in which six of them are considered as strategic KPIs. These included operating return on sales, research and development ratio, CAPEX ratio, net cash flow, net liquidity, and return on investment. To sum up, Volkswagen approached more topics and complete disclosures than previous companies.

Through nine observed cases, Duerr and Elringklinger did not report in accordance to GRI frameworks, only MAN Group applied GRI-G4, and all the rest complied with GRI-Standards. Most of them are also adhere to the UNGC requirements while implementing GRI. It is obvious that two firms that did not use GRI standards disclose considerably less than the others. No key sustainability data and no KPIs of sustainability performance were presented in these two firms' sustainability reports. Moreover, the amount of disclosed information of these firms was just one third of the average amount of presented information of the other firms. Among these firms, Volkswagen disclosed the most; however, it just presented six KSPIs and did not provide key sustainability data. Daimler and Schaeffler seem have similar patterns in sustainability performance disclosure when the disclosures were around seventy, key figures were twenty six and twenty seven respectively,

and there was no KPIs. The consistency was not only on the amount of presented information, but also on the disclosed contents in three aspects of economic, environment, and society. Audi and BMW disclosed on both key figures and KPIs, but BMW seemed take efforts in providing more key information than Audi. MAN and Porsche both disclosed total of forty six sustainability information, nevertheless, while MAN focused on KSPIs disclosure, Porsche only provided key sustainability data. Among GRI adherent firms, the disclosure levels are also diverse.

Table 5.16. Number of disclosures and KSPIs in automotive companies

Category	Economic			Environmental			Social			All		
	<i>Disclosures</i>	<i>Key figures</i>	<i>KSPIs</i>	<i>Disclosures</i>	<i>Key figures</i>	<i>KSPIs</i>	<i>Disclosures</i>	<i>Key figures</i>	<i>KSPIs</i>	<i>Disclosures</i>	<i>Key figures</i>	<i>KSPIs</i>
Audi	23	5	7	22	7	0	26	5	0	71	17	7
BMW	20	6	7	24	5	7	24	1	5	68	12	19
Daimler	18	8	0	24	12	0	27	6	0	69	26	0
Duerr	6	0	0	5	0	0	12	0	0	23	0	0
ElringKlinger	3	0	0	8	0	0	8	0	0	19	0	0
MAN	8	0	3	24	0	6	14	0	3	46	0	12
Porsche	12	7	0	18	11	0	16	5	0	46	23	0
Schaeffler	18	7	0	23	11	0	33	9	0	74	27	0
Volkswagen	21	0	6	31	0	0	35	0	0	87	0	6

Source: Author's own processing

However, it can be seen some consistence in reporting sustainability performance in automotive firms, for instance, three main categories of economic, environmental, and social were covered in all these reports. More information was likely disclosed in environmental and social fields than in economic one. Nevertheless, KSPIs focused more on economic and environmental perspectives. Similar topics and disclosures were also applied to illustrate sustainability performance in different firms. Some disclosures can be measured in some specific and measurable terms, for example, revenue, waste volume, or amount of material usage while other disclosures are described via processes, standards, real activities of firms. The KSPIs and key figures belong to the first group which mean they are measurable. These disclosures can be found directly from sustainability reports, firms' annual reports, or other reports. Sustainability reports of all these firms consist of many indicators, from which key sustainability performance indicators and key sustainability figures are determined. All disclosures, key sustainability figures and KSPIs using in observed automotive firms are shown in Appendix 1.

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. Economic performance aspect comprised the highest number of disclosures which divided into three groups: the direct economic value generated and distributed, financial implication and other risks and opportunities due to climate change, and defined benefit plan obligations and other retirement plans. 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. Within these aspects, the last three ones, which were used by MAN Group, belonged to GRI-G4 guidelines. Thirty eight disclosures were revealed in environmental perspective from which nineteen disclosures were classified as key sustainability figures, and nine 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.

Based on the list of disclosures and KSPIs, it is necessary to identify which disclosures should be used in questionnaire to explore the appropriate set of KSPIs. Currently, only four observed firms identified their KSPIs. In addition, the uses of KSPIs are diverse in each firm which may lead to the question on how to determine firm's KSPIs. As a result, a number of disclosures are conveyed into the questionnaire to ask for the management opinions on how and why they choose the disclosures as key indicators. 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.

5.3.2 Sustainability disclosures in financial service industry

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-Wuerttemberg, Postbank, and Talanx. Within these firms, Allianz, ARAG, and Talanx are German insurance companies, Hannover Ruck is one of the largest reinsurance companies, Deutsche Boerse AG is a marketplace organizer for the trading of shares and other securities, and all the rest are banks. Following paragraphs describe the disclosures of sustainability performance of nine observed firms in automotive industry. The description of each firm covers the implemented guidelines, disclosed aspects, presented key sustainability figures, and used key sustainability performance indicators.

Allianz SE has disclosed its sustainability reports in accordance to GRI guidelines since 2006. In 2017, Allianz issued Sustainability Report and complied with GRI-G4 using core option. Similar to automotive industry, presented categories also concentrated on economic, environmental, and social. Similar aspects are covered in each field. For instance, in Allianz report, economic area consisted economic performance, indirect economic impacts, anti-corruption; environmental field included energy, water, emissions, effluents and waste; and social category comprised employment, occupational health and safety, training and education, diversity and equal diversity, human rights, public policies, marketing and labelling, customer privacy, and compliance. Other than these, Allianz added two more aspects of product portfolio and active ownership. Moreover, marketing and labelling were divided into marketing and communication, and products and services labelling. In comparison to automotive industry, fewer aspects are presented which mainly due to the characteristic of this industry; for example, eliminated aspects involved manufacturing factors such as materials or suppliers. In Allianz sustainability report, it disclosed many key sustainability data which cover all three economic, environmental and social aspects. However, within these data, only two key performance indicators are stated including total energy consumption from office building per employee and total GHG emissions per employee. In addition to GRI indicators, Allianz provided further information about the consumption of paper and travelling measurement in total km and per employee. Among thirty one key sustainability data and two KPIs, only three of key sustainability data belonged to social category, and fours belonged to economic perspective, and all the rest focused on environmental aspect.

ARAG SE has disclosed its sustainability reports in accordance to GRI guidelines since 2016. In 2017, ARAG issued Sustainability Report and complied with GRI-standards declaring core option. ARAG also covered all triple bottom line areas and

usual aspects as desired in its sustainability report. Some new aspects were presented in the report; however, they are just related to detailed management approach but without any relevant indicators. These aspects included responsible remuneration and incentives, corporate culture and mission, digitalization, innovative customer offerings, and customer focus. In comparison to sustainability disclosure of Allianz, provided sustainability information in ARAG was fewer, especially in environmental category. Furthermore, no key data or KPIs for sustainability performance are presented in ARAG's report.

Commerzbank has disclosed its sustainability reports since 2005. Within this period, most of the year it complied with GRI frameworks, except for 2014 and 2015 in which its sustainability reports were classified as Non-GRI. In addition, the report was adhered to ten principles of the UN Global Compact (UNGC). In 2017, Commerzbank issued Sustainability Report and complied with GRI-Standards implementing core option. In its report, Commerzbank clearly stated the material topics which were related to economic, environmental, and social. In environmental topic, Commerzbank mentioned materials aspect, but this one is referred only to papers, therefore it is classified into paper aspects as in Allianz. Commerzbank did not provide key sustainability data but pointed out five key performance indicators in which only one is social and four are economic indicators. Unlike previous firms, Commerzbank seems not put high effort in environmental perspective.

Deutsche Bank has disclosed its sustainability reports in accordance to GRI guidelines since 2002. In 2017, Deutsche Bank changed the report name from Corporate Responsibility Report to Non-Financial Report which complying with GRI- standards declaring core option. Deutsche Bank report also served as its communication on progress for the UNGC. Sustainability material topics were identified based on the bank's business development, business results, and the bank position in relating to the influences of the bank's activities on the aspects. Disclosed areas and aspects in Deutsche Bank were similar to previous firms in the finance sector. However, aside complying with GRI-standards, in 2017 some disclosures were still aligned with GRI G4 such as sustainable products portfolio, active ownership, and local communities' indicators. In the report, eight key sustainability figures and five key performance indicators were presented. Within five KPIs, three indicators including external perception of Deutsche Bank as a responsible corporate citizen (global B2B market), people reached with CSR initiatives, hours invested by corporate volunteers were not stated in any specific aspect. Therefore, these indicators are placed in social engagement aspect. As for key sustainability data, two belonged to social and all the rest belong to economic perspective. Environment area again seems not be the focus of the bank.

Deutsche Boerse has disclosed its sustainability reports in accordance to GRI guidelines since 2010. In 2017, Deutsche Boerse issued an integrated report with combining sustainability information into its annual report. The report was stated to comply with GRI- G4 using core option. In overall, no significant difference were raised in the disclosed topics, aspects, and related indicators. In Deutsch Boerse

report, eleven key sustainability figures in environmental and social categories were presented, and no KPIs were declared. The environmental key data focused on main aspects in the topics which consist of materials, energy, water, and emissions. As for social category, only employee key figures were observed. For instance, employee gender, age group, turnover, length of service, training, parental leave in all location were presented.

DVB Bank has disclosed its sustainability reports since 2014 according to company Code of Conduct by combining economic operations with social responsible activities in a single strategy. In DVB Bank, materiality perspectives included environmental matters which focus on climate strategy to enhance environmental activities and data gathering, social matters which develop sustainable lending policy and improve supplier selection policy to embrace social and ecological criteria, and human rights which enhance human rights protection policy. In 2017, five topics which comprise environmental matter, employee matters, social matters, human rights, and anti-corruption and bribery were disclosed. In environmental matters, DVB Bank disclosed information regarding to emission consumptions, paper and water consumption in total and per employee, energy consumption which concentrated on electricity and heating, and travelling. As for employee matters, diversity in gender, age ranges, and nationalities are presented. In addition, information relating to length of employment, professional experience was also illustrated. Regarding to social matters, donations and customer relation were two main focuses. Human rights topic just briefly described employee training on the Bank Code of Conduct relating to human rights in both clients and suppliers. Lastly, anti-corruption and bribery also concentrated on data protection and mandatory training program in the field. No key figure or KPI on sustainability performance were stated in the report.

DZ Bank has disclosed its sustainability reports in accordance to GRI guidelines since 2008. During this period, DZ Bank was also aligned with ten principles of UNGC regarding to human rights, employment rights, environmental protection, and bribery and corruption prevention. In 2017, DZ Bank issued Sustainability Report complying with GRI- standards at core option. In this report, environmental information was stated to be more transparent in accordance with scopes 1, scope 2, and with the basic of the indicators of German Association for Environmental Management and Sustainability in Financial Institution. DZ Bank used materiality analysis to determine material topics in sustainable business, responsibility for employees, environmental protection and climate changes, and corporate citizenships. Relevant aspects and disclosures were presented in each topic. Even though DZ Bank mentioned about the use of KPIs in sustainability performance, the disclosure in its sustainability reports did not reveal any specific indicators as key ones, therefore, all disclosures in this report were classified as neither key figures nor KPIs.

Hannover Ruck has disclosed its sustainability reports in accordance to GRI guidelines since 2011. In 2017, Hannover Ruck issued Sustainability Report and

complied with GRI- Standards declaring core option and Financial Service Sector Disclosures. Hannover Ruck sustainability report presented annual information on economic, environmental, social, and governance topics. In comparison to previous companies, aside usual disclosures, Hannover Ruck approached to several new aspects; for example, procurement practices, freedom of association and collective bargaining, child labour, forced and compulsory labour. The information, however, was just briefly mentioned and seems insignificant. During the year, seventeen key sustainability figures were identified which cover all three perspectives: key business indicators which relate to economic, key personnel indicators which relate more to social perspective, and key environmental indicators. No KPIs on sustainability performance were clearly stated in Hannover Ruck sustainability report during the year.

Hypo Vereinsbank (HVB) has disclosed its sustainability reports since 2004. Except for non-GRI status of its sustainability reports in 2004 and 2016, all the rest are citing GRI and comply with GRI guidance. In addition, HVB is also aligned with International Integrated Reporting Council Framework. In 2017, HVB issued its sustainability report as an integrated report which aimed to combine the bank's financial and sustainability performance. The report complied with GRI- G4 using core option and Financial Services Sector Disclosures. In overall, there is no significant difference in materiality aspects determination and sustainability performance disclosures in HVB in comparison to other firms in the same sector. HVB had developed customer first index which based on the results of customer satisfaction and use this index as one of the bank's KPIs. This is also the first time this indicator is considered as a KPI in observed firms. In 2017, four key sustainability data and six KPIs were used; most of them are economic indicators except one key social sustainability figure and one KPI for social perspective. Environmental area once again seems not as significant as the other two perspectives.

KfW Bankengruppe (KfW) has disclosed its sustainability reports every three year in accordance to GRI guidelines since 2009. The reports in 2009, 2012 and 2015 were all complied with GRI frameworks. In 2017, KfW decided to publish its sustainability report annual and its sustainability report in this year was aligned with GRI Standards under comprehensive option. In addition, KfW's report was also adhered to German CSR Directive Implementation Act and relevant sections of German Commercial Code. In order to identify appropriate materiality aspects, KfW relied on in-house experts and sustainability consulting firms. Similar topics, aspects, and disclosures were presented in KfW as in the other banks in financial sector. In the report, eleven key sustainability figures were disclosed and none of them belonged to environmental perspective. No KPIs for sustainability performance were disclosed in KfW report in 2017.

LandesBank Baden-Wuerttemberg (LBBW) has disclosed its sustainability reports in accordance to GRI guidelines since 2007. In 2017, LBBW issued Sustainability Report complying with GRI- G4 under core option. LBBW's materiality analysis

was performed based on several rounds' stakeholder workshops with the participant of retail and banking customers. According to LBBW, customers' involvement in materiality analysis provides more information on their concerns, expectations, and the products' appropriateness. Aside common disclosures like previous firms, LBBW disclosed further information regarding to significant environmental impacts of transport and environmental protection expenditures and investment. The report presented seven key sustainability figures which were all economic indicators and seven KPIs which only focused on human resources. The KPIs on human resources covered several aspects in social category such as employment, occupational health and safety, training and education, and diversity and equal diversity.

Postbank has disclosed its sustainability reports since 2009 and has started in accordance to GRI guidelines since 2010. In 2017, Postbank's sustainability report complied with GRI- Standards using core option and aligned to ten principles of UNGC. In overall, disclosed information in Postbank was not as much as previous firms. In economic category, only disclosures in direct economic value generated and distributed were presented. Environmental areas showed major information in materials, water, emissions, energy, and travel aspects. And social perspectives just focused on employment, training and education, and diversity and equal diversity. However, different from the other firms, Postbank provided more information relating to the progress report according to UNGC compliance. The ten principles covered in UNGC consist of human rights, labour, environment, and anti-corruption topics. Human rights aspect recommends businesses in supporting and respecting the protection of internationally proclaimed human rights, promoting them in their sphere of influence, and ensuring that they are not complicit in human rights abuses. Labor perspective concerns about elimination of forced and compulsory labor, abolition of child labor, elimination of discrimination in employment and occupation, and recognition of the right to collective bargaining. Environment field advises businesses to support a precautionary approach to environmental challenges, undertake initiatives to promote greater environmental responsibility, and encourage the development and diffusion of environmentally friendly technologies. Lastly, anti-corruption category counsels businesses to work against corruption in all its forms, including extortion and bribery. Relevant activities and programs were illustrated regarding to each indicated topics in the progress report. No key sustainability figures and KPIs on sustainability performance were stated in Postbank's sustainability report.

