



The impact of Intellectual Capital Reporting on Debt Capital: An Empirical Evidence  
from Listed Companies in The Stock Exchange of Thailand

Natthaporn Phurahong

A Thesis Submitted in Partial Fulfillment of Requirements for  
degree of Doctor of Philosophy in Accounting

September 2021

Copyright of Mahasarakham University

ผลกระทบของการรายงานข้อมูลทุนทางปัญญาต่อต้นทุนทางการเงินด้านหนี้สินหลักฐานเชิง  
ประจักษ์บริษัทจดทะเบียนในตลาดหลักทรัพย์แห่งประเทศไทย

วิทยานิพนธ์  
ของ  
ณัฐภาพร ภูระหงษ์

เสนอต่อมหาวิทยาลัยมหาสารคาม เพื่อเป็นส่วนหนึ่งของการศึกษาตามหลักสูตร  
ปริญญาปรัชญาดุษฎีบัณฑิต สาขาวิชาการบัญชี  
กันยายน 2564  
ลิขสิทธิ์เป็นของมหาวิทยาลัยมหาสารคาม

The impact of Intellectual Capital Reporting on Debt Capital: An Empirical Evidence  
from Listed Companies in The Stock Exchange of Thailand

Natthaporn Phurahong

A Thesis Submitted in Partial Fulfillment of Requirements  
for Doctor of Philosophy (Accounting)

September 2021

Copyright of Mahasarakham University



The examining committee has unanimously approved this Thesis, submitted by Miss Natthaporn Phurahong , as a partial fulfillment of the requirements for the Doctor of Philosophy Accounting at Maharakham University

Examining Committee

..... Chairman  
(Asst. Prof. Muttanachai Suttipun ,  
Ph.D.)

..... Advisor  
(Asst. Prof. Ingorn Nachairit , Ph.D.)

..... Co-advisor  
(Asst. Prof. Natnapha Nilniyom ,  
Ph.D.)

..... Co-advisor  
( Komkrit Wongkhae , Ph.D.)

..... Committee  
(Assoc. Prof. Nuttavong Poonpool ,  
Ph.D.)

..... Committee  
(Asst. Prof. Salakjit Nillaphay ,  
Ph.D.)

..... Committee  
(Asst. Prof. Utis Bhongchirawattana  
, Ph.D.)

Maharakham University has granted approval to accept this Thesis as a partial fulfillment of the requirements for the Doctor of Philosophy Accounting

.....  
( Chonthicha Thammavinyu , Ph.D.)  
Dean of Maharakham Business  
School

.....  
(Assoc. Prof. Krit Chaimoon , Ph.D.)  
Dean of Graduate School

**TITLE** The impact of Intellectual Capital Reporting on Debt Capital: An Empirical Evidence from Listed Companies in The Stock Exchange of Thailand

**AUTHOR** Natthaporn Phurahong

**ADVISORS** Assistant Professor Ingorn Nachairit , Ph.D.  
Assistant Professor Natnapha Nilniyom , Ph.D.  
Komkrit Wongkhae , Ph.D.

**DEGREE** Doctor of Philosophy      **MAJOR** Accounting

**UNIVERSITY** Mahasarakham      **YEAR** 2021  
University

### ABSTRACT

The main objective is to examine the relationship between intellectual capital reporting and debt capital and to examine the relationship between the corporate governance mechanism and intellectual capital reporting. The conceptual model is proposed by illustrating the signaling theory that is useful to describe the relationship between intellectual capital reporting and debt capital. While the relationship between the corporate governance mechanisms and intellectual capital reporting explained by the agency theory, and the information asymmetry. The final sample of the study is 329 firm-year observations from listed companies in the Market for Alternative Investment (MAI), during the year 2015-2019. This study obtains the secondary data and using the unbalanced panel data analysis which the data is collected in cross-section and time series for testing the firm-year observations together.

The finding of this research showed that the overall intellectual capital measured by financial information is negatively associated with debt capital. Also, the overall intellectual capital disclosure of non-financial information is negatively associated with debt capital. In a part of the components of intellectual capital measured by financial information found that human capital is negatively associated with debt capital. Including, the disclosure of components intellectual capital is non-financial information found that as human capital and structural capital not significant with debt capital. While relational capital is negatively associated with debt capital.

Furthermore, the investigation of the relationship between the corporate governance mechanisms and intellectual capital reporting which the corporate governance mechanisms consist of the proportion of independent directors, as a proxy of the board composition. The number of audit committees, as a proxy of the audit committee. The proportion of common stock by the company's top five shareholders, as a proxy of the ownership structure. The finding shows that the board composition is positively significantly associated with the overall non-financial intellectual capital disclosed, and with the structural capital disclosure. As well as, the finding of the audit

committee is positively significantly associated with overall non-financial intellectual capital disclosed, and with the human capital disclosure, the structural capital disclosure. While the ownership structure is negatively significantly associated with the overall intellectual capital in form of financial information and structural capital.

Therefore, the result enhances the theoretical contribution that the value of intellectual capital information about both financial and non-financial information is a signal as supplementing information for the lenders. Meanwhile, the corporate governance mechanisms lead to safeguarding the maximize interests of the firms through the information of intellectual capital reporting. In addition, the firm has a monitor with the board composition and the audit committee in reducing the information asymmetry. The board composition and the audit committee can mitigate the agency problem, while the largest five shareholders tend to use the resource to generate private benefits.

Keyword : Intellectual capital reporting, Debt capital, Corporate governance mechanism

## ACKNOWLEDGEMENTS

This dissertation is dedicated to many people who supported the author in Ph.D.program. I am appreciated and deeply grateful to them. This dissertation would not have been complete without my advisor. I would like to express deep gratitude to my advisor, Asst.Prof.Dr.Ingorn Nachairit, for her suggestions, and insightful guidance throughout the development of my dissertation. And my co-advisor, Asst.Prof.Dr. Natnapha Nilniyom who provided insight recommendation for developing this research. Including, Dr.Komkrit Vongka is a co-advisor who suggests and guides the statistical technique for improving my dissertation. Additionally, my advisor and co-advisors shared their time, academic expertise, constructive criticism, support, and encouragement throughout the process of my dissertation. Including, Asst.Prof.Dr.Teerapan Ungphakorn, for her suggestions, and insightful guidance in the development of my dissertation, and Asst.Prof.Dr.Utis Bhongchirawattana, for his suggestions, and insightful guidance in the statistical technique. And Dr.Anupong Sukprasert, for his deep guidance in the software technique for analyzing data. Additionally, I would like to thank all my lecturers in Ph.D.program for their advice and help.

The dissertation could not have been completed without the examination of dissertation committees, I would like to express my deep gratitude to my dissertation committee members, especially the external dissertation committee. They suggested insightful comments and guidelines for improving my dissertation.

I would like to take this opportunity for Ph.D.program, also thankful for the financial support from Pibulsongkram Rajabhat University. I would like to thank my colleagues in Ph.D13 program, they involve sharing life memory. Besides, I also deeply grateful to my parent for their support throughout the studies.

Natthaporn Phurahong

## TABLE OF CONTENTS

	<b>Page</b>
ABSTRACT.....	D
ACKNOWLEDGEMENTS.....	F
TABLE OF CONTENTS.....	G
LIST OF TABLES.....	I
LIST OF FIGURES.....	K
CHAPTER I INTRODUCTION.....	1
Overview.....	1
Research Questions.....	7
Research Objectives.....	7
Scope of the Research.....	7
Keywords and Definitions.....	9
Organization of the Dissertation.....	11
CHAPTER II LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK ..	13
Theoretical Foundation.....	13
The perspective of Intellectual Capital Reporting.....	19
Quantifying the Intellectual Capital Reporting.....	25
Empirical Evidence on Intellectual Capital Reporting.....	37
Debt Capital and Relationship With Intellectual Capital Reporting.....	51
Corporate Governance Mechanisms.....	55
Hypotheses Development.....	61
Conceptual Framework.....	65
CHAPTER III RESEARCH METHODS.....	66
Population and Data Collection.....	66
Measurements.....	70
Research Model.....	82



CHAPTER IV RESULTS.....	95
Descriptive Statistics .....	95
The Results of Correlation Analysis and Hypotheses Test .....	104
The Summary of all Hypotheses Testing.....	121
CHAPTER V CONCLUSION.....	123
Conclusion .....	123
Discussion.....	124
Theoretical and Managerial Contribution.....	130
Limitations and Future Research Direction .....	132
REFERENCES .....	135
APPENDICES .....	165
Appendix A The number of intellectual capital items were used in the prior literature.....	166
Appendix B Empirical evidence of the intellectual capital’s financial and non- financial information in developed market and emerging market.....	172
Appendix C Definition of the issue of intellectual capital reporting.....	190
BIOGRAPHY .....	194

## LIST OF TABLES

	<b>Page</b>
Table 1 Sample Selection Process .....	67
Table 2 Industry type of the sample.....	80
Table 3 Measurement of the variables .....	81
Table 4 Number of Companies in Each Industry Group .....	95
Table 5 The level of intellectual capital reporting is quantified by financial information and non-financial information.....	99
Table 6 The content of intellectual capital reporting.....	100
Table 7 Descriptive statistic of debt capital and corporate governance mechanisms .....	102
Table 8 Descriptive statistic of control variables.....	103
Table 9 Person Correlation Coefficients.....	106
Table 10 Statistic Model Selection .....	109
Table 11 Multiple regression analysis results for intellectual capital and debt capital .....	111
Table 12 Multiple regression analysis results for corporate governance mechanism and intellectual capital measured by financial information. ....	114
Table 13 Multiple regression analysis results for corporate governance mechanism and intellectual capital measured by non-financial information.....	118
Table 14 Summary of all Hypotheses Testing.....	121
Table 15 The number of intellectual capital items were used in the prior literature.	167
Table 16 Empirical evidence of the intellectual capital's financial information in developed market.....	173
Table 17 Empirical evidence of the intellectual capital's non-financial information in developed market.....	177
Table 18 Empirical evidence of the intellectual capital's financial information in emerging market .....	180
Table 19 Empirical evidence of the intellectual capital's non-financial information in emerging market .....	186

Table 20 Definition of items intellectual capital.....	191
--	-----

## LIST OF FIGURES

	<b>Page</b>
Figure 1 The impact of Intellectual Capital Reporting on Debt Capital.....	65

## CHAPTER I

### INTRODUCTION

#### Overview

The economic environment is rapidly changing in the 21<sup>st</sup> century, business operations are damaged by environmental business disruptions and advanced technology impacts the operational organization. Hence, organizations must adapt to utilize resources at the maximum level because it drives business activities and strengthens strategies for competitiveness. In the past, traditional businesses get economic benefits depending on the number of products. As a result, wages are paid according to the number of goods produced. Therefore, traditional businesses created value through the mass production of goods and reliance on tangible assets such as distribution, warehouses, stores, office buildings, etc. (Marr, 2008). However, intangible assets were ignored and little attention was given to their impact on businesses. Nowadays businesses grow by creating and managing their intangible assets (Fijałkowska, 2014). It means that the corporate can rely on intangible assets to create the value-added such as research and development, intellectual property, licensing, technical knowledge, market knowledge, and trademarks (Yallwe & Buscemi, 2014). In addition, intangible assets are related to a corporate's knowledge that is embedded in an organizational process. This can create a new product, a new service, and new knowledge of a business as the main resource which is referred to “Intellectual capital” (Stewart, 2010). The corporate can produce and utilize from the possession of intellectual assets and encourage the efficacy of the business leading to long-term benefits (Canibano, Garcia-Ayuso & Sanchez, 2000; Starovic & Marr, 2003).

Under accounting literature, intellectual capital relate to the criteria of intangible assets that refer to as the International Accounting Standard Board or IAS 38, in the name of intangible assets follows, the criteria of intangible assets explain that a company can identify and they has power over an asset to generate probable expected future economic benefit. including the cost of the intangible assets can be quantified reliably (Marr, 2008). The example of intellectual capital is software, patents, copyrights, training, customer lists, servicing rights, licenses, franchises,

customer or supplier relationships, customer loyalty, market share, research, and development activities. This cannot recognize all intangible assets because some item is not related to the recognition criteria, it is incurred as an expenditure (International Accounting Standard Board (IAS), 1998). When the transaction does not meet the intangible assets criteria, it can consider in the intellectual capital context. It is implied that intellectual capital is a subset of intangible assets (Suherman, 2017).

Intellectual capital refers that a company have the knowledge-based comes from the ability of a worker or an employee in the corporation, additionally the knowledge is embedded in a business process. The human resource's knowledge can transfer to the knowledge of the management process of an organization. Moreover, the assets of the knowledge develop the relationship between a company and an external group of society. Therefore, intellectual capital consists of human capital, structural capital, and relational capital. Human capital is the knowledge of a worker or an employee that is employed in a company. Structural capital is the circulation of knowledge in the corporation and the management process, while the employees finished at the end of the working day. Relational capital is the knowledge embedded in the business partner's relationship. The company can enhance the capacity of the firms through investment intellectual capital, as the essential foundation for firms, which is used to create value has become the main competitive strategy from the business' activities (Roos & Roos, 1997; Pulic, 2000; Cabrita & Vaz, 2005; Nerantzidis, 2015). Intellectual capital reports disclose information is the uniqueness of a firm makes it difficult for others to imitate the firm's asset (Cabrita & Vaz, 2005; Kamukama, Ahiauzu & Ntayi, 2011). Meanwhile, the intellectual capital can predict the certainty of future cash inflow (Yosano & Koga, 2008). The company invests intellectual capital, they do not receive immediate cash. The intellectual capital reporting can be paid attention to the outside user, including the lenders who believe that they take part in assessing the status of the borrowing firms (Bhasin, 2012).

However, the information of intellectual capital cannot meet the recognition criteria considering their classification of IAS 38: intangible assets, but it has an alternative for quantifying in the two viewpoints consist of the financial information and the non-financial information of intellectual capital. Firstly, the financial information can be decoded from the publicly available financial data of financial

statements. Secondly, the non-financial information of intellectual capital is voluntary disclosure. The information of Intellectual capital is quantified to support the providing corporate information. The information on Intellectual capital is relevant to assess the financial health of the firm (Yosano & Koga, 2008; Ousama, Fatima, & Majdi, 2011; Guimón, 2005). The investment of intellectual capital can develop and support the capability of firms, it is relevant in the potentials of the company's long-term growth. It can create the value-added for firms (Canibano et al., 2000). However, the long-term growth should concern about seek a source of finance. The information of intellectual capital within the companies may be a meet with attract the financing fund because it can the efficiency of intangible. Meanwhile, the company be meet some problems to access finance because the intellectual capital may be a slight capacity to get the future economic benefits (Maaloul & Zéghal, 2015). Additionally, the company lack provide of sufficient information about intellectual capital. Thus, the intellectual capital reporting can lead to an understanding of the risk for the estimation of growth opportunities (Van Der Meer-Kooistra & Zijlstra, 2001). Moreover, a source of finance is the debt capital which the main source of external financing for companies. The company uses the information of intellectual capital as a signal which is crucial to reflect the creditworthiness and the financial position of the firms (Beattie & Thomson, 2007; Iazzolino, Migliano, & Gregorace, 2013).

The intellectual capital reporting informs the financial decisions of the lenders (Singh & Kansal, 2011). According to the signaling theory, the managers can provide more intellectual capital reporting, they may be better to access funds or improved financing contracts (Guimón, 2005). Bukh (2003) and Beattie and Thomson (2010) identified that the information that has increased about intellectual capital might reduce uncertainty and enhance faithfulness. When the managers provide more information leading to the lenders can access information in order to assess the condition of the debt covenants (Ross, Westerfield, & Jaffe, 2013). Bridging Information on intellectual capital is useful to the lenders for assessing the company. The lenders may prefer financial or non-financial information to estimate value for the firms. The company can create long-term financial stability depends on the ability to manage the firm's intellectual capital (Pulic, 2000). Providing the information of intellectual capital is enough, which may attract the attention of the lenders.

The element of intellectual capital may be managed to generate cash to serve the debt. The lenders can reward firms that manage and invest their intellectual capital by reducing the debt cost (Cenciarelli, Greco, & Allegrini, 2018). On top of that, some research found an interesting point that intellectual capital reporting can provide to add additional information for the lenders (Rossi, Nicolò, & Polcini, 2018). Existing corporate reporting can supplementarily provide the information relevant to intellectual capital in order to have enough assessment to decide, increase the creditworthiness, and reduce the cost of debt (Yosano & Koga, 2008; Boujelbene & Affes, 2013). Firms follow to provide intellectual capital reporting as a guarantee that they can be repayable to the lenders. Hence, the information of intellectual capital relates to the lenders. Bouchareb and Kouki (2019) stated that intellectual capital plays an important role in reducing the cost of debt. The firm's intellectual capital is negatively associated with debt capital (Attig, El Ghouli, Guedhami, & Suh, 2013; Iazzolino, Laise, & Migliano, 2014). The information provided in intellectual capital may help attract financing (Tsai & Hua, 2013; Van Liempd, Haug, & Zachariassen, 2014; Bouchareb & Kouki, 2019). Meanwhile, the use of information on intellectual capital is not affecting the debt capital (Barus & Siregar, 2015; Stropnik, Korošec, & Tominc, 2017). Consequently, this study highlights to investigate the relationship between intellectual capital and debt capital.

Apart from investigating the intellectual capital reporting related to lenders, the essential determinant to provide intellectual capital reporting is the corporate governance mechanisms. The reason for considering the non-financial information of intellectual capital reporting remains the voluntary disclosure. This is likely an incentive for the conflict of interests and information asymmetry in the firms. Intellectual capital is a strategic resource with regarding management and control within a company (Buallay & Hamdan, 2019). The corporate governance mechanisms are the core of the internal control which concern about protecting and managing intellectual capital in effectively monitoring (Ho & Wong, 2001; Keenan & Aggestam, 2001). Including, corporate governance mechanisms ensure the decision of managers which enhanced the interest of shareholders by the efficient use of intellectual capital. Moreover, corporate governance mechanisms support more the information of intellectual capital reporting. Corporate governance mechanisms examined in this study



include board composition, audit committee, and ownership structure. According to agency theory (Jensen & Meckling, 1976), managers are more likely to use this information to meet opportunistic action. They can control and manage intellectual capital such as brand development, research and policy development, advertising activities, etc. This is a criterion that may make the self-interest or maybe make the interest of shareholders. The owners need ensure that the manager's act suitable interests through using the information of intellectual capital (Appuhami & Bhuyan, 2015). The presence of board composition supports the checking, balancing, setting of the policy and strategy for the management independent (The Securities and Exchange Commission (SEC), 2017). While the audit committee plays a crucial role in monitoring, improving, and overseeing the corporate reporting for ensuring accuracy and transparency (Li, Mangena, & Pike, 2012). The existence of corporate governance mechanisms alleviates the agency problem Ho & Wong (2001). Corporate governance mechanisms lead to monitoring, improve the decision-making, investing, and protect the interests from using the company's resources (Tulung, Saerang, & Pandia, 2018). Corporate governance mechanism ensures that intellectual capital reporting can reflect with the transparency and management the knowledge-based assets (Firer & Williamson, 2005; Li, Mangena, & Pike, 2012).

As mentioned above, this study focuses on the Thai setting, especially for reason as follows. Firstly, Thailand is in the emerging market that can play a role in promoting the Southeast Asia region. The emerging market is likely raising debt capital more than the developed market (The Organization for Economic Cooperation and Development (OECD), 2020; Promtong, 2020). Based on the previous studies on the emerging market depended on debt more than equity because debt financing plays a critical role support firm's activity (Li & Mangena, 2014). The distinction between the emerging market from the developed market is the incomplete market structure, asymmetric information, lower political system, and economic uncertainty (Jantadej & Wattanatorn, 2020). The capital market of Thailand contains two capital markets consist of the Stock Exchange of Thailand (SET) and the Market for Alternative Investment (MAI). The SET is the main market, while the MAI is the alternative capital market that contains small and medium-sized enterprises. In addition, the information on intellectual capital reporting in Thailand has been voluntary information for listed companies in both the SET and

the MAI, the existing studies are on only the SET (Phusavat, Comepa, Sitko-Lutek, & Ooi, 2011; Suttipun, 2018; Aeksapang & Sopapong, 2020; Sim-im, Pajongwong, & Svetalekth, 2019). There is a lack of the previous study regarding the intellectual capital reporting of listed companies in the MAI, therefore, this information is still not analyzed and documented. The main reason choose because the MAI has the unique characteristic of using debt as the major source of funds which differs from the listed companies in the SET. Additionally, the listed companies in the MAI can represent as one the capital market, owing to focus on high and good growth firms that have the development and competitive advantage under corporate governance principles (The Market for Alternative Investment (MAI), 2020). The financial source of the MAI is willing to rely on debt capital because the corporate not pay more the expenses for raising the debt, the comparison to the financial funding through offering the securities which the corporate have more expenses for raising the fund. Moreover, they have debt capital can exploit tax benefits under the interest expense (Sim, Kadyrzhanova & Falato, 2013). Secondly, prior studies investigated intellectual capital in Thailand investigating the relationship between intellectual capital and debt capital has a little empirical evidence, for example, the relationship between board composition and the level of intellectual capital disclosure (Suttipun, 2018), the relationship between intellectual capital and firm performance (Thamprasart & Phajongwong, 2018), the relationship between intellectual capital and sustainable growth (Sim-im, Pajongwong, & Svetalekth, 2019). Especially, most prior studies in Thailand use a sample such as the specific industry, and a simple random sampling of the listed company in the SET which leading to a lack of investigation for the listed company in MAI. Therefore, this study sheds light on the intellectual capital studies in relation to debt capital which uses a sample of the listed company in the Market for Alternative Investment (MAI) during 2015-2019. In addition, this study provides empirical evidence on the relationship between corporate governance mechanism and intellectual capital. Finally, most prior empirical studies are not diverse in the emerging market, for example, the short-period study (Kamel & Shahwan, 2014; Barus & Siregar, 2015), using a small sample (Stropanik, Korošec & Tominc, 2017), the study countries not diverse (Dadashi, Zarei, Dadashi, & Ahmadlou, 2013; Gamayuni, 2015).

### **Research Questions**

1. What is the level, and content of intellectual capital reporting?
2. Is there a relationship between intellectual capital reporting and debt capital?
3. Is there a relationship between the corporate governance mechanisms and intellectual capital reporting?

### **Research Objectives**

1. To investigate the level, and content of intellectual capital reporting.
2. To examine the relationship between intellectual capital reporting and debt capital.
3. To examine the relationship between the corporate governance mechanism and the intellectual capital reporting.

### **Scope of the Research**

This study investigates the relationship between intellectual capital reporting and debt capital. Also, this study investigates the relationship between corporate governance mechanisms and intellectual capital reporting. The study is based on the signaling theory describing the lenders can receive the information of intellectual capital for decision-making. In a part of the relationship between corporate governance mechanisms and intellectual capital reporting based on the agency theory. The study can describe the relationship that the corporate governance considers the independent directors, the audit committee size, and the top five shareholders. There are corporate governance mechanisms that involve monitoring and balancing control and ownership for the maximum of the firm's benefit.

The population is all listed companies in the Market for Alternative Investment (MAI), during the year 2015-2019. The exclusion criteria were as follows. Excluding, (1) companies were listed in the financial industry to consist of the finance and securities, banking and insurance owing to operate the difference both regulations and

debt financing characteristics from the other industry (Dadashi et al., 2013; Stropnik, Korošec & Tominc, 2017). (2) The Companies were unavailability data through the fiscal year-end 31<sup>ST</sup> December. (3) The company is a rehabilitation. Also, (4) the company is incomplete data. (5) The company unavailable in the English language of the annual report. (6) The outliers of the main variable with a value below the 5<sup>th</sup> and above the 95<sup>th</sup> percentile (Detthamrong, Chancharat, & Vithessonthi, 2017).

Thus, the final sample consists of 329 firm-year observations. This period of study is the year 2015-2019. Firstly, The Thai Accounting Standards (TAS) No.38: Intangible was revised from the year 2014 until the present which is in accordance with the criteria established by International Financial Reporting Standards. This is a revised version following International Accounting Standards ending December 31, 2012 (Bound Volume 2013 Consolidated without early application), effective for accounting periods beginning on or after January 1, 2015 (The Federation of Accounting Professions of Thailand (TFAC), 2015). Secondly, the prior studies on Thailand context found that using data from the specific industry and using a sample from the listed companies on the SET (Aeksapang & Sopapong, 2020; Sim-im, Pajongwong, & Svetalekth, 2019)). This study investigates intellectual capital reporting to keep the study up to date for the year 2019 which began to collect data in terms of the longitudinal study during the year 2015-2019. This study has the data collection as follows.

This study collected data as follows. The intellectual capital reporting contains financial information and non-financial information. The financial information is collected from the financial statements and notes to financial statements. In part of the non-financial information is collected from the annual report through the computing-assisted text analysis software. The debt capital is collected from the financial statements and SET Market Analysis and Reporting Tool (SETSMART). Whereas the corporate governance mechanism is hand-collected from the annual report. Finally, the control variables are firm size, firm performance, firm liquidity, and industry type that are obtained from SETSMART.

## **Keywords and Definitions**

### **Intellectual capital reporting**

is the knowledge-based comes from human capital, structural capital, and relational capital. information through quantification based on financial information and non-financial information. Financial information is the quantifying model of the intellectual capital which using the financial data to evaluate the performance of the organization's intellectual capital. The non-financial information is voluntary disclosure. The components of intellectual capital reporting as follows.

#### Human capital

is knowledge, know-how, skill, abilities, and experience. In the meaning as the knowledge that employees take with them when they leave.

#### Structural capital

is an organizational routine, processes, systems, cultures, database, innovation, and management.

#### Relational capital

is the knowledge embedded in the customer relationship.

### **Debt capital**

is the financial funding that a business raises by taking out a borrowing. The company has the financial expense and liabilities bearing interest that the repayment is along with the debt obligation. For this study, the debt capital is measured using the ratio of finance costs in the year of the firm divided by the total liabilities in the year of the firm.

### **Corporate governance mechanisms**

are the system to organize internal control process in controlling and monitoring,

leading to transparency and align maximize value to shareholders in the long term as follows.

Board composition

is the person established by the ownership which has the role and accountability for checking, balancing, and cooperation with the management team. The board composition is measured by the proportion of independent directors on the total board members.

Audit committee

is the members of the sub-committee have a professional for auditing which has the role the accountability in monitoring for firm financial statements, internal control process and ensuring the reliability of corporate reporting. The size of the audit committee is measured by the number of members on the audit committee.

Ownership structure

is the internal person or organization of a business. They have the right of votes and duties of the shared holding a legal or equitable interest in the business. The ownership structure is measured by the total percentage of common stock by the company's top five shareholders.

### **Control variables**

Firm size

is the size of the business that is quantified by the total assets.

Firm growth

is the firm's growth opportunities.

Firm performance

is the ability of companies to produce a profit that incurred by the total assets.

Firm liquidity	is an ability to pay the debt. A firm that has liquid assets should easily obtain external financing.
Industry type	is industry according to the classification criteria of the SET in seven industry groups such as Agro & Food, Consumer products, Industrials, Property & Construction, Resources, Service, and Technology.

**Market for Alternative Investment (MAI)** is contained small and medium-sized enterprises that have over 50 million baht in paid-up capital after IPO, there are no regulatory differences from SET (The Stock Exchange of Thailand (SET), 2020). The MAI was established to be a source of fundraising for potential businesses small and medium-sized businesses with good corporate governance by focusing on businesses with high growth and good growth prospects in the future, controlled by the Securities and Exchange Commission Securities and The Stock Exchange of Thailand and Ministry of Finance (SET, 2020).

### **Organization of the Dissertation**

This research organizes into five chapters. Chapter one presents an overview of the research, the purposes of the research, research questions, the scope of the research for organizing the dissertation. Chapter two reviews the relevant literature on intellectual capital, debt capital, and antecedents of intellectual capital, theoretical foundation; and it develops the related hypotheses for testing. Chapter three explains the research methods, including the sample selection and the measure of variables for

each model. Chapter four exhibits the empirical results that explain previous studies, the empirical results of this research, and additional analysis. Finally, chapter five proposes the conclusion, the discussion, the theoretical, the contributions, the limitations, and the future research direction.



## **CHAPTER II**

### **LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK**

This chapter demonstrates more precisely the understanding of intellectual capital reporting. The contents of the literature review are divided into seven sections as follows. The first section describes theoretical perspectives employed to explain the research phenomenon include the signaling theory, agency theory, and information asymmetry. The second section describes the concept of intellectual capital and the component of intellectual capital. The third section describes quantifying intellectual capital. The fourth section explains empirical evidence of both the developed capital market and the emerging capital market. The fifth section describes debt capital and its relationship with intellectual capital. The sixth section describes the corporate governance mechanisms. The seventh section illustrates the summary of hypotheses development. The eighth section shows the conceptual framework.

#### **Theoretical Foundation**

This study uses two theories to contain the signaling theory and the agency theory for an explanation as following.

##### **Signaling Theory**

Spence (1973) proposed signaling theory to explain the information asymmetry problems. The signaling theory has been described as the two parties that are the signaler and the receiver, they can access the different information (Spence, 2002). Stiglitz (2002) explained the inequality of the information. When people know differently, they perceive differently. Connelly, Certo, Ireland and Reutzel (2011) explained the two parties that a person, as the signaler, can communicate or signal information to another person, as the receiver. The receiver has considered interpreting the signal. The information has the characteristic of public and private information. In addition to some information may be unique, causing inequality. The signaler is obtaining information about the organization, while the receiver is not fully perception

of the information. They must use the information to decide for prediction useful the future (Ross, 1973; Gaviious & Elitzur, 2003). The mechanism signaling communicates through corporate disclosure. The most holistic picture of information is required by the regulation and accounting standards, including financial and non-financial information, mandatory and voluntary disclosures (von Alberti-Alhtaybat, Hutaibat & Al-Htaybat, 2012). Signaling theory has essential to reduce the information asymmetry between two parties (Spence, 2002).

The two parties have a relationship between the signaler and the receiver. The signaler as a manager has more information and uses their discretion for communicating information (Neysi, Mazraeh & Mousavi, 2012). The receiver, as a lender, cannot perceive enough information for interpreting, evaluating leading to decisions. From a contracting perspective, the managers can signal information to the creditor for reducing the asymmetrical information. The signaling is both positive and negative information in which managers decide to communicate information to the outsiders (Connelly et al., 2011; Van Liempd et al., 2014). When managers have the information advantage, they are likely to choose a positive signal of the firm positions, on the other hand, the negative signals to the outsiders may be reacting for reducing the expectation of the outsiders (Neysi et al., 2012; Guidara, Khlif & Jarboui, 2014). Barus and Siregar (2015) reported that providing information related to the creditors' decision. When the managers provide more information to outsiders, the companies are likely the competitive advantages (An, Davey & Eggleton, 2011; Kamath, 2014). Spence (1973) and Hatane, Wijaya, William, and Haryanto (2018) stated that the company tried to give a good signal, the company has expected feedback a positive signal from the financing service provider.

Under the external economy, the companies are facing the same situation. The information is disseminated by the firm to divide into mandatory and voluntary disclosure. The mandatory disclosure has complied with all firms. Additionally, firms can provide information in the form of voluntary disclosure (Bertomeu & Magee, 2015). The voluntary disclosure can answer to consider the information asymmetry as alternative information that manager chooses to provide accounting and other information to supplement a company's financial position and performance, which was considered relevant in decision-making by annual reports' user (Caputo, Giudice,

Evangelista, & Russo, 2016). Managers may choose voluntary disclosure to reduce information asymmetry between the company and the lender (Sengupta, 1998).