Talanx has disclosed its sustainability reports in accordance to GRI guidelines since 2015. In 2017, Talanx's Sustainability Report was adhered to GRI- Standards declaring core option and in some cases the disclosures were beyond the core option to pursue high environmental, social and governance rating. Materiality analysis was performed based on stakeholders' survey with the participant of customers, employees, investors, analysts, and representatives of other stakeholders. In addition to sustainability report, Talanx prepared a consolidated non-financial statement in accordance with German Commercial Code. This statement was combined in

Management Report which is one part of Talanx Annual Report. Talanx’s Sustainability Report covered all three main perspectives of economic, environmental, and social. Disclosed topics and indicators were sufficient in all these three categories. Five key sustainability figures in economic perspective were presented in the report; however, no KPIs for sustainability performance were stated.

Table 5.17. Number of disclosures and KSPIs in financial services companies

Category	Economic			Environmental			Social			All		
	<i>Disclosures</i>	<i>Key figures</i>	<i>KSPIs</i>	<i>Disclosures</i>	<i>Key figures</i>	<i>KSPIs</i>	<i>Disclosures</i>	<i>Key figures</i>	<i>KSPIs</i>	<i>Disclosures</i>	<i>Key figures</i>	<i>KSPIs</i>
Allianz	6	1	0	19	16	2	18	4	0	43	21	2
ARAG	8	0	0	5	0	0	13	0	0	26	0	0
Commerzbank	12	0	4	13	0	0	20	0	1	45	0	5
Deutsche Bank	9	6	1	15	0	1	23	2	3	47	8	5
Deutsch Boerse	11	0	0	10	5	0	14	7	0	35	12	0
DVB Bank	2	0	0	8	0	0	7	0	0	17	0	0
DZ Bank	12	0	0	17	0	0	26	0	0	55	0	0
Hannover Ruck	14	6	0	16	6	0	32	5	0	62	17	0
HVB	15	3	5	12	0	0	28	1	1	55	4	6
KfW	16	6	0	18	0	0	34	6	0	68	12	0
LBBW	11	8	0	17	0	0	35	0	7	63	8	7
Postbank	9	0	0	11	0	0	9	0	0	29	0	0
Talanx	18	5	0	15	0	0	28	0	0	61	5	0

Source: Author’s own processing

Through thirteen observed cases, only DVB Bank did not report in accordance to GRI frameworks; Allianz, Deutsche Boerse, Hypo Vereinsbank (HVB), LandesBank Baden-Wurttemberg (LBBW) applied GRI-G4, and all the rest complied with GRI-Standards. Most of them were also aligned with ten principles of UNGC. In the same light as Non-GRI firms in Automotive sector, it is obvious that DVB disclosed considerably less than the others. No key sustainability data and no KPIs of sustainability performance were presented in DVB’s sustainability report. Moreover, the disclosed information of DVB was also the lowest in observed firms. ARAG, DZ Bank, and Postbank were the next group that had no key data and KSPIs in their sustainability reports, however, disclosures in DZ Bank was about twice the disclosed information in ARAG and Postbank. The third group which disclosed sustainability information and key data but no KSPIs consists of Deutsche Boerse, Hannover Ruck, KfW Bankengruppe, and Talanx. Presented information in Hannover Ruck, KfW and Talanx was double than sustainability disclosures in

Deutsche Boerse. However, amount of key sustainability data in Deutsche Boerse were slightly lower and equal to these data in Hannover Ruck and KfW respectively, and more than twice the figures in Talanx. Commerzbank is the only company that disclosed sustainability performance and KSPIs, but no key figures. Lastly, Allianz, Deutsche Bank, HVB, and LBBW had full disclosed in both key figures and KSPIs. Although, the observed firms belong to different groups, they also have some consistence in reporting sustainability performance. For example, three main categories of economic, environmental, and social were covered in all these reports. More information was disclosed in social fields than in economic and environmental one. Different from automotive sector, environmental perspective was not on the main focus of firms in financial sectors. Due to the industry characteristics, many environmental indicators are no longer relevant for financial services industry. Only three KSPIs were found in environmental category. Among these three KSPIs, Allianz used two indicators: total energy consumption from office buildings per employee, total GHG emissions per employee, and Deutsche Bank applied one: environment protection expenditures and investment. Even though less information was disclosed in environmental category, financial services firms took more effort in social performance and more disclosures were presented in this category. All disclosures, key sustainability figures and KSPIs using in observed financial services firms are shown in Appendix 2.

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. The first six aspects were the same as in automotive industry; however, the last aspect of responsible investors was only applied by ARAG. Economic performance aspect comprised the highest number of disclosures which divided into three groups like in automotive industry: the direct economic value generated and distributed, financial implication and other risks and opportunities due to climate change, and defined benefit plan obligations and other retirement plans. 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. Among these topics, the production and services aspect in automotive sector was eliminated, and transport aspects seem be replaced by travel which represented total kilometres travels by employees and type of transportation. 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 eleven 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, key sustainability data, and KSPIs, it is necessary to identify which disclosures should be used in questionnaire to explore the appropriate set of KSPIs. Currently, only five observed firms which include Allianz, Commerzbank, Deutsche Bank, Hannover Ruck, LBBW identified their KSPIs. In addition, the uses of KSPIs are diverse in each firm which may lead to the question on how to determine firm's KSPIs in financial service sector. Consequently, a number of disclosures are conveyed into the questionnaire to ask for the opinion of managers and key persons in observed firm in this sector regarding how and why they choose the disclosures as key indicators. 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.

5.3.3 Identification of KPIs of sustainability performance in Automotive and Financial Services Sectors

The identification of proposed KSPIs is based on the results of the questionnaire surveys that were sent to key persons and managers in German large listed firms in two industries. For automotive industry, the questionnaire consists of five main parts. The first three sections require the respondents to rate the level of appropriateness of each disclosure to become KSPIs in economic, environmental, and social categories. These disclosures are retrieved from section 5.3.1 of this thesis. The fourth section requires the rating on level of likeliness of each factor that

may impact on the selection of KSPIs. These factors are retrieved from previous research which is reviewed in section 3.2.3. All these levels are based on five-point Likert scale. The last part involves a short-answer question on the number of KSPIs that is sufficient to be able to achieve successfully. The questionnaire can be found in Appendix 1 for automotive industry. Questionnaire that was designed for financial services sector is similar to automotive industry. Based on the results of nine respondents from automotive industry, Cronbach's alpha and average of Likert points regarding to the appropriateness of disclosures to become KSPIs in Automotive industry are calculated in following table.

Table 5.18. Cronbach's alpha and Average of Likert values for each disclosure in Automotive Industry

Category	Topic / Disclosure	Alpha	Average
Economic	<i>Economic Performance</i>		
	1 Revenues	0.82	4.33
	2 Operating profit	0.82	4.11
	3 Profit before tax	0.81	2.89
	4 Profit after tax	0.80	3.22
	5 Operating return on sales	0.81	3.67
	6 Return on investment	0.80	3.89
	7 Net cash flow	0.81	3.78
	8 Research and development expenditure/ratio	0.80	4.22
	9 Research and development employees	0.80	3.00
	10 Ratio of CAPEX	0.81	3.89
	11 Net liquidity	0.80	3.22
	12 Total capital investments	0.79	3.11
	13 Employee personal costs	0.79	3.11
	14 Sales volume	0.81	3.78
	15 Production volume	0.78	2.78
	16 Purchase volume	0.78	2.78
	17 Financial assistance received from the government	0.79	2.33
	18 Expenditures on donations	0.81	4.22
	19 Expenditure on corporate citizenship	0.79	3.67
20 Defined benefit plan obligations and other retirement plans	0.79	3.67	
	<i>Indirect economic impacts</i>		

Category	Topic / Disclosure	Alpha	Average
	21 Infrastructure investments and services supported	0.80	3.56
Environmental	Materials		
	1 Materials used by weight or volume	0.80	4.00
	2 Recycle input materials used	0.79	4.33
	3 Expenditures on materials	0.80	3.11
	Energy		
	4 Energy consumption within the organization	0.79	4.78
	5 Energy intensity	0.78	3.78
	6 Fuels consumption	0.78	4.22
	Water		
	7 Volume of water withdrawal by source	0.79	4.33
	Biodiversity		
	8 Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	0.80	3.22
	Emissions		
	9 Direct GHG emissions	0.79	4.33
	10 Energy indirect GHG emissions	0.79	3.89
	11 Other indirect GHG emissions	0.78	3.00
	12 GHG emissions intensity	0.80	3.22
	13 Nitrogen oxides (NO _x), sulfur oxides (SO _x), and other significant air emissions	0.79	4.22
14 CO ₂ emissions	0.78	4.33	
15 Volatile organic compounds (VOC) emissions	0.79	3.11	
Effluents and Waste			
16 Water discharge by quality and destination	0.80	4.44	
17 Volume of waste by type and disposal method	0.80	4.67	
18 Significant spills	0.79	3.33	
	Supplier Environmental Assessment		

Category	Topic / Disclosure	Alpha	Average
	19 New suppliers that were screened using environmental criteria	0.79	3.11
	<i>Environmental protection</i> 20 Environment protection expenditures and investment	0.80	4.44
Social	<i>Employment</i> 1 New employee hires and employee turnover	0.80	3.89
	2 Parental leave	0.78	2.89
	3 Employee satisfaction and retention	0.81	3.89
	4 Age structure	0.79	3.11
	<i>Occupational Health and Safety</i> 5 Types of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities	0.80	3.89
	6 Sick leave rate	0.79	3.33
	<i>Training and Education</i> 7 Average hours of training per year per employee	0.79	4.44
	<i>Diversity and Equal Diversity</i> 8 Diversity of governance bodies and employees	0.80	4.00
	<i>Supplier Social Assessment</i> 9 New suppliers that were screened using social criteria	0.79	4.33
	<i>Customer satisfaction</i> 10 Awards for customer satisfaction	0.78	3.67

Source: Author's own processing

Cronbach's alpha in this thesis is used as an index of reliability by providing a measure of the internal consistency of a Likert scale. Alpha can be considered as a vital concept in assessing the validity of questionnaires. Therefore, this test is performed to add more value to the accuracy of research data interpretation. The alpha values are between 0 and 1, in which the reliable value is suggested to be equal or more than 0.7 (Bland and Altman, 1997). With the 0.7 reliability value, it means that there is 0.51 error variance ($1-0.7^2$). When alpha value increases, random error will decrease. However, if alpha value is too high, it also revealed the

redundant of observed items. Streiner (2003) implies a maximum value of Cronbach's alpha of 0.9. 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.

Table 5.19. Proposed KSPIs for German Large Listed Firms in Automotive Industry

Categories		
Economic	Environmental	Social
1. Revenues (4.33)	1. Materials used by weight or volume (4.00)	1. Average hours of training per year per employee (4.44)
2. Operating profit (4.11)	2. Recycle input materials used (4.33)	2. Diversity of governance bodies and employees (4.00)
3. Research and development expenditure/ratio (4.22)	3. Energy consumption within the organization (4.78)	3. New suppliers that were screened using social criteria (4.33)
4. Expenditures on donations (4.22)	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)	

Source: Author's own processing

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. As illustrated in Table 5.18, the average values of Likert points on the appropriateness of observed disclosures to become KSPIs range from 2.33 to 4.78. Disclosures which have average value from 4 point are presented in table 5.19.

The highest value (4.78) can refer to the most appropriate disclosure to turn out to be KSPIs. This disclosure is ‘energy consumption within the organization’ which belongs to environmental category. The second appropriate disclosure to become KSPIs which is ‘volume of waste by type and disposal method - 4.67’ is also in environmental group. The third group with average Likert point of 4.44 consists of two disclosures from environmental and one disclosure from social category. The fourth appropriate group with 4.33 average points covers all three perspectives and consists of the highest numbers of disclosures (6) which turn to KSPIs. The other four disclosures which have average Likert value of 4.22 equally divided into economic and environmental categories. 4.11 is the only average value of ‘operating profit’ disclosure. The last average point of 4.00 involves ‘materials used by weight or volume’ and ‘diversity of governance bodies and employees’. Among eighteen disclosures which are chosen to become KSPIs, eleven of them belong to environmental perspectives. In addition, the most appropriate disclosures to turn into KSPIs are also in this category. This can be explained by the nature of automotive industry which is likely to pollute the environment due to firm’s manufacturing processes and operations. For that reason, more efforts are focused on this perspective to pursue the sustainable development.

As for financial services industry, Cronbach’s alpha and average of Likert points regarding to the appropriateness of disclosures to become KSPIs are also calculated based on the results of eleven respondents in table bellowed. The interpretation of the results is similar to automotive industry.

Table 5.20. Cronbach’s alpha and Average of Likert values for each disclosure in Financial Services Industry

Category	Topic/ Disclosure	Alpha	Average
Economic	<i>Economic performance</i>		
	1 Net revenue	0.84	4.45
	2 Operating profit	0.83	4.27
	3 Tax expenses	0.83	3.09
	4 Pre-tax profit and loss	0.83	4.00

Category	Topic/ Disclosure	Alpha	Average
	5 Consolidated profit and loss	0.84	4.27
	6 Total assets	0.84	4.27
	7 Cost/income ratio	0.84	3.64
	8 Expenditures on donations	0.84	4.00
	9 Provision for credit loss	0.83	3.00
	10 Non-interest expenses	0.83	3.18
	11 Return on equity	0.83	4.00
	12 Gross debt/EBITDA	0.82	3.55
	13 Return on investment	0.84	3.91
	14 Tier 1 ratio	0.84	3.09
	15 Volume of lending	0.83	3.27
	16 Long-term rating	0.83	3.73
Environmental	<i>Materials</i>		
	1 Paper used by weight or volume	0.84	3.73
	2 Recycled paper used	0.84	3.55
	<i>Energy</i>		
	3 Energy consumption within organization	0.84	4.27
	4 Energy consumption outside organization	0.84	3.55
	5 Energy intensity	0.83	3.36
	6 Total energy consumption from office buildings per employee	0.84	3.45
	<i>Water</i>		
	7 Total water withdrawal by source	0.83	2.55
	8 Water consumption per employee	0.84	3.00
	<i>Emissions</i>		
	9 Direct GHG emissions	0.84	4.45
	10 Energy indirect GHG emissions	0.84	3.45
11 Other indirect GHG emissions	0.83	3.27	
12 Total GHG emissions per employee	0.83	3.55	
13 GHG emissions intensity	0.83	3.27	
14 Reduction of GHG emissions	0.83	3.36	

Category	Topic/ Disclosure	Alpha	Average
	<i>Effluents and Waste</i>		
	15 Water discharge by quality and destination	0.83	3.00
	16 Waste by type and disposal method	0.83	2.73
	17 Total waste per employee	0.84	3.64
	<i>Travel</i>		
	18 Total travel (km)	0.83	3.82
	19 Travel per employee (km)	0.83	3.82
	<i>Environment protection</i>		
	20 Environment protection expenditures and investment	0.85	4.27
Social	<i>Employment</i>		
	1 New employee hires and employee turnover	0.84	4.27
	2 Benefits provided to full-time employees that are not provided to temporary or part-time employees	0.84	3.27
	3 Parental leave	0.85	3.45
	4 Length of employment	0.84	4.09
	5 Age structure	0.83	3.64
	<i>Occupational Health and Safety</i>		
	6 Type of injury and rates of injury, occupational diseases, lost days, and absenteeism, and total number of work-related fatalities, by region and by gender.	0.83	3.73
	<i>Training and Education</i>		
	7 Average hours of training per year per employee by gender, and by employee category.	0.83	4.27
	8 Employees receiving regular performance and career development reviews	0.85	4.18
	9 Training per employee	0.83	3.73
	<i>Diversity and Equal Diversity</i>		

Category	Topic/ Disclosure	Alpha	Average
	10 Diversity of governance bodies and employees	0.83	4.00
	<i>Customer satisfaction</i> 11 Results of surveys measuring customer satisfaction	0.84	3.82

Source: Author's own processing

As presented in Table 5.20, the Cronbach's alphas range 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.

Table 5.21. Proposed KSPIs for German Large Listed Firms in Financial Services Industry

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

Source: Author's own processing

The highest average value of Likert point (4.45) includes ‘net revenue’ in economic category and ‘direct GHG emissions’ in environmental category. The second group of appropriate disclosure to become KSPIs consists of three disclosures in economic perspective and two disclosures in each of the other two perspectives. The lowest average value of Likert point (4.00) comprises three indicators in economic category and one in social category. The other two average values of 4.09 and 4.18 involve two disclosures in social perspective: length of employment and employees receiving regular performance and career development reviews. Among fifteen disclosures which are KSPIs, seven of them belong to economic perspectives, five are social indicators, and only three relate to environmental perspective. Different from automotive industry, the focus of financial services sector is not for environmental but economic and social aspects as more weight is put on economic category. The reason for the difference is also due to nature of each industry. While automotive industry operations tend to have more unfavorable impacts on environment, financial services sectors create much less harm to this aspect. Therefore, its concentration shifts to the other two categories.

The fourth section of the questionnaire survey engages the factors that may influence the selection of observed disclosures to become KSPIs. Table 5.22 illustrates the alpha and average Likert point of each factor in two industries. As alpha values are 0.79 and 0.8 in automotive industry and from 0.83 to 0.85 in financial services sector, with the recommended ranges, the collected data are supposed to be reliable for further analysis. The five-point Likert scale in this section consists of 1-very unlikely, 2-unlikely, 3-neutral, 4-likely, and 5-very likely. Therefore, factor with average Likert point equal or above 4 are considered as impacted factor on the selection of KSPIs. As revealed in table 5.22, while in financial services sector, all factors are believed to affect the selection of KSPIs, in automotive sector, only three factors which comprise firm strategy, business model and measurability are confirmed as impact factors. With the last question in this section regarding to the indication of other factors that may impact the selection of KSPIs, there was only one response filling the question with two more factors: ESG Framework(s) used and Benchmark KPIs.

Table 5.22. Factors that impact on the selection of KSPIs

Factors	Automotive Sector		Financial Services Sector	
	Alpha	Average	Alpha	Average
Firm Strategy	0.79	4.67	0.84	4.73
Business Model	0.79	4.56	0.84	4.09
Comparability	0.79	3.11	0.84	4.27
Achievability	0.80	3.67	0.85	4.27
Measurability	0.80	4.44	0.83	4.00
Industry Specific	0.79	3.89	0.84	4.73

Source: Author’s own processing

The last section of the survey refers the amount of KSPIs that firm should have to be able to successfully achieve. The responses from nine respondents in automotive industry provide the range from one to fifteen. Within this range, nine KSPIs are answered by six respondents which is also the highest number of responses. This is followed by seven and eight KSPIs which are replied by five respondents. Six and ten KSPIs have the same responses of three, and eleven and twelve KSPIs have two answers. All the other numbers of KSPIs just appear one in answers.

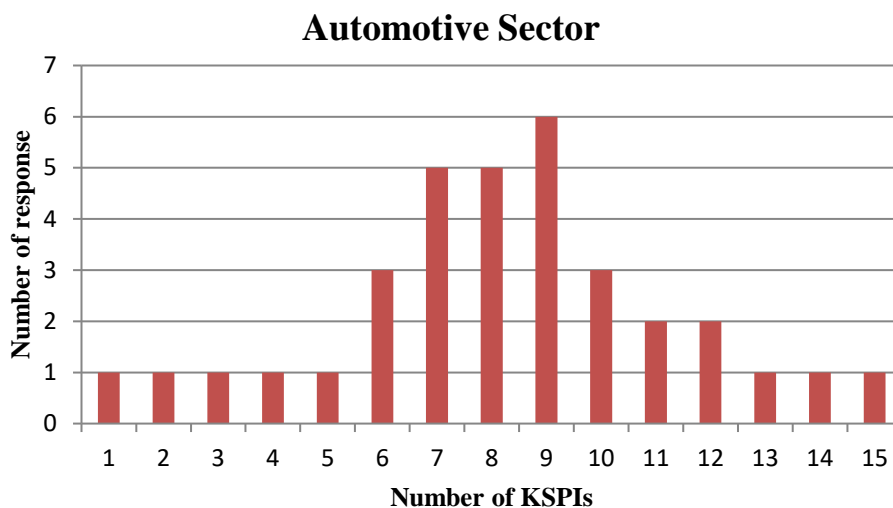


Figure 5.7. The response repetition on number of KSPIs in automotive sector
Source: Author's own processing

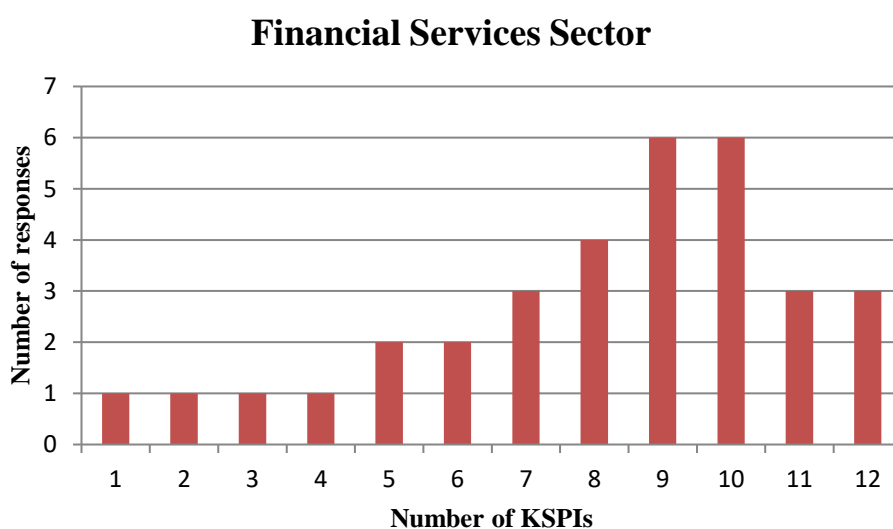


Figure 5.8. The response repetition on number of KSPIs in financial services sector
Source: Author's own processing

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.

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

Analysis of the semi-structure interview is presented according to three main questions and six sub questions that are designed in the interview. The questions are rewritten in each analysis paragraph and are formatted in italic. The interviews are performed to get more explanation on the needs of KSPIs, effective and efficient uses of KSPIs, and roadmaps of KSPIs implementation. The first question is as followed:

Main question 1: Why do firms need to use KPIs for sustainability performance?

All three interviewees confirm the necessity to use KPIs for sustainability performance and provide various reasons for the application of KSPIs in firm. Interviewee 1 states: "...we cannot track every indicator to assure achievement in sustainable development, so KPIs for sustainability performance need to be devised to align with company's main goals and performance tracking". Second interviewee also mentions the importance to identify main sustainable goals which are then measured by KSPIs. "If firm wants to get things done, they need to measure it because measurement allows them to understand what they need to achieve, then they will outline how to achieve it" (interviewee 2). Different from the first two interviewees who focus on measurement function of KSPIs, interviewee 3 consider measurement as one function in the whole sustainability system. According to interviewee 3, KSPIs is necessary for an efficient sustainability system which consists of measuring firm goals, supporting controlling and evaluation. "...in every stage of the sustainability system, we need KPIs as a benchmark to understand the targets, to aware of our performance, and to know the results" (interviewee 3). To further investigate the impact of KSPIs usage on firm, a sub question of question 1 is asked relating to benefits of using KSPIs.

Sub question 1: What benefits firms can achieve by using appropriate KPIs for sustainability performances?

Three interviewees provide diverse beneficial aspects of KSPIs application. While the first interviewee cares more about people actions, the second and the third interviewees emphasizes on firm management and resources allocation. With the successful implementation of KSPIs, interviewee 1 sees the impact of KSPIs on "perceptions and behaviours of the people involved", so that, these people "will recognize which goals are the top priorities", "make enough effort to get these KPIs", and "spread positive sustainable actions". In the mean time, interviewee 2

declare the benefits of KSPIs implementation refer to enhancing firm reputation, customer's loyalty, employee's productivities, saving costs, reducing wastes, and efficiently using firm resources. Not only beneficial for businesses process, investors also receive investment benefits due to high possibility "to get more returns and face lower risks in longer investment period" (interviewee 2). Interviewee 3 considers KSPI as a "benchmark to ensure the expected performance comes as close as possible to achieving the set goals". Appropriately allocation of firm resources to relevant departments, projects based on determined KSPIs is also a benefit stated by interviewee 3.

To sum up, according to these interviewees, it is necessary to implement KPIs for sustainability performance to be able to achieve setting sustainability goals and efficient sustainability system. In addition, appropriate implementing KSPIs can benefit firm's sustainability performance by favourable influencing employees' perception on sustainability development, enhancing firm reputation, productivities, saving costs, and improve firm resources allocation. In order to obtain these benefits, next concern is about how firms successfully use KSPIs for sustainability performance.

Main question 2: How can firm facilitate the effective and efficient use of KPIs for sustainability performance?

Three different approaches are used in the interviewees' responses. While interviewee 1 directly links KSPIs to the company's strategy and value created to obtain the successful usage, interviewee 2 describes a process to use KSPIs effectively. This process starts with setting "clear and comprehensive goals" and "respective sustainability development KPIs" with the goals; then well communicating these goals and KPIs to related departments, employees; and using "external audit to check whether achieved KPIs has been correctly stated or not". According to interviewee 2, the use of external audit "makes employees more responsible and encourages them to truthfully gain the goals. Different from the first two interviewees, interviewee 3 concentrates on the characters of the KPIs and implementing tool. In the viewpoint of this interviewee, firm should "use both lagging and leading KPIs, and don't put so much weight on the lagging ones as these lagging KPIs usually have limited relation to risks, opportunities, and sustainability activities progression". Regarding to tool to facilitate the effective and efficient use of KSPIs, interviewee 3 recommends the implementation of Sustainability Balance Scorecard which with proper KPIs, "can facilitate sustainability culture in corporate by capturing various aspect of strategy implementation". Along with dissimilar approach, interviewee 3 also has consistent views with both of previous interviewees relating to the significance of communication and the involvement of the KPIs to company's strategy. To have more insights on how to have proper set of KSPIs, a sub questions regarding the requirement on KSPI, people involved, and external supporters are raised.

Sub question 2: Are there any requirements for the KSPIs regarding the effective and efficient use of KPIs for sustainability performance?

The requirements on KSPIs focus on their characteristics, implementation processes, and aspects firm should pay attention to determine KSPIs. Firstly, KSPIs' characteristics are required to be not so detailed and too closely associated with shareholder aspect, to be clear, realistic, measurable, and to include both lagging and leading indicators (interviewee 2 and 3). Secondly, regarding implementation of KSPIs, it is necessary for firm to incorporate KSPIs in decision making and "regular check processes to achieve KPIs for proper implementation and monitoring of these KPIs for unit or department process" (interviewee 1). Furthermore, "appropriate training should be conducted to avoid misuse of sustainability practices, then affect the identification of appropriate KPIs" (interviewee 2). Interviewee 3 declares the effective use of KSPIs not only in perspectives of internal users but also external ones. For internal users, "KPIs should be related to solid goals, sustainability data that provides information for management and can be used as benchmarks for evaluation and control". Additionally, the most important thing is to make clear how KPIs fits into firm's strategy (interviewee 3). In the meantime, for external users, "KPIs related to risks, opportunities, current and long-term plans should be communicated to external stakeholders, so that they can know what firm intends to do and what firm achieves" (interviewee 3). Lastly, to successfully identify appropriate set of KSPIs, firm should determine KSPIs based on "company's core processes, current internal and external requirements, and completed information" (interviewee 1), on clear and realistic goals (interviewee 2), and on "quantitative data which can use to determined the clear threshold of achievement and can compared year to year" (interviewee 3).

Sub question 3: Are there any requirements for the people involved regarding the effective and efficient use of KPIs for sustainability performance?

Two groups of people that are likely to be mentioned in the responses consist of managers and employees. Requirements regarding management levels usually link to receiving, analysing, and using updated reports relating to KSPIs for controlling and evaluation purposes (interviewee 1). Commitments from top management are also required in the development of appropriate set of KSPIs and successfully achieve them (interviewee 2). These commitments can be gained through additional training, raising company's awareness of sustainability issue, and proper explanation to enhance comprehension of current KSPIs (interviewee 2). Both managers and employees also need to participate into regular discussions and meetings to understand well the KSPIs. It is necessary for employees to involve in process of collecting important KSPIs data and reporting to decision makers. In addition, all employees need to be clearly explained evaluation methods regarding to KSPIs, so that they can recognize the significance of KSPIs (interviewee 3).

Sub question 4: Are there any requirements for the external supporters such as NGOs and governments regarding the effective and efficient use of KPIs for sustainability performance?