In the prior literature, Guimón (2005) and Dobija and Rosolinska (2007) supported that the disclosure can reduce the information gap between borrowing and financing service providers, the reliance on basic financial indicators only and to need for inclusion of more advanced non-financial information into the processes of the future assessment of business performance, profitability, and future cash flow. Yosano and Koga (2008) noted that intellectual capital reporting has an impact on the credit risk rating process/criterion and credit conditions. Francis, Khurana, and Pereira (2005) proposed that the corporation disclosed the high-level information was likely more transparent and they received the advantage of lower interest expenses. Ho, Tjahjapranata and Yap, (2006) explained that a company that has R&D investment activities likely to have more future growth which the firm's capacity for debt. Orens, Aerts and Lybaert (2009) and Tsai and Hua (2013) demonstrated that a company has more intangible assets or more investment into research and development and advertising disclosure tended to decrease the cost of debt. Iranmahd, Moeinaddin, Shahmoradi and Heyrani (2014) commented that the manager intends to strengthen the information of intellectual capital and the observed investment opportunities by the lender to accurately estimate the risk that leads to protecting debt obligations from tracking company investment decisions. On the other hand, if intellectual capital data cannot be observed, creditors may provide high debt rates.

In summary, the signaling theory is applied to explain the solution of information asymmetry. Considering the information of the firm that can be used through financial reporting, the annual reporting, the financial statements because more efficient and available. When the managers can signal more information to demonstrate the capability of the firm, the firm can be an advantage of contracting from the creditors. The agreement of contracting parties commits to more transparent and credible information.

### **Agency theory**

Agency theory is one of the oldest and contemporary perspectives which explain the relationship between two or more parties that make something activities

under the agreements (Ross, 1973; Jensen & Meckling, 1976). The relationship between the principals and the agents in the firm. Under the firm has aggregated wealth of various parties, a set of contracts occur in the firm views which as a nexus of contracting for making these relationships (Alchian & Demsetz, 1972; Jensen & Meckling, 1979; Watts & Zimmerman, 1983). Jensen and Meckling (1976) define the relationship of a contract as the person (the principals) hire another person (the agents) to make some activities, giving the power of the agents for managing and decision-making. By the nature of the relationship between the principal and the agent is a difference of interests which leads to conflicts of interest. The exploitation of each party leads to the agency problem, causing the separation of ownership and control to reduce the agency problem (Jensen & Meckling, 1976). According to Jensen and Meckling (1976) described the conflict of interest has become the agency problem. The owner assigns the task of management to the managers, the owners expect that the managers work for the owner's interest (Panda & Leepsa, 2017). The company has agency problems leading to agency costs. Jensen & Meckling (1976) define agency costs as the costs incurred by the company when managers have opportunistic behavior and their decisions regarding benefit themselves. The managers are likely not to act in the best interests of the owners (Jensen & Meckling, 1976). The owners are concerned about the way of control mechanisms.

Moreover, the relationship between the majority shareholders and the minority shareholders has a difference in interest lead to the agency problem. The majority shareholders were a person or group which holding in higher proportion and relative to voting rights power (Fama & Jensen, 1983), such as the degree of concentrated ownership through the level of shares holding can identify the power of right related to taking any decision-making in favor of their interest (Linder & Foss, 2013). They are to tend seeking opportunities in the firm's resources, which may imply belonging to the entrenchment rather than the alignment of interest (Aboody & Lev, 2000; Fifer & Williamson, 2005; Mohd-Saleh & Che Abdul Rahman, 2009). The minority has a less proportion of shares holding compared to the majority shareholders which the minority shareholders cannot protect in their interest (Demsetz & Lehn, 1985). A high proportion of shareholders may seek the benefits through more information than the minority.

Garcia-Meca and Sanchez-Ballesta (2010) proposed that firms with a high ownership concentration can disclose more information to reduce agency costs and information asymmetry. However, Fama and Jensen (1983) suggested that the level of ownership structure is widely held to carry with an incentive for a firm to provide voluntary information to shareholders. Thus, the ownership structure can be seen as a mechanism to manage appropriately the conflict of interests (Fan & Wong, 2005). The agency theory embedded the problem of information asymmetry which is related to the agency and principal conflict leading to the company use voluntary information on intellectual capital reporting as information maybe reduce the information asymmetry (An, Davey & Eggleton, 2011; Haji & Ghazali, 2013). The company uses monitoring mechanisms for creating transparency. It conducts to manage inequality interest that is information asymmetry (Jensen & Meckling, 1979). Hence, information asymmetry is a key element of agency theory to arise within the information environment of a company.

### **Information asymmetry**

Information asymmetry was proposed by Joseph Stiglitz, George Akerlof and Michael Spence in 2001 (Löfgren, Persson & Weibull, 2002). The nature of information is the amount of information holding different. Information asymmetry is defined as one party is more information than the other party (Akerloff, 1970). Consistent with Connelly et al. (2011) stated that information can affect the decision processing between the owners and the managers. Information asymmetry leads to the key factor of the agency problems (An, Davey & Eggleton, 2011). The information asymmetry cannot be observed directly which the owner's lack of access to complete information (Ross, 1973; Fama & Jensen, 1983). Corporate information can reduce the information asymmetry for the management control.

The corporate information, including the voluntary disclosure, is a function that eliminates the gap of information between the owners and the managers (Jensen & Meckling, 1976; Fama & Jensen, 1983; Firer & Williams, 2005). One reason is possible to solve the gap information that can use the information on intellectual capital reporting. The voluntary information of intellectual capital reporting makes equality to know information for observing the economy's activities of the firms. In order to curb

opportunistic behavior of the managers and ensuring efficient utilization of organization resources for protecting the interest of the company (Dalwai & Mohammadi, 2020). When the voluntary information of intellectual capital reporting may be utilized under a difference of interest. Information asymmetry can identify the behavior of the managers which leads to the entrenchment of management in the decision-making. Information disclosure is low level to imply that cannot be able to control the managers because the owners are not sufficient information perception (Ishak & Al-Ebel, 2013). The company should the monitoring systems in terms of the corporate governance mechanisms which serve to reduce seeking interest via the information concealment (Bergh, Ketchen Orlandi, Heugens & Boyd, 2019). This mechanism can monitor and seek the alignment of interest, regarding the key value of the intellectual asset for the organization (An et al., 2011).

Corporate governance mechanisms can link to the viewpoint of intellectual capital reporting leading to more voluntary disclosure, which regards to use of the company's effective resource (Li, Pike & Haniffa, 2008; Samaha, Khlif & Hussainey, 2015; Goebel, 2019). Consistent with Fama and Jensen (1983) supported that the large proportion of independents on the board, they have more effective monitoring managerial opportunism, and companies can be to have more voluntary information disclosure. In addition, the corporate governance in a part of the audit committee can improve the clarity and reliability of corporate reporting (Azman & Kamaluddin, 2012). They also extend to the revealing of voluntary information including intellectual capital which can benefit maximize the firms (Keenan & Aggestam, 2001). Voluntary disclosure is monitoring the owner used to explore the activities of the manager to ensure information transparency (Jensen & Meckling, 1976). Corporate governance is the shift toward knowledge-based organizations (Keenan & Aggestam, 2001). According to Cerbioni and Parbaonetti (2007) and Li et al. (2008) stated that corporate governance mechanisms a part important in the alignment of management's interests through the information of intellectual capital reporting. The corporate governance mechanisms are likely to focus their attention on activities that can increase value creation, such as investing more in training, acquiring new experts, improving processes, procedures, work culture, and working to enhance their relationships with

stakeholders. It can be reflected in an increase the intellectual capital reporting (Mohd-Saleh & Che Abdul Rahman, 2009).

Additionally, the ownership structure is one part of the control mechanisms in the firm. The majority shareholders are likely to access the information more than the minority (Arifah & Chariri, 2020). A higher level of ownership structure creates a power base on the conditions to induce the managerial power that the disclosure is influenced by the ownership structure (Firer & Williams, 2005). They can use a voting right power for monitoring the top managers. They can be effective on the information of the intellectual capital that is a direction on the strategy to achieve more effective performance in intellectual capital (Zanjirdar & Kabiribalajadeh, 2011). While the awareness of the relationship between ownership structure and intellectual capital can support the policy and management in implementing effective strategies to increase the wealth of shareholders (Shahveisi, Khairollahi & Alipour, 2017).

In summary, the agency theory provides a framework to explain that the relationship between corporate governance mechanisms and intellectual capital reporting. The agency theory emphasizes the conflict of interest, leading to the agency problem between owners and managers. The managers can assess the information more than the owners which may be used for an opportunistic behavior of managers who possessing crucial information on the company. Under the conflict of interest leading to the agency problem. This scenario arises that the information is not equally shared between the owners and the managers. The owners concern the control of the management which the corporate governance mechanisms are likely to reduce the agency problem through more voluntary information on intellectual capital reporting for checking and balancing the power of management. Therefore, Intellectual capital reporting is a source of information comprehensive the utilizing intellectual assets to reduce information asymmetry in a company.

## **The perspective of Intellectual Capital Reporting**

### **Definition of the intellectual capital reporting**

Since the 19<sup>th</sup> century, intellectual capital has gained the attention of researchers and practitioners. Intellectual capital has developed the definition along to background

and perspective among researchers, but the meaning of intellectual capital was not finished for still developing an accepted definition, the definition is explained as follows.

Stewart (1997) defined that intellectual capital as the aggregation of knowledge within a company that generates competitive advantages. Including, Edvinsson and Malone (1997) suggested that intellectual assets as knowledge can be converted into value. Edvinsson (1997) defined it as the possession of knowledge, applied experience, organizational technology, customer relationships, and professional skills, the value of intellectual capital was determined by the extent to which these intangible assets would be turned into financial returns.

Bontis (1998) state that intellectual capital was an attempt to use knowledge effectively against information (raw material). Intellectual capital was a term to mix market intangible asset, intellectual asset, human asset, and infrastructural asset which makes the organization capable to perform its operations. Meanwhile, the International Federation of Accountants (IFAC, 1998) defined capitals based on knowledge possessed by the firm. It can be either the result of a process of transformation of knowledge or the knowledge itself that was transformed into intellectual property rights or intangible assets of the company.

Chartered Institute of Management Accountants (CIMA, 2001) definitions of intellectual capital were the possession of knowledge, experience, professional knowledge skill, good relationships, and technological capacities, which they can apply for organizations a competitive advantage.

Meritum (2002) and Lev and Zambon (2003) defined intellectual capital as non-monetary assets or resources without physical substance, such as innovation, knowledge, research and development, employee training, or customer satisfaction, underlying a firm's value creation process. The intellectual capital as a value-added by Zéghal & Maaloul (2010), was the aggregation of knowledge which was used in the business value creation process.

Marr (2008) and Starovic and Marr (2003) stated that can be found in some disciplines such as, financial accounting and legal disciplines have created quite narrow definitions as non-financial fixed assets that do not have physical substance. It was identifiable and controlled by the entity through protecting and legal rights, identified



the intellectual with words, such as intangible, knowledge-based, and non-financial assets.

The Organization for Economic Cooperation and Development (OECD) (2006) proposed that knowledge embodied in intellectual assets (e.g., human capital, R&D, patents, software, and organizational structures) has been becoming crucial for firms' performance and growth, companies need to be able to earn benefit returns from both developing and using intellectual capital.

Dewi, Young and Sundari, (2014) defined it as a knowledge resource contained workers, customers, processes and technology which can be used in the creation value of processing for the company.

Moghadampour, Hamed and Behzad (2016) noted that the business environment needs an approach that involves new intangible assets, such as HR knowledge, competencies, innovation, organizational culture, and organizational structure.

In summary, intellectual capital reporting is the knowledge-based comes from human ability, skills, and focus on attracting, retaining, developing, and maintaining human ability. Their knowledge transfers through the knowledge management process and expands the path to apply knowledge to develop the relationship between an organizational and an external group of society. The organization has maintained a collection of knowledge. They can utilize knowledge for creating the operational process. The flexible operational process in technology, innovation, product, and service generates a competitive advantage.

### **Importance of intellectual capital reporting**

Fathi (2013) presents that companies have a resource that consists of tangible and intangible assets. Tangible assets have been physical objects, such as buildings, infrastructure, technologies and equipment, and monetary assets. Intangible assets have been knowledge, intelligence, talents, skill, brands, reputation, intellectual properties, organizational values, traditions, and symbols. Intellectual capital is a part of an intangible asset such as employee skill, customer trust, technology, and a firm's system that can enhance firm value (Barus & Siregar, 2015). The presence of resources is not mean to create value. The company goes beyond the mere presence of resources to

transform from one resource into valuable another (Roos, Bainbridge & Jacobsen, 2001).

Companies can lift from intangible assets to a knowledge-based economy by using the possession of intellectual capital (Edvinsson & Malone, 1997; Fernandez, Montes & Vázquez 2000; Guthrie & Petty, 2000). (Bukh, Nielsen, Gormsen and Mouritsen, 2005) stated that most intellectual capital is knowledge resources, in the form of employees, customers, processes, or technology which the company can mobilize its value creation processes. The intellectual capital leads to develop and utilize the sources of knowledge in corporations and create their network community. Each company uses intellectual capital, to create a competitive advantage leading to the differentiated value of the firm (Srivaastava, Shervani & Fahey 1998; Lippman & Rumelt, 2003). Roos and Roos (1997) recommended that knowledge society comes from the use of intellectual capital which different from the industrial society. Acquiring and applying intellectual capital becomes the key to competitive advantage factors. Consistent with Nonaka and Takeuchi (1995) support that creating knowledge becomes the key to sustaining a competitive advantage in the future.

### **Component of Intellectual Capital reporting**

In early, intellectual capital reporting is classified into two categories which consisted of human capital and structural capital. Human capital includes the knowledge of employees, applied experience, the company's values, culture, philosophy, and professional skills. Structural capital is innovation and process, organizational structure, patents, trademarks, and everything of organizational capability (Roos & Roos, 1997).

Nevertheless, two categories were not popular to use for intellectual capital, after that many scholars develop into three categories to consist of human capital, structural capital and relational capital (IFAC, 1998; Meritum, 2002; Marr, 2008). It can describe comprehensively the content of intellectual capital. Prior literature defines the component of intellectual capital as follows.

#### **(1) Human capital**

Human capital is also sometimes known as employee competence (Stewart, 1997; Edvinsson, 1997). There is referred to as the tacit knowledge embedded in the

minds of employees (Chang, Chen & Lai, 2008; Hejazi, Ghanbari & Alipour, 2016). Stewart (1997) as the knowledge, qualifications and skills of employees and the companies cannot own or prevent those employees from going home at the end of the day. Its value was attributed to employee training, know-how, teamwork capacity, competency, learning capacity (Khalique, Bontis, bin Shaari & Isa, 2015). Sveiby (1997) referred to individual experience, competence, skills, and idea. Consistent with Bozzolan, O'Regan and Ricceri (2006) explained that competence, skill, and experience with employees. Roos et al. (2001) noted that the intellectual agility of the individual employees. Marr (2008) explained that its workforce's skill-sets, depth of expertise, and breadth of experience including employee loyalty, motivation, and flexibility, while, a high level of staff turnover might mean that a firm was losing these important elements.

However, the investment in human capital should be recognized as expenditure rather than costs because to provide on employees, such as education, and training for producing human capability rather than physical or financial capital (Young, Su, Fang & Fang, 2009; Bontis, Janošević & Dženopoljac, 2015). The employees can build the capacity of learning which leads to work efficiency and consequently firms with a greater human capital can enhance productivity (Cabrita & Bontis, 2008; Clarke, Seng & Whiting, 2011). The firm should pay employees for retaining key experience, creativity, educate and avoid knowledge leakages that may be an opportunity for firms to acquire fresh knowledge for newer employees (Bontis, Keow & Richardson, 2000; Saeed, Rasid & Basiruddin, 2016). Including, the employees should be gained welfare about the well-being (Li et al., 2008).

In summary, human capital is knowledge, know-how, skill, abilities, and experience. In the meaning as the knowledge that employees take with them when they leave. It is concerned with determining the value of the human resource employed in an organization to employees of that organization. Including, innovative capacity, creativity, prior experience, motivation, employee welfare, community, ability to work in teams, capacity for learning, formal training, and educational qualifications.

## (2) Structural capital

Structural capital is also sometimes known as internal capital (Skandia, 1998; Haji & Ghazali, 2013), the internal structure (Stewart, 1997; Edvinsson, 1997; Guthrie,

Ferrier & Wells, 1999; Meritum, 2002; Bozzolan et al., 2006) or organizational capital (Ross & Ross, 1997; IFAC, 1998). Stewart (1997) infers to the knowledge that this remains in the possession of enterprise even after employees have left work at the end of the day or retire. Prior literature showed that structural capital has two main elements, namely intellectual property and infrastructure assets (Guthrie & Petty, 2000; Bozzolan, Favotto & Ricceri, 2003). Intellectual property refers to the elements of intellectual capital protected by law such as commercial rights, patent, copyright, trademarks, trade secrets that were owned by the firm but do not appear on its balance sheet (Bozzolan et al., 2006; Abeysekera & Guthrie, 2005; Husin, Hooper & Olesen, 2012).

Infrastructure assets referred to the knowledge embedded in the firm's processes, routines, and practices (CIMA, 2001; Bontis et al, 2015). Guthrie and Petty (2000) stated that business processes, corporate culture, information and networking systems, research and development projects can be generated within the firm or acquired from outside (IFAC, 1998; Bozzolan et al., 2003; Bozzolan et al., 2006). It is referred to all the systems, databases, processes, information systems, innovations, hardware, organizational culture, philosophy, and financial dealing (Sveiby, 1997; Li et al., 2008; Ting & Lean, 2009; Sydler, Haefliger & Pruksa, 2014; Bontis et al., 2015). Roos et al. (2001) noted that processes, systems, structures. Bozzolan et al. (2006), Li et al. (2008) identified that the knowledge captured in organizational procedures, and very often codified in managerial routines and processes.

In summary, structural capital is an organizational routine, processes, systems, cultures, database, innovation, and management philosophy. In the meaning as the knowledge that stays within the firm at the end of the working day. It covers organizational culture, the general use of information technologies, research and development, organizational learning, and knowledge-based infrastructure. Some of the assets may be legally protected and become intellectual property right which owned by the firm under a protected by law.

### (3) Relational capital

Relational capital is also sometimes known as customer capital (Stewart, 1997; IFAC, 1998; Skandia, 1998; Haji & Ghazali, 2013), external structure (Guthrie et al., 1999; Meritum, 2002; Bozzolan et al., 2006) or external capital (Skandia, 1998; Haji & Ghazali, 2013). It concerns relationships with customers and other groups external to

the firm (Beattie & Smith, 2010). Relational capital is the knowledge embedded in learning from the market, development, and maintenance of external relationships (Bontis, 1998; CIMA, 2001; Meritum, 2002; Joshi, Cahill, Sidhu & Kansal, 2013). The firm's ability to create value from the complex relationships with external stakeholders of the firm with customers, suppliers, and partners (Bozzolan et al., 2006; Cabrita & Bontis, 2008; Joshi et al., 2013; Meles, Porzio, Sampagnaro & Verdoliva, 2016; Sydler et al., 2014; Tsakalerou, 2015). Sveiby (1997) supported the relationship between the customers, brand image, reputation, and image of the company. It represented all the valuable relationships with customers, suppliers, and other relevant stakeholders (Roos et al., 2001). Most literature supported that the corporate's reputation can manage product or service through the distribution channel which reflected the relationships between organizations and their customers, such as customer loyalty, market leadership, commercial power, customer satisfaction, links with suppliers, favorable contracts, and reputation (Abeysekera & Guthrie, 2005; Marr, 2008; Li et al., 2008; Nerantzidis, 2015). Having a better understanding and build strong relationships with external stakeholders, will help firms to develop and create products (Meles et al., 2016).

In summary, relational capital is the knowledge embedded in the customer relationship. It comprised all resources linked to the external relations of the firm such as customer, supplier, or business partner. Both human and structural capital have involved outside relations. It covers brands, image, collaboration with other businesses or linked with customer loyalty, customer relationships, favorable contracts, distribution channel, including, the company can get leadership in the market.

### **Quantifying the Intellectual Capital Reporting**

Intellectual capital reporting can be quantified based on financial and non-financial information. The financial information can be driving value for the firm. Meanwhile, the non-financial information has likely to be a hidden value to capture the firm's economic reality and more detail to be informative about the firm's activities (Wyatt, 2008). Accordingly, the various literature has appeared to attempt the measurement of intellectual capital, to a company can manage its resources more

efficiently and minimize cost (Hunter, Webster & Wyatt, 2005). Thus, intellectual capital can be grouped into two elements between the financial and the non-financial information as follows.

### **Financial information**

Financial information disclosure is the quantifying model of the intellectual capital which using the financial data to evaluate the performance of the organization's intellectual capital (Jurczak, 2008; Fathi, Farahmand & Khorasani, 2013). The previous literature recommends the various main models to measure intellectual capital as including.

(1) Economic Value Added (EVA<sup>TM</sup>) proposed by Stewart (1997). It considers the economic profit or the residual income which taking into consideration the future cash flows, also a cost and risk of all investment (Bontis, 2001). The EVA<sup>TM</sup> value is a firm's rate of return higher than its required rate of return. It is metric and provides accurate about the effect of intellectual capital on firm performance, its focus on the maximization of shareholder wealth (Arafat & Shahimi, 2013). This approach was used in prior studies of Shakina and Barajas (2013), Salehi, Enayati and Javadi (2014) and Iazzolino et al. (2014). It is estimated as follows,

$$\text{EVA}^{\text{TM}} = \text{Net Operating Profit After Tax (NOPAT)} - (\text{WACC} \times \text{invested capital})$$

(2) Market Value Added model (MVA) is the difference between the market value of a company (both equity and debt), it over the book value of capital, and the present value of invested capital (Stewart, 1997). This model shows earnings performance and identifies the assets producing by reflecting the market's expectation about firms' future cash (Yang & Chen, 2010). MVA is a cumulative measure of the value created by the management more than the capital invested (Ramana, 2005). This approach was used in prior studies of Kavida and Sivakoumar (2008), Yang and Chen (2010) and Barajas (2014). It is estimated as follows,

$$\text{Market value added} = \text{Market value of equity} - \text{Invested capital (Total assets minus Non-Interest-bearing liabilities)}$$

(3) Tobin's q method is concerned about investment behavior in macroeconomics (Tobin, 1969). This model uses the replacement cost of tangible assets rather than the book value of tangible assets to predict the investment of the firm (Botten, 2007). It is represented to measure the effective performance of a firm's intellectual asset (Jurczak, 2008). This approach explains that a company's ability produces the profit using all assets to maximize benefit more than other companies (van den Berg, 2003). This approach was used in prior studies of Villalonga (2004) and Rostamy, Amoghin and Deljou (2012). It is estimated as follows,

$$\text{Tobin's } q = \frac{\text{Market value of equity}}{\text{the replacement cost of asset}}$$

As mentioned above, prior literature discussed quantifying intellectual capital via the Market Value Added model (MVA), Economic Value Added (EVA<sup>TM</sup>), Tobin's q. Chen and Dodd (2001) and Andriessen (2004) argued that EVA<sup>TM</sup> is relevant to the profitability to consist of operating income, residual income, and economic profit which is assessed the value-added from the shareholder's perspective. van den Berg (2003) argued that the purpose of EVA<sup>TM</sup> has little support to measure valuation intellectual assets. Botten (2007) and Kavida and Sivakoumar (2008) argued that MVA is used as a benchmarking market performance between companies. According to Brennan (2001) and Anghel (2008) indicated that MVA can little capture attributed to intellectual assets, as parts of its estimate relate to tangible asset values that appear on the organization's financial statement. Marr (2005) argued that Tobin's q is often difficult to estimate the replacement cost of intellectual assets, this model cannot separate the value of intellectual capital components. Thus, the estimation of three approaches assesses the monetary value from the performance of the whole asset, but it cannot assess to point out the component of intellectual capital (Chen, Zhu & Xie, 2004; Kavida & Sivakoumar, 2008).

(4) Human Resource Costing and Accounting (HRCA), this model estimates the hidden impact of human resource-related costs which reduce a firm's profits (Jan-Erik & Ulf, 1998). Human asset is a part of intellectual capital, measured by the calculation of the contribution of human assets in the company divided by capitalized salary expenditures (Jurczak, 2008). This approach was used in prior studies of Morse (1973).

(5) The financial method of the intellectual asset was proposed by Edvinsson and Malone (1997). This model used indicators for measuring intellectual capital such as value-added per employee, the number of employees, customers lost, laptops per employee, and share of training hours. R&D expenditures or advertising expenditures (Lu, Wang, Tung & Lin, 2010; Hsuehchang, 2013). Selling, General and Administrative (SG&A) expenses include training, consulting and information technology expenses, research and development, marketing, managerial compensation which gathers to create organization capital (Lev & Radhakrishnan, 2005). This approach was used in prior studies of Liu (2000), Hsuehchang (2013) and Lu et al. (2010).

From prior literature discussed quantifying intellectual capital via the approach of Human Resource Costing and Accounting (HRCA), the Financial method of the intellectual assets. Starovic and Marr (2003) stated that HRCA is described as the aspect of capitalizing expenditure about employees such as recruitment, salary, training, and development, it measures human capital alone. The financial method of intellectual assets is indicated the specific source of resources for firms. It is directly evaluated focus on the more specific issue of activities and transactions for firms, including it may be less comparison cross the industry.

(6) Value Added Intellectual Coefficient (VAIC<sup>TM</sup>) analyzes the value-added (VA) of intellectual capital efficiency (Pulic, 1998). This model is the value creation from knowledge investment. It uses the capability to transform knowledge into products and services (Pulic, 2008; Lazzolino & Laise, 2013). It is shown that a company produces added value based on intellectual capital efficiency (Lev & Zambon, 2003). This model shows to create value with one invested monetary unit, it utilizes the intellectual capital to consist of human capital, structural capital, physical/financial capital (Pulic, 2000). In order to monitor the level of efficiency with intellectual capital



is being used to create value for firms (Whicker & Andrews, 2004). Companies with a higher value of VAIC<sup>TM</sup> could interpret that better management utilization of firms' value creation capability of intellectual capital (Nimtrakoon, 2015). VAIC<sup>TM</sup> is the sum of human capital efficiency, structural capital efficiency, and capital employed efficiency (Pulic, 2000). This approach was used in prior studies of Appuhami (2007), Sianipar (2012) and Djamil, Razafindrabinina and Tandean (2013). It is estimated as follows.

$$\text{VAIC}^{\text{TM}} = \text{HCE} + \text{SCE} + \text{CCE}$$

This approach of VAIC<sup>TM</sup> was used for reflecting straightforwardly to indicate insight value to be created under a monetary invested unit (Laing, Dunn & Hughes-Lucas, 2010; Iazzolino et al., 2014). Pulic (2000) recommended that it can provide information about the value creation efficiency of both tangible (physical/financial capital) and intangible assets (human capital and structural capital) of the organization. According to Firer and Williams (2003), Jurczak (2008) and Arafat and Shahimi (2013) state that VAIC<sup>TM</sup> links to the activities to use the resources of the company. This model is standardized to analyze effective comparative across companies and countries. However, VAIC<sup>TM</sup> has not fully explained the intellectual capital components such as relational capital. Joshi et al. (2013) argued that VAIC<sup>TM</sup> neglects some component of intellectual capital. Some researchers extended the model of VAIC<sup>TM</sup>, in order to evaluate more efficiency. Chang (2010) suggested modifications VAIC<sup>TM</sup> by adding research and development (R&D) expenditure and intellectual property (IP). Consistent with Ulum, Ghozali and Purwanto (2014) argued that the model does not appear to include relational capital in its measurement of intellectual capital. Chen, Cheng and Hwang (2005) also argued that advertising expenditures concern about relational capital.

(7) Modified -Value Added Intellectual Coefficient (M-VAIC) is developed from the original VAIC<sup>TM</sup> of Pulic (2004, 2008). M-VAIC explains the utilization of intellectual capital efficiency which can capture the components of intellectual capital (Joshi et al., 2013; Ulum et al., 2014; Xu & Wang, 2019). Initiation with the evaluation of value-added (VA) to follow Pulic (2004, 2008). M-VAIC is based on the sum of human capital efficiency, structural capital efficiency. Some researchers recommended

adding quantifying relational capital is as a part of its component, for example, Chen et al. (2005) supported that advertising expenditure is used to promote the brand value of products and services. They obtained the marketing, selling, and advertising expenses as relational capital. Similarly, Ulum et al. (2014), Soetanto and Liem (2019), Xu and Li (2019) and Xu and Wang (2019) showed that relational capital efficiency was the ratio of marketing, selling and advertising expenses to value-added. Consistency with Buallay (2018) using the marketing and the sales expense are represented to calculate the relational capital efficiency. The complete formula of M-VAIC is the sum of three efficiencies which consist of human capital efficiency (HCE), structural capital efficiency (SCE) and relational capital efficiency (RCE). It is explained as follows,

$$\text{M-VAIC (ICE)} = \text{HCE} + \text{SCE} + \text{RCE}$$

Thus, M-VAIC has overcome the limitation of VAIC<sup>TM</sup>. It can quantify the relational capital efficiency that is represented the efficiency of investment rather than a cost because a firm depends on the relation with customers and business partners for maintaining a market position (Bontis, 2001; Sawarjuwono & Kadir, 2003). This model is explained in more detail as follows.

#### The Modified - Value Added Intellectual Coefficient (M-VAIC)

The M-VAIC can quantify the intellectual capital of a firm using audited published financial information likely the original VAIC<sup>TM</sup> (Joshi, Cahill, Sidhu & Kansal., 2010). This model provides a consistent basis to measure intellectual capital performance, applying this method entails the initiating “value-added” (Pulic, 2008). It is generally accepted in prior studies for example, Nazari and Herremans (2007), Nimtrakoon (2015), Vishnu and Gupta (2014), Ulum et al. (2014) and Zakariaa, Purhanudinb, Wahidudinc and Chind (2020). The M-VAIC can explain as the following.

- The value-added (VA) is to assess the ability to create the company value (Pulic, 2008). It is started calculating the value-added to explain the intellectual capital and its component. It is calculated by using the formula proposed by Pulic (2008). It is the difference between income and expenditure (Pulic, 2008; Stähle, Stähle & Aho, 2011). VA is referred that the total value-added as the sum of operating profit,

employment cost, depreciation and amortization of the firm (Zakariaa et al., 2020). The formulation is illustrated,

$$VA = OP + EC + D + A$$

where OP is operating profit, EC is employee costs, D is depreciation, and A is amortization.

- Human capital efficiency (HCE) means as a company creates value through investment monetary unit for human resource (Stähle et al., 2011). The expenditure of employees invests their knowledge and capabilities to engage in a company's activities (Pulic, 2008). HCE indicates the employees' costs incentive pay additional value to generate the retaining and attracting talent (Singh, Sidhu, Joshi & Kansal, 2016). HCE is higher than the value that comes from each employee that indicates the productivity of knowledge workers (Lazzolino & Laise, 2013). It is expenses related to employees that are not treated as a cost but represent an investment (Nazari & Herremans, 2007). It has formulated as follows.

$$HCE = VA/HC$$

where HCE is the human capital efficiency for the company, VA is value-added and HC is the total salaries and wages for the company.

- Structural capital efficiency (SCE) is set from the structural capital (SC) that covers all characteristics of intangible assets, such as brands, patents, processes, and organizational structure etc. (Lazzolino et al., 2014). The company enhances processes, networks, and infrastructure that an organization received from its human capital (Xu & Wang, 2019). Thus, SC is the difference between the produced value-added and human capital (Stähle et al., 2011). Transferring the value of the human's knowledge to the embedded knowledge of the working processing. Then, SCE can describe that the value-added over the human capital because the investment in human capital creates more competent and capable personnel who then develop better structural capital, leading to the development of the more productive organization (Tseng & Goo 2005; Clarke et al., 2011; Stähle et al., 2011; Shahveisi et al., 2017). When SCE is increasing to drive the value-added for the structured capital of the company (Pulic, 1998, 2000). It has formulated as follows.

$$SC = VA - HC$$

where SC is the structural capital for the company, VA is value-added, and HC is the total salaries and wages paid.

$$SCE = SC/VA$$

where SCE is the structural capital efficiency for the company, SC is the structural capital and VA is the value added.