Most of suggestions relating to external supporters are linked to setting standards, legislations, or guidelines relating to KSPIs. Whilst these suggestions have a common approach in the interviewees' viewpoints, the application of these suggestions is dissimilar. For instance, both interviewee 1 and 3 suggest external supporters to develop a "unique and proficient standard for using Sustainable Development KPIs" or "common sustainability reporting standard which is similar to international financial reporting standards", with the intention that "company may not struggle on choosing appropriate guidelines to adhere to". However, while interviewee 2 consider mandatory as one of the option to use the standards, interviewee 1 does not recommend this implication as it makes "firm disclose something in common, easy to achieve but not based on firm main goals". When a unique standard has not developed, interviewee 1 suggest another option for firm to use current standards set by NGOs and governments to generate its own guidelines. Nevertheless, interviewee 1 asserts that "this process requires high efforts in both human and financial resources to obtain sufficient information, and needs the participant of sustainability experts to ensure for the suitability of the guidance". Regarding to the common standards, interviewee 3 proposes the sectors to pay attention on specific guidelines for sectors due to the divergence in terms of "operating process, business nature, and social and environmental impact". The proposal also mentions the guidance on using balance lagging and leading KPIs for sustainability performance.

In brief, in order to facilitate the efficient and effective use of KPIs for sustainability performance, it is necessary to link KSPIs to company's strategy; value creation; core processes; clear, realistic, and comprehensive goals. In addition, KSPIs should be properly communicated, well understood, regularly tracked, and appropriately reported by management and employees. KSPIs also need to be obvious, reasonable, measurable, and to consist of both lagging and leading indicators. To successfully implementing KSPIs, it is in need to have high commitment from top management levels, suitable trainings and transparent application and evaluation processes regarding to KSPIs. On perspective of external supporter, a common sustainability reporting standard is recommended, in which suitable guidelines are developed to support firm in choosing appropriate set of KSPIs and successfully implementing and reporting them.

Main question 3: What roadmap can be implemented to support the use of KPIs for sustainability performance?

Following the responses of three interviewees, roadmaps for KSPIs' application can be illustrated in steps. The response from interviewee 1 can be summarised into four steps:

Step 1 : Clarify firm's vision and mission.

Step 2 : Determine appropriate goals based on the vision and mission.

Step 3 : Develop a set of KPIs for sustainability performance according to predetermined goals.

Step 4 : Collect and use data from KSPIs for decision making, progress tracking, forecasting, and improving.

Interviewee 2 produces a five-step roadmap and provides detailed explanation on each step. Step 1 focuses on the creation of a shortlist of critical sustainability issues which firm can measure and take effort to change or improve them. Formulation of company sustainable strategy in step 2 involves stating company's current sustainability position, company's mission and vision related to sustainable strategy, and outlining how company is going to achieve its mission and vision. The reporting step is considered as the advantages of using KSPIs as provided information in both internal and external users. These reports are recommended to be prepared regularly "to provide meaningful information to internal managers to have a complete picture of what firm has been doing relating to setting goals" (interviewee 2). Lastly, step 5 requires the reassessment of previous steps every three to five years to see whether these steps are already used properly to achieve what firm desires or need more improvement.

Step 1 : Identify significant sustainability issues.

Step 2 : Formulate company sustainable strategy.

Step 3 : Identify potential goals and KPIs for sustainability performance.

Step 4 : Produce sustainability report

Step 5 : Reassess the above steps every three to five years.

With the steps' description, consistent approaches can be observed in the steps mentioned by the first two interviewees. Step 1 of interviewee 1 is actually an action in step 2 of interviewee 2. In addition, step 2 and 3 of interviewee 1 are combined to become step 3 of interviewee 2. Lastly, step 4 of these two interviewees can be considered parallel.

Interviewee 3 proposes a roadmap for KSPIs' implementation based on Sustainability Balance Scorecard (SBSC) approach. This roadmap can be presented into six steps.

Step 1 : Investigate key stakeholders and their interests in sustainability goals.

Step 2 : Set the goals for each perspective of SBSC

Step 3 : Add objectives under each goals

Step 4 : Align indicators with objectives

Step 5 : Determine suitable KPIs for sustainable performance

Step 6 : Use KPIs data for management decision making and improvement.

The identification of the goals in step 2 is obtained by choosing the most suitable goals after considering of the combination of interested goals of key stakeholders, current business goals, and sustainability development goals of the company. The selection of the goals is advised to have depth considerations in all four perspectives of SBSC: finance, customer, internal, and learning and growth perspectives. Interviewee 3 measures sustainability performance based on indicated objectives

which are the actions, implemented steps to achieve identified goals. Among these measures, company can decide which one should become KPIs for sustainability performance according to company strategy. These steps are recommended to be assessed, adjusted, or expanded annually.

In comparison to indicated steps of interviewee 2, step 1 of interviewee 3 can be considered as an internal action in step 1 of interviewee 2. These activities can be combined to represent a material analysis as will be discussed in the following paragraphs. Different from interviewee 2, interviewee 3 adds two more steps between identifying goals and KSPIs. These steps consist of determination of objectives and corresponding indicators. Nevertheless, these steps somehow have a consistent approach which can be customized and generated a unique roadmap which has the insights of all three interviewees and considers both internal and external successful factors. This roadmap can be illustrated by the following diagram (Figure 5.9).

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. This process will provide meaningful information for firm to decide which sustainability issues are significant and need to pay attention to or improve the most. These issues of course should be taken care, measured and actions should be taken for the improvement.

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. The goals and objectives are required to be clear, realistic, and understandable. In addition, if the objectives are measurable, they will better engage with the determination of KPIs for sustainability performance.

In order to have an appropriate set of KSPIs and proper implementation of these KSPIs, previous steps need to be properly taken place as the KPIs reflect what firm needs to achieve. Therefore, they must have close connection with firm vision, mission, strategy, goals, and objectives. To achieve the appropriateness, KSPIs are required to be clear, realistic, measurable, comparable, and comprise both lagging and leading indicators.

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.

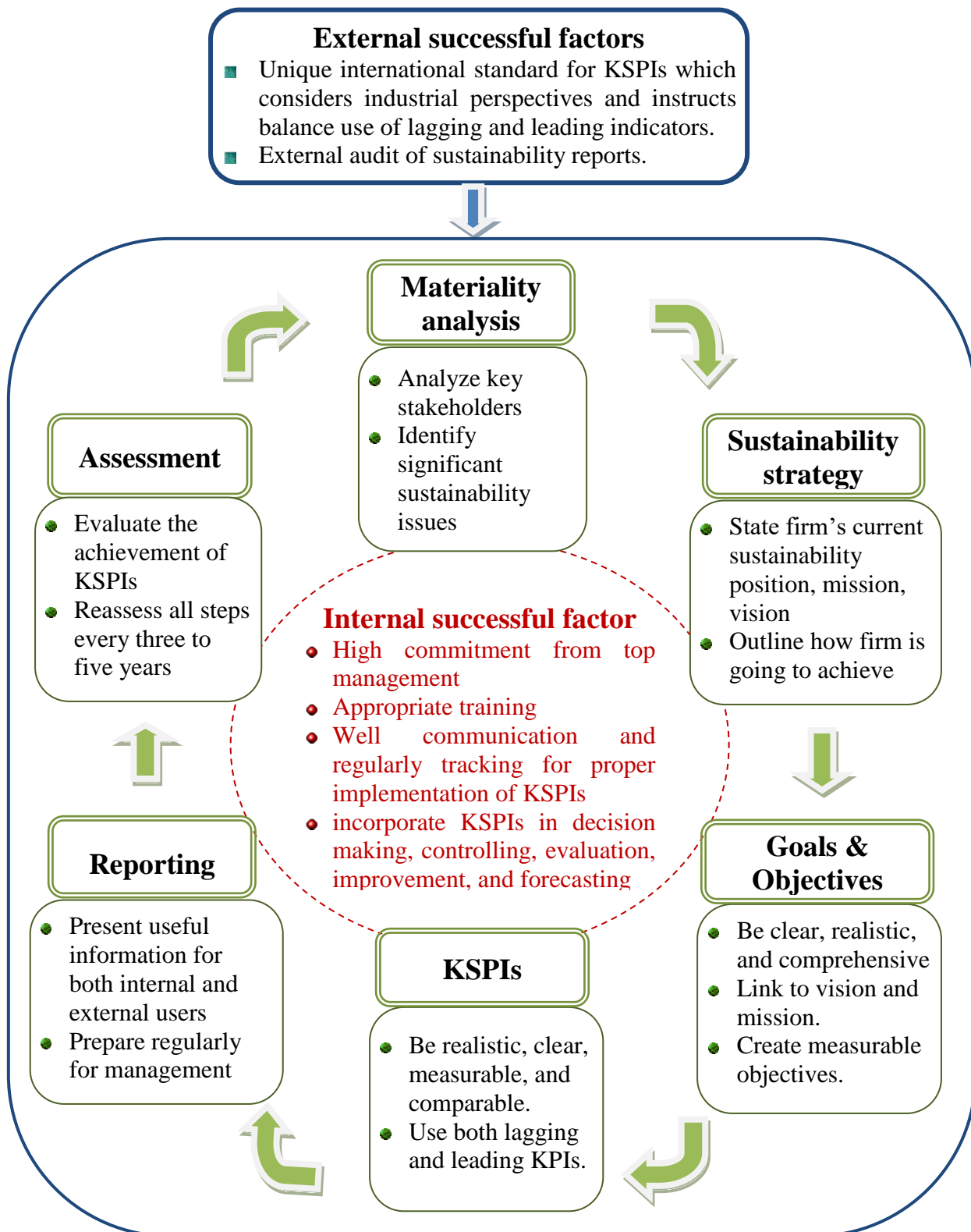


Figure 5.9: Roadmap for implementing KPIs for sustainability performance

The last step in the pathway relate to assessment which approach both sustainability performance and KSPIs implementation process. When outcomes of the process are generated, it is essential to evaluate whether what firm achieved have met the indicated targets or need some adjustment or improvement. Furthermore, the implementation process itself need apposite evaluation to see whether they are already used properly to gain what firm desires or need more enhancements. As the second assessment impact on how firm implement the actions into business process and core operations, therefore, according to cost and benefit aspect, it should not be performed so frequent. This assessment is recommended to apply every three to five years.

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. 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.

Beside developing a useful roadmap for implementation of KPIs for sustainability performance, it is in need to dig further on whether KSPIs reflect firm does, whether firm achieves sustainable goals, and whether firm improves. Previous interview questions have discovered the characteristics that a good KPI needs, implementation processes, and aspects firm should pay attention to determine KSPIs. Following question will explore the second phase of the implementation process which relates to the usage of KSPIs outcomes.

Sub question 5: How can KSPIs reflect what firm does, whether firm achieves sustainability targets, and whether firm improves?

According to interviewee 1, "the usefulness of these KPIs only comes out when the data collected from these KPIs is applied to decision making and allows firm to track progress." The interviewee advised to gather KSPIs data quarterly to reflect the most current sustainability performance and to find out what goals need more efforts to obtain. Waiting until financial year ended report is too late for managerial

decision and improvement to gain the desired goals. In the viewpoint of this interviewee, another advantage of KPIs data that firm should exploit is forecasting as it provide more information on how should firm be in the future relating to these key performances. “When we have a clear picture of the past, present, and future, it will be easier for us to improve our sustainable performance....When decisions regarding improvement are made, improvement actions should be discussed and outline how existing business processes are affected if executing the improvement” (Interviewee 1). This outline is advised to combine with costs and benefits analysis to determine whether it is worthy to make the improvement. Once, relevant analysis has been done, useful information will benefit both internal and external stakeholders through firm’s reporting system and facilitate performance improvement via cause and effects of measurement outcomes and decision making. In order to use the above process effectively, interviewee 1 suggest forming a standardized process which will then facilitate firm’s sustainability performance and enable constant improvement. Focusing on the effective usage of KSPIs data, interviewee 3 recommends designing how to collect the data from business operation and how to analyse them to have reasonable outcomes before implementing processes. This is due to the direct influences of the design on these KSPIs application processes. Interviewee 3: “If required data cannot be collected according to the design, the implementation process should be adjusted until it meets the company’s needs”.

The last interview question relate to how industry impact the implementation of KSPIs in the developed roadmap. This question focuses on the influences of two industries that are investigated in the survey parts: the automotive and financial services sectors.

Sub question 6: How industry factor impact on the implementation of the roadmap? Please provide specific explanation for automotive and financial services sectors.

As stated by three interviewees, industry factor does not lead to considerable changes in the roadmap to implement KSPIs. The steps’ order seem not be impacted as this framework can be used for every type of organizations in any sectors. The difference due to industrial factor may appear in the actions and activities incurring in each step. Interviewee 1: “differences incur not only in different industries but also in different companies because each company has different vision, mission, strategy, and goals”. In addition, “the difference in dissimilar industries makes weight put on each step different” (interviewee 3). Therefore, the selection of appropriate set of KSPIs is also diverse, for instance, “more environmental KPIs are likely to be used in automotive than in financial services sectors” (interviewee 2).

In short, main interview question three helps to solve the concern regarding development of roadmap of implementing KPIs for sustainability performance. After getting opinions from three interviewees, a final roadmap with sequential steps is retrieved. This pathway can be used for variety of firm and industry types;

however, due to the differences in each firm and industry nature, it is in need to adjust the implementation actions in each step to match with firm's goals and industry specific.

6. CONCLUSION

6.1 Summary of research objectives, data collection and research methodology

The thesis consists of three main research objectives which relate to sustainability reporting and the use of KPIs in sustainability performance. Sustainability reporting has received remarkable attention due to sustainability development target of firms themselves as well as requirements on mandatory sustainable disclosures and increasing awareness of stakeholders about transparent sustainability reporting. Nevertheless, allocating firm's resources to sustainability reporting does not guarantee for firm value enhancement and the association between sustainability reporting and firm value is still diverse (Cahan et al., 2016; Margolis et al, 2007). As a result, the first research's purpose is to test the effect of sustainability disclosure on firm value. In order to lessen incompatible factors involving national culture, geographic, and legislation, this study concentrates on German large listed firms due to initiative position of Germany sustainability reporting development in Europe and current compulsory requirement in disclosing non-financial information. This mandatory requirement on non-financial disclosures also raises concern regarding to which factors may impact on the sustainability disclosure in German large listed firms. Once impacted factors are identified, firm can get insights on how to facilitate its disclosure quality base on these factors. Therefore, the second objective of this thesis is examining the association between sustainability disclosure and factors that may impact on sustainability disclosure. To achieve the consistency in determination of sustainability reporting transparency, Global Reporting Initiative (GRI) is taken as a core guideline in this research due to its popularity and convenience. Lastly, identifying appropriate set of key performance indicators (KPIs) for sustainability activities, which can assure the consistency with firm strategy and can be achievable, is also current major firm issues. Choosing suitable KSPIs can facilitate the consistency in achieving economic growth and satisfying social and environmental goals. Consequently, the last research objective is to propose set of KSPIs in specific industries and to roadmap the implementation of the KSPIs.