- Relational capital efficiency (RCE) is the amount of monetary unit that can be express the relationships with business partners, clients, brand awareness, and managing customer relationships (Nazari & Herremans, 2007; Vergauwen, Bollen & Oirbans, 2007). It is represented that the value is produced by the marketing capability, customer, and relatively business partners that help create and maintain their long-term partnerships (Chen et al., 2004; Gupta & Raman, 2020). Jiraudomsarod (2019) indicated that the amount of money can be support consumers to receive information between a company and a customer. Ulum et al. (2014) pointed out that the efficiency of investment in the relational aspect. It is the amount that the company spends on advertising, selling and marketing expenditure (Ulum et al., 2014; Xu & Li, 2019; Xu & Wang, 2019; Jiraudomsarod, 2019; Gupta & Raman, 2020; Tran, Van & Vo, 2020; Zakariaa et al., 2020). It has formulated as follows.

$$RCE = RC/VA$$

where RCE is the relational capital efficiency for the company, RC is the relational capital and VA is the value-added.

In summary, M-VAIC is a reason as it can measure complementary the criteria of intellectual capital and its components. Firstly, this model is provided the standardized and basis for measuring intellectual capital, due to the unit of money is employed additionally to generate from intellectual capital (Pulic & Bornemann, 1999; Firer & Williams, 2003; Chen et al., 2005; Xu & Wang, 2019). Secondly, this model uses data publicly available and can calculate from the audited financial data (Fijałkowska, 2014). Thirdly, companies can be a comparison efficiently managing intellectual capital cross-industry (Maditinos, Chatzoudes, Tsairidis & Theriou 2011; Lazzolino & Laise, 2013). Finally, this model can explain the information about intellectual capital relating to the potential efficiency of businesses, it is perceived with both internal and external users (Sianipar, 2012; Xu & Wang, 2019).

### **The Non-financial information**

Non-financial information is an approach to assessing the information of intellectual capital reporting through the information of each company. The non-financial information aims to supplement, and extent measured to cover the important substance. The early literature identified the non-financial information estimated valuation of intellectual capital to reference using as follows.

In the mid-1990s, Brooking (1996) proposed Technology Broker's Intellectual Capital Audit which proposed the 20 questions for answering specific audits and three methods to calculate a value. Broker's approach was the estimation value from qualitative results, even though, a cost figures the actual value (Bontis, 2001). In 1997, the Skandia Navigator Model was developed by Edvinsson (1997), Edvinsson and Malone (1997). It builds complementary information that focuses on five components to consist of financial, customer, process, renewal and development, and human (Bontis, 2001; Choong, 2008). It was mainly the content for creating value, such as a company's culture, organizational learning, and an employee's creativity (Sitar & Vasić, 2005; Arafat & Shahimi, 2013). While Ross and Ross (1997) proposed Intellectual Capital-Index which the specific measurement weightings and indicators were decided to know the company's strategy, to know the characteristics of the business and day-to-day operations. Around the same time, the Intangible Asset Monitor was developed by Sveiby (1997) provided strategic information of the firm which to concern about growth, renewal, efficiency, stability, and risk. Bontis Intellectual Capital was developed by Bontis (1998) classified intellectual capital measurement into three; human capital, structural capital, and relational capital or customer capital, and assigned indicators for each classification. The method could be capable of measuring intellectual capital even of different financial information standing existed among firms (Arafat & Shahimi, 2013). And then, the Balanced Scorecard (BSC) was developed by Kaplan and Norton (2004) is set to indicate four perspectives that cover the financial perspectives, customer perspective/customer capital, internal process perspective/organizational capital, learning and growth perspective/human capital. BSC is described as managing the vision and strategy of the firm's intellectual assets (Jurczak, 2008). This model helps to use intellectual assets effectively based on the implementation of a strategy, it can lead the creation,

formation, measurement, and support the reporting for the strategy of intellectual capital (Wu, 2005).

From the models above, the company should attempt to better understand the possible combined value of their people, processes, and relational/customer capital for providing supplementary corporate information to the annual report (Ghemawat, 2002; Choong, 2008; Dumay & Garanina, 2013). However, most models are not generally publicly available which has restricted some scope of content and can be less comparative among companies (Brennan, 2001).

Further, intellectual capital reporting extends to the reporting model (Choong, 2008). Corporate reports become a tool to help to disclose to connect with the decision users (Karchegani, Sofian & Amin, 2013). Providing corporate reporting can help to capture the holistic information, including intellectual capital reporting (Oliveira, Rodrigues & Craig, 2010), intellectual capital reporting on the financial statement has incomplete information for the users (Garcia-Meca, 2005). The intellectual capital on disclosure support uses parallel with the financial statement. Companies are more likely to report intellectual capital in the annual report (Guthrie, Ward & Cuganesan, 2008). It is perceived as disclosure of the companies provide to the intellectual capital in a sense that gives more realistic results (Yıldız, Meydan & Güner, 2014). Beattie and Thomson (2004) stated that the firms can use intellectual capital by disclosure, it can increase transparency and enhance the communication of the firms (Starovic & Marr, 2003).

Owing to prior literature set the sub-categories of intellectual capital to investigate the corporate reporting, this study explains that the intellectual capital items were used in each prior literature as follows.

<sup>1</sup>Intellectual capital items were developed items in the studies of Guthrie and Petty (2000), Bozzolan et al. (2003), Abeysekera and Guthrie (2005), Beattie and Thomson (2007) and Li et al. (2008). Previous literature used different items, the total number of items range between 17 and 61 items. The items are grouped in categories to consist of human capital, structural capital, relational capital. Human capital shows the number of items range between 5 and 22 items, structural capital range between 5

---

<sup>1</sup> See in Appendix A (Table 15) for more details.

and 18 items, relational capital range between 5 and 23 items. Relational capital is the highest item and human capital, structural capital, respectively. Except, the items of Bontis (2003) have not grouped items into any categories of intellectual capital.

The intellectual capital items of Guthrie and Petty (2000) adapted the intangible Asset Monitor of Sveiby (1997). The total number of items is shown as 24 items to consist of human capital six items, structural capital nine items, relational capital nine items. The sample of the study was Australia's largest listed companies and a company held as an example of best practice in the field of intellectual capital reporting. And then, Bozzolan et al. (2003) adapted the items of Guthrie and Petty (2000). The total number of items shows 22 items to consist of human capital five items, structural capital eight items, relational capital nine items. Using the sample of Italian companies, they made a direct comparison between the two findings that this finding was not comparable with Australian voluntary reporting practices (Guthrie & Petty, 2000), while it is comparable with the Irish context (Brennan, 2001). Moreover, Guthrie and Petty (2000) tested reliability by using inter-coder reliability. Consistency, Bozzolan et al. (2003) tested by inter-coder reliability and applied Krippendorff's alpha in the form of a statistical agreement. In prior studies adapted the items, such as Brennan (2001), April, Bosma and Deglon (2003), Goh and Lim (2004), Guthrie, Petty and Ricceri (2006), Abeysekera (2008), Striukova, Unerman and Guthrie (2008) and Branco, Delgado, Sá and Sousa (2010).

The intellectual capital items of Bontis (2003), the total number of items is shown 38 items, it comes from a consensus in the panel of researchers from the World Congress on Intellectual Capital finalized the list of intellectual capital items (Bontis, 2003; Bhasin, Shaikh & Hanif, 2011). The items were not classified as the group into sub-categories. They used an electronic search on 38 keywords of intellectual capital for a large sample in Canada. After that, Vergauwen and van Alem (2005) and Brügger, Vergauwen and Dao (2009) adapted the items of Bontis (2003), classified into three categories and sub-items of intellectual capital such as human capital (ten items), structure capital (12 items), relation capital (five items) and adding the fourth category namely general terms (ten items). Although, some kinds of intellectual property require to be disclosed on the financial statements such as patents, trademarks, and copyrights

that to enable sustain their competitive advantage (Brüggen et al, 2009). In prior studies adapted the items, for example, Bhasin et al. (2011) and Bhasin (2012).

The intellectual capital items of Abeysekera and Guthrie (2005) have the total number of items are shown 17 items to consist of human capital seven items, structural capital five items, relational capital five items. Using the sample 30 listed on Colombo stock exchange in Sri Lanka for two years which to compare Australia. They focus on voluntary information provided in the annual reports. They used the content analysis method that involves codifying intellectual capital items, not to mention about testing the reliability. In prior studies adapted the items, for example, Abeysekera (2008), Sujan and Abeysekera (2007) and Davey, Schneider and Davey (2009).

While the intellectual capital items of Beattie and Thomson (2007) have the total numbers of items are shown 59 items to consist of human capital 20 items, structural capital 16 items, relational capital 23 items. They used the sample in U.S. companies in the year 2004. The intellectual capital items were obtained to review prior literature of Beattie and Thomson (2004). The electronic search terms used intellectual capital items in the annual report, coding was undertaken by one author and verified by the other one.

The intellectual capital items of Li et al. (2008) have the total number of items are shown 61 items to consist of human capital 22 items, structural capital 18 items, relational capital 21 items. They adopted and adapted from Sveiby (1997), the items were reviewed from previous literature of intellectual capital definition and classification. Using the sample of UK listed firms during March 2004 and February 2005. Annual report disclosure is assessed by a disclosure index score, to capture a word count and percentage of word count metrics. Testing reliability and validity used the pilot tested and inter-coder reliability. In prior studies adapted the items, for example, Haji and Ghazali (2012), Boujelbene and Affes (2013), Barus and Siregar (2015) and Stropnik et al. (2017).

Conclusively as mention above, this study reasonably replicated the keywords of prior research to determine the number of the keywords that perform under the reliability and the validity of the prior study. Because the previous keywords used over one research paper that the items of intellectual capital were investigated from a varied



context of research. And the number of the keywords used to test the inter-coder reliability which based on the content analysis approach (Krippendorff, 2004).

In summary, from prior literature is find that the items used to replicate<sup>2</sup> in Human capital such as know-how, employee teamwork, employee training, employee welfare, working knowledge, work-related competencies, employee commitment, employee commitment, entrepreneurial spirit, employee productivity, employee capability, employee equality.

The items used to replicate in structural capital such as intellectual property, management philosophy, corporate culture, information systems, networking systems, financial relations, research and development, organization structure, quality improvements.

The items used to replicate in relational capital such as brands, business collaborations, customers, customer loyalty distribution channels, contracts, market share, licensing agreements, franchising agreements, relationship with stakeholders, relationship with suppliers.

## **Empirical Evidence on Intellectual Capital Reporting**

This section presents based on empirical studies, from a different country which is divided by the developed market and the emerging market. In order to explore both financial and non-financial information of intellectual capital, to explain the result differ from the prior empirical studies, as follows.

### **Empirical evidence in the developed market**

#### Financial information

The prior empirical studies were explained as follows. Mostly, the empirical study of intellectual capital linked the firm performance or firm value. In empirical evidence measures the efficiency of intellectual capital as VAIC<sup>TM</sup>. For example, In Singapore, Tan, Plowman and Hancock (2007) investigate the association between the intellectual capital of firms and financial performance. Using the sample of 150 publicly

---

<sup>2</sup> See in Appendix A (Table 16) for more details.

listed companies between 2000 and 2002. They find that the relationship positively between intellectual capital and components and firm performance significant. In UK firms, the study of Zégha and Maaloul (2010) found positively in the relationship between all intellectual capital efficiency, physical and financial capital (CEE) and economic performance, financial performance, stock market performance. In the Australian context, Clark, Seng and Whiting (2011) revealed that studied the impact of intellectual capital on the financial performance of firms and found that intellectual capital efficiency in term VAIC<sup>TM</sup> was directly related to the financial performance of the firms, especially the physical and financial capital efficiency were relative with financial performance.

Puntillo (2009) investigated the relationship between the value creation efficiency and the firms' market valuation and financial performance of the banks listed on the Milan Stock Exchange. The author showed that physical and financial capital (CEE) was a significant positive relationship with profitability in terms of ROI and ROA. While, in Spain setting, Diez, Ochoa, Prieto and Santidrián (2010) explored the human capital and structural capital on the creation of business value in the year 2005. They reported that human capital and structural capital were positively related to value creation. The value creation is measured by sales growth. In European countries, Gigante (2013) examined the effects of intellectual capital performance on profitability. Using the sample of 64 banks in selected European countries (Czech Republic, Denmark, Finland, Germany, Italy, Norway, Poland, Spain, Sweden). The author found that the relationship between intellectual capital efficiency positively and financial performance. The author reported that cross-country was a difference in the use of intellectual capital.

Further, the past empirical evidence to investigate the relationship between intellectual capital and other dependent variables. The intangible assets are referred to as intellectual capital for example, the study of Liu (2000) explored the relationship between knowledge capital and optimal debt. The use of the R&D investment was a key variable and using the firm leverage was the dependent variable. The final sample was 107 firms and 437 observations in U.S. biotech firms between the 1983-1992 period. Their result demonstrated that R&D investment was a negative influence on a firm's leverage level in the presence of other better measures for knowledge capital.

Consistent with Sporleder and Moss (2004) investigated the role of knowledge capital and other intangible assets in capital structure decisions of U. S. agricultural biotechnology firms. The sample was 6,671 firm-year observations from 748 firms in the period 1980-2000. They found that intangible assets were negatively related to firm leverage. They revealed that agricultural biotechnology firms prefer internal to external financing.

Hasan, Hoi, Wu and Zhang (2017) studied the influences of the social environment on debt contracting evidence from bank loans and public bonds in the US. Using the sample 32,425 loan-year observations in the years 1990, 1997, 2005, and 2009. They explained that social environment as social capital which a part of intellectual capital. The social capital was represented both social norms and social networks, and the social network component is more likely to reflect the overall environmental connections of the firm. The levels of social capital across US counties indices reported in the form of the Northeast Regional Center for Rural Development (NRCRD) at the Pennsylvania State University. Their result found that debt holders, including private banks and public bond investors, the social capital-constrained opportunistic firm behaviors in debt contracting and, consequently, reduce the cost of debt.

Lim, Macias and Moeller (2017) examined the relationship between intangible assets and leverage. The sample of 469 firms between 2002 and 2014 in U.S. Counties. The intangible asset is measured by the market-based valuation of intangible assets. Finding that intangible assets was a negative effect on leverage. They provided a reason that many intangible assets can support debt.

Furthermore, there seems little empirical evidence studied in intellectual capital construct. The relationship between intellectual capital reporting and cost of finance, for example, the study of Cenciarelli, Greco and Allegrini (2018) examined a firm's intellectual capital performance associate with the probability of default and can help to predict bankruptcy. Using the final sample of 28,915 firm-year observations of U.S. firms from 1985 to 2015. Their result revealed that the intellectual capital performance, measured using VAIC<sup>TM</sup> was negatively associated with the probability of default, measured using Ohlson's (1980) model and Altman's Z-score. Therefore,

firms with higher intellectual capital performance display a lower probability of bankruptcy.

#### Non-financial information

The prior studies investigated the non-financial information of intellectual capital reporting through voluntary disclosure. Prior empirical research linked voluntary disclosure with the external financing view at firm-level, country-level as follows. The study of Sengupta (1998) investigates the voluntary disclosure on the cost of debt using data from U.S. companies to ensure comparability across industries, the final sample of 570 firm-year come from excluding the financial institutions and deleted firm not match condition in the period 1987-1991. The author based on the idea of the voluntary disclosure was the disclosure policy measured by financial analysts' evaluation of corporate disclosure practices available from the annual volumes of the Report of the Financial Analysts Federation (FAF) Corporate Information Commit, provided by AIMR. The cost of debt based on two alternative measures was considered the yields to maturity on new debt issues which analysis the final sample of 114 firms while involving 103 firms was the total interest cost of new debt issues. They show that both measures of the cost of debt were negatively associated with voluntary disclosure. The author supported that the voluntary disclosure of firms on the lenders that were perceived to have a lower default risk and rewarded with a lower cost of borrowing. Similarly, Using the annual volumes of FAF AIMR investigated by Mazumdar, Sarin and Sengupta (2000) firm's overall disclosure quality was negatively associated with the loan spread on private debt. The final sample was 141 firm-year observations and 102 firms from 1987 to 1992. The result complemented that the bank evaluated a firm's disclosure quality into its default risk estimate loan spread and banks rely on cross-monitoring, while the firms had rate favorably on the disclosure quality enjoy a lower interest. Nikolaev and Van lent (2005) examine the same association for the sample of 358 firm-year observations from 1986-1996 in U.S. companies. They have still reported a significant negative association between disclosure and yield to maturity as the cost of debt.

Attig et al. (2013) investigated the relationship between corporate social responsibility disclosure and firms' credit ratings, which uses data from the U.S. The

sample of 11,662 firm-year observations in 1,585 firms and the period 1991–2010. The corporate social responsibility disclosure from KLD stats contain intellectual capital such as community relations, diversity, employee relations, environmental performance, and product, while the credit ratings are compiled by S&P rating. They reported that the sub-items of disclosure were employee relations, diversity issues, product issues, community relations, and environmental issues positively affect firms' credit ratings, while the human rights dimension was not a significant effect on firms' credit ratings. In order to study in U.S. of Ge and Liu (2015) found that the firm was high overall performance scores in four corporate social responsibility dimensions, such as product, diversity, and employee relations which were significantly associated with the higher cost of debt, while four dimensions such as community, product, employee relations, and governance were significantly associated with the lower cost of debt that was bond yield spreads.

Francis et al. (2005) examined both the voluntary disclosure incentives and the voluntary disclosure consequence on the cost of capital using data from U.S. and cross-country differences in disclosures, the final sample of 672 observations from 34 countries. The sample firm and disclosure data come from the Center for International Financial Analysis and Research (CIFAR) to obtain for the 1991 and 1993 fiscal years. The voluntary disclosure index based on CIFMR created disclosure scores by containing 90 items in the following seven categories such as general information (eight items), income statement (11 items), balance sheet (14 items), funds flow statement (five items), accounting policy disclosure (20 items), shareholders' information (20 items), and other supplementary information (12 items). They measured the external financing by the cost of capital consist of the cost of debt which was the interest rate expense, cost of equity was the ex-ante cost of equity defined as the square root of the inverse of the price-earnings growth ratio under approach in Easton (2004). They found that firms in industries with greater external financing needs have higher voluntary disclosure levels. The expanded disclosure of firms was higher disclosure level to receive a lower cost of both debt and equity capital. Cross-country differences in legal and financial systems affect disclosure level, and the global importance of voluntary disclosure gained access to lower cost of capital.

Among these voluntary disclosures have led to more demand accounting information in which intellectual capital has value to request from the financial providers (Guimón, 2005). Orens et al. (2009) examined the impact of web-based intellectual capital reporting on the firm's value and its cost of finance. The intellectual capital voluntary disclosure developed by a self-created disclosure index based on Kaplan and Norton (1996), and Ittner and Larcker (1998) and Robb et al. (2001), which consisted of 42 items as following three categories such as customer value (16 items), human capital (16 items), internal capital (10 items). The sample of large continental European from 267 non-financial listed firms into 43 Belgian firms, 43 Dutch firms, 97 French firms, and 84 German firms in 2002. And they used proxy a firm's cost of finance by its cost of equity capital following the methodology of Easton (2004), the cost of debt capital measured by the firm's rate of interest paid and the level of information asymmetry measured using trading volume and bid-ask spread. The finding shows that cross-sectional differences in the extent of intellectual capital disclosure were positively associated with firm value. Greater intellectual capital disclosure in continental Europe was associated with lower information asymmetry, lower implied cost of equity capital, and a lower rate of interest paid. The extent study of Orens, Aerts and Cormier (2010) examines the effect of the web-based non-financial voluntary disclosure on the cost of debt as a cross-country study (North America and Continental Europe). The sample size consisted of 895 firms in the period 2002 from Continental Europe (43 from Belgium, 97 from France, 84 from Germany and 43 from the Netherlands), and North America (209 from Canada and 419 from the United States). They adapted from Botosan's (1997) index and based on the balanced scorecard framework of Kaplan and Norton (2004) including creating the index by themselves, containing six categories and 92 non-financial information items such as Corporate governance (17 items), Customer value (16 items), Human/intellectual capital (16 items), Production efficiency (17 items), Innovation/research and development and growth (10 items), and Social responsibility (16 items). They found that the association between non-financial voluntary disclosure and cost of debt was negatively significant in Continental European firms, while the result of North American firms was not significant. They also confirmed that the more information on intellectual capital was disclosed, the lower was the information asymmetry.

In summary, the developed market is based on prior empirical evidence<sup>3</sup>. Several studies investigate the relationship between intellectual capital and performance. The financial indicator has been widely applied to measure intellectual capital. There is VAIC<sup>TM</sup> as they produce economic value in a knowledge-based company (Pulic, 2000; Yu, Ng, Wong, Chu & Chan, 2010). Previous studies explored the relationship between intellectual capital and firm performance in both the developed market and emerging market. The firm performance is widely measured by gross profit margin (GPM), return on assets (ROA), the return of equity (ROE), earnings per share (EPS), asset turnover (ATO), Tobin's Q, employee productivity and market valuation are measured by the market to book value (MB). These studies examine the various samples to explain the country-specific, cross-industry, cross-country, and longitudinal. The result mostly shows that the association intellectual capital has a positive with firm performance significant, in the study of Tan et al. (2007), Puntillo (2009), Zégha and Maaloul (2010), Clarke et al. (2011), Diez et al. (2010) and Gigante (2013). Moreover, the empirical evidence extension studies the relation between intellectual capital and the cost of finance.

In a developed market, a few empirical studies of financial information show that intellectual capital reporting relates to the cost of finance. The intellectual capital was not directly measured but measured through intangible assets. The intellectual capital was measured by the market-based valuation of intangible assets (Sporleder & Moss, 2004; Lim et al., 2017), R&D expenditure (Liu, 2000), VAIC<sup>TM</sup> (Cenciarelli et al., 2018). Sporleder and Moss (2004), Lim et al. (2017), Liu (2000) findings show that intangible assets can reduce the cost of finance. On the other hand, Cenciarelli et al. (2018) reported that the result of some empirical evidence was not related to the cost of finance.

Based on empirical studies of the non-financial information, the relationship between voluntary disclosure and cost of finance. It can explain that the disclosure is likely to support to access financial providers. Prior empirical used voluntary disclosure to extract about the intellectual capital reporting such as disclosing product, diversity, employee relations, human rights, community relations, diversity, employee relations,

---

<sup>3</sup> See in Appendix B (table 16-17) for more details.

product characteristics (Attig et al., 2013; Ge & Liu, 2015). The index of intellectual capital disclosure is adopted and adapted from prior literature (Orens et al., 2009; Orens et al., 2010) or the database from the ranking of institutions (Sengupta, 1998; Francis et al., 2005; Mazumdar et al., 2000). Most studies support the level of voluntary disclosure was increasing to reduce the cost of issuing debt (Sengupta, 1998; Mazumdar et al., 2000; Nikolaev & Van lent, 2005; Ge & Liu, 2015). Consistency, some empirical evidence employs the cost of finance (Francis et al., 2005; Orens et al., 2009; Orens et al., 2010)

The main studies focus on the US and the setting such as European countries, North America. Most empirical studies examined by using a large sample. The testing is the long-time period study such as Sporleder and Moss (2004), Lim et al. (2017) and Cenciarelli et al. (2018). The developed market is more reliant on equity capital for funding activities (Sengupta, 1998; Mazumdar et al., 2000; Nikolaev & Van lent, 2005; Orens et al., 2009; Ge & Liu, 2015). Most studies focus on only one indicator of intellectual capital which does not consider measuring the financial indicators and the non-financial indicators related to the consequence together.

### **Empirical evidence in the emerging market**

#### Financial information

The prior studies investigated the intellectual capital reporting through use the of financial information as follows. Mostly, the empirical evidence studied the intellectual capital to link the firm performance or the firm value. For example,

In the Taiwan setting, Chen et al. (2005) studied the relationship between the efficiency of intellectual capital and components (VAIC<sup>TM</sup>) and performance. Using the sample of 4,254 in Taiwanese listed during 1992-2002. Findings show the firms' intellectual capital was a positive impact on market value and financial performance. Additionally, they use R&D and advertising costs as additional variables on structural capital and was a positive effect on firm value and profitability. Meanwhile, Chang and Hsieh (2011) analyze the relationship between intellectual and components and companies' operating, financial and stock market performance. The sample was 367 firms in the period 2000-2008. Using Modified VAIC<sup>TM</sup> for measuring intellectual capital and four sub-components. They found that traditional IC components have a



negative association with the companies' financial and stock market performance. The association between R&D expenditure efficiency (RDE) and the companies' operating, financial, and stock market performance was positively significant. Also, a significantly positive association between the capital employed efficiency (CEE) and the companies' operating performance while human capital efficiency (HCE) and structural capital efficiency (SCE) not significant.

In the study in Hongkong of Yu et al. (2010) was the sample of 151 in the Hong Kong Stock Exchange (HKSE) during 2005-2008. The measure business performance four proxy such as market valuation, profitability, productivity, and return on equity. The result shows that the efficiency of intellectual capital in terms of VAIC<sup>TM</sup> was positive with profitability and negatively with productivity. Capital Employed Efficiency (CEE), Structural Capital Efficiency (SCE), and Human Capital Efficiency (HCE) were positively business performance measured by market valuation, profitability and productivity, and Human Capital Efficiency (HCE) not significant with profitability. Likewise, the study of Firer and Williams (2003) uses the sample of 75 firms in the year 2001 of South African. Finding efficiency of intellectual capital was positively significant with productivity and market valuation, HCE was negatively significant with productivity and market valuation, CEE was positively significant with market valuation, SCE was positively significant with productivity.

While Maditinos et al. (2011) studied the Athens Stock Exchange (ASE) in Greek concluded that the financial performance of the companies was only significantly associated with human capital efficiency. In the Malaysia setting, Gan and Saleh (2008) study the sample of 89 technology-intensive companies listed on Bursa Malaysia. They report that the efficiency of intellectual capital can explain profitability and productivity. Finding physical capital efficiency was the most significant variable related to profitability while human capital efficiency was of great importance in enhancing the productivity of the company.

In a cross-industry study, Pal and Soriya (2012) use the sample of an unbalanced panel of 105 and 102 companies with 918 and 877 observations of pharmaceutical and textile industries respectively, from 2000-2001 to 2009-2010. Finding the relationship positively between intellectual capital and the profitability of firms measured in terms of ROA. The relationship positively between intellectual

capital and the profitability of firms measured in terms of ROE only Pharmaceutical industry.

In a cross-country study, Hamdan (2018) investigates the relationship between intellectual capital and firm performance. The sample comprised 171 firms from 15 sectors of the Saudi financial market and 27 firms from 6 sectors of Bahrain Bourse during 2014–2016. They used firm performance as an accounting-based performance as ROA, the market-based performance as Tobin's  $q$ . Finding the efficiency of intellectual capital and component of firms in Saudi was positively related to accounting-based performance while Bahrain showed Structural capital efficiency (SCE) was positively related to accounting-based performance and Human capital efficiency (HCE) was positively related with market-based performance.

A few empirical pieces of evidence illustrated the intellectual capital reporting on the cost of finance. According to Gamayuni (2015) investigated the relationship between intangible assets, financial policies, financial performance and firm value at the going-public company in Indonesia in the year 2007 to 2009, which using path analysis. The intangible assets were contained human capital, structural capital, customer capital and the financial policies as referring to debt. Their study provided empirical evidence that intangible assets, financial policies, financial performance were a significant influence on the firm value simultaneously. Intangible assets were no significant influence on the debt but have a positive and significant influence on financial performance and firm value. The study of Hsuehchang (2013) investigated the effects of intangible assets on loan interest rates with a focus on SMEs. The intangible assets are measured by R&D and advertising expenditures. The finding of intangible assets was negatively affected the interest rates on bank loans.

In Iran setting, Rostamy et al. (2012) investigated the relationship between intellectual capital both operating cash flow and the weighted average cost of capital in Tehran Stock Exchange (TSE) between 2005 to 2009. They reported that a negative significant relationship between intellectual capital and the weighted average cost of capital but a positive significant relationship between intellectual capital and corporations' operating cash flow. They supported the utilization of this effective intellectual capital for obtaining a lower cost of finance and a better future performance. Similarly, Iranmahd et al. (2014) examined the relationship between intellectual capital

and financing costs and the value of manufacturing companies listed in the Tehran Stock Exchange. The final sample was 84 firms from 2005 to 2012. Using the value-added coefficient of intellectual capital including its components as the independent variables and the dependent variables also consisted of the weighted average cost of capital and firm value. They found that was a significant reverse relationship among the value-added of capital applied, the value-added of intellectual coefficient, the value-added of intellectual capital, and the weighted average cost of capital, while not significantly correlated with firm value. Therefore, the value-added of intellectual capital, which contained human capital, structural capital, including the value-added of capital applied reduced the weighted average cost of capital. Meanwhile, the study of Arjmandi and Abadi (2016) examined the influence of the component of intellectual capital on the cost of capital. Using the sample of 131 companies listed Tehran stock exchange in the period 2009-2014. The component of intellectual capital was measured by VAIC<sup>TM</sup>. They show the result that the relationship significantly between capital employed and cost of capital, although, human capital and structural capital were not significant.

The study of Zakariaa et al. (2020) investigated that does intellectual capital influences a firm's financial health? This study examines the impact of intellectual capital (IC) on the firm financial health of 503 construction and material firms across eight countries in developing markets (Bangladesh, India, Indonesia, Malaysia, Philippines, Pakistan, Thailand, and Vietnam), from 2010 to 2017. Based on system GMM, two measures of intellectual capital were applied, namely VAIC<sup>TM</sup> and M-VAIC. The result suggests a significant positive relationship between intellectual capital and firm financial health. Firm capital employed efficiency (CEE) and human capital efficiency (HCE) are the main components that contributed to financial health. It also reported that the previous year's HCE has negatively influenced the financial health of construction and material companies. They revealed that HCE and CEE would enhance the financial health of the company, it can refer to reducing the likelihood of bankruptcy.

### Non-financial information

In the emerging economy, China setting, Wang, Sewon and Claiborne (2008) examine the determinants and consequences of voluntary disclosure. Using the sample of 110 listed Chinese companies. They examined the extent of voluntary disclosure cross-sectionally at the end of the year 2005 both domestic, namely A-share and foreign shares, namely B-share. The determinants are measured by state ownership, foreign ownership, and firm performance. The voluntary disclosure score was a list of 79 items into (1) strategic, (2) non-financial, and (3) financial information developed from Meek, Roberts and Gray (1995), which obtained the company's annual report published by the Shanghai and Shenzhen Stock Exchanges. They reported that positively affected state share ownership, foreign share ownership, firm performance. Although, no evidence that companies can benefit from extensive voluntary disclosure by having a lower cost of debt capital. Likewise, the studied in Iran by Dadashi et al. (2013) the same result as the China setting, they used the sample of 52 firms listed in the Tehran Stock Exchange from 2001 to 2010. They found that was an insignificant relationship between the amount of information voluntary disclosure and the cost of debt.

Moving to South Africa setting, the study of Guidara et al. (2014) investigate the effect of voluntary and timely disclosure on the cost of debt. Using sample 20 non-financial companies listed in Johannesburg Stock Exchange for the period 2008-2011. They used the disclosure index developed by self-constructed and adapted Chau and Gray (2002) which incorporates 12 categories, which concern the topic for instance, financial, strategic, intellectual, social and risk information. Adding the timely disclosure was a proxy of the earnings announcement lag. They found that the extent of voluntary disclosure was negatively and significantly associated with the cost of debt. While timely disclosure was less effective on the cost of debt. The authors supported that increasing the extent of voluntary disclosure may influence creditors' behavior. On the other hand, the founding in Egypt of Kamel and Shahwan (2014) identified that there was no significant association between the voluntary disclosure and the cost, also insignificant on the cost of debt. They adapted the disclosure index from earlier studies (i.e. Meek et al., 1995; Botosan, 1997; Patel & Dallas, 2002; Leventis & Weetman, 2004b; Alsaeed, 2006; Kristandl & Bontis, 2007) and a preliminary list of

45 items dropped nine items, which a final 36 items can not the specific title of categories.

In Tunisian setting, the study of Talbi and Omri (2014) investigated the impact of voluntary information disclosure on the cost of debt capital. The sample of 22 firms listed in the Tunis stock exchange from 1998 to 2004. The index of voluntary disclosure was adopted from Matoussi et al. (2004), Botosan (1997) and adapted to the Tunisian context. The results showed that voluntary disclosure mitigated the asymmetric information between managers and lenders, which consequently decreased the cost of capital.

In addition, the prior studies investigated the voluntary disclosure of intellectual capital reporting as follows. Barus and Siregar (2015) examined that the effect of voluntary disclosure of intellectual capital on both costs of equity and cost of debt, using sample 103 technology-intensive industry listed firms on the Indonesia Stock Exchange the period 2010-2011. The disclosure contained three categories as human capital, structural capital, and relation capital which adapted the sub-categories of Li et al. (2008) and excluded items were related to the mandatory items, which used the final total of 48 items. Both cost of equity and cost of debt used following Francis et al. (2005). They found that all sub-categories of intellectual capital disclosure were insignificantly on the cost of debt. Meanwhile, intellectual capital disclosure was negatively affecting the cost of equity, also the human capital and structural capital were negatively affecting the cost of equity.

While Iazzolino et al. (2014) focused on Greek context for intellectual capital disclosure was included in credit risk assessment. Using the sample 40 firms and the intellectual capital disclosure divided into three dimensions total ten items: human capital (three items), structural capital (4 items), and relational capital (3 items) based on Edvinson (1997). Their research suggested that the non-financial indicators of intellectual capital can be used to improved credit scoring models based on multiple discriminant analyses.

Stropnik et al. (2017) investigated the association between intellectual capital disclosures by organizations and the cost of debt. They used a sample of 100 organizations of Slovenian in the year 2014. The component of intellectual capital adopted Li et al. (2008) which contained 61 items such as human capital

(22 items), structural capital (18 items), and relation capital (21 items). They showed that the association between all intellectual capital disclosure and the cost of debt were statistically insignificant. In the North African region of Tunisian context, the study of Bouchareb and Kouki (2019) the effect of intellectual capital disclosure (ICD) and corporate governance practices on the cost of finance. Using a final sample consists of 135 observations of 27 firms in the period 2010-2014. They modified the number of items disclose intellectual capital from Guthrie and Petty's framework and reclassified the items to fit the Tunisian context which consists of 31 items divided into three categories: internal (structural) capital (9 items), external (customer/relational) capital (13 items), and employee competence (human capital) (9 items). They used the cost of finance compose of the cost of equity based on Easton's (2004) approach and the cost of debt was the interest rate paid. They revealed that some corporate governance such as a large board of directors was negative and CEO duality was positively significantly associated with the cost of equity, while the board of directors' size was positively associated with the cost of debt. Moreover, some ownership structures, namely managerial ownership and ownership concentration were positively and significantly associated with the cost of finance, while institutional shareholding cannot influence creditors' behavior through their effect on the cost of finance. Additionally, the overall intellectual capital disclosure was negatively and significantly associated with the cost of debt and the cost of equity.

In summary, the emerging market is based on prior empirical evidence<sup>4</sup>. The intellectual capital is measured by market-based valuation (Gamayuni, 2015), Tobin's q method (Rostamy et al., 2012), R&D, and advertising expenditures (Hsuehchang, 2013), VAIC<sup>TM</sup> (Iranmahd et al., 2014; Arjmandi & Abadi, 2016). The emerging market is various measure value of intellectual capital. As a result, intellectual capital was negatively related to the cost of capital in terms of the weighted average cost of capital and cost of debt (Rostamy et al., 2012; Hsuehchang, 2013; Iranmahd et al., 2014). While some empirical evidence stated that intellectual capital components are not relatively with the cost of capital (Gamayuni, 2015; Arjmandi & Abadi, 2016). Given the value of intellectual capital can assume the relation with the cost of debt.

---

<sup>4</sup> See in Appendix B (table 18-19) for more details.

Meanwhile, the non-financial information represents the disclosure which is important for the organization. Previous empirical evidence found that the relationship between voluntary disclosure and the cost of finance was significant (Guidara et al., 2014; Talbi & Omri, 2014). Most studies adopted the disclosure items from a prior study (Wang et al., 2008; Kamel & Shahwan, 2014; Talbi & Omri, 2014). Similarly, intellectual capital is measured by non-financial information, it adapted and adopted items from prior literature (Iazzolino et al., 2014; Barus & Siregar, 2015; Stropnik et al., 2017; Bouchareb & Kouki, 2019). Prior studies of Barus and Siregar (2015) and Bouchareb and Kouki (2019) show that the intellectual capital and component disclosure relates negatively with the cost of finance while some studies is not a relationship. While Stropnik et al. (2017) reported that the association between all intellectual capital disclosure and the cost of debt was statistically insignificant. Thus, the prior result found a mix of outcomes.

Additionally, it can be explained that the studies in emerging markets are often restricted to using a database. Using the sample is not widely to study, owing to the small sample size and not generally result in other countries. Prior empirical used a period to study in the short term. Most research on intellectual capital investigates the relationship and consequence of financial information. In another part, there is research that investigates the relationship and consequence of non-financial information. Thus, prior research separated to investigate in each viewpoint of the information of intellectual capital. Moreover, the emerging market is a good setting because of depended on debt more than equity because the financial institution plays a critical role support firm's activity (Wang et al., 2008).

### **Debt Capital and Relationship With Intellectual Capital Reporting**

Debt has one of the important elements in the capital structure that was influenced by providing funding to the company (Masri & Martani, 2014). Debt has defined that the cost of funds arising from external financing that the type of debt or the rate an organization has paid on its debt, such as bonds and loans as borrowing costs. Kim and Sorensen (1986) identified the debt as all debt with maturity within one year or a maturity greater than one year as long-term debt. Likewise, Leland (1994)

identified a debt structure that has time-dependent or no explicit time dependence. Black and Cox (1976) offered some bonds with no maturity date have still promised a fixed coupon rate, the borrower burden has expense at an interest rate base on the contractual (Sengupta, 1998). Hence, the lenders' decision has based on evaluating the firm's financial position or firm's information as processing known as credit risk analysis, in order to estimate the probability of default risk. The lending can be accompanied by the request for collateral or security for the credit based on the provision of the value of assets and the estimation of the firm's future cash flow (Berger & Udell, 2002; Guimón, 2005; Moro, Lucas, Bazzanella & Grassi, 2009). For debt creation, the organization can use the bond issue or bank loan to promise to pay out the future cash flow, they undertook to make the interest and principal payments (Jensen, 1986).

The presence of debt in a firm's capital structure has considered costs and benefits, because of negotiation conditions through the debt contract. The debtholders have been protected in term contract by the debt-covenant or financial covenant that they ensured to receive the timely payment of the principal and interest that are their claims on a borrower's future cash flow and assets (Leland, 1994; Bourveau, Stice & Wang, 2020). In the protective debt-covenants have required that the firm constrained the dividend payment or the financial accounting-based performance such as the current assets ratio, the debt services coverage ratio, the interest coverage ratio, the debt to assets ratio, the debt to equity ratio that the borrower maintained liquidation and debt capacity (Myers, 1977; Leland, 1994; Lambert, 2001). Examples of the cost, the corporate has depended on external financing through to use debt financing or leverage can help to discipline the device. The managers' ability is committed to making their contractual payments to debtholders because it allows creditors the option to force the firm into liquidation (Jensen, 1986; Harris & Raviv, 1990; Uğurlu, 2000; Abor, 2008). In case the organization cannot make the payment in maturity or the default risk that they have changed in liquidation or renegotiation, the probability incurred the cost of financial distress more likely risk the organization face bankruptcy cost (Jensen & Mecking, 1976, 1986; Harris & Raviv, 1990; Fosberg, 2004; Markopoulou & Papadopoulos, 2010). So, the risk of default has an incentive for the debtholders to monitoring the managers leading to the requirement of more information (Markopoulou



& Papadopoulos, 2010). Examples of the benefits of the debt, the information disclosed by the management is helpful in the investment policy, opportunities, using intellectual capital and the company's activities, this creates to understand the existing risks and increasing the confidence of the financing decision (Utomo & Chariri, 2015). Signaling information regarding financial and non-financial information disclosed by the managers is meaningful to creditor's decisions (Ross, 1977; Guimón, 2005). The extension of voluntary disclosure provides signaling of the company that shows an added value of information, including solving the inadequacy of information arising from information asymmetry with the debtholder (Connelly et al., 2011; Kateb, 2014; Kamath, 2014). Moreover, Armstrong, Guay and Weber (2010) stated that the managers with high debts have been required more screen information from the lending institutions, credit rating agencies, and controlled to use the debt contract. Also, the tax benefits suggested by Black and Cox (1976), MacKie-Mason (1990) and Duffie and Lando (2001) the interest rates have generated benefits the tax shields offered for interest expense. The prior literature demonstrated to use of the cost of debt capital as follows. The study of corporate bond yields spreads as a proxy for the cost of debt capital by Mansi, Maxwell and Miller (2011) and Dhaliwal, Hogan, Trezevant and Wilkins (2011) as the difference between the yield to maturity on a corporate debt security and its duration equivalent Treasury security with an exact yield to maturity. When not the treasury security with an exact maturity was available, in the missing yields using interpolation based on the Nelson and Siegel (1987) model. Mansi et al. (2011) suggested that the firms with multiple debt securities, to use two approaches. First, a firm's yield spread from the most recently issued bond. This was typically the most liquid bond instrument and should reflect the most accurate estimate of a firm's cost to debt. Second, an overall yield spread for the firm based on a weighted average of the bonds yields spreads, with the weight being the amount outstanding for a bond divided by the total amount outstanding for all traded bonds in the firm.

The corporate bond rating score in order to reflect a rating agency's opinion of a firm's overall creditworthiness and its capacity the financial obligations used by Ashbaugh-Skaife, Collins and LaFond (2006), Cheng and Subramanyam (2008), Oikonomou, Brooks and Pavelin (2014), to get by standardizing the financial institution

in bond issue rating classifications, as speculative issues were significant in terms of implied default rates of bond prices and yields.

The interest cost of debt issues suggested by Mazumdar et al. (2000), the quoted loan spread in basis points over the interest rate benchmark the London Interbank Offered Rate or LIBOR rate on the first new loan of next year. The effective rate of interest which the present value of the principal and interest payment was equal to the amount received by the firm net of underwriter discounts (Sengupta, 1998; Nikolaev & Van Lent, 2005; Yu, 2005).

The cost of debt was the firm's debt as interest expense for the year divided by average short and long-term debt during the year, as evidenced by prior research to follow Francis et al. (2005), Gray, Koh and Tong (2009) and Orens et al. (2010). Additionally, Talbi and Omri (2014) and Stropnik et al. (2017) suggested that an estimate from the ratio of financial expenses on bank borrowing in the amount of borrowing.

In summary, intellectual capital reporting is concerned with the assessment of lenders. When the company invests intellectual capital, it does not provide immediate cash. It relies on a growth opportunity of intellectual capital value. The intellectual capital reporting could signal their group of corporate stakeholders (Haji, 2015). Intellectual capital is contained uncertainly in the future cash flow. But the presence of intellectual capital can create a competitive advantage in a business environment and long-term value. The debt holders cannot observable the complete information. Managers attempt to give comprehensive information with lenders' decisions for better signaling, they are likely to receive a reasonable benefit. According to Bukh (2003) and Beattie and Smith (2010) identified that the information that has increased about intellectual capital might reduce uncertainty leading to lower risk and enhance transparency. Intellectual capital reporting is a signal to assess the company's ability to pay. The lenders are likely to estimate low company risk and consequently borrowing costs. They receive sufficient information for decisions. They can confidence to repay follow to a contract.

## **Corporate Governance Mechanisms**

Corporate governance mechanisms are influenced by both international factors such as the growth of global, the corporate framework of legal, the institutional of regulators, and international securities markets, and the national factors of the legal frameworks, the nature of the capital market, the business culture, the political and economic environment (Appuhami & Bhuyan, 2015). The definition of corporate governance mechanisms is supervised and designed by the institution as follows.

### **Definition of corporate governance mechanisms**

The Stock Exchange of Thailand define corporate governance as the system organizes the structure and process of relations between the board of directors, management and shareholders to build competitiveness for the company, lead to growth and add value to shareholders in the long term regarding other interested parties (SEC, 2017). In 2002, the principles of corporate governance were implemented by the Organization for Economic Cooperation and Development with the support of the Global Corporate Governance Forum and underpin the corporate governance component of World Bank/IMF Reports on the Observance of Standards and Codes (ROSC) (The Organization for Economic Cooperation and Development (OECD), 2004). The Organization for Economic Cooperation and Development defined corporate governance as the set of relationships between the board of the company, its shareholders and other stakeholders (OECD, 2004).

In 2012, the Securities and Exchange Commission together with relevant capital market organizations issued the Corporate Governance Code for Listed Companies to shape following the principles from the ASEAN corporate governance scorecard (ASEAN) and the framework of the Corporate Governance Report from the Thai Institute of Directors (IOD) as name as the Principles of Good Corporate Governance for Listed Companies 2012 which consist of five principles (SET, 2012). Since 2013, this principle has been practiced by the listed companies in Thailand.

In 2017, the CG Principles for the year 2012 is implemented as Corporate Governance Code for Listed Companies 2017 (CG Code). From now on known as CG code 2017 is replaced the principles of Good Corporate Governance for Listed

Companies 2012, this reflects current international standards and trends by focusing on the roles and responsibilities of the board for each aspect of governance (The National Corporate Governance Committee, 2017; Jantadej, 2017, SEC, 2017). Under CG code 2017, The board of directors should a core role that is (a) to set the aim of the company to ensure companies long-term sustainable value creation. (b) implementation of goals by having a committee that facilitates the achievement of the objectives that followed by defining, supervise, and develop executives (management) and employees. In addition, the organization can promote innovation and operate business responsibly. (c) monitoring and disclosing information for ensuring, there are an internal control system and risk management. This principle can apply the maintaining credibility financial of the information disclosure and participation of shareholders throughout the communication with shareholders (Jantadej, 2017).

In summary, under the code of corporate governance is a set of mechanisms to induce the framework ensuring the efficient internal control system within the company. Corporate governance mechanisms are designed and implemented for equivalent treatments underline the interests together. It supports the operation of the company can check and balance the power of the management team. It can promote transparency in manage the business process to achieve the goal.

### **Important of corporate governance mechanisms**

The presence of corporate governance mechanisms insists to protect maximize-interest for firms and to keep the interest of the shareholders. Corporate governance mechanisms are one key element to express the responsibility within the company because this is the actions of the monitoring and the balancing concerning the best interest between the managers and the shareholders (OECD, 2004; SET, 2012; Gyamerah & Agyei, 2016). They engage to be strenuous the management and monitor mechanism, the maintaining of accountability in the corporate reporting. They engage to investigate ensuring accuracy to release information. They participate to set the direction for creating and sharing the proper allocation of resources leading to good governance (OECD, 2004; SET, 2012).

Hence, the corporate governance mechanisms are considered an important determinant for the firms to achieve their transparency and accountability through the

disclosure which is essential for reporting the corporate information (Taliyang, & Jusop, 2011; Al-Musali & Ismail, 2015). Corporate reporting includes the disclosing of intellectual capital, corporate governance support to conduct for creating, developing, and usefulness the intellectual capital enclosing in the people, processes of the firm (Keenan & Aggestam, 2001). Good corporate governance mechanisms enhance the reporting information regarding intellectual capital which indicates the ability of firms in managing their intellectual assets and reflecting their usefulness of intellectual capital (Al-Sartawi, 2018). Singh and Van der Zahn (2008) pointed out that this is to monitor the management to the extent of increasing the possibility of providing more information on intellectual capital.

### **Corporate governance mechanism and relationship with intellectual capital reporting**

The corporate governance mechanisms are the vital role that can check the financial and non-financial information for disclosing transparency. They can monitor management actions and limit opportunistic behavior of the managers such as concealment, and distortion (Fama & Jensen, 1983; Li, Pike & Haniffa, 2007; Cerbioni & Parbonetti, 2007). The mechanism of corporate governance is a key part of the voluntary disclosure because this information is produced under the incentive the managers' aspects (Ho & Wong, 2001). According to Fama and Jensen (1983) noted the corporate governance mechanism can induce good internal control lead to the prospect manage of a conflict of interest arising within the company, they can exercise pressure the controlling and monitoring the manager's behavior. García-Meca and Sánchez-Ballesta (2010), Samaha et al. (2015) and Tejedo-Romero and Esteves (2018) supported that the relationship between the corporate governance mechanisms and the voluntary disclosure, also they improve corporate reporting policy. They provide the necessary control system to increase the degree of transparency and the reliability of the extent of voluntary disclosure includes intellectual capital (Tejedo-Romero, Araujo & Emmendoerfer, 2017). This mechanism enhances the disclosure leading more accurate to relate the information of intellectual capital (Firer & Williams, 2003; Cerbioni & Parbonetti, 2007). Al-Musali and Ismail (2015) informed that the responsibility of corporate governance can create, develop, and utilize the intellectual

capital which relates to the people, structures, and processes of the company. On the other hand, some prior studies of Titisari (2018) found that corporate governance does not affect the intellectual capital in form of financial information. Likely, Salehi and Shirazi (2016), Tejedó-Romero et al. (2017), Buallay (2018) and Kavida, Harun and Murshid (2019) indicated that less attention is paid to the relationship between intellectual capital and corporate governance mechanisms. Alfraih (2018) noted that the mechanism of corporate governance considers carefully disclosure, owing to the information can support extending benefit and increasing credibility.

In summary, corporate governance mechanisms can support the operating organization and monitoring the disclosures. They can provide the suggestion and to trace the requirement for supporting the strength of the firm. The mechanisms of corporate governance mainly involve thinking holistically about information about intellectual capital. It can be used to create the value-added of the firm's resources for exploiting the intellectual capital reporting. This study focus on a part of the corporate governance mechanism consists of the board composition, the audit committee, the ownership structure and relationship with intellectual capital reporting as follows.

#### The board composition and relationship with intellectual capital reporting

The board composition is the core strength of the internal control for companies and emphasizes transparency in the role and accountability for checking and balancing. The composition of the board is determined by independence, they have knowledge and experience for business. They can involve setting the policy and strategy for the management independently. In addition, the directors have a diverse knowledge for seeking opportunities and risks in different visions (SEC, 2017). They have an influence on the efficiency, effectiveness and supervision of management conduction (Hidalgo, García-Meca & Martínez, 2011). Meanwhile, they can advise that can create, develop, utilize, and manage the efficiency of intellectual capital for improving the policy and strategy of a company (Al-Musali & Ismail, 2015). They could play in enforcing management to disclose intellectual capital (Ishak & Al-Ebel, 2013). They can support monitoring capacity in organizing activities (Haji & Ghazali, 2013). Li et al. (2008), Haji and Ghazali (2013), Muttakin, Khan and Belal (2015) revealed that the proportion of independent directors is positively associated with

intellectual capital disclosure in determining the value of the non-financial information. By contrast, Abdul Rashid, Ibrahim and Othman (2012) showed that the board composition negatively influences the extent of intellectual capital disclosure. Likewise, the finding of Tran, Van and Vo (2020) indicated that a larger number of independent directors is a negative effect on the efficiency of intellectual capital. In addition, Tejedo-Romero et al. (2017) and Dalwai and Mohammadi (2020) pointed out the board composition is not effective supervision and advisory mechanism to disclose more information about intellectual capital efficiency. Dashtbayaz, Salehi, Mirzaei and Nazaridavaji (2020) found that the proportion of independent directors has no significant relationship with intellectual capital efficiency, and its components. Also, Hidalgo et al. (2011) found that the independent directors are not statistically significant the overall of intellectual capital and its components disclosure.

As the result of previous research are not a consensus. For this study, independence is closely linked to ensure in monitoring the decisions taken by managers, they can protect the interests of shareholders (Fama, 1980). Fama and Jensen (1983) reported that the independent directors confident the separation between the decision of the management and control decisions, leading the effective control in the top managers' interest. Leading to investigate the relationship between board composition and intellectual capital reporting.

#### The audit committees and relationship with intellectual capital reporting

The audit committees of the company are independently in accordance with the standards as the function of the supervisor of information disclosure. They play a part in the company's monitoring, particularly in improving the effectiveness of the board directors in monitoring the management team which emphasizes report improvement. They are a one of factor that can reduce the agency problem between the shareholders and the managers (Forker, 1992; Mangena & Pike, 2005). They oversight the firm financial statements, internal control process for ensuring the quality of corporate reporting (Beasley, 1996; Klein, 2002). The audit committee is considered as representatives of minority shareholders and has the duty of ensuring the accuracy and transparency of the company's disclosure. Moreover, they ensure the managerial decisions for maximizing the wealth of balance using intellectual capital reporting

(Keenan & Aggestam, 2001). Azman and Kamaluddin (2012) and Madi, Ishak and Manaf (2014) stated that the audit committee may encourage to provide intellectual capital disclosure which enhances corporate voluntary disclosure in the annual report. Likewise, Li et al. (2012) found that the audit committee size is positively related to the overall intellectual capital disclosure and its components. While Lari Dashtbayaz, Salehi and Nazari Davaji (2020) pointed out that a significantly negative relationship between the audit committee and intellectual capital reporting. In contrast, the result of Suttipun (2018) and Kavida et al. (2019) reported that no relationship between audit committee size and intellectual capital reporting. Also, Buallay (2018) found that there is no impact on the audit committee size for the overall intellectual capital efficiency and its components.

Based on the past research indicate the result can be both positive and negative, including the finding of the result of the audit committees are not affect the intellectual capital reporting. Leading to investigate the relationship between the audit committees and intellectual capital reporting.

#### The ownership structure and relationship with intellectual capital reporting

The ownership structure is referred to the level of shared ownership which relevant with the power of right and control leading to consider the separation between ownership and control for the fair distribution of other shareholders' wealth (White, Lee & Tower, 2007). The ownership structure concerns the incentive to act against the interests of other smaller shareholders because of their strong voting power (Morck, Shleifer & Vishny 1988). The company treats all shareholders fairly and equitably to enable them to exercise shareholders' rights and can communicate their views on matters affecting the company (Jantadej, 2018). The ownership structure can act as manage and control power through intellectual capital reporting. This determines the intellectual capital reporting inducing a managers' incentive, they may create more value for the company or maximize self-interest (Veltri & Mazzotta, 2016). They can directly access the information, additionally, they have the voting right to affect the firm's strategic directions and business operations (Whiting & Woodcock, 2011; Tran et al., 2020). The finding of Gan and Saleh (2013) and Shahveisi et al. (2017) there is a positive relationship between ownership concentration and intellectual capital



reporting. In contrast, Firer and Williams (2005) and Mohd-Saleh and Che Abdul Rahman (2009) found that the shared ownership concentration is a negative association with intellectual capital reporting. They reported the information of intellectual capital is lower in the firm with higher share ownership concentration. Also, Tran et al. (2020) found that the major shareholders holding 20 percent of the outstanding shares is negatively effect on intellectual capital efficiency. They identified that the majority shareholders can reduce investment in the intellectual capital of firms for the long term. On the other hand, Buallay and Hamdan (2019) indicated that the largest three shareholders are not associated with the overall intellectual capital provided by financial information but only the structural capital is a positive association. They reported that the three shareholders with a total sum exceeding 50 percent are monopolizing and controlling the firm, this means to protect their interests rather than the interest of minority shareholders. Consistency, the finding by Whiting and Woodcock (2011) and Hidalgo et al. (2011), the relationship between the ownership structure by the top three shareholders and the intellectual capital disclosure is not significant. They revealed that the firm might not have the resources and tools necessary to report on its intellectual capital. Moreover, the intellectual capital disclosure may not be high on the list of management's priorities.

According to the result of previous research, the finding is not consensus which leading to investigate the relationship between the ownership structure and the intellectual capital reporting.

### **Hypotheses Development**

The hypotheses development can determine from mentioned theoretical foundation section, the literature review and the empirical evidence on the intellectual capital section. The research gab of this study can explain that the relationship between intellectual capital reporting and the debt capital which the decision is considered by the financial information and the non-financial information, the finding of prior studies is not consensus. By the emerging market needs to develop the utilization of intellectual capital to strengthen the organizational resource for future growth. In addition, the emerging market often depends on the debt capital more than the equity capital.

Particularly in the context of Thailand, this setting is considered one of the emerging markets which is a good setting. Due to the companies aware to use intellectual capital as the key value of information. It is essential for the company is growing and to expect the financing fund. The value of intellectual capital reporting can be communicated to the lenders for enhancing the creditworthiness of the firm and to reduce risk.

However, the capital market of Thailand contains the listed companies in the Stock Exchange of Thailand (SET) and the Market for Alternative Investment (MAI) are the difference that the SET is contained the large companies with more than 300 million baths in paid-up capital after IPO, whereas the MAI has contained small and medium-sized enterprises that have over 50 million baht in paid-up capital after IPO, there are no regulatory differences from SET (SET, 2020). Although, both the SET and the MAI are likely growth to raise long-term. Including, the SET and the MAI have similarly the disclosure practice forced by the regulator, such as the disclosure of information sufficiently fact and timely manner leading to transparency and fairness to the external user in form the lenders (SET, 2020). In addition, both a large market and a small and medium market have comprehensive information undertaken to attract the attention of external users (Abeysekera, 2008). This study focuses on the characteristics of the MAI as follows, firstly, the listed company in the MAI is as the driver for economic progress, due to having higher the growth opportunity (Promtong, 2020). Secondly, the characteristics between the SET and the MAI are different to access the external funding because the listed companies in the MAI choose to fund their needs raising debt that is inferior costs in comparison to equity issues, consistency with the Bank of Thailand (BOT, 2016), The Organization for Economic Cooperation and Development (2020) reported that the demanding loans of small and medium-sized enterprises depend on debt capital. For this reason, they use more disclosure to signal on the lenders. Therefore, the intellectual capital reporting appears as the activities, investment, or development in the corporate reporting which generates added value for the listed company in the MAI.

Thus, this study investigates that there is the relationship between intellectual capital reporting and the debt capital? It can be hypothesized as follows.

H1: Intellectual capital reporting quantified by financial information is negatively associated with the debt capital.

H1a: The human capital quantified by financial information is negatively associated with the debt capital.

H1b: The structural capital quantified by financial information is negatively associated with the debt capital.

H1c: The relational capital quantified by financial information is negatively associated with the debt capital.

H2: Intellectual capital reporting quantified by the non-financial information is negatively associated with the debt capital.

H2a: The human capital quantified by the non-financial information is negatively associated with the debt capital.

H2b: The structural capital quantified by the non-financial information is negatively associated with the debt capital.

H2c: The relational capital quantified by the non-financial information is negatively associated with the debt capital.

As mentioned above in the theoretical foundation section determines the agency theory. this study believes in this theory can be explained the relationship between the corporate governance mechanisms and intellectual capital reporting. Although, the past research reported the result for understanding the relationship between the corporate governance mechanisms and the intellectual capital reporting that the results have remain not consensus. It would also be interesting to consider intellectual capital reporting to demonstrate the potential growth of the company. This information is a part to enhance the benefit of wealth for the managers and the shareholders. The protection of intellectual capital reporting is important to determine the corporate governance mechanism in particularly the context of Market for Alternative Investment (MAI).

Corporate governance mechanisms are the internal control system which the key principle complied by the regulators for the Market for Alternative Investment (MAI). The nature of corporate governance principal support to effectively build the structure and system efficiency governance. Corporate governance mechanisms concern with the responsibility for checking and monitoring transparency of the

intellectual capital reporting. They can investigate the policy about intellectual capital, control, and monitor for the management's ability to achieve the company's plan (Mohd-Saleh & Che Abdul Rahman, 2009). Additionally, the characteristic of the MAI is a good characteristic to study the corporate governance mechanisms that influence the decision to disclose intellectual capital in corporate reporting. The MAI has the corporate governance principle emphasis on minority interest protection and relatively requirements for voluntary disclosure regarding intellectual capital.

Thus, corporate governance mechanisms are selected as one of the factors influencing intellectual capital reporting. It is one of the monitoring tools to reduce agency problems in the companies. Corporate governance mechanisms examine in this study include board composition, audit committee, and ownership structure. Is there a relationship between the corporate governance mechanism and the intellectual capital reporting? It can be hypothesized as follows.

H3.1 : The board composition is positively associated with intellectual capital reporting quantified by the financial information.

H4.1 : The audit committee is positively associated with intellectual capital reporting quantified by the financial information.

H5.1 : The ownership structure is negatively associated with intellectual capital reporting quantified by the financial information.

H3.2 : The board composition is positively associated with intellectual capital reporting quantified by the non-financial information.

H4.2 : The audit committee is positively associated with intellectual capital reporting quantified by the non-financial information.

H5.2 : The ownership structure is negatively associated with intellectual capital reporting quantified by the non-financial information.

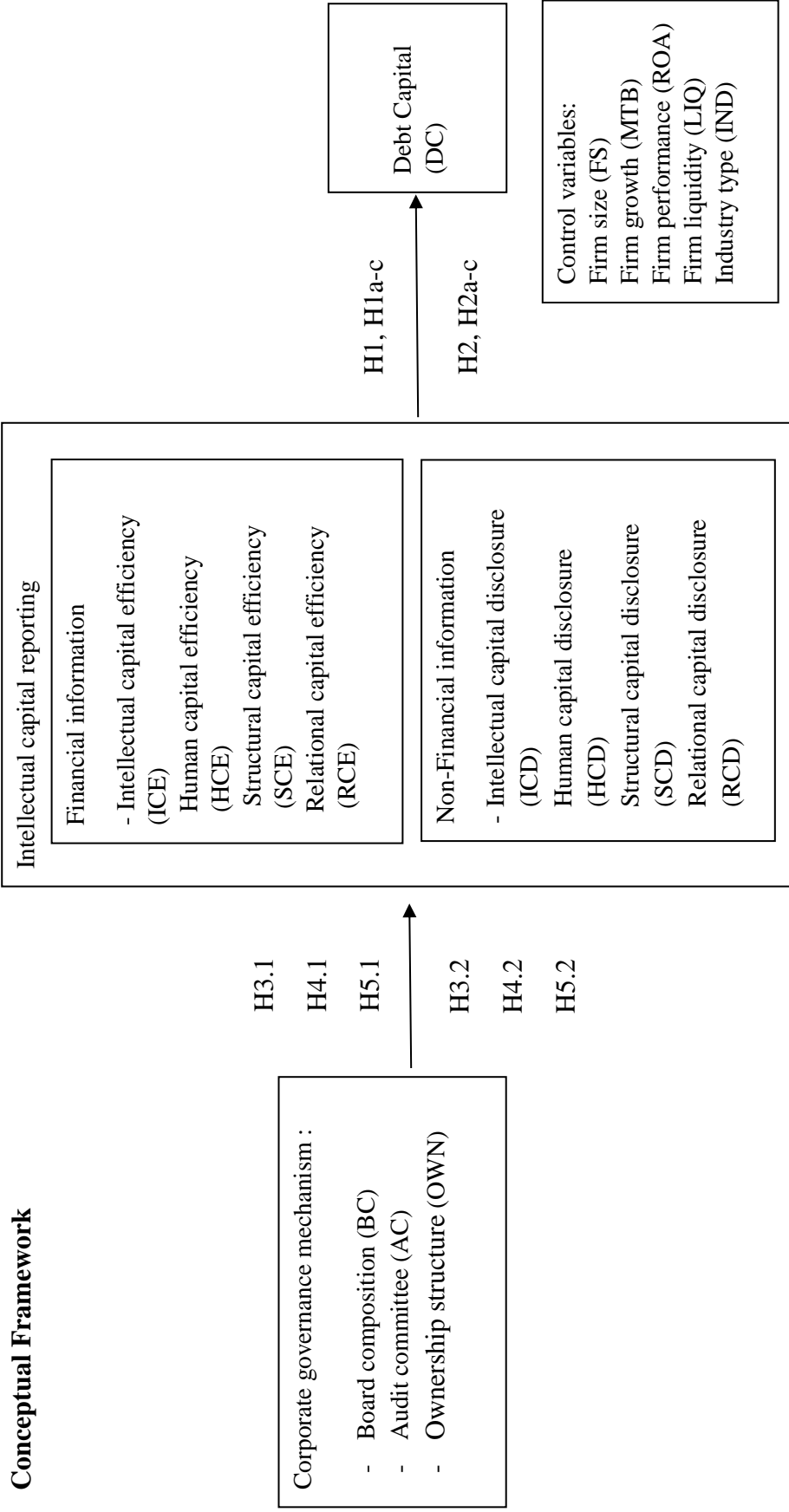


Figure 1 The impact of Intellectual Capital Reporting on Debt Capital

## **CHAPTER III**

### **RESEARCH METHODS**

The previous chapter describes the understanding of intellectual capital with a theoretical foundation, literature review, conceptual framework, and hypotheses development. Consequently, this chapter illustrates the research methods which are organized as follows. First, the population and data collection, which includes the population and sample, the data collection. Second, the variable measurements, the method section includes the definitions and measuring the variables. Finally, the research model is analytical statistics and related to the analysis of the equations.