Data collections are separated for these three objectives. The research develops eleven hypotheses to achieve the first two main research objectives. The first hypothesis is tested to conclude whether there is the impact of sustainability reporting on firm value. All the other hypotheses are developed to examine factor that impact firm's compliance in sustainability reporting. For all these hypotheses, the research is conducted on 97 German large listed firms each year within the research period from 2013 to 2017 which structure a 485-observation sample. These hypotheses all involve GRI adherent level rankings which represent for sustainability disclosures. These rankings are generated based on Sustainability Disclosure Database. As for firm value in hypothesis 1, share price at year end and

four-month after year end of each firm are collected from eight German Stock Market including Frankfurt, Xetra, Stuttgart, Munich, Berlin, Dusseldorf, Hamburg, and Hannover Stock Exchange. Referring to independent variables in the rest hypotheses, data of board of directors' characteristics which include board size, board independence, board gender diversity, board subcommittees, and board meetings are gathered from firm's corporate governance reports or annual reports. For firm features such as firm size, firm profitability, and firm age, the data are collected via firm's annual report and firm's website. The last firm feature, industry and sustainability report character, external assurance are gathered from Sustainability Disclosure Database. For research question three which refers to how German large listed firm use KPIs in their sustainability reports, questionnaire surveys are first applied to support the finding of suitable set of KSPIs, then semi-structure interviews are implemented to gain the opinions from observed firms' management on how to use these KSPIs successfully. A total of 108 questionnaires were sent successfully to potential participants. These include 41 participants from automotive industry and 67 participants from financial services sectors. After one month of collection, 9 and 11 respondents are collected from automotive and financial services industries respectively.

The research uses regression analysis to test developed hypotheses in the first two objectives and a combination of quantitative and qualitative method to achieve objective three. As non-linear relationships are observed in the research models, Quantiles regression is used to investigate the relationship between firm value and sustainability disclosures in hypothesis 1. However, for the rest of hypotheses, as dependent variable is a scale from one to nineteen, Logistic regression is chosen to discover the association between sustainability disclosures and factors that may impact the disclosures. To resolve research question three, a combination of desk study, questionnaire survey and semi-structure interview are applied. At first, sustainability indicators in observed firms are retrieved from sustainability reports. Then, these indicators are transferred to questionnaires to obtain management perception on the appropriateness of potential key performance indicators of sustainability performance. Lastly, semi-interviews are performed, interview contents are then transcribed and 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, effective and efficient use of KSPIs, and roadmap for KSPIs.

6.2 Summary of the association between sustainability disclosure and firm value

As linear regression assumptions are violated, 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. As for control variables, significant positive relationships are found between firm value and firm size within the quantiles range from 0.01 to 0.8, firm performance within the quantile range from 0.075 to 0.9 and comprise a single 0.99 quantile, and firm age within the quantile range from 0.075 to 0.75 and comprise a single 0.01 quantile. Inconsistent with other control variable, significant negative relation is found between firm value and firm leverage within quantile ranges from 0.075 to 0.4, from 0.85 to 0.9, and from 0.975 to 0.99. 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 extends 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.

Although the results are varied, they are not conflict to each other as different outcomes appear in different quantile levels or in different ranges of share prices. In addition, the significant patterns can be explained by the considerable number of DAX30 companies that exist in the ranges of quantiles that have significant connection between firm value and sustainability disclosure. DAX 30 includes thirty biggest listed companies based on German market capitalization and liquidity and is considered as a strong measure of German and European economic health. Therefore, companies belong to this index are likely attracted the investors and increase investors' efforts in searching appropriate information which including sustainability information for investment decision. As a result, the significance of sustainability disclosures can be explored in relation to firm value in these share price ranges.

Different from previous research, this research illustrates mixed connections between firm value and sustainability disclosure in diverse share price ranges instead of only one direction impacts. Moreover, the outcome shows the strength movement of these associations when share prices change. Indeed, prior studies are more likely to provide one way relationship between firm share price and sustainability disclosures. For example, significant favourable associations between these two variables are discovered by Guidry and Patten (2010) and Berthelot et al.

(2012); significant unfavourable links are found by Lorraine et al. (2004), and no connection are explored by Clarkson et al. (2010) and Qiu et al. (2016).

6.3 Summary of the association between sustainability disclosure and factors that influence firm's sustainability disclosure

The 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.

Positive association between firm size, firm age, external assurance and sustainability transparency are in accordance with research outcomes of Sharif and Rashid (2014), Rahman et al. (2011); Godos-Diez et al. (2011), Bayoud et al. (2012); and Junior et al. (2014) and Simnett et al. (2009) respectively. Insignificant association between sustainability disclosure and board size, board independence, board gender diversity, board committees, board meetings, firm performance and firm industry are also found in prior studies (Fuente et al., 2017; Giannarakis, 2014; Michelon and Parbonnetti, 2012; Frias-Aceituni et al, 2012; Qui et al., 2016, Larran and Giner, 2002). Nevertheless, data separation into friendly and sensitive sectors leads to the negative significant link between sustainability disclosure and board size in friendly sectors. Possible reasons for the adverse influence can be more members in board may make decision making less consistent (Said et al., 2009). The separation also turn the relationship between sustainability disclosure and board diversity into significant unfavourable in sensitive sector. This can be explained by

the fact that with higher environmental and social problems concerning in firm operation in sensitive industry, the focus on these issues of females members (Liao et al., 2016) may deflect the main business objectives and strategy. Therefore, the appearance of females in board of directors can be seen as a distracted factor in sensitive sectors.

6.4 Summary of the identification and implementation of KSPIs

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 alpha and average of Likert points regarding to the appropriateness of disclosures to become KSPIs in economic, environment, and social categories are calculated. Cronbach's alphas value in automotive industry ranges from 0.78 to 0.82, and in financial services industry are within 0.83 and 0.85. These 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.

The questionnaires also provide results relating to factors that may influence the selection of observed disclosures to become KSPIs. While all indicated factors are believed to affect the selection of KSPIs in financial services sector, only three of them which include firm strategy, business model and measurability are selected as impact factors in automotive sector. The last outcome from the survey refers the amount of KSPIs that firm should have to be able to successfully achieve. In automotive industry provide, the expected KSPIs numbers range from one to fifteen, and these numbers in financial services sector is from one to twelve. Based on the results from two sectors, suitable numbers of KSPIs are likely to fall from seven to ten, in which nine KSPIs appear as the most likely number.

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 (Figure 5.9). 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.

6.5 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.

6.6 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] ADAMS, C.A. and FROST, G.R. Accessibility and functionality of the corporate web site: implications for sustainability reporting. *Business Strategy and the Environment*. 2006, vol. 15, issue 4, pp. 275-287. <https://doi.org/10.1002/bse.531>
- [2] ADAMS, R.B. and FERREIRA, D. Women in the boardroom and their impact on governance and performance. *Journal of Finance and Economics*, 2009, vol. 94, pp. 291-309. <https://doi.org/10.1016/j.jfineco.2008.10.007>
- [3] ADAMS, C.A. AND FROST, G.R. Integrating sustainability reporting into management practices. *Accounting Forum*. December 2008, vol. 32, issue 4, pp.288- 302. <https://doi.org/10.1016/j.accfor.2008.05.002>
- [4] AERTS, W. and CORMIER, D. Media legitimacy and corporate environmental communication. *Accounting, Organizations and Society*. 2009, vol. 34, issue. 1, pp. 1–27. <https://doi.org/10.1016/j.aos.2008.02.005>
- [5] 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>
- [6] 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>
- [7] AL-NAJJAR, B. Corporate Governance, Tourism Growth and Firm Performance: Evidence from Publicly Listed Tourism Firms in Five Middle Eastern Countries. *Tourism Management*. 2014, vol.42, pp.342-51. <https://doi.org/10.1016/j.tourman.2013.09.008>
- [8] AMRINA1, E. and YUSOF, S. M. Key Performance Indicators for Sustainable Manufacturing Evaluation in Automotive Companies. Proceedings of IEEE IEEM, 2011. <https://doi.org/10.1109/IEEM.2011.6118084>
- [9] ANAM, O.A., FATIMA, A.H. and Majdi, A.R.H. Effects of Intellectual Capital Information Disclosed in Annual Reports on Market Capitalization: Evidence from Bursa Malaysia. *Journal of Human Resource, Costing and Accounting*. 2011, vol. 15, issue 2, pp.85-101. <https://doi.org/10.1108/14013381111157328>
- [10] 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>
- [11] 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>

- [12] BAKER, G.P. and KENNEDY, R.E. Survivorship and the Economic Grim Reaper. *Journal of Law, Economics and Organization*. 2002, vol.18, pp.324-341. <https://doi.org/10.1093/jleo/18.2.324>
- [13] BAYOUD, N.S., KAVANAGH, M. and SLAUGHTER, G. An empirical study of the relationship between corporate social responsibility disclosure and organizational performance: evidence from Libya. *International Journal of Management and Marketing Research*. 2012, vol. 5, issue 3, pp. 69-82. <https://ssrn.com/abstract=2162581>
- [14] BEAUBIEN, L. Co-operative Accounting: Disclosing Redemption Contingencies for Member Shares. *Journal of Co-operative Studies*. 2011, vol. 44, issue 3, pp. 38-54. ISSN 0961 5784
- [15] BEBBINGTON, J., HIGGINS, C. and FRAME, B. Initiating sustainable development reporting: evidence from New Zealand. *Accounting, Auditing & Accountability Journal*. 2009, vol. 22, issue 4, pp. 588-625. <https://doi.org/10.1108/09513570910955452>
- [16] BELAL, A., and ROBERTS, R. Stakeholders' perceptions of corporate social reporting in Bangladesh. *Journal of Business Ethics*. 2010, vol. 97, issue 2, pp.311-324. <https://doi.org/10.1007/s10551-010-0511-4>
- [17] BERGH, D. D., CONNELLY, B. L., KETCHEN, D. J. and SHANNON, L. M. Signaling theory and equilibrium in strategic management research: An assessment and a research agenda. *Journal of Management Studies*. 2014, vol. 51, issue 8, pp.1334–1360. <https://doi.org/10.1111/joms.12097>
- [18] BERGH, D. D., KETCHEN, D. J., Jr., BOYD, B. K. and BERGH, J. New frontiers of the reputation - Performance relationship: Insights from multiple theories. *Journal of Management*. 2010, vol.36, issue 3, pp. 620–632. <https://doi.org/10.1177/0149206309355320>
- [19] 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>.
- [20] 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>
- [21] BLAND, J. and ALTMAN, D. Statistics notes: Cronbach's alpha. *British Medical Journal*. 1997, pp.314-275. <https://doi.org/10.1136/bmj.314.7080.572>
- [22] BOULOUTA, I. Hidden Connections: The Link between Board Gender Diversity and Corporate Social Performance. *Journal of Business Ethics*, 2013, vol.113, pp.185–197. <https://doi.org/10.1007/s10551-012-1293-7>
- [23] 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>
- [24] BRANCO, M.C. and RODRIGUES, L.L. Factors influencing social responsibility disclosure by Portuguese companies. *Journal of Business Ethics*. 2008, vol. 83, issue 4, pp. 685-701. <https://doi.org/10.1007/s10551-007-9658-z>.
- [25] BRANNEN, J. Mixing methods: The entry of qualitative and quantitative approaches into the research process. *International Journal of Social Research Methodology*. 2005, vol. 8, issue 3, pp. 173-184. <https://doi.org/10.1080/13645570500154642>
- [26] CAHAN, S.F., DE VILLIERS, C., JETER, D.C., NAIKER, V. and VAN STADEN, C.J. Are CSR Disclosures Value Relevant? Cross-country Evidence. *The European Accounting Review*. 2016, vol. 25, issue 3, pp.579-611. <https://doi.org/10.2139/ssrn.2321727>
- [27] CAMERON, A.C. and TRIVEDI, P.K. Regression-based tests for over dispersion in the Poisson model. *Journal of Econometrics*. December 1990, vol. 46, issue 3, pp 347-364. [https://doi.org/10.1016/0304-4076\(90\)90014-K](https://doi.org/10.1016/0304-4076(90)90014-K).
- [28] CAMPBELL D. Intra- and inter-sectoral effects in environmental disclosures: Evidence for legitimacy theory? *Business Strategy and the Environment*. 2003, vol.12, issue 6, pp.357-371. <https://doi.org/10.1002/bse.375>
- [29] Carrots and Sticks. *Global trends in sustainability reporting regulation and policy*. 2016 [viewed 2017-06-04]. Available from: <https://assets.kpmg/content/dam/kpmg/pdf/2016/05/carrots-and-sticks-may-2016.pdf>
- [30] CASTRO, M.F. Defining and using performance indicators and targets in Government M&E systems. 2011 [viewed 2017-05-16]. Available from: <http://documents.worldbank.org/curated/en/518971468346443826/Defining-and-using-performance-indicators-and-targets-in-government-M-and-E-systems>
- [31] CHEN, M. H. Hotel Stock Performance and Monetary Conditions. *International Journal of Hospitality Management*. 2007, vol. 26, issue 3, pp. 588–602. <https://doi.org/10.1016/j.ijhm.2006.05.003>
- [32] CHENHALL, R. Management control systems design within its organizational context: findings from contingency-based research and directions for the future. *Accounting, Organizations and Society*. 2003, vol.28, pp.127–168. [https://doi.org/10.1016/S0361-3682\(01\)00027-](https://doi.org/10.1016/S0361-3682(01)00027-)
- [33] CHO, C.H., LAINE, M., ROBERTS, R.W. and RODRIGUE, M. Organized hypocrisy, organizational façades, and sustainability reporting. *Accounting, Organizations and Society*. 2015, vol. 40, pp. 78-94. <https://doi.org/10.1016/j.aos.2014.12.003>
- [34] CHO, C.H., MICHELON, G. and PATTEN, D.M. Impression management in sustainability reports: an empirical investigation of the use of graph.

- Accounting and the Public Interest*. 2012, vol. 12, issue 1, pp. 16-37. <https://doi.org/10.2308/apin-10249>
- [35] CLARKSON, P., FANG, X.H., LI, Y. and RICHARDSON, G. *The Relevance of Environmental Disclosures for Investors and Other Stakeholder Groups: Are Such Disclosures Incrementally Informative?* 2010 [viewed 2018-06-03]. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1687475.
- [36] COAD, A., SEGARRA, A. and TERUEL, M. Like Milk or Wine: Does Firm Performance Improve with Age? *Structural Change and Economic Dynamics*. 2013, vol.24, pp.173–89. <https://doi.org/10.1016/j.strueco.2012.07.002>
- [37] CONNELLY, B. L., CERTO, S. T., IRELAND, R. D. and REUTZEL, C. R. Signaling theory: A review and assessment. *Journal of Management*. 2011, vol.37, issue 1, pp.39–67. <https://doi.org/10.1177/0149206310388419>
- [38] 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>
- [39] 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>
- [40] CORMIER, D., LEDOUX, M. AND MAGNAN, M. The informational contribution of social and environmental disclosures for investors. *Management Decision*. 2011, vol. 49, issue 8, pp. 1276-1304. <https://doi.org/10.1108/00251741111163124>
- [41] COYNE, J. G., SUMMERS, S. L., WILLIAMS, B. and WOOD, D. A. Accounting Program Research Rankings by Topical Area and Methodology *Issues in Accounting Education*, 2010, vol. 25, issue 4, pp.631-654. <https://doi.org/10.2308/iace.2010.25.4.631>. 2010
- [42] CRONBACH, L. Coefficient alpha and the internal structure of tests. *Psychometrika*. 1951, vol.16, pp.297-334. <https://doi.org/10.1007/BF02310555>
- [43] CROPLEY, D.H. Towards formulating a semiotic theory of measurement information – Part 1 Fundamental concepts and measurement theory. *Measurement*. 1998, vol. 24, pp.237–248. [https://doi.org/10.1016/S0263-2241\(98\)00058-X](https://doi.org/10.1016/S0263-2241(98)00058-X)
- [44] 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>
- [45] DEEGAN, C. and BLOMQUIST, C. Stakeholder influence on corporate reporting: an exploration of the interaction between WWF-Australia and the

- Australian minerals industry. *Accounting Organizations and Society*. 2006, vol. 314, pp.343-372. <https://doi.org/10.1016/j.aos.2005.04.001>
- [46] DEFOND, M.L., HANN, R.N. and HU, X. Does the market value financial expertise on audit committees of boards of directors? *Journal of Accounting Research*. 2005, vol.43, pp.153–193. <https://doi.org/10.1111/j.1475-679x.2005.00166.x>
- [47] DELMAS, M.A. and BURBANO, V.C. The Drivers of Greenwashing. *California Management Review*. 2011, vol. 54, pp.64–87. <https://doi.org/10.1525/cmr.2011.54.1.64>
- [48] DESJARDINS, J. And WILLIS, A. *Climate Change Briefing: Questions for Directors to Ask*. [viewed 2018-03-01]. Available from: http://www.transformgcc.com/resources/CICA_Briefings/Climate%20Change.pdf
- [49] DHALIWAL, D.S., LI, O.Z., TSANG, A. and YANG, Y.G. Voluntary nonfinancial disclosure and the cost of equity capital: the initiation of corporate social responsibility reporting. *The Accounting Review*. 2011, vol. 86, issue 1, pp. 59-100. <https://doi.org/10.2308/accr.00000005>
- [50] 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>
- [51] DIENES, D., SASSEN, R. and FISCHER, J. What are the drivers of sustainability reporting? A systematic review. *Sustainability Accounting, Management and Policy Journal*. 2016, vol. 7, issue 2, pp. 154-189. <https://doi.org/10.1108/SAMPJ-08-2014-0050>
- [52] DRAGOMIR, V.D. The disclosure of industrial greenhouse gas emissions: a critical assessment of corporate sustainability reports. *Journal of Cleaner Production*. 2012, vol. 29, pp. 222- 237. <https://doi.org/10.1016/j.jclepro.2012.01.024>
- [53] DUCHON, D. and DRAKE, B. Organizational narcissism and virtuous behavior. *Journal of Business Ethics*. 2009, vol. 85, issue 3, pp. 301-308. <https://doi.org/10.1007/s10551-008-9771-7>
- [54] EBRAHIM, A. Earnings management and board activity: an additional evidence. *Review of Accounting and Finance*. 2007, vol. 6, issue 1, pp. 42-58. <https://doi.org/10.1108/14757700710725458>
- [55] ECCLES, R.G. and SERAFEIM, G. 2011. *Leading and Lagging Countries in Contributing to a Sustainable Society*, Harvard Business School Working Knowledge, Boston.
- [56] ECKERSON WAYNE W. Performance management strategies. *Business Intelligence Journal*. 2009, vol.14, issue 1, pp.24-27.
- [57] Edelman Trust Barometer. *The tenth global opinion leaders study*. 2009 [viewed 2018-07-23] Available from:

- <https://www.edelman.com/sites/g/files/aatuss191/files/2018-10/2009-Trust-Barometer-Global-Deck.pdf>
- [58] EL-BASSIOUNY, D. AND EL-BASSIOUNY, N. Diversity, corporate governance and CSR reporting: A comparative analysis between top-listed firms in Egypt, Germany and the USA. *Management of Environmental Quality*. 2019, vol. 30, issue 1, pp. 116-136. <https://doi.org/10.1108/MEQ-12-2017-0150>
- [59] 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
- [60] ENG, L. L. and MAK, Y. T. Corporate governance and voluntary disclosure. *Journal of Accounting and Public Policy*. 2003, vol. 22, issue 4, pp. 325–345. [https://doi.org/10.1016/S0278-4254\(03\)00037-1](https://doi.org/10.1016/S0278-4254(03)00037-1)
- [61] European Commission. *Fact sheets Guidelines on disclosure of non-financial information Brussels*. 2017 [viewed 2017 01 12]. Available from http://europa.eu/rapid/press-release_MEMO-18-3730_en.htm
- [62] European Commission. *Position of the European Parliament*. 2014 [viewed 2017 04 23]. Available from: www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGMLTCP7-TC1-COD-2013-01100DOCPDFV0//EN
- [63] European Union. *Directive 2014/95/EU of the European Parliament and of the Council* 2014 [Viewed 2017 04 23]. Available from:<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0095>
- [64] FARBER, D.B. Restoring trust after fraud. *Accounting Review*. 2005, vol. 80, pp.539–561. <https://doi.org/10.2308/accr.2005.80.2.539>
- [65] Federal Law Gazette. *Law to strengthen the non-financial reporting of companies in their situation and group management reports*. In: CSR Directive Implementation Act, Edition 20: 802-814. 2017 [viewed 2018 8 4]. Available from: https://www.bgbl.de/xaver/bgbl/start.xav?start=%2F%2F*%5B%40attr_id%3D%27bgbl117s0827.pdf%27%5D#__bgbl__%2F%2F*%5B%40attr_id%3D%27I_2017_20_inhaltsverz%27%5D__1569449473090.
- [66] FERGUSON, C. J. An effect size primer: A guide for clinicians and researchers. *Professional Psychology: Research and Practice*. 2009, vol.40, issue.5, pp.532-538. <https://doi.org/10.1037/14805-020>
- [67] FIELD, A. (2005) *Discovering Statistics Using SPSS*, 2nd ed., Sage, London.
- [68] 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

- [69] FIFKA, M.S. *Einführung-Nachhaltigkeitsberichterstattung: Eingrenzung Eines Heterogenes Phänomen* Springer: Berlin/Heidelberg, Germany, 2014; pp. 1–18
- [70] FIFKA, M.S. The development and state of research on social and environmental reporting in global comparison. *Journal für Betriebswirtschaft*. 2012, vol. 62, issue 1, pp. 45-84. <https://doi.org/10.1007/s11301-012-0083-8>
- [71] FREEMAN, R.E. (1984). *Strategic Management: A Stakeholder Approach*. Prentice Hall, Englewood Cliffs.
- [72] FREUNDLIEB M, TEUTEBERG F (2013) Corporate social responsibility reporting-a transnational analysis of online corporate social responsibility reports by market-listed companies: contents and their evolution. *International Journal of Innovation and Sustainable Development* 7: 1–26.
- [73] FRIAS-ACEITUNO, J., RODRIGUEZ-ARIZA, L. and GARCIA-SANCHEZ, I.M. The role of the board in the dissemination of integrated corporate social reporting. *Corporate Social Responsibility and Environment. Management*. 2012, vol. 20, issue 4, pp. 219-233. <https://doi.org/10.1002/csr.1294>
- [74] 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>
- [75] 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>.
- [76] GARAY, U. and GONZALEZ, M. Corporate Governance and firm performance: the case of Venezuela. *Corporate Governance: An international review*. 2008, vol. 16, issue 3, pp.194-209. <https://doi.org/10.1111/j.1467-8683.2008.00680.x>
- [77] German Corporate Governan ce Code. [online] 2015 [viewed 2017-05-17]. Available from: <https://www.dcgk.de/en/code.html>
- [78] 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>
- [79] GODOS-DIEZ, J.L., CAGO, R.F. and CAMPILLO, A.M. How Important Are CEOs to CSR Practices? An Analysis of the Mediating Effect of the Perceived Role of Ethics and Social Responsibility. *Journal of Business Ethics*. 2011, vol.98, pp. 531 – 548. <https://doi.org/10.1007/s10551-010-0609-8>
- [80] Governance and Accountability Institute. 2012. *Corporate ESG/sustainability/responsibility reporting – does it matter? Analysis of S&P 500 companies’ ESG reporting trends & capital markets response and*

- possible associations with desired rankings & rating.* Governance & Accountability Institute, New York, NY
- [81] GRI Database. *Sustainability Disclosure database*. 2017 [viewed 2017-05-17]. Available from: <http://database.globalreporting.org/>
- [82] GRI Standard. *GRI and sustainability reporting*. 2017 [viewed 2017-05-17]. Available from: <https://www.globalreporting.org/information/sustainability-reporting/Pages/gri-standards.aspx>
- [83] GROSSMAN, S. J. and HART, O.D. The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration. *Journal of Political Economy*. 1986, vol.94, issue 4, pp.691-719. <https://doi.org/10.1086/261404>
- [84] GUEST, P. M. The determinants of board size and composition: evidence from the UK. *Journal of Corporate Finance*. 2008, vol. 14, issue 1, pp. 51-72. <https://doi.org/10.1016/j.jcorpfin.2008.01.002>
- [85] GUIDRY, R.P. and PATTEN, D.M. Market Reactions to the First-Time Issuance of Corporate Sustainability Reports: Evidence That Quality Matters. *Sustainability Accounting, Management and Policy Journal*. 2010, vol. 1, issue 1, pp.33-50. <https://doi.org/10.1108/20408021011059214>.
- [86] GUL, F.A., HUTCHINSON, M. and LAI, K.M. Gender-diverse boards and properties of analyst earnings forecasts. *Accounting Horizon*. 2013, vol. 27, issue 3, pp. 511–538. <https://doi.org/10.2308/acch-50486>
- [87] GULENKO, M. Mandatory CSR reporting—literature review and future developments in Germany. *Sustainability Management Forum*. 2018, vol. 26, pp. 3–17. <https://doi.org/10.1007/s00550-018-0476-9>
- [88] GURCHARAN, S. A Review of Optimal Capital Structure Determinant of Selected ASEAN Countries. *International Research Journal of Finance and Economics*. 2010, vol. 47, 32–43. <https://doi.org/10.1080/23322039.2017.1418609>
- [89] HAHN, R. and KUHNEN, M. Determinants of sustainability reporting: a review of results, trends, theory, and opportunities in an expanding field of research. *Journal of Cleaner Production*. 2013, vol. 59, pp. 5-21. <https://doi.org/10.1016/j.jclepro.2013.07.005>
- [90] HAIR, J. F., HOLLINGSWORTH, C. L., RANDOLPH, A. B. and CHONG, A. Y. L. An updated and expanded assessment of PLS-SEM in information systems research. *Industrial Management & Data Systems*. 2017, vol. 117, issue 3, pp.442–458. 10.1108/IMDS-04-2016-0130
- [91] HAIR, J., HULT, G.T.M., RINGLE, C.M., and SARSTEDTA, M. 2014. *Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. 2nd edition, Thousand Oaks: Sage
- [92] HANDAJANI, L., SUBROTO, B., SUTRISNO, T. and SARASWATI, E. Does board diversity matter on corporate social disclosure? An Indonesian evidence. *Journal of Economics and Sustainable Development*. 2014, vol. 5, issue 9, pp.8–16

- [93] HARJOTO, M.A. and JO, H. Corporate Governance and CSR Nexus. *Journal of Business Ethics*. 2011, vol. 100, pp.45–67. <https://doi.org/10.1007/s10551-011-0772-6>
- [94] HASAN, A. and BUTT, S.A. Impact of Ownership Structure and Corporate Governance on Capital Structure of Pakistani Listed Companies. *International Journal of Business and Management*. 2009, vol. 4, issue 2, pp.50-58. <https://doi.org/10.5539/ijbm.v4n2p50>
- [95] HENARD, D. H. and SZYMANSKI, D. M. Why some new products are more successful than others. *Journal of Marketing Research*, 2001, vol.38, issue 3, pp.362-375. <https://doi.org/10.1509/jmkr.38.3.362.18861>
- [96] HERZIG, C. and KUHN, A.L. Corporate Responsibility reporting. In *Corporate Social Responsibility: Strategy, Communication, Governance*; Rasche, A., Morsing, M., Moon, J., Eds.; Cambridge University Press: Cambridge, UK, 2017; pp. 187–219.
- [97] HOSSAIN, M. and REAZ, M. The Determinants and Characteristics of Voluntary Disclosure by Indian Banking Companies. *Corporate Social Responsibility and Environmental Management*. 2007, vol. 14, pp. 274 – 288. <https://doi.org/10.1002/csr.154>.
- [98] HRISTOV, I. and CHIRICO, A. The Role of Sustainability Key Performance Indicators (KPIs) in Implementing Sustainable Strategies. *Sustainability*. 2019, vol. 11, issue 20, pp.1-19. <http://dx.doi.org/10.3390/su11205742>
- [99] HU, M. and LOH, L. Board Governance and Sustainability Disclosure: A Cross-Sectional Study of Singapore-Listed Companies. *Sustainability*. 2018, vol. 10. <https://doi.org/10.3390/su10072578>
- [100] HUSE, M. and SOLBERG, A.G. Gender-related Boardroom Dynamics. How Scandinavian Women Make and Can Make Contributions on Corporate Boards. *Women in Management Review*. 2006, vol. 21, issue 2, pp. 113–130. <https://doi.org/10.1108/09649420610650693>
- [101] HUSE, M., NIELSEN, S. T. and HAGEN, I. M. Women and employee-elected board members, and their contributions to board control tasks. *Journal of Business Ethics*. 2009, vol. 89, issue 4, pp.581–597. <https://doi.org/10.1007/s10551-008-0018-4>
- [102] IFAC (2012). *International Federation of Accountants, Investors Demand for Environmental, Social, and Governance Disclosures: Implications for Professional Accountants in Business*, New York.
- [103] 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>

- [104] 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>
- [105] JENSEN, M.C. and MECKLING, W. Theory of the Firm: Managerial Behavior, Agency Costs, and Capital Structure. *Journal of Financial Economic.*, 1976, vol.3, pp.305-360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)
- [106] JOHNSON, R.B., ONWUEGBUZIE, A.J. and TURNER, L.A. Toward a definition of mixed methods research. *Journal of Mixed Methods Research*. 2007, vol. 1, issue 2, pp.112- 33. <https://doi.org/10.1177/1558689806298224>
- [107] JONES, S., FROST, G., LOFTUS, J. and VAN DER LAAN, S. An Empirical Investigation of the Market Returns and Financial Performance of Entities Engaged in Sustainability Reporting. *Australian Accounting Review*. 2007, vol. 17, issue 1, pp.78-87. <https://doi.org/10.1111/j.1835-2561.2007.tb00456.x>
- [108] 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>
- [109] KASPEREIT, T. and LOPATTA, K. 2016. The value relevance of SAM’s corporate sustainability ranking and GRI sustainability reporting in the European stock markets. *Business Ethics: A European Review*, vol. 25, issue 1, pp. 1-24. <https://doi.org/10.1111/beer.12079>
- [110] KENDALL, L. 2008. The conduct of qualitative interview: Research questions, methodological issues, and researching online. In J. Coiro, M. Knobel, C. Lankshear and D. Leu (Eds.), *Handbook of research on new literacies*. pp. 133-149. New York: Lawrence Erlbaum Associates
- [111] KHAN, H.U.Z. The effect of corporate governance elements on corporate social responsibility (CSR) reporting empirical evidence from private commercial banks of Bangladesh. *International Journal of Law and Management*. 2010, vol. 52, issue 2, pp. 82-109. <https://doi.org/10.1108/17542431011029406>
- [112] KHANNA, R. and VAN DER SCHAAR, M. Reduced complexity genetic algorithm for motion estimation. Proc. SPIE 5308, *Visual Communications and Image Processing*. 2004. <https://doi.org/10.1117/12.527750>
- [113] KIRCHHOFF. *Nachhaltigkeitsberichterstattung im Wandel*; Springer: Hamburg, Germany, 2017.
- [114] KLUGE, N. and SICK, S. *Private economy with transparency to social engagement? To companies potentially affected by the CSR Directive Implementation Act*. 2016 [viewed 2018-4-8]. Available from: https://www.boeckler.de/pdf/p_mbf_report_2016_27.pdf.