#### **Population and Data Collection**

##### **(1) Population and sample**

In this study, the population is all listed companies in the Market for Alternative Investment (MAI) from the following industries; Agro & Food, Consumer products, Industrials, Property & Construction, Resource, Service, and Technology. The population is 710 firm-year observations (on December 31, 2019), during the year 2015-2019. The exclusion criteria were as follows.

Excluding, (1) companies were listed in the financial industry to consist of the finance and securities, banking and insurance owing to operate the difference both regulations and debt financing characteristics from the other industry (Dadashi et al., 2013; Stropnik et al., 2017). (2) The Companies were unavailability data through the fiscal year-end 31<sup>ST</sup> December. (3) The company is a rehabilitation. Also, (4) the company is incomplete data. (5) The company unavailable in the English language of the annual report. (6) The outliers of the main variable with a value below the 5<sup>th</sup> and above the 95<sup>th</sup> percentile (Detthamrong et al., 2017). As shown in Table 1.

Table 1 Sample Selection Process

Sample Selection Criteria from listed firms in the MAI (Number of firm-years)	2015	2016	2017	2018	2019	Total
Panel A: Final sample selection						
Initial sample from company listed.	122	126	142	152	168	710
<u>Less</u> Financial, insurance, and leasehold property funds industries.	(6)	(8)	(8)	(9)	(10)	(41)
The fiscal yearend of companies is not 31 <sup>st</sup> December.	(5)	(5)	(5)	(5)	(5)	(25)
Companies under rehabilitation	(-)	(-)	(-)	(-)	(1)	(1)
Companies incomplete data	(4)	(4)	(2)	(4)	(4)	(18)
Companies lack a data in the English language of the annual report.	(39)	(44)	(48)	(56)	(63)	(250)
Outliers	(10)	(5)	(14)	(8)	(9)	(46)
Final sample after calculating	<u>58</u>	<u>60</u>	<u>65</u>	<u>70</u>	<u>76</u>	<u>329</u>
Panel B: Final sample classify by industry						
Final sample are as follow:						
Agro & Food	2	4	6	8	8	28
Consumer product	5	5	4	3	5	22
Industrial	17	14	14	18	20	83
Property&Construction	4	4	6	6	8	28
Resources	9	6	8	6	7	36
Services	18	23	23	23	22	109
Technology	<u>3</u>	<u>4</u>	<u>4</u>	<u>6</u>	<u>6</u>	<u>23</u>
Final sample	<u>58</u>	<u>60</u>	<u>65</u>	<u>70</u>	<u>76</u>	<u>329</u>

Table 1 presents the detail of the study final sample. Panel A presents a final sample selection of this research was obtained during 2015-2019. Starting with 710 firm-years. The initial sample was considered removing the financial industries 41 firm-years. The fiscal year-end of the company was not fiscal year-end 31<sup>ST</sup> December with 25 firm-years, and rehabilitation with 1 firm-year. This study eliminated the company's incomplete data with 18 firm-years. Further, this study eliminated the company unavailable in the English language of the annual report with 250 firm-years. The 46 firm-year observations of the main variable with a value below the 5<sup>th</sup> and above the 95<sup>th</sup> percentile (Detthamrong et al., 2017). Thus, the final sample with an unbalanced panel sample of 329 firm-years observations.

Panel B presents the final sample is classified by industry of a total of 329 firm-years for the period of 2015-2019. The Service industry is the largest number 109 firm-years. Followed by Industries, Resource is 83, 36 firm-years, respectively. While Agro & Food, Property & Construction, and Technology is 28, 28, and 23 firm-years, respectively. The least number of samples is the Consumer products industry with 22 firm-years.

## (2) Data collection

This study uses the data during 2015-2019 which a reason selects the investigation during the year. The Thai Accounting Standards (TAS) No.38: Intangible was revised from the year 2014 until the present which is in accordance with the criteria established by International Financial Reporting Standards. This is a revised version in accordance with International Accounting Standards ending December 31, 2012 (Bound Volume 2013 Consolidated without early application), effective for accounting periods beginning on or after January 1, 2015 (The Federation of Accounting Professions of Thailand (TFAC), 2015).

Second, the research of intellectual capital reporting in Thailand raises an awareness which that the growth of prior empirical evidence as follows, the study of Aekapang and Sopapong (2019) explores the value-added intellectual capital from the listed company in the Stock Exchange of Thailand during the year 2012-2016. The study of Sim-im, et al. (2019) investigated the relationship between intellectual capital and sustainable growth from listed companies in the Stock Exchange of Thailand which



using a sample of Service, Technology, and Agro & Food industry, during the year 2011-2015.

When looking at the prior studies on Thailand context found that using data from the specific industry and using a sample from the listed companies on the SET. Therefore, this study investigates intellectual capital reporting to keep the study up to date for the year 2019 which began to collect data in terms of the longitudinal study from 2015 to 2019. In addition, this study analyzes the financial, and non-financial information in the listed company on the Market for Alternative Investment (MAI).

For this study collected the population data from the websites of SET ([www.set.or.th](http://www.set.or.th)). This study uses secondary data to be obtained the data based on the annual report, notes to financial statements, the SET Market Analysis and Reporting Tool (SETSMART), and the websites of various companies. This database is considered that the data sources are followed by The Stock Exchange of Thailand (SET) and The Securities and Exchange Commission of Thailand (SEC). These data sources can publicly available acceptant accurate and reliable. For this study use the variables such as intellectual capital reporting consist of the financial information the disclosure information. The debt capital, the corporate governance mechanism, and the control variables. It can explain the details of data collection as follows.

The intellectual capital reporting contains financial information and disclosure information. The financial information uses to measure the model of M-VAIC which is collected from the notes to financial statements and the financial statements. Also, the disclosure information is collected from the annual report through the computing-assisted text analysis software. The annual report is screened by the keywords of intellectual capital that it is adapted the items from Guthrie and Petty (2000), Bozzolan et al. (2003), Abeysekera and Guthrie (2005), Beattie and Thomson (2007) and Li et al. (2008).

The debt capital is collected from the SET Market Analysis and Reporting Tool (SETSMART). Whereas the corporate governance mechanism is hand-collected from the annual report. Finally, the control variables are obtained from the SET Market Analysis and Reporting Tool (SETSMART).

## **Measurements**

This study explains to measure variables that it consists of dependent variables, independent variables, and control variables. The dependent variable is the cost of debt. The independent variables consist of financial information and information disclosure. The antecedent variables consist of the board composition, the audit committees, and the ownership structure. Then, the control variables consist of firm size, firm growth, firm performance, firm liquidity, and industry type. The discussion of variables measuring is as follows.

### Debt capital

Debt capital is the financial funding that a business raises by taking out a borrowing. The company has the financial expense and liabilities bearing interest that the repayment is along with the debt obligation. Debt capital is represented as the cost of debt. Debt capital is measured using the ratio of finance costs in the year of the firm divided by the total liabilities in the year of the firm and multiplied by 100. This study following Talbi and Omri (2014), Guidara et al. (2014) and Bouchareb and Kouki (2019). The cost of debt captures the cumulative debt financing decisions of each firm (Francis et al., 2005).

### Financial information

This study measures the intellectual capital and its components which is used by the Modified - Value Added Intellectual Coefficient (M-VAIC) following Ulum et al. (2014), Xu and Li (2019) and Xu and Wang (2019). This model means creating more value with one invested monetary unit in utilized intellectual capital (Pulic, 2008). M-VAIC is the sum of the valued add intellectual capital efficiency that is adapted from Pulic (2004, 2008). Thus, the overall intellectual capital is measured by financial information disclosure that uses the symbol M-VAIC for calculating as follows.

$$\text{M-VAIC (ICE)} = \text{HCE} + \text{SCE} + \text{RCE}$$

Where

$$\begin{aligned} \text{HCE} &= \text{Human capital efficiency} \\ \text{SCE} &= \text{Structural capital efficiency} \\ \text{RCE} &= \text{Relational capital efficiency} \end{aligned}$$

The Modified - Value Added Intellectual Coefficient (M-VAIC) estimation model has the details of the step as follows,

(1) Value added (VA) is determined as the starting point of the calculation to estimate the net value added created by the company during the year (Chen et al., 2005; Pulic, 2004; Pulic, 2008). The calculating VA by using the formula proposed by Pulic (2004, 2008). This is called the gross value-added approach (Soetanto & Liem, 2019).

$$\text{Value added (VA)} = \text{OP} + \text{EC} + \text{D} + \text{A}$$

Where

$$\begin{aligned} \text{VA} &= \text{Value added of company} \\ \text{OP} &= \text{Earnings before interest and tax} \\ \text{EC} &= \text{Employee cost consisting of overall salaries and wages and other employee benefits under "expenses by nature" in Notes to financial statements (Thamprasart & Phajongwong, 2018; Sim-im et al., 2019).} \\ \text{D} &= \text{Depreciation} \\ \text{A} &= \text{Amortization} \end{aligned}$$

(2) Human capital efficiency (HCE) is a company create value through investment monetary unit for human resource (Ståhle et al., 2011). The expenditure of employees is investing their knowledge and capabilities to engage in a company's activities (Public, 2008). HCE is higher the value comes from each employee. The value of employees indicates the productivity of knowledge workers (Lazzolino & Laise, 2013). According to Public (2008) and Zakariaa et al. (2020) identified that the value of HCE is less than one, which means that the firm value-added is not able to cover wages and salaries. If HCE is a value equal to one, the firm only covers employee

expenses and not value creation. If HCE is a value higher than one, the firm can able overcome employee expense and the creation of value-added. It is calculated as follows.

$$\text{HCE} = \text{VA/HC}$$

Where

$$\text{VA} = \text{value-added}$$

$\text{HC} =$  Employee cost consisting of overall salaries and wages and other employee benefits under “expenses by nature” in Notes to financial statements (Thamprasart & Phajongwong, 2018; Sim-im et al., 2019).

(3) Structural capital (SC) is described that the value added (VA) is influenced by the efficiency of HC and SC (Clarke et al., 2011). SC is the flow value added of residual from human capital (Andriessen, 2004). When SCE is increasing to drive the value added for a company. SCE has the two steps as follows.

Firstly, structural capital (SC) determines the value added that is created leftover from human investment (Tseng & Goo 2005; Clarke et al., 2011; Ståhle et al., 2011). It is calculated as follows.

$$\text{SC} = \text{VA} - \text{HC}$$

Where

$$\text{VA} = \text{value added}$$

$\text{HC} =$  Overall salaries and wages and other employee benefits under “expenses by nature” in Notes to financial statements (Thamprasart & Phajongwong, 2018; Sim-im et al., 2019).

Secondly, the calculation of structural capital (SC) can determine the ability of a company’ process and its structure (Public, 2008). It is calculated as follows.

$$\text{SCE} = \text{SC/VA}$$

Where

$$\text{SC} = \text{structural capital}$$

$$\text{VA} = \text{value added}$$

According to Public (2008) and Zakariaa et al. (2020) identified that the value of SCE less than zero or negative marks the firm is unable value-added. When SCE is a value equal to zero remains cannot value-added creation. If SCE is valued more than zero, the value creation zone.

(4) Relational capital efficiency (RCE) is the efficiency of investment in the relational viewpoint (Ulum et al., 2014). RCE is the amount of expenses in marketing, selling, and distribution that can approximate the investment in RC which are expenses to promote a product, to establish a brand name, to improve distribution lines, and so on. This expense invests in inputs for the relationships between the company and its connections (Vergauwen et al., 2007; Nazari & Herremans, 2007, Jiraudomsarod, 2019). It is calculated as follows.

$$\text{RCE} = \text{RC/VA}$$

Where

RC = marketing, advertising, selling expense

VA = value added

#### Non-financial information

This study uses the disclosure represented by the level of intellectual capital. The intellectual capital disclosure uses content analysis. Content analysis is defined as a technique for gathering data via the codification of qualitative information from the assignment of categories criteria leading to the pattern of quantitative scale in varying levels (Abbott & Monsen, 1979). It is the systematic analysis that has been widely applied within the academic literature to analyze voluntary disclosures in corporate reports (Striukova et al., 2008). The content analysis is criticizing to rely on the definitions of text units for analyzing, the units of analysis are words, sentences, paragraphs or any type of communication which is both reliable and replicable, it is being able to use available statistical techniques (Milane & Adler, 1999; Krippendorff, 2004). Many prior studies of intellectual capital disclosure use the content analysis because of the proper technique for investigating intellectual capital for example; Abeysekera and Guthrie (2004), Guthrie and Petty (2000), Bozzolan et al. (2003), Brügggen et al. (2009), Haji and Ghazali (2013) and Dumay and Cai (2015). The

intellectual capital reporting is materially interpreted from text to consider the relevance of user judgment.

The steps of developing the issue of intellectual capital reporting as follows,

(1) The intellectual capital reporting is classified into the three sub-categories to consist of human capital, structural capital, relational capital to follow Li et al. (2008).

(2) The three sub-categories comprise the content of the keywords which are drawn from previous literature on the intellectual capital definition. The content of the keywords is adapted from Guthrie and Petty (2000), Bozzolan et al. (2003), Abeysekera and Guthrie (2005), Beattie and Thomson (2007) and Li et al. (2008). The keywords make it suited for Thailand's context. The keywords are into predefined categories which are identified as the keyword meaning to show clearly inference-making content. The reliability is considered by selecting categories from well-grounded relevant literature and previous items of intellectual capital were investigated as reliable in form of inter-coder reliability (Guthrie, Petty, Yongvanich & Ricceri, 2004; Papula & Volná, 2012). The total number of intellectual capital reporting is 31 items<sup>5</sup> across three intellectual capital categories to be divided into human capital 11 items, structural capital 10 items, relational capital 10 items.

(3) The corporate annual report is used as a source for retrieving the keywords. Using the unit of analysis is words which are smaller units to capture or the word count (Milane & Adler, 1999; Steenkamp & Northcott, 2007; Brüggem, Vergauwen & Dao 2009). The number of keywords is the unit of analysis because it is good to explain different the annual reports (Gao, Heravi & Xiao, 2005).

(4) Using the computer-assisted text analysis software following Liao, Chan and Seng (2013). This study uses Rapid Miner tool that is open-source software to be used for modeling and validating various classifications, an automatically coding process which to aggregate the number of word occurrence for showing the quantity of intellectual capital disclosure (Krippendorff, 2004). The keyword is assigned to the coding process. A reason chooses the computer-aided techniques used the content

---

<sup>5</sup> In Appendix C (Table 20) for more details.

analysis because this tool can examine large data and provide a quantitative measurement. Moreover, this tool avoided human bias and subjectivity analysis.

(5) The data preparation uses the complete annual reports of each company. The data preprocessing procedure transform the annual report into a text file. The clean data use the operator changes text to the word frequency such as the tokenization processes each sentence splits, using n-grams of tokens in a document are generated. The term n-gram is defined as a word of consecutive length. The word extract through the text processing used by filter keywords (Heidari & Felden, 2015).

(6) Testing the validity perform by considering compare the result of word count between the text analysis software and the word processing program, following this approach of Morris (1994), Oliveras, Gowthorpe, Kasperskaya and Perramon (2008) and Li (2008). This study compares to different is the instrument by using the same sample and the items. It can confirm the validity of the instrument is smaller than 5% following Li (2008).

(7) Testing the whole sample by the text analysis software for testing of the hypotheses.

#### The variables of corporate governance mechanisms

This study points out the antecedent variables are the corporate governance mechanisms including the board composition, the audit committees, and the ownership structure as follows.

#### Board composition

The board composition is the person established by the ownership which has the role and accountability for checking and balancing and cooperation with the management team. The board composition is measured by the proportion of independent directors on the total board. In addition, a reason this study chooses this proxy following the criteria given by CG Code (SEC, 2017) suggests that the company's governance structure has more the number of independent directors on the board. They are the core value to balance the power which works independently leading to the benefits for all stakeholders. Moreover, the independent directors involve important to set the direction and the policy for the company. This study uses the proxy

following Haji and Ghazali (2013). The Securities and Exchange Commission requires having the proportion of independent directors at one-third of the total board, also at least three members (SEC, 2017).

#### Audit committees

The audit committee is the person who has a professional for auditing. They have the role and accountability in monitoring the firm financial statements, the internal control process for ensuring the reliability of corporate reporting. The audit committee refers to the size of the audit committee which is measured by the number of members on the audit committee. Additionally, a reason chooses this proxy because of the number of the audit committees that can refer to an independent in overseeing to relate with the finance and non-financial information on the corporate report, including the voluntary disclosure. The size of the audit committee can collaborative opinion to provide ensure accurate information for protecting a stakeholder (Samaha, Khelif & Hussainey, 2015; SEC, 2017). This proxy follows Li et al. (2012). The Securities and Exchange Commission has at least three members who are independent non-executive directors (SEC, 2017).

#### Ownership structure

The ownership structure is the internal person or organization of a business. They have the rights and duties of the shared holding a legal or equitable interest in the business, due to the right of votes and decision-making. The ownership structure is measured by the total percentage of common stock by the company's top five shareholders, following Veltri and Mazzotta (2016). The top five shareholders, as a proxy because the top five shared holdings are one characteristic of the large shareholders. They can act as right voting or control which may set the management policy encourages the retention of information leading to extracting private benefits. In addition, the top five shared holdings are likely to increase the stake of the ownership and control (Fama & Jensen, 1983). They can interfere with the benefits related to the minority shareholders. Moreover, the emerging market has a low a dispersed equity ownership shareholder (Mohd-Saleh & Che Abdul Rahman, 2009; Tran et al., 2020).



### Control variables

This study identifies the control variables to consist of firm size, firm growth, firm performance, firm liquidity, and industry type which relate with the variables of the debt capital, intellectual capital reporting as follows.

#### Firm size

Firm size is the size of the business that is quantified by the total assets. Firm size (FS) is measured by the natural logarithm of total assets. The firm size is associate with the cost of debt (Francis et al., 2005). Consistent with Talbi and Omri (2014) reported that a large firm has the ability of power to negotiate with the debt holders. They can create a network or relationship with the lenders. Orens et al. (2009) supported that the firm is small size likely to difficult to monitor as a cause of the higher cost of debt. While Wang et al. (2008) reported that firm size is not predictive of the cost of debt. The firm size is not a major consideration for creditor analysis (Barus & Siregar, 2015).

In part of the firm size and intellectual capital reporting, a previous study of Alfraih (2018) found that the larger company is positive related to the higher level of intellectual capital disclosure. Similarly, the study of Bozzolan, Favotto and Ricceri (2003) showed that the larger company is likely to disclose intellectual capital reporting more than the smaller firm company for enhancing the interest of the company. In Contrast, the prior study of Dalwai and Mohammadi (2020) reported that the larger firm is less likely to create intellectual capital efficiency. Whereas the study of Azman and Kamaluddin (2012) found that the firm size is not significant with the intellectual capital reporting.

#### Firm growth

Firm growth is the firm's growth opportunities. Firm growth (MTB) is measured by the equity market value divided by the book value. When a firm is the higher market-to-book ratio is related to the cost of debt because the firm growth prefers to use debt funding (Barus & Siregar, 2015). Orens et al. (2009) found that market-to-book ratio is negatively associate with cost of debt. When the lower market-to-book ratios reflect higher uncertainty about the firm's future growth opportunities (Cheng,

Lin, Hsiao & Lin, 2008; Orens et al., 2009). While Bouchareb and Kouki (2019) found that market to book ratio is negatively but not significantly associated with the cost of debt.

In part of the firm growth and intellectual capital reporting, the result of Mohd-Saleh and Che Abdul Rahman (2009) showed that the firm is high growth effect on intellectual capital efficiency. Similarly, the study of Mangena, Liu and Li (2014) found that the firms with higher growth are likely to provide the information of intellectual capital. While Kamath (2017) found that the firm has a high growth is likely to limit the voluntary information of intellectual capital reporting. Contrary, Cerbioni and Parbonetti (2007) found that the relationship between firm growth and the intellectual capital reporting is not significant.

#### Firm performance

Firm performance is the ability of companies to produce a profit that is incurred by the total assets. Firm performance (ROA) is measured by the return on asset. The return on asset is calculated by the net income before interest and tax divided by average total assets and multiplied by 100. The ROA is indicated as the ability of firm performance. Oikonomou et al. (2014) demonstrated the firm uses its resources and assets, the ability to produce a profit to cover its debt commitment. Wang et al. (2008) identified that ROA is negatively significant more likely to attract a lower cost of debt. Consistency, Arjmandi and Abadi (2016) found that the relationship between great firm performance and debt financing. While Francis et al. (2005) and Kamel and Shahwan (2014) found that ROA is not associated with the cost of debt.

In part of the firm performance and intellectual capital reporting, the result of Dalwai and Mohammadi (2020) showed that the firm has a higher performance effect on intellectual capital efficiency. As well as the study of Haji and Ghazali (2013) found that the relationship between the firm performance is positively and the non-financial of intellectual capital reporting. While the result of Firer and Williams (2005) showed that firm performance is negatively associated with the intellectual capital disclosure. On the other hand, the result of Hassan and Yaacob (2019) and Kavida et al. (2019) found that the firm performance is not significant with intellectual capital reporting.

### Firm liquidity

Firm liquidity is the ability to pay the debt. The firm liquidity (LIQ) is calculated by the current assets divided by the current liabilities. The corporate liquidity demonstrates an ability to pay short-term debt obligations. The prior research provided the mixed results. Tarus, Nehemiah and Geoffrey (2014) and Warrad and Oqdeh (2018) found that the firm liquidity indicated negatively and significantly related to reducing debt cost. A lower level of liquidity for increasing risk (Hirth & Uhrig-Homburg, 2010). While Cai, Fairchild and Guney (2008) and Terra (2011) revealed that the positive associations between liquidity and debt capital. The firm with a large number of liquidities should easily obtain external financing because the lenders are concerned about the long-term opportunity of the borrows (Cai et al., 2008).

In a part of the firm liquidity and intellectual capital reporting, the finding of Shahveisi et al. (2017) found that the firm that has high liquidity can invest the intellectual capital. Contrary, the finding of Nurunnabi, Hossain and Hossain (2011) and Isnalita and Romadhon (2018) showed that the relationship between the firm liquidity and the intellectual capital reporting is not significant. The result of insignificant is less incentive for the extension of information disclosure.

### Industry type

Industry type (IND) is industry according to the classification criteria of the SET in seven industry groups such as Agro&Food, Consumer products, Industrials, Property& Construction, Resources, Service, and Technology. Industry type is measured by dummy variables. The industry is different activities from some industries. Aoun and Heshmati (2008) and Hsuehchang (2013) showed that the information and communication technology (ICT) firms are a lower cost of debt financing than non-ICT firms. The ICT firms have innovation with network development or new product with various technology used (Barus & Siregar, 2015). Cenciarelli et al. (2018) analyzed the industry dummies are a significant association with debt capital. Consistency, Orens et al. (2009) found that the industry type significantly affects the cost of debt. The firms from different industry types have different risks (Oikonomou et al., 2014).

In part of the industry type and intellectual capital reporting, the study of Brüggén, Vergauwen and Dao (2009) showed that the industry type impacts intellectual

capital disclosure, causing the intellectual capital is in some industries more important than in others. Therefore, measure the industrial types are defined as a dummy variable, as shown in Table 2.

Table 2 Industry type of the sample

Industry type	IND1	IND2	IND3	IND4	IND5	IND6	IND7
	1	2	3	4	5	6	7
Consumer products	1	0	0	0	0	0	0
Industrials	0	1	0	0	0	0	0
Property& Construction	0	0	1	0	0	0	0
Resources	0	0	0	1	0	0	0
Services	0	0	0	0	1	0	0
Technology	0	0	0	0	0	1	0
Agro & Food	0	0	0	0	0	0	0

Where:

IND1: Consumer products are 1 and 0 otherwise.

IND2: Industrials is 1 and 0 otherwise.

IND3: Property & Construction is 1 and 0 otherwise.

IND4: Resources is 1 and 0 otherwise.

IND5: Services is 1 and 0 otherwise.

IND6: Technology is 1 and 0 otherwise.

IND7: Agro & Food is 0 as a reference group of industry.

Table 3 Measurement of the variables

Variables	Measurement	Source
Debt capital (DC)	The financial cost divided by the total liabilities and multiplied by 100.	Financial statements, SETSMART
Intellectual capital reporting		
Financial information		
(1) Intellectual Capital Efficiency (ICE)	(1) M-VAIC (ICE) = HCE + SCE + RCE	Financial statements, and Notes to financial statements.
- Human Capital Efficiency (HCE)	HCE = Value added (VA)/Human capital (HC)	
- Structural Capital Efficiency (SCE)	SCE = Structural capital (SC)/Value added (VA)	
- Relational Capital Efficiency (RCE)	RCE = Relational capital (RC)/ Value added (VA)	
Non-financial information		
(1) Intellectual Capital Disclosure (ICD)	(1) ICD = the sum of the number of word frequency of all intellectual capital.	The computer-assisted text analysis software from annual reports.
- Human Capital Disclosure (HCD)	HCD = the number of word frequency of human capital by content analysis.	
- Structural Capital Disclosure (SCD)	SCD = the number of word frequency of structural capital by content analysis.	
- Relational Capital Disclosure (RCD)	RCD = The number of word frequency of relational capital by content analysis.	
Corporate governance mechanisms		
- Board composition (BC)	- The number of independent directors divided by the total number of directors and multiplied by 100.	Annual reports
- Audit committees (AC)	- The number of the audit committee.	
- Ownership structure (OWN)	- The total proportion of common stock by company's top five shareholders.	

Table 3 Measurement of the variables (Continued)

Variables	Measurement	Source
Control variables		
Firm size (FS)	The natural logarithm of total assets.	SETSMART
Firm growth (MTB)	The equity market value divided by the book value.	SETSMART
Firm performance (ROA)	The net income before interest and tax divided by average total assets and multiplied by 100.	SETSMART
Firm liquidity (LIQ)	The ratio of the current assets divided by the current liabilities.	SETSMART
Industry type (IND)	Dummy 1,0 by giving a value of 1 is the specific firm, a value of 0 is the other firm. It contains seven industry which divided by six dummy variables (Agro & Foods, Consumer products, Industrials, Property & Construction, Resources, Services, Technology).	SETSMART

## Research Model

### Data Analysis Method

This study explains the data analysis into two items as follows.

#### 1. Initial data analysis

Explaining the descriptive statistics is used to the narrative the properties of variables such as mean, median, standard deviation maximum, minimum, frequency, and proportion.

## 2. Inference statistics analysis

For inference statistics used in the analysis to test the research hypothesis, the relationship of independent variables and dependent variables. For this research, the panel data regression tool will be used due to the property of the data that the researcher uses in this study is the data collected for a period of five years from 2015-2019. Panel data or cross-sectional and time-series data is a dataset in which the behavior of entities is observed across time (Park, 2011). In addition, the characteristic of the data used is the unbalanced panel data because each sample has the unequal observation (Buallay & Hamdan, 2019).

### Statistical Techniques

The data analysis of this study is examined through the panel data regression model. For this study estimate the panel data regression model which the total number of observations is 329 firm-years in an unbalanced panel. Unbalanced panel data contain cross-sectional observations and time-series for five years. This technique analyzes both cross-sectional and time-series merging. Generally divided into three techniques (Gujarati & Porter, 2009; Piriyaikul, 2016).

#### 1. Pooled OLS Regression

The pooled method is a regression analysis method that ignores whether the cross-section unit is affected by external factors or unobserved variables that are unique or not and have long time data records that are any different. This method has the assumption that the constants and coefficients of variables are equal every year in the equation. The equation can explain as follows.

$$Y_i = \alpha + \beta_1 X_i + \varepsilon_i$$

Where  $Y_i$  is the dependent variable of company (i);  $\alpha$  is the intercept;  $\beta_1$  is the slope of coefficient;  $X_i$  is the independent variable of the company (i);  $\varepsilon_i$  is the error term of company (i).

However, this study estimates the pooled OLS regression model that is not considered the observations for each period, including the variables that may affect the unobserved variables. The pooled OLS regression model estimates data biased and inconsistent. Thus, this study concerns the sample which is unbalanced panel data with cross-sectional or the company and time-series or the five year.

## 2. Fixed effect within-group model

This method examines an intercept that varies across groups or time-period. The fixed-effect model examines individual differences in intercepts, assuming the same slopes and constant variance across individuals or entities instead of many dummies. The data of estimation remove all time-invariant variables (Park, 2011). In addition, the key parameter is that the unobserved variable can change over time, such as the business practices of a company. The fixed effect characteristic has the unobserved variables ( $u_i$ ) to be correlated with the independent variables. It means that the fixed effect models have the effect of time-invariant variables and time-variant effects (Williams, 2015). The parameter estimation uses the deviation of each variable from the average value then used to estimate the parameters in the OLS equation. The equation can explain as follows.

$$Y_{it} = (\alpha + u_i) + \beta_1 X_{it} + v_{it}$$

Where  $Y_{it}$  is the dependent variable of company (i) in the periods (t);  $\alpha$  is the intercept;  $u_i$  is the unobserved variables or fixed effect of company (i);  $\beta_1$  is the slope of coefficient;  $X_{it}$  is the independent variable of company (i) in the periods (t);  $v_{it}$  is the error term of company (i) in the periods (t).

## 3. Random effect model (REM)

The random effect regression model is estimated by Generalized Least Squares (GLS). The random effect differs from the fixed effect because this method contains the unobserved variables ( $u_i$ ) which are not correlated with all the observed variables (Park, 2011). The random effect allows the time-invariant variables to act as explanatory variables. This method has the regression equation which comprise of the error values from cross-sectional ( $u_i$ ) and the error from time-series ( $\varepsilon_{it}$ ). The equation can estimate as follows.

$$Y_{it} = \alpha + \beta_1 X_{it} + (u_i + \varepsilon_{it})$$

Where  $Y_{it}$  is the dependent variable of company (i) in the periods (t);  $\alpha$  is the intercept;  $\beta_1$  is the slope of coefficient;  $X_{it}$  is the independent variable of company (i) in the periods (t);  $u_i$  is the error term from cross-sectional of company (i);  $\varepsilon_{it}$  is the error term from time-series of company (i) in the periods (t).

$$v_{it} = u_i + \varepsilon_{it}$$



When the characteristic of the random effect model consists of  $v_{it}$  is the composite error term of a company (i) in the periods (t);  $u_i$  is the unobserved effect of a company (i);  $\varepsilon_{it}$  is the error term from time-series of a company (i) in the periods (t).

$$Y_{it} = \beta_0 + \beta_1 X_{it} + v_{it}$$

Where  $Y_{it}$  is the dependent variable of a company (i) in the periods (t);  $\beta_0$  is the intercept;  $\beta_1$  is the slope of coefficient;  $X_{it}$  is the independent variable of a company (i) in the periods (t);  $v_{it}$  is the composite error term of a company (i) in the periods (t).