- [115] KOENKER, R. and BASSETT, G. W. Regression Quantiles. *Econometrica*. 1978, vol.46, pp.33–50. <https://doi.org/10.1007/s10687-015-0232-2>
- [116] 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>
- [117] KPMG. *The KPMG Survey of Corporate Responsibility Reporting 2017*. 2017. [viewed 2017-01-12]. Available from <https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2017/10/kpmg-survey-of-corporate-responsibility-reporting-2017.pdf>
- [118] 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>
- [119] KUZHEY, 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>
- [120] 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>
- [121] LA TORRE, M., SABELFELD, S., BLOMKVIST, M., TARQUINIO, L. and DUMAY, J. Harmonising non-financial reporting regulation in Europe: Practical forces and projections for future research. *Meditari Accountancy Research*. 2018, vol. 26, issue 4, pp. 598-621. <https://doi.org/10.1108/MEDAR-02-2018-0290>
- [122] 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>
- [123] 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
- [124] LARRINAGA-GONZALEZ. 2011. Insights from neoinstitutional theory. In J. Unermann, J.Bebbington & B. O' Dwyer (Eds.), *Sustainability Accounting and Accountability*. London: Routledge.
- [125] 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>

- [126] LI, Q., LUO, W., WANG, Y. and LIANSHENG, W. Firm performance, corporate ownership, and corporate social responsibility disclosure in China. *Business Ethics: A European Review*. 2013, vol. 22, issue 2, pp. 159-173. <https://doi.org/10.1111/beer.12013>
- [127] 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>
- [128] LIM, S., MATOLCSY, Z., and CHOW, D. The association between board composition and different types of unitary disclosure. *European Accounting Review*. 2007, vol.16, issue 3, pp.555-583. <https://doi.org/10.1080/09638180701507155>
- [129] LIU, X. and ANBUMOZHI, V. Determinant factors of corporate environmental information disclosure: an empirical study of Chinese listed companies. *Journal of Cleaner Production*. 2009, vol. 17, pp. 593-600. <http://dx.doi.org/10.1016/j.jclepro.2008.10.001>
- [130] LU, Y., ABEYSEKERA, I. and CORTESE, C. Corporate social responsibility reporting quality, board characteristics and corporate social reputation: evidence from China. *Pacific Accounting Review*. 2015, vol. 27, issue 1, pp. 95-118. <https://doi.org/10.1108/PAR-10-2012-0053>
- [131] 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>
- [132] LYON, T.P. and MAXWELL, J.W. Greenwash: Corporate Environmental Disclosure under Threat of Audit. *Journal of Economics and Management Strategy*. 2011, vol.20, pp.3–41. <https://doi.org/10.1111/j.1530-9134.2010.00282.x>
- [133] MAHONEY, L., THORNE, L., CECIL, L. and LAGORE, W. A Research Note on Standalone Corporate Social Responsibility Reports: Signaling or Greenwashing? *Critical Perspectives on Accounting*. 2013, vol. 24, issue (4–5), pp. 350– 359. <https://doi.org/10.1016/j.cpa.2012.09.008>
- [134] MAJEED, S., AZIZ, T. and SALEEM, S. The Effect of Corporate Governance Elements on Corporate Social Responsibility (CSR) Disclosure: An Empirical Evidence from Listed Companies at KSE Pakistan. *International Journal of Financial Studies*. 2015, vol.3, pp.530-556. <https://doi.org/10.3390/ijfs3040530>
- [135] MANETTI, G. and BECATTI, L. Assurance services for sustainability reports: standards and empirical evidence. *Journal of Business Ethics*. 2009, vol. 87, issue 1, pp. 289-298. <https://doi.org/10.1007/s10551-008-9809-x>
- [136] MARIMON, F., ALONSO-ALMEIDA, M.D.M., RODRÍGUEZ, M.D.P. and CORTEZ ALEJANDRO, K.A. The worldwide diffusion of the global

- reporting initiative: what is the point? *Journal of Cleaner Production*. 2012, vol. 33, pp. 132-144. <https://doi.org/10.1016/j.jclepro.2012.04.017>
- [137] MARQUIS, C. and QIAN, C. Corporate social responsibility reporting in China: symbol or substance? *Organization Science*. 2014, vol. 25, issue 1, pp. 127-148. <https://doi.org/10.1287/orsc.2013.0837>
- [138] MARTINEZ-FERRERO, J. and FRÍAS-ACEITUNO, J.V. Relationship between sustainable development and financial performance: International empirical research. *Business Strategy and Environment*. 2013, vol. 24, pp.20-39. <https://doi.org/10.1002/bse.1803>
- [139] MATE, A., ZOUMPATIANOS, K., PALPANAS, T., TRUJILLO, J., MYLOPOULOS, J. and KOCI E. *A systematic approach for dynamic targeted monitoring of KPIs*. In: Proceedings of 24th annual international conference on computer science and software engineering. IBM Corp.; 2014
- [140] MEIER, H., LAGEMANN, H., MORLOCK, F. and RATHMANN, C. Key performance indicators for assessing the planning and delivery of industrial services. *Procedia Cirp*. 2013, vol. 11, pp.99-104. <https://doi.org/10.1016/j.procir.2013.07.056>
- [141] 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_sustainability_performance.pdf
- [142] MICHELON, G. and PARBONETTI, A. The effect of corporate governance on sustainability disclosure. *Journal of Management and Government*. 2012, vol.12, issue 16, pp.477-509. <https://doi.org/10.1007/s10997-010-9160-3>
- [143] MILLER, T. and TRIANA, C. M. Demographic diversity in the boardroom: Mediators of the board diversity-firm performance relationship. *Journal of Management Studies*. 2009, vol. 46, issue 5, pp.755-786 <https://doi.org/10.1111/j.1467-6486.2009.00839.x>
- [144] MODIGLIANI, F. and MILLER, M. H. Corporate Income Taxes and the Cost of Capital: A Correction. *The American Economic Review*. 1963, vol. 53, pp.433-443. <https://doi.org/10.2139/ssrn.1715044>
- [145] MOMIN, M.A. and PARKER, L.D. Motivations for Corporate Social Responsibility Reporting by MNC Subsidiaries in an Emerging Country: The Case of Bangladesh. *The British Accounting Review*. 2013, vol. 45, issue 3, pp.215-228. <https://doi.org/10.1016/j.bar.2013.06.007>
- [146] 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>

- [147] NIKOLAEVA, R. and BICHO, M. The role of institutional and reputational factors in the voluntary adoption of corporate social responsibility reporting standards. *Journal of the Academy of Marketing Science*. 2011, vol. 39, issue 1, pp. 136-157. <https://doi.org/10.1007/s11747-010-0214-5>.
- [148] 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>
- [149] 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>
- [150] 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>
- [151] PARMENTER, D. 2015. *Key Performance Indicators: Developing, Implementing, and Using Winning KPIs*. 3rd Edition. John Wiley & Sons: Hoboken, New Jersey.
- [152] PENG, M.W. Outside Directors and Firm Performance During Institutional Transitions (in China). *Strategic Management Journal*. May 2004, vol. 25, issue 5, pp.453-471. <https://doi.org/10.1002/smj.390>
- [153] PEREZ-BATRES, L.A., DOH, J.P. and MILLER, V.V. Stakeholder Pressures as Determinants of CSR Strategic Choice: Why do Firms Choose Symbolic Versus Substantive Self-Regulatory Codes of Conduct? *Journal of Business Ethics*. 2012, vol. 110, pp.157–172. <https://doi.org/10.1007/s10551-012-1419-y>
- [154] 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>
- [155] PRADO–LORENZO, J.M. and GARCIA–SANCHEZ, I.M. The Role of the Board of Directors in Disseminating Relevant Information on Greenhouse Gases. *Journal of Business Ethics*. 2010, vol. 97, issue 3, pp.391–424. <https://doi.org/10.1007/s10551-010-0515-0>
- [156] PRATTEN, J.D. and MASHAT, A.A. Corporate social disclosure in Libya. *Social Responsibility Journal*, July 2009, vol. 5, pp.311-327. <http://dx.doi.org/10.1108/17471110910977258>
- [157] PRIETO-CARRON, M., LUND-THOMSEN, P., CHAN, A., MURO, A. N. A. and BHUSHAN, C. Critical perspectives on CSR and development: what we know, what we don't know and what we need to know. *International Affairs*. 2006, vol.82, issue 5. <https://doi.org/10.1111/j.1468-2346.2006.00581.x>

- [158] 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>
- [159] RAHMAN, N.H.W.A., ZAIN, M.M. and AL-HAJ, N.H.Y.Y. CSR disclosures and its determinants: evidence from Malaysian government link companies. *Social Responsibility Journal*. 2011, vol. 7, issue 2, pp. 181-201. <https://doi.org/10.1108/17471111111141486>
- [160] RETTAB, B., BRIK, A. B. and MELLAHI, K. A study of management perceptions of the impact of corporate social responsibility on organisational performance in emerging economies: The case of Dubai. *Journal of Business Ethics*. 2009, vol.89, pp.371-390. <http://dx.doi.org/10.1007/s10551-008-0005-9>
- [161] RODRIGUES, G.S., BUSCHINELLI, C.D., and AVILA, A.D. An environmental impact assessment system for agricultural research and development II: institutional learning experience at Embrapa. *Journal of Technology Management Innovation*. 2010, vol.5, issue 4, pp.38-56. <http://dx.doi.org/10.4067/S0718-27242010000400004>.
- [162] 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>.
- [163] SAKA, C. AND OSHIKA, T. Disclosure effects, carbon emissions and corporate value", *Sustainability Accounting, Management and Policy Journal*. 2014, vol. 5, issue 1, pp. 22-45. <https://doi.org/10.1108/SAMPJ-09-2012-0030>
- [164] SCOTT, W. R. and MEYER, J. W. 1994. *Institutional Environments and Organisations: Structural Complexity and Individualism*, Newbury Park: Sage.
- [165] SERRASQUEIRO, Z.S. and MACASNUNES, P. Performance and Size: Empirical Evidence from Portuguese SMEs. *Small Business Economics*, 2008, vol.31, issue 2, pp.195-217. <https://doi.org/10.1007/s11187-007-9092-8>
- [166] SHAMIL, M.M., SHAIKH, J.M, HO, P. and KRISHNAN, A. The influence of board characteristics on sustainability reporting. *Asian Review of Accounting*. July 2014, vol. 22, issue 2, pp.78-97. <https://doi.org/10.1108/ARA-09-2013-0060>
- [167] SHAMKI, D. and RAHMAN, A.A. Value relevance of earnings and book value: Evidence from Jordan. *International Journal of Business and Management*. 2012, vol. 7, issue 3, pp.133-141. <https://doi.org/10.5539/ijbm.v7n3p133>
- [168] SHARIF, M. AND RASHID, K. Corporate governance and corporate social responsibility (CSR) reporting: an empirical evidence from commercial banks

- (CB) of Pakistan. *Quality and Quantity*. 2014, vol. 48, issue 5, pp. 2501-2521. <https://doi.org/10.1007/s11135-013-9903-8>
- [169] 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>
- [170] SINGH, R.K., MURTY, H.R., GUPTA, S.K. and DIKSHIT, A.K. An overview of sustainability assessment methodologies. *Ecological Indicator*. 2012, vol. 15, pp.281–299. <http://dx.doi.org/10.1016/j.ecolind.2011.01.007>
- [171] 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>
- [172] SRINIDHI, B., GUL, F.A. and TSUI, J. Female directors and earnings quality. *Contemporary Accounting Research*. 2011, vol. 28, issue 5, pp.1610–1644. <https://doi.org/10.1111/j.1911-3846.2011.01071.x>
- [173] STAMATOVIC, M. and ZAKIC, N. Effects of the global economic crisis on small and medium enterprises in Serbia. *Serbian Journal of Management*. 2010, vol.5, issue 1, pp.151 - 162.
- [174] STREINER D. Starting at the beginning: an introduction to coefficient alpha and internal consistency. *Journal of personality assessment*. 2003, vol.80, pp.99-103. https://doi.org/10.1207/S15327752JPA8001_18
- [175] STUBBS, W., HIGGINS, C. and MILNE, M. Why do companies not produce sustainability reports? *Business strategy and the environment*. 2013, vol.22, issue 7, pp. 456-70. . <https://doi.org/10.1002/bse.1756>
- [176] 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>
- [177] TAGESSON, T., BLANK, V., BROBERG, P. and COLLIN, S.O. What explains the extent and content of social and environmental disclosures on corporate websites: a study of social and environmental reporting in Swedish listed corporations. *Corporate Social Responsibility and Environmental Management*. 2009, vol. 16, issue 6, pp.352-364. <https://doi.org/10.1002/csr.194>
- [178] TAHIR, A.C. and DARTON, R.C. The process analysis method of selecting indicators to quantify the sustainability performance of a business operation. *Journal of Cleaner Production*. 2010, vol. 18, pp. 1598-1607. <https://doi.org/10.1016/j.jclepro.2010.07.012>
- [179] TARSKI, A. Contributions to the theory of models. *Dagationes Mathematicae*. 1954, vol.16, pp.572–588.