Therefore, for testing the model considers fixed effect or random effect model be tested by the Hausman specification test (Piriyakul, 2016). The assumption is as follows.

#### Hausman test

$H_0$ : The error in variable not related to independent variables time-invariant variable (REM).

$H_1$ : The error in variable related to independent variables time-invariant (FEM).

Therefore, accepting  $H_0$  means may use RE model, while rejecting  $H_0$  means may use FE model or  $H_0$ : difference in coefficients not systematic. In addition, the statistical techniques are used for investigation, as follows.

#### Variance Inflation Factors (VIF's)

The VIF is a measurement of the variance for detection of the multicollinearity problem for regression coefficients correlation between multiple independents. The problem is not a serious problem in regression equation, if the VIF was lower than ten on the scales (Gujarati & Porter, 2009). This study uses the value of VIF is higher than 10 to insist on the multicollinearity problem.

#### Correlation Analysis

Pearson's relationship technique is a common method for testing correlation between variables. In addition, the regression hypothesis does not require the problem of multi-value relationships. Pearson coefficient there is a range of values between +1 and -1 that lack accuracy with the estimation of regression coefficients.

However, the correlation coefficient must not exceed 0.8 for the criteria for investigating the problem (Hair, Black, Babin & Anderson, 2010).

### Model

This study used panel data analysis by the data is collected in cross-section and time series for testing the observations together and then uses the panel data analysis. The all equation tests the hypotheses as follows.

(1) To examine the relationship between the intellectual capital reporting measured by financial, non-financial information and the debt capital. The hypotheses consist of H1, H2 in terms of the equation 1. Thus, it is examined using the regression model as follows,

#### Model 1

$$\begin{aligned} DC_{it} = & \beta_0 + \beta_1 ICE_{it} + \beta_2 ICD_{it} + \beta_3 FS_{it} + \beta_3 MTB_{it} \\ & + \beta_4 ROA_{it} + \beta_5 LIQ_{it} + + \beta_6 IND1_{it} + \beta_7 IND2_{it} \\ & + \beta_8 IND3_{it} + \beta_9 IND4_{it} + \beta_{10} IND5_{it} + \beta_{11} IND6_{it} + \varepsilon_{it} \end{aligned}$$

(Equation 1)

Where	DC	=	Debt capital
	ICE	=	Intellectual capital efficiency measured by financial information
	ICD	=	Intellectual capital disclosure measured by non-financial information
	FS	=	Firm size
	MTB	=	Firm growth
	ROA	=	Firm performance
	LIQ	=	Firm liquidity
	IND1	=	Consumer Products Industry
	IND2	=	Industrials Industry
	IND3	=	Property & Construction Industry
	IND4	=	Resources Industry
	IND5	=	Services Industry
	IND6	=	Technology Industry

(2) To examine the relationship between the component of intellectual capital

measured by financial, non-financial information and the debt capital. The hypotheses to consist of H1a-c, H2a-c in term of the equation 2, it is examined using the regression model as follows,

Model 2

$$\begin{aligned}
 DC_{it} = & \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 RCE_{it} + \beta_4 HCD_{it} + \beta_5 SCD_{it} \\
 & + \beta_6 RCD_{it} + \beta_7 FS_{it} + \beta_8 MTB_{it} + \beta_9 ROA_{it} + \beta_{10} LIQ_{it} \\
 & + \beta_{11} IND1_{it} + \beta_{12} IND2_{it} + \beta_{13} IND4_{it} + \beta_{14} IND5_{it} \\
 & + \beta_{15} IND6_{it} + \beta_{16} IND7_{it} + \varepsilon_{it}
 \end{aligned}$$

(Equation 2)

Where	DC	=	Debt capital
	HCE	=	Human capital efficiency measured by financial information
	SCE	=	Structural capital efficiency measured by the financial information
	RCE	=	Relational capital efficiency measured by the financial information
	HCD	=	Human capital disclosure measured by non-financial information
	SCD	=	Structural capital disclosure measured by non-financial information
	RCD	=	Relational capital disclosure measured by non-financial information
	FS	=	Firm size
	MTB	=	Firm growth
	ROA	=	Firm performance
	LIQ	=	Firm liquidity
	IND1	=	Consumer Products Industry
	IND2	=	Industrials Industry
	IND3	=	Property & Construction Industry

- IND4 = Resources Industry  
 IND5 = Services Industry  
 IND6 = Technology Industry

(3) To examine the relationship between corporate governance mechanisms (the board composition, the audit committees, and the ownership structure) and the intellectual capital measured by the financial information. The hypotheses consist of H3.1, H4.1, H5.1 in term of the equation 3-6. It is examined using the panel data regression model as follows.

Model 3

$$\begin{aligned} ICE_{it} = & \beta_0 + \beta_1 BC_{it} + \beta_2 AC_{it} + \beta_3 OWN_{it} + \beta_4 FS_{it} \\ & + \beta_5 MTB_{it} + \beta_6 ROA_{it} + \beta_7 LIQ_{it} \\ & + \beta_8 IND1_{it} + \beta_9 IND2_{it} + \beta_{10} IND3_{it} \\ & + \beta_{11} IND4_{it} + \beta_{12} IND5_{it} + \beta_{13} IND6_{it} + \varepsilon_{it} \end{aligned}$$

(Equation 3)

- Where ICE = Intellectual capital efficiency, measured by the financial information disclosure
- BC = Board composition
- AC = Audit committees
- OWN = Ownership structure top five shareholders
- FS = Firm size
- MTB = Firm growth
- ROA = Firm performance
- LIQ = Firm liquidity
- IND1 = Consumer Products Industry
- IND2 = Industrials Industry
- IND3 = Property & Construction Industry
- IND4 = Resources Industry
- IND5 = Services Industry
- IND6 = Technology Industry

Model 4

$$\begin{aligned}
HCE_{it} = & \beta_0 + \beta_1 BC_{it} + \beta_2 AC_{it} + \beta_3 OWN_{it} + \beta_4 FS_{it} \\
& + \beta_5 MTB_{it} + \beta_6 ROA_{it} + \beta_7 LIQ_{it} \\
& + \beta_8 IND1_{it} + \beta_9 IND2_{it} + \beta_{10} IND3_{it} \\
& + \beta_{11} IND4_{it} + \beta_{12} IND5_{it} + \beta_{13} IND6_{it} + \varepsilon_{it}
\end{aligned}$$

(Equation 4)

Where	HCE	=	Human capital efficiency, measured by the financial information disclosure
	BC	=	Board composition
	AC	=	Audit committees
	OWN	=	Ownership structure top five shareholders
	FS	=	Firm size
	MTB	=	Firm growth
	ROA	=	Firm performance
	LIQ	=	Firm liquidity
	IND1	=	Consumer Products Industry
	IND2	=	Industrials Industry
	IND3	=	Property & Construction Industry
	IND4	=	Resources Industry
	IND5	=	Services Industry
	IND6	=	Technology Industry

Model 5

$$\begin{aligned}
SCE_{it} = & \beta_0 + \beta_1 BC_{it} + \beta_2 AC_{it} + \beta_3 OWN_{it} + \beta_4 FS_{it} \\
& + \beta_5 MTB_{it} + \beta_6 ROA_{it} + \beta_7 LIQ_{it} \\
& + \beta_8 IND1_{it} + \beta_9 IND2_{it} + \beta_{10} IND3_{it} \\
& + \beta_{11} IND4_{it} + \beta_{12} IND5_{it} + \beta_{13} IND6_{it} + \varepsilon_{it}
\end{aligned}$$

(Equation 5)

Where	SC	=	Structural capital efficiency, measured by the financial information disclosure
	BC	=	Board composition
	AC	=	Audit committees
	OWN	=	Ownership structure top five shareholders
	FS	=	Firm size
	MTB	=	Firm growth
	ROA	=	Firm performance
	LIQ	=	Firm liquidity
	IND1	=	Consumer Products Industry
	IND2	=	Industrials Industry
	IND3	=	Property & Construction Industry
	IND4	=	Resources Industry
	IND5	=	Services Industry
	IND6	=	Technology Industry

#### Model 6

$$\begin{aligned}
 RCE_{it} = & \beta_0 + \beta_1 BC_{it} + \beta_2 AC_{it} + \beta_3 OWN_{it} + \beta_4 FS_{it} \\
 & + \beta_5 MTB_{it} + \beta_6 ROA_{it} + \beta_7 LIQ_{it} \\
 & + \beta_8 IND1_{it} + \beta_9 IND2_{it} + \beta_{10} IND3_{it} \\
 & + \beta_{11} IND4_{it} + \beta_{12} IND5_{it} + \beta_{13} IND6_{it} + \varepsilon_{it}
 \end{aligned}$$

(Equation 6)

Where	RCE	=	Relational capital efficiency, measured by the financial information disclosure
	BC	=	Board composition
	AC	=	Audit committees
	OWN	=	Ownership structure top five shareholders
	FS	=	Firm size
	MTB	=	Firm growth
	ROA	=	Firm performance
	LIQ	=	Firm liquidity

IND1	=	Consumer Products Industry
IND2	=	Industrials Industry
IND3	=	Property & Construction Industry
IND4	=	Resources Industry
IND5	=	Services Industry
IND6	=	Technology Industry

(4) To examine the relationship between corporate governance mechanisms (the board composition, the audit committees, and the ownership structure) and the intellectual capital measured by the non-financial information. The hypotheses consist of H3.2, H4.2, H5.2 in terms of the equation 7-10. It is examined using the panel data regression model as follows.

Model 7

$$\begin{aligned}
 ICD_{it} = & \beta_0 + \beta_1 BC_{it} + \beta_2 AC_{it} + \beta_3 OWN_{it} + \beta_4 FS_{it} \\
 & + \beta_5 MTB_{it} + \beta_6 ROA_{it} + \beta_7 LIQ_{it} \\
 & + \beta_8 IND1_{it} + \beta_9 IND2_{it} + \beta_{10} IND3_{it} \\
 & + \beta_{11} IND4_{it} + \beta_{12} IND5_{it} + \beta_{13} IND6_{it} + \varepsilon_{it}
 \end{aligned}$$

(Equation 7)

Where	ICD	=	Intellectual capital disclosure, measured by the non-financial information
	BC	=	Board composition
	AC	=	Audit committees
	OWN	=	Ownership structure top five shareholders
	FS	=	Firm size
	MTB	=	Firm growth
	ROA	=	Firm performance
	LIQ	=	Firm liquidity
	IND1	=	Consumer Products Industry
	IND2	=	Industrials Industry
	IND3	=	Property & Construction Industry

IND4	=	Resources Industry
IND5	=	Services Industry
IND6	=	Technology Industry

Model 8

$$\begin{aligned}
 HCD_{it} = & \beta_0 + \beta_1 BC_{it} + \beta_2 AC_{it} + \beta_3 OWN_{it} + \beta_4 FS_{it} \\
 & + \beta_5 MTB_{it} + \beta_6 ROA_{it} + \beta_7 LIQ_{it} \\
 & + \beta_8 IND1_{it} + \beta_9 IND2_{it} + \beta_{10} IND3_{it} \\
 & + \beta_{11} IND4_{it} + \beta_{12} IND5_{it} + \beta_{13} IND6_{it} + \varepsilon_{it}
 \end{aligned}$$

(Equation 8)

Where	HCD	=	Human capital disclosure, measured by the non-financial information
	BC	=	Board composition
	AC	=	Audit committees
	OWN	=	Ownership structure top five shareholders
	FS	=	Firm size
	MTB	=	Firm growth
	ROA	=	Firm performance
	LIQ	=	Firm liquidity
	IND1	=	Consumer Products Industry
	IND2	=	Industrials Industry
	IND3	=	Property & Construction Industry
	IND4	=	Resources Industry
	IND5	=	Services Industry
	IND6	=	Technology Industry

Model 9

$$\begin{aligned}
 SCD_{it} = & \beta_0 + \beta_1 BC_{it} + \beta_2 AC_{it} + \beta_3 OWN_{it} + \beta_4 FS_{it} \\
 & + \beta_5 MTB_{it} + \beta_6 ROA_{it} + \beta_7 LIQ_{it} \\
 & + \beta_8 IND1_{it} + \beta_9 IND2_{it} + \beta_{10} IND3_{it}
 \end{aligned}$$



$$+ \beta_{11} \text{IND4}_{it} + \beta_{12} \text{IND5}_{it} + \beta_{13} \text{IND6}_{it} + \varepsilon_{it}$$

(Equation 9)

Where	SCD	=	Structural capital disclosure, measured by the non-financial information
	BC	=	Board composition
	AC	=	Audit committees
	OWN	=	Ownership structure top five shareholders
	FS	=	Firm size
	MTB	=	Firm growth
	ROA	=	Firm performance
	LIQ	=	Firm liquidity
	IND1	=	Consumer Products Industry
	IND2	=	Industrials Industry
	IND3	=	Property & Construction Industry
	IND4	=	Resources Industry
	IND5	=	Services Industry
	IND6	=	Technology Industry

#### Model 10

$$\begin{aligned} \text{RCD}_{it} = & \beta_0 + \beta_1 \text{BC}_{it} + \beta_2 \text{AC}_{it} + \beta_3 \text{OWN}_{it} + \beta_4 \text{FS}_{it} \\ & + \beta_5 \text{MTB}_{it} + \beta_6 \text{ROA}_{it} + \beta_7 \text{LIQ}_{it} \\ & + \beta_8 \text{IND1}_{it} + \beta_9 \text{IND2}_{it} + \beta_{10} \text{IND3}_{it} \\ & + \beta_{11} \text{IND4}_{it} + \beta_{12} \text{IND5}_{it} + \beta_{13} \text{IND6}_{it} + \varepsilon_{it} \end{aligned}$$

(Equation 10)

Where	RCD	=	Relational capital disclosure, measured by the non-financial information
	BC	=	Board composition
	AC	=	Audit committees

OWN	=	Ownership structure top five shareholders
FS	=	Firm size
MTB	=	Firm growth
ROA	=	Firm performance
LIQ	=	Firm liquidity
IND1	=	Consumer Products Industry
IND2	=	Industrials Industry
IND3	=	Property & Construction Industry
IND4	=	Resources Industry
IND5	=	Services Industry
IND6	=	Technology Industry

## CHAPTER IV

### RESULTS

The previous chapter describes that the research methods explain the population and sample, data collection including data analysis to examine hypotheses. Consequently, this chapter demonstrates the statistical test of results which are organized as follows. The first section presents the descriptive statistics for understanding the key basic data of the sample and the variables. The second section details the results of hypotheses testing.

#### Descriptive Statistics

In this section, the finding of descriptive statistics to explain the sample, and the level of intellectual capital reporting. Including the variables under study consists of intellectual capital, debt capital, corporate governance mechanism, and control variables as follows.

##### Summary of sample size

This study uses the firms listed in the Market for Alternative Investment (MAI) during the period 2015-2019. The study was conducted on the intellectual capital reporting. The final samples by the industry of this study are 329 firm-year observations. This study can be classified into seven industry groups as showed in Table 4.

Table 4 Number of Companies in Each Industry Group

Industry	Firms	Firm-year Observations	Percent
Agro & Food	8	28	8.51
Consumer products	7	22	6.69
Industrials	25	83	25.23
Property & Construction	11	28	8.51
Resource	10	36	10.94
Service	31	109	33.13
Technology	8	23	6.99
Total	100	329	100.00

Table 4 presents a summary of the number of listed companies classified by industry groups, and the final sample is 329 firm-year observations which consist of the industry groups as follows, Service is the highest number 31 companies or 109 firm-year observations, representing 33.13 percent. Next, Industrial, and Resource are 25 companies or 83 firm-year observations, 10 companies or 36 firm-year observations, respectively with representing 25.23, and 10.94 percent, respectively. While Agro & Food, Property & Construction, and Technology are 8 companies or 28 firm-year observations, 11 companies or 28 firm-year observations, and 8 companies or 23 firm-year observations, respectively with representing 8.51, 8.51, and 6.99 percent, respectively. The least number of samples in Consumer products is 7 companies or 22 firm-year observations with representing 6.69 percent.

#### The level, and content of intellectual capital reporting

The descriptive analysis of intellectual capital reporting is quantified by financial information and non-financial information during 2015-2019. The finding explains to provide the level of information of intellectual capital reporting as shown in Table 5. The content of intellectual capital reporting shown in Table 6.

The finding of Panel A in Table 5 shows the level of intellectual capital reporting in form of financial information. The level of the overall intellectual capital efficiency (ICE) shows the mean scores of 2.69 in 2015, the mean value is 2.47 in 2016-2017, from 2015 declining and stabilize in 2016 and 2017. Intellectual capital reporting shows the resulting mean value rises to 2.66 in 2018. And the mean value is 2.17 decreasingly in 2019. Thus, an average of ICE slightly fluctuates during 2015-2019. In addition, the components of intellectual capital efficiency consist of human capital efficiency (HCE), structural capital efficiency (SCE), and relational capital efficiency (RCE). The finding of HCE has means value of 1.90, 1.69, 1.71, 1.89, and 1.40 for the period 2015-2019, respectively. According to Pulic (2008) and Zakariaa et al. (2020) stated that the mean value shows more than that means the firm can able overcome employee expense and the creation of value-added. While the mean value of SCE is 0.45, 0.46, 0.46, 0.43, and 0.42 for the period 2015-2019, respectively. Consistent with Pulic (2008) and Zakariaa et al. (2020) suggested that SCE is a value more than zero which is the value creation zone. RCE shows a mean value of 0.34, 0.32, 0.30, 0.34,

and 0.35 for the period 2015-2019, respectively. The mean value of RCE is in accordance to Ulum et al. (2014) found that the mean value of RCE is smaller than other components in the Indonesia context. They suggested that the number of investments in the relational capital which the amount of marketing, advertising, selling expense which the number of marketing, advertising, selling expense is not large. Moreover, the result of a mean value of HCE fluctuated, comparing to a mean value of SCE, and RCE was fairly constant. The reason a mean value of HCE fluctuates because HCE is the value created by money spent on employees (Nimtrakoon, 2015), for example as salaries and wages, severance payments, and other employee benefits. One possibility may be the investment for the human resource which the money unit of employee's expenses. It is consistent with Stewart (1997) determined that the monetary investment possesses by employees rather than the company. The expenses are fluctuated throughout the period 2015-2019. The company may identify the money spent on the employee policy, the other employee benefits which it may pressure the company's turnover or the economy.

In addition, the highest mean value is HCE 1.71, HCE is dominant among its components, followed by SCE of 0.44, and the mean RCE of 0.34. This finding is similar to Xu and Wang (2019), Xu and Li (2019) and Soetanto and Liem (2019) which study in the emerging market such as China, South Korea, Indonesia. They revealed that human capital is the most effective driver of value creation compared to structural capital and relational capital. While in the developed market, the finding of Zéghal and Maaloul (2010) show that the human and structural capital is joint the greatest influential component in creating value-added in UK companies.

Panel B in Table 5 shows the level of intellectual capital in form of non-financial information. This is employed by content analysis for retrieving the keyword from the annual report in terms of the number of words for showing the quantity of intellectual capital disclosure. During the year 2015-2018, the companies provide the non-financial information of intellectual capital reporting that the result of the average word counts is likely to increase 131.66, 144.64, 152.88, and 171.91, respectively. In the 2019 year, the average word counts drop to 168.88. Consistent with Suttipun's (2018) finding the intellectual capital disclosure increase in voluntary reporting by listed firms in Thailand during 2012-2014. Including, the finding of Klawtanong (2017)

also shows increasing disclosure for the listed firms in Thailand during 2013-2016. Additionally, the ranking of average word counts for human, structural, and relational capital change according to the disclosure. The average word count of human capital disclosure (HCD) is 30.05, structural capital disclosure (SCD) with the average word count of 18.91, and relational capital disclosure (RCD) is 106.39 which the highest disclosed among the components. The finding is consistent with the prior studies in the emerging market. For example, the result of Haji (2015), Anifowose, Rashid and Annuar (2017) and Ousama, Al-Mutairi & Fatima (2019) indicate that relational capital is the most disclosed in Malaysia, Nigeria, Qatar. They reported that companies are aware to provide intellectual information in corporate reporting. While in the developed market, for example UK, Australia. The study of and White et al. (2007) that human and structural capital is slightly dominant among its components, however, the level of three components is disclosed similarly for the company.

Table 5 The level of intellectual capital reporting is quantified by financial information and non-financial information.

Intellectual Capital and Components	2015		2016		2017		2018		2019		Average	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Panel A : Intellectual capital reporting quantified by financial information.												
ICE	2.69	9.14	2.47	1.58	2.47	3.22	2.66	1.97	2.17	3.78	2.48	4.60
HCE	1.90	9.00	1.69	1.44	1.71	3.07	1.89	1.73	1.40	3.69	1.71	4.52
SCE	0.45	0.40	0.46	0.48	0.46	0.65	0.43	0.64	0.42	0.73	0.44	0.60
RCE	0.34	0.45	0.32	0.57	0.30	0.48	0.34	0.51	0.35	0.54	0.34	0.52
Panel B : Intellectual capital reporting quantified by non-financial information.												
ICD	131.66	55.76	144.64	63.81	152.88	58.88	171.91	65.79	168.88	66.37	155.35	63.97
HCD	25.24	18.52	26.85	16.64	30.84	19.16	33.86	18.62	32.12	18.53	30.05	18.51
SCD	15.91	13.62	18.33	12.85	18.22	12.25	20.52	14.66	20.75	16.15	18.91	14.12
RCD	90.50	45.66	99.46	53.69	103.81	48.88	117.54	53.95	116.01	53.05	106.39	52.03

Table 6 shows the content of intellectual capital reporting consists of the keyword of human capital 11 items, structural capital 10 items, relational capital 10 items. Thus, the total number of intellectual capital reporting is 31 items. Table 6 comprises a list of the keyword dealt with intellectual capital reporting, as follows.

Table 6 The content of intellectual capital reporting

Human capital	Word	Structural capital	Word	Relational capital	Word
Employee training	8,301	Information/ Networking systems	3,464	Customers	26,695
Employee welfare	1,325	Intellectual property	1,624	Contracts	4,121
Employee teamwork	232	Management processes	510	Brands	2,732
Employee capability	12	Organization structure	289	Market share	445
Employee equality	6	Corporate culture	278	Business collaborations	359
Employee productivity	5	Quality improvement	55	Distribution channels	330
Employee commitment	2	Management philosophy	1	Customer loyalty	223
Working knowledge	2	Financial dealings	0	Franchise/ Licensing agreements	98
Know-how	0	Research and development	0	Relationship with stakeholders	0
Entrepreneurial spirit	0	Knowledge- based infrastructure	0	Relationship with suppliers	0
Work-related competencies	0				
Total	9,885	Total	6,221	Total	35,003



Table 6 indicates the content of intellectual capital reporting in the form of non-financial information. Disclosures of intellectual capital in the listed companies from the MAI. When looking at the intellectual capital reporting through the content analysis, the finding of human capital comprises a list of the content as follows, the employee training has 8,301 words which is in the top content of human capital. Followed by the employee welfare has 1,325 words, the employee teamwork has 232 words, the employee capability has 12 words, the employee equality has 6 words, the employee productivity has 5 words, the employee commitment, and the working knowledge have 2 words. While, the content of the know-how, the entrepreneurial spirit, and the work-related competencies have not occurred the word count in the intellectual capital reporting.

The top content of structural capital is the information/networking systems which have 3,464 words. Followed by the intellectual property have 1,624 words, the management processes have 510 words, the organization structure has 289 words, the corporate culture has 278 words, the quality improvement has 55 words, and the management philosophy has 1 word, while the financial dealings, the research and development, and the knowledge-based infrastructure are the content of the keyword which does not appear on intellectual capital reporting.

The top content of relational capital is the customers which has 26,695 words. Followed by the contracts have 4,121 words, the brands have 2,732 words, the market share has 445 words, the business collaborations have 359 words, the distribution channels have 330 words, the customer loyalty has 223 word, the franchise/ licensing agreements have 98 words, while the relationship with stakeholders, and the relationship with suppliers do not appear the word count on intellectual capital reporting. Therefore, the result of the content on intellectual capital reporting is disclosed that differ among firms in the strategic context.

#### Summary of debt capital and corporate governance mechanisms

The descriptive statistics of debt capital and corporate governance mechanisms for the listed companies as a sample. Debt capital is measured by the financial cost divided by the total liabilities and multiplied by 100 which is collected from the financial

statements, and SETSMART. A part of variables of corporate governance mechanisms is collected from the annual reports. As shown in Table 7.

Table 7 Descriptive statistic of debt capital and corporate governance mechanisms

Variables	Mean	Median	Std. Deviation	Minimum	Maximum
Panel A: Debt Capital					
DC	2.0058	2.5506	1.6860	0.0001	10.2366
Panel B: Corporate governance mechanisms					
BC	43.3541	42.8571	8.7556	25.0000	71.4300
AC	3.1307	3.0000	0.3719	3.0000	5.0000
OWN	59.7072	61.0700	16.0664	11.9100	94.6700

Table 7 presents the descriptive analysis of debt capital in Panel A, corporate governance mechanisms in Panel B, including the mean, standard deviation, maximum and minimum, as follow. Panel A provides the mean value of debt capital (DC) is 2.0058 percent. The value of median is 2.5506, while the standard deviation is 1.6860, including the minimum, and maximum values are 0.0001, and 10.2366, respectively.

Panel B presents the descriptive statistics of corporate mechanisms variables for sample firms which relating to the board composition (BC), measured by the proportion of independent directors to the total number of directors. The audit committee size (AC), and the ownership structure (OWN), measured by the total percentage of shares owned by the top five shareholders.

Panel B of Table 7 shows the result of descriptive analysis of corporate governance mechanism variables under study consists of the board composition (BC) that indicate an average of the proportion of independent directors is 43.3541 percent. The value of median is 42.8571. The standard deviation is 8.7556, and ranges between 25.0000 and 71.4300. This result of a mean value is consistent with the Securities and Exchange Commission and the Stock Exchange of Thailand require that not less than one-third of the total board, also at least three independent directors (SEC, 2017). The audit committee (AC) which an average audit committee size is 3.1307 or approximately three persons. The value of median is 3.0000. The standard deviation is 0.3719, and ranges between 3.0000 and 5.0000. This result of a mean value is consistent

with the Securities and Exchange Commission and the Stock Exchange of Thailand have at least three members who are independent non-executive directors (SEC, 2017). This meant that the company prefers to comply with regulations, announcements, or any rules of the Securities and Exchange Commission and the Stock Exchange of Thailand. In addition, a mean value of the ownership structure (OWN) with the average proportion of share ownership is 59.7072 percent. The value of median is 61.0700. The standard deviation is 16.0664, and ranges between 11.9100 and 94.6700. The ownership structure in case the top five shareholders were combined, they hold rather than half of the total shares in the slight level. Thus, an average value of the ownership structure based on the similarity of the prior study of Mohd-Saleh and Che Abdul Rahman (2009) and Tran et al. (2020) suggested that the ownership structure in Malaysia, Vietnam is more concentrated compared to the ownership structure in the developed market, for example Australia (Whiting & Woodcock, 2011).

#### Summary of control variables

The descriptive statistics of each control variable, the firm size (FS) measured by the natural logarithm of total assets. Firm growth (MTB) measured by the equity market value divided by the book value. Firm performance (ROA) measured by the net income before interest and tax divided by average total assets multiplied by 100. Firm liquidity (LIQ) measured by the ratio of the current assets divided by the current liabilities, this section shows in Table 8.

Table 8 Descriptive statistic of control variables

Variables	Mean	Median	Std. Deviation	Minimum	Maximum
FS	13.9863	13.8725	0.7795	12.2900	17.3100
MTB	2.8112	1.7800	3.5004	0.1800	36.0300
ROA	4.3738	6.2600	14.7719	-129.7100	37.0000
LIQ	2.5320	1.5800	2.7625	0.1300	29.2000

Table 8 shows the result of descriptive analysis for sample firms. This result indicates the mean value of firm size (FS) is 13.9863, the value of median is 13.8725, the standard deviation is 0.7795, including the minimum, and the maximum value are

12.2900, and 17.3100, respectively. The mean value of firm growth (MTB) is 2.8112 times, the value of median is 1.7800, the standard deviation is 3.5004 times, including the minimum, and the maximum value are 0.1800 times, and 36.0300 times, respectively. The mean value of firm performance (ROA) is 4.3738 percent, the value of median is 6.2600, the standard deviation is 14.7719 percent, including the minimum, and the maximum value are -129.7100 percent, and 37.0000 percent, respectively. Finally, the average value of firm liquidity (LIQ) is 2.5320 times, the value of median is 1.5800, the standard deviation is 2.7625 times, including the minimum, and the maximum value are 0.1300 times, and 29.2000 times, respectively.

### **The Results of Correlation Analysis and Hypotheses Test**

The correlation analysis of key variables used in this study for the final sample of 329 firm-year observations over the period 2015-2019. The multicollinearity problems are considered the correlation coefficient between the explanatory variables is above 0.80 (Hair et al., 2010). As seen in Table 9, the correlation coefficients of all variables are ranging from 0.144 to 0.992 at 0.01 level, and 0.111 to 0.141 at 0.05 level.

When looking at correlation coefficients is above 0.80 as follows. The relationship between HCE and ICE variables is highly correlated with 0.992, p-value < 0.01. The relationship between RCD and ICD variables are highly correlated with 0.919, p-value < 0.01. However, as the relationship between HCE and ICE variables, between RCE and ICD have isolated the equations for the regression model testing of hypothesis. Thereby, there is not produce a problem of multicollinearity. However, this study uses the variance inflation factor (VIF) to indicate the multicollinearity problem for the independent variables of concern, when VIF is higher than 10 in all the regression model (Gujarati & Porter, 2009).

In addition, the relationship between intellectual capital reporting and debt capital shows that the correlation coefficient of RCE, and SCD are a negative significant relation at -0.118, and -0.109 with p-value<0.05, respectively. The relationship between corporate governance mechanisms and intellectual capital reporting measured by financial information shows that the correlation coefficient of OWN is a positive significant relation at 0.175, and 0.185 with p-value<0.01,

respectively. The relationship between corporate governance mechanisms and intellectual capital reporting measured by non-financial information shows that the correlation coefficient of AC is a positive significant relation at 0.151,  $p$ -value  $< 0.01$ . The relationship between control variables and debt capital shows that the correlation coefficient of FS, and IND4 are a positive significant relation at 0.245, and 0.186,  $p$ -value  $< 0.01$ , respectively. The correlation coefficient of ROA, and LIQ are a negative significant relation at -0.261, and -0.183,  $p$ -value  $< 0.01$ , respectively. The correlation coefficient of IND5 is a negative significant relation at -.111,  $p < 0.05$ .