- [180] THINGGAARD, F. and DAMKIER, J. Has financial statement information becomes less relevant? Longitudinal evidence from Denmark. *Scandinavian Journal of Management*. 2008, vol. 24, pp.375-387. <https://doi.org/10.1016/j.scaman.2008.06.001>
- [181] THOMSON, I. 2011. *Mapping the terrain of sustainability accounting*. Sustainability Accounting and Accountability . London: Routledge
- [182] VAERENBERGH, Y.V., ORSINGHER, C., VERMEIR, I. and LARIVIERE, B. A meta-analysis of relationships linking service failure attributions to customer outcomes. *Journal of Service Research*. 2014, vol.17, issue 4, pp.381-398. <https://doi.org/10.1177/1094670514538321>
- [183] VAN DER STEDE, W.A., CHOW, C.W. and LIN, T.W. Strategy, Choice of Performance Measures, and Performance. *Behavioral Research in Accounting*. 2006, vol.18, pp.185-205. <https://doi.org/10.2308/bria.2006.18.1.185>
- [184] VDA. *Industry overview: The Automotive Industry in German*. 2017 [viewed 2017 12 01]. Available from: https://www.gtai.de/GTAI/Content/EN/Invest/_SharedDocs/Downloads/GTAI/Industry-overviews/industry-overview-automotive-industry-en.pdf
- [185] 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>
- [186] VISSER, W. 2010. *A-Z of Corporate Social Responsibility*, John Wiley and Sons Ltd. John Wiley and Sons Ltd., UK
- [187] VORMEDAL, I. and RUUD, A. Sustainability Reporting in Norway – an Assessment of Performance in the Context of Legal Demands and Socio-Political Drivers. *Business Strategy and the Environment*. May 2009, vol.18, issue 4, pp.207 – 222. <http://dx.doi.org/10.1002/bse.560>
- [188] 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>
- [189] WANG, K.T. and LI, D. Market Reactions to the First-Time Disclosure of Corporate Social Responsibility Reports: Evidence from China. *Journal of Business Ethics*. 2015, vol. 138, issue 4, pp.661-682. <https://doi.org/10.1007/s10551-015-2775-1>
- [190] 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>

- [191] ZUBAIDAH, Z.A., NURMALA M.K. and KAMARUZAMAN, J. Board structure and corporate performance in Malaysia. *International Journal of Economic and Finance*. 2009, vol. 1, issue 1, pp.150-164. <https://doi.org/10.5539/ijef.v1n1p150>

APENDICIES

Appendix 1. Sustainability Reporting Standards and Guidance in the European Union

Year	Standard	Type	Themes and Focus							Scope
			<i>Environment</i>	<i>Social</i>	<i>Employee and labor</i>	<i>Human rights</i>	<i>Diversity</i>	<i>Anticorruption</i>	<i>Indicators</i>	
1993	Eco-Management and Audit Scheme (EMAS)	V	*						*	EU
1996	ISO 14001	V	*						*	GL
1999	AA1000 Framework Standard	V	*	*	*					GL
2000	GRI Sustainability Reporting Guidelines	V	*	*	*				*	GL
2000	EU Financial Reporting Strategy: the way forward COM	M								GL
2000	United Nations Global Compact (UNGC) foundation	V	*	*	*	*		*		GL
2000	Carbon Disclosure project (CDP) foundation	V	*						*	GL
2001	GHG Protocol Standards	V	*						*	GL
2001	Commission Recommendation on the recognition, measurement and disclosure of environmental issues in the annual accounts and annual reports of companies(2001/453/EC)	M	*						*	EU
2001	Standard GBS 2001 - Principi di redazione del bilancio social	V	*	*	*				*	IT
2001	SA8000	V		*	*	*	*	*		GL
2001	EMAS revision (EC No 761/2001)	V	*						*	EU
2002	Transparency International Business Principles for Countering Bribery			*						GL
2002	GRI G2 Guidelines (update)	V	*	*	*	*	*	*	*	GL

Year	Standard	Type	Themes and Focus							Scope
			<i>Environment</i>	<i>Social</i>	<i>Employee and labor</i>	<i>Human rights</i>	<i>Diversity</i>	<i>Anticorruption</i>	<i>Indicators</i>	
2003	Accounts Modernization Directive (2003/51/EC)	M	*	*	*				*	EU
2003	AA1000 Assurance Standard	V								
2004	Ministry of Trade and Industry's Guidelines on Promotion of Corporate Responsibility									FI
2004	Corporate Social Responsibility: A government update									GB
2004	GHG Protocol Standards (update)	V	*						*	GL
2004	ISO 14001 (update)	V	*						*	GL
2004	Gesetz zur Einführung internationaler Rechnungslegungsstandards und zur Sicherung der Qualität der Abschlussprüfung (Bilanzrechtsgesetz - BilReG)	M	*	*	*				*	GE
2005	Corporate Social Responsibility: International strategic framework (2005)									GB
2005	Guidelines for Sida's Support to Corporate Social Responsibility: Position paper									SW
2005	GBS - La rendicontazione social nel settore pubblico	V	*	*	*				*	IT
2005	AA1000 Stakeholder Engagement Standard	V								GL
2006	British Standard on Sustainability Management, BS									GB

Year	Standard	Type	Themes and Focus							Scope
			<i>Environment</i>	<i>Social</i>	<i>Employee and labor</i>	<i>Human rights</i>	<i>Diversity</i>	<i>Anticorruption</i>	<i>Indicators</i>	
	8900									
2006	Reference Framework: Corporate social responsibility in Belgium									BE
2006	Corporate Social Responsibility: An Introduction from the Environmental Perspective									GE
2006	CSR Toolkits for developing countries									NE
2006	CSR Implementation Guide: Non-legislative options for the Polish government (IFC,2006)									PO
2006	GRI G3 Guidelines	V	*	*	*	*	*	*	*	GL
2007	Decreto Legislativo 32/2007 (Italian implementation of Directive (2003/51/EC)	M	*	*	*				*	IT
2008	AA1000 Assurance Standard (update)	V								GL
2008	AA1000 AccountAbility Principles separate standard	V								GL
2008	SA8000: 2008 (update)	V	*		*	*	*			GL
2009	EMAS revision (EC No 1221/2009)	V	*						*	EU
2010	ISO 26000	V	*	*	*	*	*	*	*	GL
2011	GRI G3.1 Guidelines	V	*	*	*	*	*	*	*	GL
2011	Guiding Principles on Business and Human Rights	V		*	*	*	*			GL
2012	Rio+20 Declaration explicit references to nonfinancial reporting paragraph 47	V	*	*	*	*		*		GL

Year	Standard	Type	Themes and Focus							Scope
			<i>Environment</i>	<i>Social</i>	<i>Employee and labor</i>	<i>Human rights</i>	<i>Diversity</i>	<i>Anticorruption</i>	<i>Indicators</i>	
2013	GRI G4 Guidelines	V	*	*	*	*	*	*	*	GL
2013	Directive 2013/34/EU	M								EU
2013	Standard GBS 2013—Principi di redazione del bilancio sociale	V	*	*	*				*	IT
2013	International Integrated Reporting Framework	V	*	*	*	*	*	*	*	GL
2014	Directive 2014/95/EU	M	*	*	*	*	*	*		EU
2014	SA8000: 2014 (update)	V		*	*	*	*	*		GL
2015	ISO 26000									GL
2015	ISO 14001 (update)	V	*						*	GL
2015	AA1000 Stakeholder Engagement Standard (update)	V								GL
2015	GHG Protocol Standards (update)	V	*						*	GL
2016	Decreto Legislativo 243/2016 (Italian implementation of Directive 2014/95/EU)	M	*	*	*	*	*	*		IT
2016	GRI Standards	V	*	*	*	*	*	*	*	GL
2017	CSR Richtlinie-Umsetzungsgesetz (German implementation of Directive 2014/95/EU)	M	*	*	*	*	*	*		GE
2017	Guidelines on non-financial reporting (2017/C 215/01)	V	*	*	*	*	*	*	*	EU

Character: (V) voluntary, (M) mandatory; Themes and focus: () topics are covered; Scope: (GL) Global, (EU) European Union, (BE) Belgium, (FI) Finland, (GB) Great Britain, (GE) Germany, (IT) Italy, (NE) Netherlands, (PO) Poland, (SW) Sweden*

Source: Author's compilation based on previous research

Appendix 2: List of key sustainability figures and KSPIs used in automotive sector

Category	Topic / Disclosure	No. of firms used as			
		Disclosure	Key figure	KSP I	
Economic	<i>Economic Performance</i>				
	1 Revenues	9	3	3	
	2 Operating profit	7	2	3	
	3 Profit before tax	1	1	0	
	4 Profit after tax	2	2	0	
	5 Operating return on sales	5	2	2	
	6 Return on investment	2	0	2	
	7 Net cash flow	3	1	2	
	8 Research and development expenditure/ratio	8	4	2	
	9 Research and development employees	3	1	0	
	10 Ratio of CAPEX	2	0	2	
	11 Net liquidity	2	1	1	
	12 Total capital investments	1	1	0	
	13 Employee personal costs	2	2	0	
	14 Sales volume	4	2	1	
	15 Production volume	3	3	0	
	16 Purchase volume	2	2	0	
	17 Financial assistance received from the government	4	1	0	
	18 Expenditures on donations	3	1	2	
	19 Expenditure on corporate citizenship	2	1	1	
	20 Defined benefit plan obligations and other retirement plans	6	2	0	
		<i>Indirect economic impacts</i>			
	21 Infrastructure investments and services supported	5	1	0	
	<i>Alternative drive-train technologies</i>				
22 Annual sales of electric and electrified vehicles	1	0	1		
23 DriveNow and ReachNow users	1	0	1		

Category	Topic / Disclosure	No. of firms used as		
		Disclosure	Key figure	KSP I
Environmental	<i>Materials</i>			
	1 Materials used by weight or volume	7	1	0
	2 Recycle input materials used	5	1	0
	3 Expenditures on materials	2	0	1
	<i>Energy</i>			
	4 Energy consumption within the organization	9	4	2
	5 Energy intensity	8	2	0
	6 Fuels consumption	4	4	0
	7 Share of renewable energy purchased from third parties	1	0	1
	8 Share of production-relevant purchasing volume in the CPD Supply Chain Program	1	0	1
	<i>Water</i>			
	9 Volume of water withdrawal by source	9	4	2
	<i>Biodiversity</i>			
	10 Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	2	1	0
	<i>Emissions</i>			
	11 Direct GHG emissions	7	3	0
	12 Energy indirect GHG emissions	7	3	0
13 Other indirect GHG emissions	6	1	0	
14 GHG emissions intensity	7	1	0	
15 Nitrogen oxides (NO _x), sulfur oxides (SO _x), and other significant air emissions	8	5	1	
16 CO ₂ emissions	8	3	2	
17 Volatile organic compounds (VOC) emissions	5	3	2	
<i>Effluents and Waste</i>				

Category	Topic / Disclosure	No. of firms used as		
		Disclosure	Key figure	KSP I
	18 Water discharge by quality and destination	7	2	0
	19 Volume of waste by type and disposal method	8	3	1
	20 Significant spills	5	1	0
	<i>Supplier Environmental Assessment</i>			
	21 New suppliers that were screened using environmental criteria	6	2	0
	<i>Environmental protection</i>			
	22 Environment protection expenditures and investment	4	2	0
Social	<i>Employment</i>			
	1 New employee hires and employee turnover	9	4	2
	2 Parental leave	7	2	0
	3 Employee satisfaction and retention	4	1	1
	4 Age structure	4	3	0
	<i>Occupational Health and Safety</i>			
	5 Types of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities	9	3	2
	6 Sick leave rate	4	3	0
	<i>Training and Education</i>			
	7 Average hours of training per year per employee	8	4	1
<i>Diversity and Equal Diversity</i>				
8 Diversity of governance bodies and employees	9	4	2	
<i>Supplier Social Assessment</i>				
9 New suppliers that were screened using social criteria	7	1	0	

Category	Topic / Disclosure	No. of firms used as		
		Disclosure	Key figure	KSPI
	<i>Customer satisfaction</i>			
	10 Awards for customer satisfaction	1	1	0

Source: Author's own processing

Appendix 2. List of key sustainability figures and KSPIs used in Financial Services Sector

Category	Topic/ Disclosure	No. of firms used as		
		Disclosure	Key figure	KSPI
Economic	<i>Economic performance</i>			
	1 Net revenue	7	3	1
	2 Operating profit	8	5	1
	3 Tax expenses	4	1	0
	4 Pre-tax profit and loss	5	2	1
	5 Consolidated profit and loss	10	5	2
	6 Total assets	8	4	2
	7 Cost/income ratio	4	2	1
	8 Expenditures on donations	4	0	1
	9 Provision for credit loss	1	1	0
	10 Non-interest expenses	1	1	0
	11 Return on equity	6	3	1
	12 Gross debt/EBITDA	2	1	0
	13 Return on investment	2	2	0
	14 Tier 1 ratio	3	2	0
	15 Volume of lending	1	1	0
16 Long-term rating	3	2	0	
Environmental	<i>Materials</i>			
	1 Paper used by weight or volume	12	3	0
	2 Recycled paper used	5	1	0
	<i>Energy</i>			
3 Energy consumption within organization	13	3	0	
4 Energy consumption outside organization	4	1	0	

Category	Topic/ Disclosure	No. of firms used as			
		Disclosure	Key figure	KSPI	
	5 Energy intensity	7	1	0	
	6 Total energy consumption from office buildings per employee	2	0	1	
	Water				
	7 Total water withdrawal by source	11	3	0	
	8 Water consumption per employee	2	1	0	
	Emissions				
	9 Direct GHG emissions	13	3	0	
	10 Energy indirect GHG emissions	13	1	0	
	11 Other indirect GHG emissions	12	1	0	
	12 Total GHG emissions per employee	2	0	1	
	13 GHG emissions intensity	7	1	0	
	14 Reduction of GHG emissions	12	1	0	
	Effluents and Waste				
	15 Water discharge by quality and destination	5	1	0	
	16 Waste by type and disposal method	10	2	0	
	17 Total waste per employee	1	1	0	
	Travel				
	18 Total travel (km)	6	2	0	
	19 Travel per employee (km)	2	1	0	
	Environment protection				
20 Environment protection expenditures and investment	2	0	1		
Social	Employment				
	1 New employee hires and employee turnover	11	5	2	
	2 Benefits provided to full-time employees that are not provided to temporary or part-time employees	9	1	0	

Category	Topic/ Disclosure	No. of firms used as		
		Disclosure	Key figure	KSPI
	3 Parental leave	6	2	0
	4 Length of employment	4	1	1
	5 Age structure	8	5	1
	<i>Occupational Health and Safety</i>			
	6 Type of injury and rates of injury, occupational diseases, lost days, and absenteeism, and total number of work-related fatalities, by region and by gender.	9	3	1
	<i>Training and Education</i>			
	7 Average hours of training per year per employee by gender, and by employee category.	9	4	0
	8 Employees receiving regular performance and career development reviews	11	0	1
	9 Training per employee	2	0	1
	<i>Diversity and Equal Diversity</i>			
	10 Diversity of governance bodies and employees	13	4	1
	<i>Customer satisfaction</i>			
	11 Results of surveys measuring customer satisfaction	4	0	1
	<i>Social engagement</i>			
	12 External perception of Deutsche Bank as a responsible corporate citizen (global B2B market) in %	1	0	1
	13 People reached with CSR initiatives in m.	1	0	1
	14 Workers representation in formal joint management–worker health and safety committees	1	0	1

Source: Author's own processing

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

**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

Published by: Tomas Bata University in Zlín,
nám. T. G. Masaryka 5555, 760 01 Zlín.

Edition: 6 pcs

Typesetting by: Nguyen Thi Thuc Doan

This publication has not undergone any proofreading or editorial review.

Publication year: 2020