Table 9 Person Correlation Coefficients

Variables	DC	ICE	HCE	SCE	RCE	ICD	HCD	SCD	RCD	BC	AC	OWN	FS	MTB	ROA	LIQ	IND1	IND2	IND3	IND4	IND5	IND6
DC	1																					
ICE	-0.028	1																				
HCE	-0.016	.992**	1																			
SCE	0.003	0.06	-0.017	1																		
RCE	-.118*	.145**	0.098	.483**	1																	
ICD	-0.074	0.106	0.091	0.035	0.104	1																
HCD	0.006	0.035	0.042	-0.058	0.01	.476**	1															
SCD	-.109*	0.012	0.013	.113*	-.136*	.521**	.271**	1														
RCD	-0.064	.115*	0.094	0.033	.162**	.919**	.156**	.272**	1													
BC	.126*	0.095	0.086	.125*	-0.048	0.088	-0.023	0.087	0.093	1												
AC	-0.099	0.089	0.083	0.021	0.042	0.059	0.044	.151**	0.015	0.069	1											
OWN	-0.051	.175**	.185**	-0.064	0.016	-0.021	0.057	0.076	-0.066	-0.02	0.075	1										
FS	.245**	.283**	.269**	.137*	0.006	.170**	.150**	-0.025	.163**	.141*	.202**	-0.009	1									
MTB	0.009	0.078	0.081	0.009	-0.024	-0.04	-1.29*	-0.034	0.006	0.093	0.049	0.087	-.114*	1								
ROA	-.261**	.668**	.676**	-0.084	.124*	.151**	0.037	0.032	.164**	-0.03	-0.016	.206**	0.02	0.105	1							
LIQ	-.183**	-.189**	-.184**	-0.002	-0.075	-0.087	-0.028	.122*	-.130*	-0.01	.113*	0.026	-.266**	-0.088	-0.018	1						
IND1	-0.033	0.077	0.049	0.025	.231**	0.027	-0.019	0.011	0.037	0.099	-0.025	.137*	-0.062	-0.013	0.087	0.057	1					
IND2	0.074	0.031	0.046	-0.004	-.125*	-.193**	-0.085	-.152**	-.166**	-.207**	0.075	0.085	.136*	-.130*	0.07	-0.037	-.153**	1				
IND3	-0.046	-0.007	0.015	-0.1	-0.077	0.065	.156**	-.229**	0.086	.182**	0.006	-0.011	0.064	-0.067	-0.049	0.057	-0.081	-.182**	1			
IND4	.186**	0.074	0.08	-0.029	-0.005	0.035	0.013	0.042	0.027	.215**	-0.068	-.121*	.320**	-0.006	-0.057	-0.095	-0.09	-.202**	-0.107	1		
IND5	-.111*	-.144**	-.145**	0.056	-0.077	.146**	0.099	.196**	0.091	-.172**	0.03	-.131*	-.294**	0.097	-0.103	0.096	-.184**	-.412**	.219**	-.243**	1	
IND6	-0.102	0.008	0.005	0.051	-0.028	-0.029	-0.106	.200**	-0.053	0.039	-0.032	-0.046	-0.105	0.098	0.086	-0.013	-0.072	-.161**	-0.085	-0.095	-.193**	1

This table report correlation coefficients for the variables. \*, \*\* represent statistical significance at the 0.05, 0.01 level (2-tailed), respectively

### **The result of the hypotheses test**

This study consisted of a final sample have 329 firm-year observations. In the period of five years, the year from 2015 to 2019. This study collected the data is in the form of an unbalanced panel data regression model. This research is a longitudinal data study which sets for analyzing the observations in several different time periods (Kennedy, 2008).

In hypothesis testing, the data modeling is tested the reliability of the data, in order to be accurately estimated the model. Determining an appropriate model for panel data, having to perform statistical tests to confirm the selection of the estimation model. The model is estimated initially by a pooled OLS and a fixed effect/or a random effect model; however, based on the F-test. This study found that F-test of all models shows the chi-squared test value (Chi2) with the significance at 0.01 level ( $p < 0.01$ ). This study found that the Model 1-10 with the chi-squared test value is 4.49, 4.23, 9.89, 10.80, 1.84, 8.40, 9.70, 10.08, 10.20, and 13.08, respectively. As shown in Table 10. It can be indicated that the null hypothesis is rejected.

Therefore, a fixed effect/or random effect model is favored over a pooled OLS. This study is not suitable to use a pooled OLS model because it has not considered that the survey units (Cross Section Unit) may be affected by external factors that are different or not and relate to collect the time series data. Moreover, the different survey units may be influenced by variables lurking outside the regression equation (Unobserved Heterogeneity) (Park, 2011; Phiriyakun, 2016).

Then, this study compares the fixed-effect model (FE) and the random-effect model (RE). For the criteria determining all models, in order to ensure valid statistical inference for a Hausman Specification test. The null hypothesis is the effects of each variable are not related to other variables. If accepting the null hypothesis, the RE model will be appropriate. If rejecting the null assumption, the FE estimate is appropriate (Piriyakul, 2016). This study found that the statistics of Hausman values of Model 1 - 6 shows the chi-squared test value (Chi2) with significance at 0.01, and 0.05 level ( $p < 0.01$ ,  $p < 0.05$ ). This study found that the Model 1-6 with the chi-squared test value is 88.16, 88.81, 141.66, 105.17, 42.37, and 20.40, respectively. As shown in Table 10. The assumption of the null hypothesis is rejected. The Model 1-6 with a fixed effect model is favored. Thus, Model 1-2, the analysis of the relationship between intellectual

capital reporting and debt capital which the unobserved heterogeneity arises from some variables drive the observed relationship between intellectual capital reporting and debt capital. A fixed effect regression model estimates on the possible correlation between cross-sectional unit or firms, amount of error ( $\varepsilon_i$ ) or other factors affect debt capital and regressed variable is independent variables or intellectual capital reporting. Thus, a fixed effect of Model 1-2 is  $\varepsilon_i$  and intellectual capital reporting are correlated, including to remove the industry type effects that are time-invariant. As well as Model 3-6 estimates a correlation between the corporate governance mechanisms and intellectual capital reporting in form of financial information. A fixed effect of Model 3-6 is  $\varepsilon_i$  and the corporate governance mechanisms are correlated because to omit time-invariant of the industry type effects.

While the Model 7-10 shows the statistical of a Hausman values of the chi-squared test value ( $\chi^2$  - test) is 6.41, 4.74, 4.30, and 9.19, respectively. This finding shows that the significant values greater than 0.05 level. As shown in Table 10. The assumption of the null hypothesis is accepted. Therefore, this RE model is suitable for estimation in Model 7 - 10. A random effect regression model estimates a correlation between cross-sectional units (firms), and error ( $\varepsilon_i$ ) or other factors affect intellectual capital reporting in form of non-financial information and regressed variable is independent variables or the corporate governance mechanisms. This method is  $\varepsilon_i$  and the corporate governance mechanisms which are not correlated, including the industry type are time-invariant. In addition, this model has some influence on intellectual capital reporting in form of non-financial information such as the industry characteristics.

Further, this study detected the heteroskedasticity and the autocorrelation for all models. This study performed heteroskedasticity-consistent standard errors in terms of the robust standard errors option to get an effective regression (Cameron & Trivedi, 2005). Therefore, all regression shows the robust results from the fixed effect regression and random effect regression.



Table 10 Statistic Model Selection

Model	Fixed Effect (F-test)	Hausman Test ( $\chi^2$ - test)	Model Selection
Model 1	4.49 <sup>***</sup>	86.16 <sup>***</sup>	Fixed Effect
Model 2	4.23 <sup>***</sup>	88.81 <sup>***</sup>	Fixed Effect
Model 3	9.89 <sup>***</sup>	141.66 <sup>***</sup>	Fixed Effect
Model 4	10.80 <sup>***</sup>	105.17 <sup>***</sup>	Fixed Effect
Model 5	1.84 <sup>***</sup>	42.37 <sup>***</sup>	Fixed Effect
Model 6	8.40 <sup>***</sup>	20.40 <sup>**</sup>	Fixed Effect
Model 7	9.70 <sup>***</sup>	6.41	Random Effect
Model 8	10.08 <sup>***</sup>	4.74	Random Effect
Model 9	10.20 <sup>***</sup>	4.30	Random Effect
Model 10	13.08 <sup>***</sup>	9.19	Random Effect

Note:  $\chi^2$  represents the value of chi-squared in the Hausman test. It shows that the fixed effect is suitable for 1-6 models, while the random effect is suitable for 7-10 models. Symbols mean significance at: \*\*\* p<0.01, \*\*p<0.05, respectively.

(1) The hypothesis testing of the relationship between intellectual capital reporting and the debt capital.

In part of the test hypotheses, this study presents the test of result of the relationship between the intellectual capital reporting and the debt capital. Followed by hypotheses H1, H1a-c and H2, H2a-c, as shown in Table 11.

Table 11 presents the result testing is used a fixed effect regression model. The result of the model can predict the relationship between independent variables and dependent variables ( $R^2$ ) 0.1407, 0.1481 within Model 1 and 2, respectively. The F-value of the model is statistically significant at the 0.05 level. The variance inflation factors (VIF) is the highest 2.17, 2.23 for the model 1 and 2, respectively. This finding

is less than a value of 10 which is not a multicollinearity problem (Gujarati & Porter, 2009).

The evidence of Model 1 in Table 11 shows that the overall intellectual capital reporting quantified by financial information and the debt capital (H1). The regression results show that the overall intellectual capital reporting quantified by financial information is negatively significantly associated with the debt capital (H1:  $\beta = -0.0662$ ,  $p < 0.10$ ). This finding is in keeping with the previous study of Iranmahd et al. (2014) suggested that the intellectual capital efficiency has negatively significant with the cost of debt for the companies in Iran's capital market context. This result is consistent with the finding of Cenciarelli et al. (2018) suggested that the company can efficiently manage a firm's intellectual capital resulting in a reduced risk including lenders are desirable to provide a lower cost of debt. Consistent with expectations, hence, this study support Hypothesis 1.

The results of sub-hypotheses present in the Model 2 that the components of intellectual capital quantified by financial information and the debt capital (H1a-c). The three components consist of human, structural, and relational capital. The result shows that the human capital is negatively significantly associated with the debt capital (H1a:  $\beta = -0.0741$ ,  $p < 0.10$ ). This finding is consistent with the research of Cenciarelli et al. (2018) found that the productivity of knowledge workers can increase performance leading to timely payment which reduces a risk and lower the debt cost. Consistent with the study of Zakariaa et al. (2020) found that human capital efficiency were the main components to support the great firm financial health among the eight countries in emerging market, leading to a lower debt cost. Hence, Hypothesis 1a is supported.

Table 11 Multiple regression analysis results for intellectual capital and debt capital

Independent Variables	H <sub>0</sub>	Dependent Variable : Debt Capital (DC)					
		Model 1			Model 2		
		Coef.	t-test	p-value	Coef.	t-test	p-value
Intercept		1.8167	0.24	0.812	2.7043	0.35	0.730
ICE	H1	-0.0662*	-1.74	0.085			
HCE	H1a				-0.0741*	-1.67	0.099
SCE	H1b				0.0845	0.47	0.637
RCE	H1c				0.1377	0.43	0.671
ICD	H2	-0.0045**	-2.00	0.048			
HCD	H2a				0.0050	0.48	0.635
SCD	H2b				-0.0153	-1.23	0.221
RCD	H3c				-0.0051*	-1.74	0.084
FS		0.0342	0.06	0.950	-0.0416	-0.07	0.941
MTB		0.0234	0.53	0.599	0.0260	0.57	0.568
ROA		-0.0031	-0.24	0.807	-0.0002	-0.01	0.989
LIQ		0.2071***	3.42	0.001	0.2109***	3.34	0.001
Industry FE		Included			Included		
R <sup>2</sup>		0.1407			0.1481		
F-value		3.63**			2.51**		
p-value		0.0027			0.0098		
Hausman test		86.16**			88.81**		
p-value		0.0000			0.0000		
Maximum VIF		2.17			2.23		

This table presents the regression results using the ordinary-least-squares with firm and year fixed effects (FE).

All regressions are estimated with the robust standard errors clustered at the firm level.

Symbols mean \*, \*\*, and \*\*\* imply statistical significance on the 0.1, 0.05, and 0.01 level, respectively.

While the structural capital is not significantly associated with the debt capital (H1b:  $\beta = 0.0845$ ,  $p > 0.10$ ). The result is consistent with the research of Arjmandi and Abadi (2016) which found that the structural capital is not significant with the debt cost in Iran's capital market context. The relational capital is not significantly associated with the debt capital (H1c:  $\beta = 0.1377$ ,  $p > 0.10$ ). Consistent with the prior study of Gamayuni (2015) found that the intangible assets consist of the component of the structural capital, and customer or relational capital is not significantly associated with the debt capital of corporate in the Indonesian context. They suggested that the company use the funds within corporation from the retained earnings for investing the intellectual capital, because the intellectual capital is likely risk information. Thus, this study is not meet the expected sign. For these reasons, structural capital is the value-added residual of the human expense when the worker finishes the job, they created the system, infrastructure, or the intellectual property owned by the company. This indicator is not interesting for assessing the lenders. As well as it may be the monetary investment of relational capital is related to external or customer leading to low the cash flow. The lenders cannot use the information of relational capital in sufficiently assessing. Thus, Hypotheses 1b and 1c are not supported.

Table 11 shows a part of intellectual capital reporting quantified by non-financial information. The evidence of Model 1 in Table 11 shows that the overall intellectual capital reporting quantified by non-financial information and the debt capital (H2). The results show that the overall of intellectual capital reporting quantified by non-financial information is negatively significantly associated with the debt capital (H2:  $\beta = -0.0045$ ,  $p < 0.05$ ). This finding is consistent with the research of Bouchareb and Kouki (2019) found that the intellectual capital by non-financial information disclosure can access lower the cost of debt in the Tunisian context. Hypothesis 2 is supported.

In Table 11, the finding of the Model 2 presents the components of intellectual capital quantified by non-financial information and the debt capital (H2a-c). The three components are human, structural, and relational capital. The results of human capital, and structural capital are not significantly associated with the debt capital (H2a:  $\beta = 0.0050$ ,  $p > 0.10$ ; H2b:  $\beta = -0.0153$ ,  $p > 0.10$ ). This finding is consistent with the research of Barus and Siregar (2015) found that the human capital disclosure is not

significant on the cost of debt. In addition, they found that the structural capital disclosure is not significant with the debt cost in Indonesia context. As well as the finding of Stropnik et al. (2017) found that the human and structural capital disclosure are not significant with the debt cost in Slovenian. In contrast, the result of the relational capital is negatively significant associated with the debt capital (H2c:  $\beta = -0.0051$ ,  $p < 0.10$ ). The result is consistent with the research of Orens et al. (2009) which found that the relational capital disclosure is negatively significantly associated with the cost of debt in the continental European countries. Hence, Hypothesis 2a, 2b are not supported. In a part of Hypothesis 2c is supported.

The control variable of Model 1 and 2 in Table 11 shows the key control variable regarding the debt capital. The result shows that firm liquidity (LIQ) is positively significant with the debt capital ( $\beta = 0.2071$ ,  $p < 0.01$ ;  $\beta = 0.2109$ ,  $p < 0.01$ ), for Model 1 and 2, respectively. Therefore, the company has the high liquidity refer to the current asset is greater than current liabilities which the ability of the short-term debt payment. When the firm has high liquidity leading the long-term opportunity of the borrows. the lending for the long term is concerned about high liquidity because the debt covenant requirements identify that the company should maintain the high liquidity across the age of covenants (Cai et al., 2008). While the three control variables (firm size, firm growth, and firm performance) are not significant with the debt capital.

Table 12 Multiple regression analysis results for corporate governance mechanism and intellectual capital measured by financial information.

Independent Variables	H <sub>0</sub>	Dependent Variable											
		Model 3 : ICE			Model 4 : HCE			Model 5 : SCE			Model 6 : RCE		
		Coef.	t-test	p-value	Coef.	t-test	p-value	Coef.	t-test	p-value	Coef.	t-test	p-value
Intercept		8.2292	1.12	0.264	8.2165	1.21	0.228	0.1225	0.05	0.962	-0.1170	-0.13	0.897
BC	H3.1	0.0491	1.37	0.174	0.0349	0.97	0.334	0.0187	1.52	0.133	-0.0046	-1.13	0.263
AC	H4.1	0.6354	1.20	0.234	0.6117	1.16	0.250	-0.0517	-0.54	0.587	0.0758	1.07	0.289
OWN	H5.1	-0.0366**	-2.03	0.045	-0.0208	-1.33	0.185	-0.0185**	-2.02	0.046	0.0028	0.60	0.551
FS		-0.6101	-1.00	0.322	-0.6906	-1.20	0.234	0.0689	0.39	0.695	0.0118	0.17	0.864
MTB		-0.0169	-0.46	0.645	0.0000	0.00	1.000	-0.0337***	-2.61	0.010	0.0166**	2.05	0.043
ROA		0.1642**	2.53	0.013	0.1737**	2.78	0.007	-0.0106	-1.39	0.167	0.0011	0.30	0.766
LIQ		0.0715	0.73	0.465	0.0799	0.95	0.346	-0.0193	-1.07	0.286	0.0115*	1.85	0.067
Industry FE		Included	Included		Included	Included		Included	Included		Included	Included	
R <sup>2</sup>		0.5101			0.5612			0.1290			0.1612		
F-value		2.16**			5.25**			4.13**			4.14**		
p-value		0.0442			0.0000			0.0005			0.0000		
Hausman test		141.66**			105.17**			42.37**			20.40**		
p-value		0.0000			0.0000			0.0000			0.0048		
Maximum VIF		1.436			1.436			1.436			1.436		

This table presents the regression results using the ordinary-least-squares with firm and year fixed effects (FE). All regressions are estimated with the robust standard errors clustered at the firm level. Symbols mean \*, \*\*, and \*\*\* imply statistical significance on the 0.1, 0.05, and 0.01 level, respectively.

(2) The hypotheses testing of the relationship between corporate governance mechanism and intellectual capital reporting quantified by financial information.

In part of test hypotheses demonstrated that the test of result of the relationship between corporate governance mechanism (board composition, audit committee, ownership structure) and the overall of intellectual capital and its components quantified by financial information. This study focus on board composition is the proportion of independent directors to the total number of directors. Audit committee is the number of directors on the audit committee. Ownership structure is the total proportion of common stock by company's top five shareholders. The results of hypotheses H3.1, 4.1 and 5.1, as shown in Table 12.

For table 12 presents the result testing is used a fixed effect regression model. It can be inferred from the table is that the result can predict the relationship between independent variables and dependent variables ( $R^2$ ) 0.5101, 0.5612, 0.1290, and 0.1612 of Model 3 - 6, respectively. The F-value of the model is statistically significant at the 0.05 level. The variance inflation factors (VIF) is the highest 1.436. This result is less than a value of 10 which a multicollinearity issue is no problem for this study (Gujarati & Porter, 2009).

The main hypothesis test results are showed in Model 3, the relationship between corporate governance mechanism (board composition, audit committee, ownership structure) and the overall intellectual capital reporting quantified by financial information. The finding of the board composition, audit committee are not significant associated with intellectual capital efficiency (H3.1 :  $\beta = 0.0491$ ,  $p > 0.10$ ; H4.1 :  $\beta = 0.6354$ ,  $p > 0.10$ ). The result is consistent with Dalwai and Mohammadi (2020) found that the independent directors are not significant associated with the overall intellectual capital efficiency. Also, Buallay (2018) found that the audit committee size is not significant with intellectual capital efficiency. Thus, Hypotheses 3.1 and 4.1 are not supported.

While this study found that the coefficient of the ownership structure is negatively and significantly associated with intellectual capital efficiency (H5.1 :  $\beta = -0.0366$ ,  $p < 0.05$ ). It can be implied that the high proportion of ownership is affected by decreased the efficiency of intellectual capital. The finding is consistent with the previous study of Mohd-Saleh and Che Abdul Rahman (2009) suggested that the

ownership structure is high proportion associated with low intellectual capital efficiency. Therefore, Hypothesis 5.1 is supported.

A part of this study analyzes additional data for the intellectual capital components. The relationship between corporate governance and the intellectual capital components. This study found evidence that the corporate governance mechanism (board composition, audit committee, ownership structure) ( $\beta = 0.0349$ ,  $p > 0.10$ ;  $\beta = 0.6117$ ,  $p > 0.10$ ;  $\beta = -0.0208$ ,  $p > 0.10$ ) are not significantly associated with human capital efficiency. This finding is related to Dalwai and Mohammadi (2020), the result shows that the proportion of independent directors, the size of audit committee, and the shareholder concentration are not statistically significant with human capital efficiency. As well as the corporate governance mechanism (board composition, audit committee, ownership structure) ( $\beta = -0.0046$ ,  $p > 0.10$ ;  $\beta = 0.0758$ ,  $p > 0.10$ ;  $\beta = 0.0028$ ,  $p > 0.10$ ) are not significantly associated with relational capital efficiency. This is consistent with Buallay (2018) found that the audit committee size is not influenced the relational capital efficiency. Including, the board composition, audit committee ( $\beta = 0.0187$ ,  $p > 0.10$ ;  $\beta = -0.0517$ ,  $p > 0.10$ ) are not significant associated with structural capital efficiency. The finding of Buallay (2018) and Dashtbayaz et al. (2020) revealed that the audit committee size, and the proportion of independent directors is not a significant relationship with structural capital. Moreover, this finding shows that the ownership structure is negatively significant associated with structural capital efficiency ( $\beta = -0.0185$ ,  $p < 0.05$ ). This result is consistent with Mohd-Saleh and Che Abdul Rahman (2009) revealed that the ownership concentration is negatively related to intellectual capital with structural capital efficiency.

For the control variables of Model 3 in Table 12 Firm performance (ROA) ( $\beta = 0.1642$ ,  $p < 0.05$ ) has positive significant with intellectual capital efficiency (ICE). Consistent with Dalwai and Mohammadi (2020) suggested that high performance led to investment with intellectual capital for long-term growth. The three control variables (firm size, firm growth, and firm liquidity) are not significant with the overall intellectual capital. The finding of the control variables of the intellectual components shows that firm performance (ROA) ( $\beta = 0.1737$ ,  $p < 0.05$ ) has positive significant with human capital. The result of firm growth (MTB) ( $\beta = -0.0337$ ,  $p < 0.05$ ) has negative significant with structural capital. Also, firm growth (MTB) ( $\beta = 0.0166$ ,  $p < 0.05$ ), and



firm performance (ROA) ( $\beta = 0.0115$ ,  $p < 0.05$ ) has positive significant with relational capital. In other words, the three control variables (firm size, firm growth, and firm liquidity) have not significant with human capital. The three control variables (firm size, firm performance, and firm liquidity) are not significant with structural capital. The two control variables (firm size, firm performance) have not significant with relational capital.

(3) The hypotheses testing of the relationship between corporate governance mechanism and intellectual capital reporting quantified by non-financial information.

In part of hypotheses testing demonstrated that the regression result of the relationship between corporate governance mechanism (board composition, audit committee, ownership structure) and the overall of intellectual capital and its components quantified by non-financial information. This study focus on board composition is the proportion of independent directors to the total number of directors. Audit committee is the number of directors on the audit committee. Ownership structure is the total proportion of common stock by company's top five shareholders. The results testing of hypotheses H3.2, 4.2 and 5.2 show in Table 13.

Table 13 presents the random effect (RE) regression model is employed in Model 7 - 10. It can be inferred from the table is that the result can predict the relationship between independent variables and dependent variables ( $R^2$ ) 0.0722, 0.0949, 0.0599, and 0.0456 for Model 7 - 10, respectively. The F-value of the model is statistically significant at the 0.05 level. The variance inflation factors (VIF) is the highest 1.436. This result is less than a value of 10 which a multicollinearity issue is not a problem for this study (Gujarati & Porter, 2009).

Table 13 Multiple regression analysis results for corporate governance mechanism and intellectual capital measured by non-financial information.

Independent Variables	H <sub>0</sub>	Dependent Variable																	
		Model 7 : ICD			Model 8 : HCD			Model 9: SCD			Model 10 : RCD								
		Coef.	t-test	p-value	Coef.	t-test	p-value	Coef.	t-test	p-value	Coef.	t-test	p-value						
Intercept		-149.0739	-1.55	0.122	-47.1537	-1.64	0.101	-1.7288	-0.11	0.916	-107.6038	-1.35	0.176						
BC	H3.2	0.7064*	1.73	0.083	0.0200	0.2	0.842	0.1805*	1.92	0.055	0.5368	1.63	0.103						
AC	H4.2	19.1175*	1.95	0.052	6.5876**	1.98	0.047	4.9262*	1.90	0.058	7.9729	1.20	0.231						
OWN	H5.2	0.1172	0.34	0.735	0.0815	1.01	0.313	0.0492	0.83	0.405	0.0185	0.06	0.950						
FS		14.8626**	2.28	0.022	3.4559*	1.86	0.063	-0.6427	-0.58	0.561	12.2489**	2.26	0.024						
MTB		-1.3506*	-1.71	0.087	-0.6156*	-1.84	0.065	-0.4532**	-2.48	0.013	-0.2458	-0.58	0.560						
ROA		0.1782	1.21	0.226	0.0374	0.86	0.388	0.0252	0.73	0.468	0.0590	0.44	0.663						
LIQ		-1.5408	-1.54	0.123	-0.3663	-1.42	0.157	0.0093	0.03	0.972	-1.0539	-1.36	0.173						
ind1		2.2479	0.07	0.942	1.8284	0.32	0.750	1.7431	0.30	0.766	-1.8255	-0.07	0.943						
ind2		-26.1580	-1.00	0.317	-2.8233	-0.49	0.627	-0.6695	-0.19	0.846	-22.5052	-1.15	0.251						
ind3		12.3794	0.49	0.625	10.5894	1.21	0.227	-7.0860**	-2.25	0.025	8.6235	0.43	0.668						
ind4		-18.7973	-0.64	0.523	0.9934	0.16	0.872	4.5241	1.15	0.252	-25.3120	-1.09	0.276						
ind5		20.5319	0.78	0.435	8.2544	1.36	0.173	8.0706**	2.19	0.028	3.9505	0.19	0.851						
ind6		24.2198	0.81	0.419	1.2908	0.19	0.849	20.8602**	2.47	0.014	2.7326	0.12	0.906						
R <sup>2</sup>		0.0722			0.0949			0.0599			0.0456								
F-value		33.92**			22.87**			51.11**			25.38**								
p-value		0.0012			0.0433			0.0000			0.0205								
Hausman test		6.41			4.74			4.30			9.19								
p-value		0.4929			0.6921			0.7445			0.2394								
Maximum VIF		1.436			1.436			1.436			1.436								

This table presents the regression results using the ordinary-least-squares with firm and year random effects (RE).

All regressions are estimated with the robust standard errors clustered at the firm level.

Symbols mean \*, \*\*, and \*\*\* imply statistical significance on the 0.1, 0.05, and 0.01 level, respectively.

The main hypothesis test results are showed in Model 7 of Table 13, the relationship between corporate governance mechanism (board composition, audit committee, ownership structure) and the overall of intellectual capital reporting quantified by non-financial information. The finding of the board composition is positively significant associated with intellectual capital disclosure (H3.2 :  $\beta = 0.7064$ ,  $p < 0.10$ ). This result is consistent with the research of Haji and Ghazali (2013) and Muttakin et al. (2015) found that the high proportion of independent directors have significant with the extent of intellectual capital disclosure. As well as the finding of the audit committee is positively significant associated with intellectual capital disclosure (H4.2 :  $\beta = 19.1175$ ,  $p < 0.10$ ). Consistent with the finding of Li et al. (2012) and Madi et al. (2014) showed that the audit committee size has positive significant with the overall intellectual capital disclosure. Therefore, Hypotheses 3.2 and 4.2 are supported.

The result of the ownership structure is not significant with intellectual capital disclosure (H5.2 :  $\beta = 0.1172$ ,  $p > 0.10$ ). Consistent with Whiting and Woodcock (2011) and Hidalgo et al. (2011) found that a high ownership proportion is not significantly associated with the overall intellectual capital. They suggested that the ownership has a high proportion of shareholders not impact on agency cost. The company is likely to mitigate agency cost through an alternative such as making the other remuneration to managers for aligning their interests. Hence, Hypothesis 5.2 is not supported.

This study analyzes additional data for the intellectual capital components. The relationship between corporate governance and the component of intellectual capital. This study find evidence that the audit committee are positively significant associated with human capital disclosure ( $\beta = 0.0200$ ,  $p < 0.05$ ), which is consistent with Li et al. (2012) found that the audit committee size is positively related to human capital disclosure, while the board composition and the ownership structure ( $\beta = 0.0200$ ,  $p > 0.10$ ;  $\beta = 0.0815$ ,  $p > 0.10$ ) are not associated with human capital disclosure. In accordance with Hidalgo et al. (2011) results that the independence directors, and the ownership structure are not associated with more voluntary disclosure, including human capital. In addition, the board composition and audit committee are positively significant associated with structural capital disclosure ( $\beta = 0.1805$ ,  $p < 0.01$ ;  $\beta =$

4.9262,  $p < 0.01$ ). This finding is related to Li et al. (2012) found that the proportion of independent directors and the audit committee size is positively associated with structural capital disclosure. While the ownership structure ( $\beta = 0.0492$ ,  $p > 0.10$ ) is not associated with structural capital disclosure. This finding is related to Whiting and Woodcock (2011) found that the ownership concentration is not related to the component of intellectual capital. In addition, the board composition, audit committee, and ownership structure ( $\beta = 0.5368$ ,  $p > 0.10$ ;  $\beta = 7.9729$ ,  $p > 0.10$ ;  $\beta = 0.0185$ ,  $p > 0.10$ ) are not significantly associated with relational capital disclosure.

The relationship between control variables and the overall of intellectual capital disclosure are showed in Model 7 of Table 13 which firm size (FS) has positive significant with the overall of intellectual capital disclosure ( $\beta = 14.8626$ ,  $p < 0.05$ ). This finding is consistent with Alfraih (2018) showed that the positive coefficient indicates that larger companies are likely to disclose more total intellectual capital reporting. Firm growth (MTB) has negative significant with intellectual capital disclosure ( $\beta = -1.3506$ ,  $p < 0.10$ ). Consistent with Kamath (2017) found that the firm has a high growth is low the voluntary intellectual capital disclosure. They are likely to limit their access to information, particularly the information of intellectual capital. This information can imitate the competitive strategy. The three control variables (firm performance, firm liquidity, industry type) are not significant with the overall of intellectual capital.

For the relationship between control variables and the human capital disclosure is shown in Model 8 of Table 13. Firm size (FS) has positive significant with the human capital disclosure ( $\beta = 3.4559$ ,  $p < 0.10$ ). The larger firm can disclose more the human capital information. Firm growth (MTB) has negative significant with the human capital disclosure ( $\beta = -0.6156$ ,  $p < 0.10$ ). The firm has a high growth is low the human capital information. The three control variables (firm performance, firm liquidity, industry type) are not significant with the human capital disclosure.

For the relationship between control variables and the structural capital disclosure are shown in Model 9 of Table 13. Firm growth (MTB) has negative significant with the structural capital disclosure ( $\beta = -0.4532$ ,  $p < 0.5$ ). The firm has a high growth is low the structural capital information. In addition, the Property& Construction has a negative relationship with the structural capital disclosure when

compared to the Agro & Food. While the Service and the Technology have a positive relationship with structural capital disclosure when compared to the Agro & Food. The three control variables (firm size, firm performance, and liquidity) are not significant with structural capital disclosure. On the other hand, for the control variables of Model 10 shows that firm size (FS) has positive significance with the relational capital disclosure ( $\beta = 12.2489$ ,  $p < 0.05$ ). The larger firm can disclose more the relational capital information. The four control variables (firm growth, firm performance, firm liquidity, industry type) are not significant with the relational capital disclosure.

### The Summary of all Hypotheses Testing

Table 14 Summary of all Hypotheses Testing

Research Questions	Hypotheses	Estimated Sign	Hypotheses Description	Results
Is there the relationship between the intellectual capital reporting and the debt capital?	H1	-	Intellectual capital reporting quantified by financial information is negatively associated with the debt capital.	Supported
	H1a	-	The human capital quantified by financial information is negatively associated with the debt capital.	Supported
	H1b	-	The structural capital quantified by financial information is negatively associated with the debt capital.	Not supported
	H1c	-	The relational capital quantified by financial information is negatively associated with the debt capital.	Not supported
	H2	-	Intellectual capital reporting quantified by the non-financial information is negatively associated with the debt capital.	Supported
	H2a	-	The human capital quantified by the non-financial information is negatively associated with the debt capital.	Not supported

Table 14 Summary of all Hypotheses Testing (Continued)

Research Questions	Hypotheses	Estimated Sign	Hypotheses Description	Results
	H2b	-	The structural capital quantified by the non-financial information is negatively associated with the debt capital.	Not supported
	H2c	-	The relational capital quantified by the non-financial information is negatively associated with the debt capital.	Supported
Is there the relationship between the corporate governance mechanisms and the intellectual capital reporting?	H3.1	+	The board composition is positively associated with intellectual capital reporting quantified by the financial information.	Not supported
	H4.1	+	The audit committee is positively associated with intellectual capital reporting quantified by the financial information.	Not supported
	H5.1	-	The ownership structure is negatively associated with intellectual capital reporting quantified by the financial information.	Supported
	H3.2	+	The board composition is positively associated with intellectual capital reporting quantified by the non-financial information.	Supported
	H4.2	+	The audit committee is positively associated with intellectual capital reporting quantified by the non-financial information.	Supported
	H5.2	-	The ownership structure is negatively associated with intellectual capital reporting quantified by the non-financial information.	Not supported

## **CHAPTER V**

### **CONCLUSION**

The previous chapter explains summarize the descriptive of the final sample, and variables, the result of hypotheses testing with regression analysis. Consequently, this chapter is organized as follows. Firstly, the conclusion presents the overview of this study. Secondly, the discussion from the finding of hypotheses testing. Thirdly, the theoretical, managerial, and institutional contributions. Finally, the limitations and future research direction.

#### **Conclusion**

This research is proposes three questions, the first question is What is the level, and content of intellectual capital reporting? The second question is that there a relationship between the intellectual capital reporting and debt capital? The third question is that there a relationship between the corporate governance mechanisms and intellectual capital reporting? The objective contains three items as follows. First, investigation of the level, and content of intellectual capital reporting. Second, the relationship between the intellectual capital reporting and the debt capital. Third, the relationship between the corporate governance mechanism and the intellectual capital reporting. Moreover, this research relied on three theoretical perspectives to discuss the next section that is the signaling theory use to explain the relationship between the intellectual capital reporting and the debt capital. The agency theory supports the relationship between the corporate governance mechanism and the intellectual capital, including the theory of information asymmetry to explain does not share the information on intellectual capital in each party.

The research data is unbalanced panel data or the longitudinal study of the intellectual capital reporting of companies listed in the Market for Alternative Investment (MAI) in Thailand. The result of the study is divided into three objectives as follows. First, the level of the overall intellectual capital reporting in form of financial information is slightly fluctuates. The finding shows that the level of intellectual capital reporting that human capital efficiency (HCE) can generate value

outstandingly followed by structural capital efficiency (SCE), and relational capital efficiency (RCE). Whereas the level of intellectual capital reporting in form of non-financial information found that the quantity of an average of word counts is likely to increase, but slightly reduced in the final year during the period of this study. The highest average word counts of the disclosure is relational capital (RCD), followed by human capital (HCD), and structural capital (SCD). In addition, the five top disclosure content of intellectual capital reporting of the MAI found that the content of human capital has the employee training, the employee welfare, the employee teamwork, the employee capability, and the employee equality. The content of structural capital has the information/networking systems, the intellectual property, the management processes, the organization structure, and the corporate culture. The content of relational capital has the customers, the contracts, the brands, the market share, and the business collaborations.

The finding of the second objective found that intellectual capital reporting is negatively associated with debt capital. A part of the sub-hypotheses found that financial information on human capital is negatively related to the debt capital, while structural, and relational are not significant with the debt capital. In a part of non-financial information on relational capital is negatively associated with the debt capital while human and structural capital are not significant with the debt capital.

Finally, the third objective found that a negatively significant of the relationship between the top five of ownership structures and intellectual capital reporting in form of financial information. Whereas the proportion of independent directors, and the size of audit committees are not significant with the intellectual capital reporting. In a part of non-financial information on intellectual capital reporting found that the proportion of independent directors, and the size of audit committees are positively related to intellectual capital reporting, while the top five of ownership structure is not significant with intellectual capital reporting.

## **Discussion**

### **1. The intellectual capital reporting and relationship with the debt capital.**

This research addresses the issue of the intellectual capital reporting is diffusion within the corporate reporting among the companies listed in the Market for Alternative Investment (MAI) of Thailand. This research is the key research questions.



The answer to the research question is determined that is there the relationship between the intellectual capital reporting and the debt capital? With respect to the objective of this research. The result presents that the overall of intellectual capital measured by financial information is negatively associated with debt capital. The result is consistent with Iranmahd et al. (2014). The value of intellectual capital increases can support the company to use efficiently their intellectual capital, the company can create a value-added for reducing risk throughout the lender favor a lower the debt cost (Cenciarelli et al., 2018). Also, the result presents that the overall of intellectual capital measured by non-financial information is negatively associated with the debt capital. It also corresponds to Bouchareb and Kouki (2019), this finding explained that the company provides more non-financial intellectual capital that can reflect the business activities based on knowledge assets, strategy regarding intellectual capital through disclosure of more information associate with the awareness of the lenders (Bouchareb & Kouki, 2019). The lenders can reflect to trust this information with a lower cost of debt.

In part of the component of intellectual capital reporting, the finding of financial information can support that human capital is negatively associated with the debt capital. Consistent with Cenciarelli et al. (2018) and Zakariaa et al. (2020), it meant that human capital is fundamental regard to the growth future. The efficiency of human capital plays a major proportion can contribute to long-term value (Zakariaa et al., 2020). The efficient use of human capital drives the company taken for lowering the debt capital (Cenciarelli et al., 2018). While the finding of non-financial information can on relational capital is negatively associated with the debt capital. Consistent with Orens et al. (2009), the ability of a company through relational capital reporting which interact with a business collaboration, such as the external partner, customers and others. The company can create opportunities competitive in market which can reduce the anxiety of lenders, leading to a decrease in the debt cost (Orens et al., 2009).

This finding can be explained by the Signaling theory, the value of intellectual capital in form of financial information shows that the company is efficiently using their intellectual capital creating value-added for generating the future growth, the company gain benefit related to the lender in assessing firms. While the firms engage in non-financial information of intellectual capital reporting which is visible tool leading to trustworthiness with the lenders. Intellectual capital is alternative

information reduces the information asymmetry with the lenders that the lenders can rely on them for assessing the ability repayment of the firms (Spence, 2002; Guimón, 2005). Considering the forms of financial information, the company has intellectual capital efficiency that is observable investment opportunities by the lender to access estimate the risk that leads to protecting debt covenant from tracking company investment activities (Iranmahd et al., 2014). The company uses intellectual capital reporting as a complementary strategic issue. In addition, considering the non-financial information is used as signaling to reduce uncertainty about the risk of the financial position (Yosano & Koga, 2008). Therefore, the lenders' beliefs of the ability repayment of the company come from the investment of the human capital efficiency. In addition, the company disclosing more relational capital provides insight into non-financial information for the decision of the lenders.

On the other hand, the components of intellectual capital in form of financial information as structural capital is not significant with the debt capital. Consistent with Arjmandi and Abadi (2016), also relational capital is not significant with the debt capital. Consistent with Gamayuni (2015), it can refer that the possibility of failing to aware of structural capital and relational capital related to the lenders. The lenders do not pay attention about the utilizing of structural capital efficiency, due to structural capital cannot provide value-added to attract the lenders. As well as the financial information of relational capital is expensed which may be reduce the firm's ability the future cash flow, when the company is likely intensive a market competition (Gamayuni, 2015). This indicator is not interesting for assessing the lenders, because a value of structural capital may be to reduce profitability. As well as it may be the monetary investment of relational capital is related to external or customer leading to low the amount of cash inflow for the future economic benefit. The lenders cannot use the information of relational capital in sufficiently assessing.

In addition, the components of intellectual capital reporting in form of non-financial information. This finding shows that human capital not significant with the debt capital. Include, structural capital is not significant with the debt capital which is consistent with Barus and Siregar (2015) and Stropnik et al. (2017). They suggested that the bank does not pay attention to this non-financial information of human, and structural cannot assess the future cash flow. This study can explain the finding accord

with a reason that the lenders are not considered as the main factor because they considered the other factor regarding more the ability of firms for repayment such as the history of credit rating to seek a risk of loan for the firms (Barus & Siregar, 2015). For the reason possibility is that non-financial information on human capital, and structural capital are not impact on the decision of lenders. It may be less interested in conveying the intrinsic value of the company to the financial benefits in the form of the debt cost.

## 2. Corporate governance mechanisms and relationship with intellectual capital reporting.

In part of the key research questions. The answer to the research question is there the relationship between the corporate governance mechanisms and the intellectual capital reporting? With respect to the objective of this research. The finding indicates that the high proportion of independent directors is positively significantly associated with intellectual capital reporting, including structural capital which is consistent with Haji and Ghazali (2013) and Muttakin et al. (2015). They suggested that the independent directors can balance management between managers and owners by encouraging more intellectual capital reporting. As well as the audit committee size is positively significantly associated with intellectual capital reporting, including human capital and structural capital which is consistent with Li et al. (2012) and Madi et al., (2014). This finding support that the number of audit committee members increases can effectively monitor the non-financial information of intellectual capital reporting leading to the quality of corporate reporting (Li et al., 2012; Madi et al., 2014). They suggested that the larger audit committees can oversee monitoring the behavior of management for increasing transparency through intellectual capital reporting. While the high proportion of shareholders is negatively significantly associated with intellectual capital reporting, including structural capital which is consistent with the finding of Mohd-Saleh and Che Abdul Rahman (2009). The high proportion of ownership can reduce investment in the intellectual capital of firms for the long-term period (Tran et al., 2020). The reason is that they have voting right and controlling power which can reduce to create value-added for intellectual capital reporting.

This finding is explained by Agency theory, the corporate governance can enhance transparency and drive the company to alleviate the agency problem issue. The company uses the corporate governance mechanism which is determined the proportion of independent directors, the audit committee size, and the total proportion of shareholders. For the accountability of the independent committee can explain that a greater proportion of independent directors can reduce agency costs because they can monitor the actions of the managers (Fama & Jensen, 1983). The independent directors determine the intellectual capital reporting in form of non-financial information for the fair distribution of wealth of shareholders. Additionally, the independent directors are important for the company that supports check and balance in the power of the management team. They support ensuring efficient utilization of organizational resources for protecting the interest of the company (Dalwai & Mohammadi, 2020). As well as the number of audit committee members are related to disclose the non-financial information of intellectual capital reporting which can reduce the agency problem. The larger audit committee size ensures effective internal control and monitoring in the disclosure. They can assurance in the information of intellectual capital reporting (Keenan & Aggestam, 2001). The presence of corporate governance can determine as part of overcoming the conflicts of interest. While the ownership is concentrated not favorable with corporate governance mechanism. They have a lot of voting power from a high proportion of shares which obstacle in protection for the interest of minority shareholders (Demsetz & Lehn, 1985). The finding can explain that the ownership concentration manages to utilize less efficiency of the intellectual capital. This evidence describes underlining it can note that the high proportion of ownership are less active in monitoring and improving intellectual capital efficiency. They can pressure set the direction of the policy or strategy for their interest which may have adverse effects on decisions (Firer & Williams, 2005; Hidalgo et al., 2011). The meant that the majority may determine the decision to affect a value creation activity through intellectual capital. They may induce management to extract wealth from the minorities, which use the resource to generate private benefits in the form of the managerial entrenchment (Mohd-Saleh & Che Abdul Rahman, 2009). They are likely averting invest in managing the intellectual capital activities for developing the long-term (Tran et al., 2020).

In contrast, the finding of intellectual capital in form of financial information shows that the proportion of independent directors are not significant associated with intellectual capital reporting, including the component of intellectual capital which is consistent with Dalwai and Mohammadi (2020). They suggested that the independent directors cannot create value-added by the intellectual capital reporting. The reason possibility of the independent directors maybe lacks the strategic direction of investment intellectual capital. The audit committee size is not significant with intellectual capital reporting, including the component of intellectual capital which is consistent with Buallay (2018). They indicated that the audit committee has a larger size not involved intellectual capital efficiency. A possible explanation is the audit committee focus on a review of the company's financial statements regarding the mandatory financial information. This meant that the audit committee may be less pay attention to monitor in managing intellectual capital efficiency. Including, the ownership structure not significant with the human capital and relational capital efficiency.

In addition, the finding of intellectual capital in form of non-financial information shows that the ownership structure not significant with intellectual capital reporting, including the components of intellectual capital which is consistent with Whiting and Woodcock (2011) and Hidalgo et al. (2011). They suggested that the intellectual capital disclosure does not appear on the management's list of priorities. They have a greater the voting rights power which is likely to decision disclose the other voluntary information more than intellectual capital. Meanwhile, they can conceal some information for self-interest. One possible reason is the intellectual capital reporting is disclosed which may be competitive sensitive (Goebel, 2019). From these reasons, the ownership structure has the holding a high proportion of shares may focus on their interests with disclosures of other voluntary information. In addition, this study found that the high proportion of independent directors are not significant associated with the human capital, and relational capital disclosure. Also, the audit committee size is not related to the relational capital.

## **Theoretical and Managerial Contribution**

### Theoretical Contribution

This research is expanded to contribute the existence of the signaling theory, and the agency theory, especially in the emerging market. First, for understanding the relationship between intellectual capital reporting and the debt capital, underline the signaling theory. The intellectual capital reporting in form of financial and non-financial information can powerfully complement signaling with the lenders. The presenting financial information has the benefits of favorable conditions with the lenders. As well as intellectual capital on non-financial information disclosure is an information signal with the lenders. It can identify the business activities, strategy throughout supporting the knowledge-based assets. The lenders can understand the picture of intellectual capital through corporate reporting in viewpoint of financial information, and non-financial information. In addition, intellectual capital reporting can build the picture of using intellectual capital for enhancing value of voluntary information. Therefore, this empirical research hope that the value of intellectual capital in form of financial information, and non-financial information will lead to the lender's decision-making in the emerging market.

Second, this research elaborates the strong existing of the agency theory as theory can help to explain the corporate governance and intellectual capital reporting are connected. This research shows that the finding is considered in line of the proportion of independent directors, as represented by the board composition. The audit committee size, as represented by the audit committee. The five largest shareholders, as represented by the ownership structure. The board composition and the audit committee enhance the knowledge of the determinants more non-financial information of intellectual capital disclosure. While corporate governance drive by the top five shareholders related to the intellectual capital of financial information. They seek self-interest through utilizing intellectual capital. The corporate governance mechanisms lead to safeguarding the maximize interests of the firms. Thus, this empirical research hopes that the corporate governance mechanisms, especially the independent directors, the audit committee size, and the top five shareholders can lead to a revision of the corporate governance practice under the emerging market.

### Managerial Contribution

The result of this study will benefit from the framing of intellectual capital reporting in form of financial and non-financial information. This study provides an approach to the assessment hidden value the information of intellectual capital on financial statement, and annual report. The contribution can divide to the company, the bank, and the governance organization as follows.

First, the company can use the information on intellectual capital reporting which is the opportunity for management, strategy, and practical about its information. In part of financial information is a source information to assess the invest activity about intellectual capital which can manage, develop, and exploit for the future growth. The information of overall intellectual capital reporting leads to reduce the gap information with the lenders throughout a lower cost of debt. Especially, the information of human capital. The company aware to use the monetary in terms of human capital which related activities such as developing and retaining human capital. In addition, the corporate information disclosure in terms of relational capital which related the growth opportunity on the market share.

Meanwhile, the information on a intellectual capital reporting is a voluntary information. The company should provide information about intellectual capital not only financial information but also to provide additional disclosure. Owing to the company can explain the activities of business and the supplement information showing the operation. The company will be benefiting from this information advantage. Intellectual capital reporting can provide valuable insights into the corporate information disclosure.

Second, this research can contribute to a bank and a financial institution. They aware of the value of information on intellectual capital reporting. The results highlight intellectual capital reporting can enhance the benefit of consideration of the efficiency manage intellectual capital. Financial information of intellectual capital reporting reflects the ability for the growth of the future. This study shows that intellectual capital reporting can provide the potential to produce the value creation. The lenders can assess a financial health of a firm. Non-financial information of intellectual capital reporting supplementary provides the risk or opportunity of the companies which results from the company properly managing and trend investing their intellectual capital assets. In

addition, the information on intellectual capital reporting can reduce the gap of information relating to the lenders. Thus, a bank and a financial institution consider the value information of intellectual capital for estimation of the probability of the future economic benefits.

Third, this research can contribute voluntary information on intellectual capital reporting for the governance organization. Even the absence of mandatory regulations provides the information of intellectual capital reporting, but intellectual capital reporting regards as a voluntary information practice. The governance organization should consider the importance of intellectual capital reporting, owing to this information can impact the lenders' decision-making for setting the cost of debt. The results can reflect that intellectual capital reporting can reduce the information asymmetry in both internal and external users. Therefore, the regulators and policymakers can help the corporate users understanding and acknowledge the importance of corporate voluntary information in the Market for Alternative Investment (MAI) listed companies in Thailand.

Second, the results of this study can reflect that good corporate governance monitors voluntary corporate reporting, in particular the Market for Alternative Investment (MAI) listed companies in Thailand. The regulators and policymakers can provide ways to help corporate information users understanding and recognizing the importance of intellectual capital reporting for the firm's transparency. Thus, this study expands a valuable policy for the emerging market in promoting, as well as in the developed market.

## **Limitations and Future Research Direction**

### Limitations

This study has some limitations which can be mentioned as follows.

First, this study uses the sample which listed companies in the Market for Alternative Investment (MAI). Even though this sample of research can find the evidence empirical which shows the influence on the lender, but this study finds that it is limited access data. Under the sample of study found that the annual report is published data in term of the English language which is limited access data.



Second, this study found that the limitation of the indicator of intellectual capital in form of financial information, and non-financial information which the findings of this study show interesting elements of human, and relational capital impact on the lenders. While structural capital can better improve the measurement and disclosure under the information of intellectual capital.

Third, this study uses a rapid miner analysis tool within the document datasets from the annual report, including the content of intellectual capital reporting. The notice is the outcome of word count has a little number or does not incur a word count for some keyword. This study uses the unit of analysis that is words to aggregate the keyword surrounding a text and a sentence transpose keywords into quantities. The characteristic of the tool focuses on specifying the keyword within the content of intellectual capital reporting. The occurrence of a word spells as same as a keyword that is predefined from prior literature. The keywords are under the characteristic of this tool, not capture matching the word from the synonym within the content of intellectual capital reporting.

#### Future Research Direction

In order to overcome the limitations that arises from this study, some recommendations are suggested for future research as follows.

First, future research can expand the sample is widely investigate under the content analysis. Important of intellectual capital reporting via the annual report in the English language to explore in the large sample because this information is critical for the users to be able the decision-making.

Second, a further possible development of the research is to move to under the growing global which trends the company drives the innovation for increasing the business opportunity. The future research can be improved about the indicator of intellectual capital in form of financial information which can change to improve the structural capital, for example using research and development expenditure. While the keywords of non-financial information can expand the keywords for developing the innovation content to support disclosing the value information of intellectual capital.

Third, this study opined that future research could improve a content analysis that expands the extent of the keywords under the content of intellectual capital reporting. This suggestion can bring more the number of a keyword when the study of future research will examine in a larger sample or the other market capital. The analysis can use the other tool analysis with the keywords of this study that can adopt or to make the comparison with the previous study.

## REFERENCES

## REFERENCES

- Abdul Rashid, A., Ibrahim, M. K., & Othman, R. (2012). IC Disclosures in IPO Prospectuses: Evidence from Malaysia. *Journal of Intellectual Capital*, 13(1), 57-80.
- Aboody, D., & Lev, B. (2000). Information asymmetry, R&D, and insider gains. *The Journal of Finance*, 55(6), 2747-2766.
- Aekapang, J., & Sopapong, P. (2020). Value Added Intellectual Capital of listed Companies in the Stock Exchange of Thailand. *Rajabhat Maha Sarakham University Journal*, 14(1), 81-89.
- Akerlof, G. A. (1970). The market for “lemons”: Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3), 488-500.
- Alchian, A. A., & Demsetz, H. (1972). Production, information costs, and economic organization. *The American Economic Review*, 62(5), 777-795.
- Alfraih, M. M. (2018). The role of corporate governance in intellectual capital disclosure. *International Journal of Ethics and Systems*. 34(1), 101-121.
- Al-Musali, M. A. K. M., & Ismail, K. N. I. K. (2015). Board diversity and intellectual capital performance. *Accounting Research Journal*.28(3), 268-283.
- Al-Sartawi, A. (2018). Corporate governance and intellectual capital: evidence from Gulf cooperation council countries. *Academy of Accounting and Financial Studies Journal*, 22(1), 1-12.
- Andriessen, D. (2004). *Making Sense of Intellectual Capital: Designing a Method for the Valuation of Intangibles*. Retrieve from [https://books.google.co.th/books?id=tccJBAAQBAJ&pg=PA100&lpg=PA100&dq=EVA+intellectual+capital&source=bl&ots=hKMzXSy4gw&sig=ACfU3U1NmMVRO3\\_jDo50ONfS9tyZHEjefw&hl=en&sa=X&ved=2ahUKEwj9NbOttPpAhUi7HMBHaQZBQM6AEwB3oECAsQAQ#v=onepage&q=EVA%20intellectual%20capital&f=false](https://books.google.co.th/books?id=tccJBAAQBAJ&pg=PA100&lpg=PA100&dq=EVA+intellectual+capital&source=bl&ots=hKMzXSy4gw&sig=ACfU3U1NmMVRO3_jDo50ONfS9tyZHEjefw&hl=en&sa=X&ved=2ahUKEwj9NbOttPpAhUi7HMBHaQZBQM6AEwB3oECAsQAQ#v=onepage&q=EVA%20intellectual%20capital&f=false)[27 May 2020].
- Anghel, I. (2008). Intellectual capital and intangible assets analysis and valuation. *Theoretical and Applied Economics*, 3(3), 75-84.

- Anifowose, M., Rashid, H. M. A., & Annuar, H. A. (2017). Intellectual capital disclosure and corporate market value: does board diversity matter?. *Journal of Accounting in Emerging Economies*, 7(3), 369-398.
- An, Y., Davey, H., & Eggleton, I. R. (2011). Towards a comprehensive theoretical framework for voluntary IC disclosure. *Journal of Intellectual Capital*, 12(4), 571-585.
- April, K. A., Bosma, P., & Deglon, D. A. (2003). IC measurement and reporting: establishing a practice in SA mining. *Journal of Intellectual Capital*, 4(2), 165-180.
- Appuhami, B. R. (2007). The impact of intellectual capital on investors' capital gains on shares: an empirical investigation of Thai banking, finance and insurance sector. *International Management Review*, 3(2), 14-25.
- Appuhami, R., & Bhuyan, M. (2015). Examining the influence of corporate governance on intellectual capital efficiency: Evidence from top service firms in Australia. *Managerial Auditing Journal*, 30(4/5), 347-372.
- Arifah, D. A., & Chariri, A. (2020, January). *Corporate Governance: A Key Driver of Intellectual Capital Performance*. In 17<sup>th</sup> International Symposium on Management (INSYMA 2020) (pp. 48-53). Atlantis Press.
- Arafat, N. M., & Shahimi, M. (2013). *An Exploratory of the Intangible Assets: Methods of Measuring Intellectual Capital*. In 3<sup>rd</sup> International Conference on Business, Economics, Management and Behavioral Sciences (ICBEMBS'2013), Singapore.
- Armstrong, C. S., Guay, W. R., & Weber, J. P. (2010). The role of information and financial reporting in corporate governance and debt contracting. *Journal of Accounting and Economics*, 50(2-3), 179-234.
- Ashbaugh-Skaife, H., Collins, D. W., & LaFond, R. (2006). The effects of corporate governance on firms' credit ratings. *Journal of Accounting and Economics*, 42(1-2), 203-243.
- Attig, N., El Ghouli, S., Guedhami, O., & Suh, J. (2013). Corporate social responsibility and credit ratings. *Journal of Business Ethics*, 117(4), 679-694.

- Attarit, T., Dampitakse, K., Panmanee, P. (2017). Analysis of mediating effect of intellectual capital efficiency linking board of directors' characteristics and firm performance: Empirical evidence from Thai listed companies. *International Business Management*, 11(11), 1871-1881.
- Azman, H., & Kamaluddin, A. (2012, March). *Corporate Governance Mechanisms and Intellectual Capital Disclosure in Malaysian GLCs*. In 3<sup>rd</sup> International Conference on Business and Economic Research (3rd Icerb 2012) Proceeding, Indonesia.
- Bank of Thailand (BOT), B. (2016). *Senior Loan Officer Survey*. Retrieve from [https://www.bot.or.th/Thai/MonetaryPolicy/EconomicConditions/CreditCondition/LoanSurvey\\_TH\\_Q3\\_2016\\_white3.pdf](https://www.bot.or.th/Thai/MonetaryPolicy/EconomicConditions/CreditCondition/LoanSurvey_TH_Q3_2016_white3.pdf) [15 July 2020]
- Barus, S. H., & Siregar, S. V. (2015). The effect of intellectual capital disclosure on cost of capital: Evidence from technology intensive firms in Indonesia. *Journal of Economics, Business, & Accountancy Ventura*, 17(3), 333-344.
- Barajas, E. S. A. (2014). Value creation through intellectual capital in developed European markets. *Journal of Economic Studies*, 41(2), 272-291.
- Beattie, V., & Thomson, S. J. (2004, July). *A Comprehensive Analysis of Intellectual Capital Components as a Precursor to Empirical Investigation of Disclosures in annual reports*. In 8<sup>th</sup> Annual Financial Reporting and Business Communication Conference. Cardiff.
- Beattie, V., & Thomson, S. J. (2007, June). Lifting the lid on the use of content analysis to investigate intellectual capital disclosures. *Accounting Forum*, 31(2), 129-163.
- Beattie, V., & Smith, S. J. (2010). *Intellectual Capital Reporting: Academic Utopia or Corporate Reality in a Brave New World?*. Enlighten : T. J. International.
- Berger, A. N., & Udell, G. F. (2002). Small business credit availability and relationship lending: The importance of bank organizational structure. *The Economic Journal*, 112(477), 32-53.
- Bergh, D. D., Ketchen Jr, D. J., Orlandi, I., Heugens, P. P., & Boyd, B. K. (2019). Information asymmetry in management research: Past accomplishments and future opportunities. *Journal of Management*, 45(1), 122-158.

- Bertomeu, J., & Magee, R. P. (2015). Mandatory disclosure and asymmetry in financial reporting. *Journal of Accounting and Economics*, 59(2-3), 284-299.
- Berzkalne, I., & Zelgalve, E. (2014). Intellectual capital and company value. *Procedia-Social and Behavioral Sciences*, 110, 887-896.
- Bhasin, M. L., Shaikh, D., & Hanif, J. M. (2011). Intellectual capital disclosures in the annual reports: a comparative study of the Indian and Australian IT-corporations. *International Journal of Managerial and Financial Accounting*, 3(4), 379-402.
- Bhasin, M. L. (2012). Measurement and disclosure of intellectual capital in a developing country: An exploratory study. *Australian Journal of Business and Management Research*, 2(8), 63-75.
- Bontis, N. (1998). Intellectual capital: an exploratory study that develops measures and models. *Management Decision*, 36 (2), 63-76.
- Bontis, N. (2003). Intellectual capital disclosure in Canadian corporations. *Journal of Human Resource Costing and Accounting*, 7(1/2), 9-20.
- Bontis, N., Janošević, S., & Dženopoljac, V. (2015). Intellectual capital in Serbia's hotel industry. *International Journal of Contemporary Hospitality Management*, 27(6), 1365-1384.
- Bontis, N., Keow, W. C. C., & Richardson, S. (2000). Intellectual capital and business performance in Malaysian industries. *Journal of Intellectual Capital*, 1(1), 85-100.
- Bontis, N. (2001). Assessing knowledge assets: a review of the models used to measure intellectual capital. *International Journal of Management Reviews*, 3(1), 41-60.
- Botten, N. (2007). *CIMA Official Learning System Management Accounting Business Strategy*. Butterworth-Heinemann. Retrieved from <https://books.google.co.th/books?id=QBdCttidCNMC&pg=PA233&lpg=PA233&dq=intellectual+capital+using+tobin+q&source=bl&ots=Kf77vEumK9&sig=ACfU3U1osYAk0zSxYMUlBMM1ClqMhLIaYA&hl=en&sa=X&ved=2ahUKEwiBx4vA5NPpAhXNeisKHcbjDxUQ6AEwEnoECAsQAQ#v=onepage&q=intellectual%20capital%20using%20tobin%20q&f=false> [27 May 2020].

- Boujelbene, M. A., & Affes, H. (2013). The impact of intellectual capital disclosure on cost of equity capital: A case of French firms. *Journal of Economics Finance and Administrative Science*, 18(34), 45-53.
- Bouchareb, M., & Kouki, M. (2019). The impact of intellectual capital disclosure and corporate governance practices on the cost of finance: Tunisian evidence. *International Journal of Management and Enterprise Development*, 18(1-2), 151-169.
- Bourveau, T., Stice, D., & Wang, R. (2020). *Strategic Disclosure and Debt Covenant Violation* (Research report). Singapore: Singapore Management University School of Accountancy.
- Bozzolan, S., Favotto, F., & Ricceri, F. (2003). Italian annual intellectual capital disclosure. *Journal of Intellectual Capital*, 4(4), 543-558.
- Bozzolan, S., O'Regan, P., & Ricceri, F. (2006). Intellectual capital disclosure (ICD). *Journal of Human Resource Costing & Accounting*, 10(2), 92-113.
- Branco, M. C., Delgado, C., Sá, M., & Sousa, C. (2010). An analysis of intellectual capital disclosure by Portuguese companies. *EuroMed Journal of Business*, 5(3), 258-278.
- Brennan, N. (2001). Reporting intellectual capital in annual reports: evidence from. *Accounting, Auditing and Accountability Journal*, 14(4), 423-436.
- Brooking, A., & Motta, E. (1996, January). *A Taxonomy of Intellectual Capital and a Methodology for Auditing it*. In 17<sup>th</sup> Annual National Business Conference, McMaster University, Canada.
- Brüggen, A., Vergauwen, P., & Dao, M. (2009). Determinants of intellectual capital disclosure: evidence from Australia. *Management Decision*, 47(2), 233-245.
- Bukh, P. N. (2003). The relevance of intellectual capital disclosure: a paradox?. *Accounting, Auditing & Accountability Journal*, 16(1), 49-56.
- Bukh, P. N., Nielsen, C., Gormsen, P., & Mouritsen, J. (2005). Disclosure of information on intellectual capital in Danish IPO prospectuses. *Accounting, Auditing & Accountability Journal*, 18(6), 713-732.
- Buallay, A. (2018). Audit committee characteristics: an empirical investigation of the contribution to intellectual capital efficiency. *Measuring Business Excellence*, 22(2), 183-200.



- Buallay, A., & Hamdan, A. (2019). The relationship between corporate governance and intellectual capital: The moderating role of firm size. *International Journal of Law and Management*, 61(2), 384-401.
- Cabrita, M., & Vaz, J. L. (2005). Intellectual capital and value creation: Evidence from the por-tuguese banking industry. *Electronic Journal of Knowledge Management*, 4(1), 11-20.
- Cabrita, M. D. R., & Bontis, N. (2008). Intellectual capital and business performance in the Portuguese banking industry. *International Journal of Technology Management*, 43(1-3), 212-237.
- Cai, K., Fairchild, R., & Guney, Y. (2008). Debt maturity structure of Chinese companies. *Pacific-Basin Finance Journal*, 16(3), 268-297.
- Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: Methods and Applications*. Cambridge: Cambridge University.
- Caputo, F., Giudice, M. D., Evangelista, F., & Russo, G. (2016). Corporate disclosure and intellectual capital: the light side of information asymmetry. *International Journal of Managerial and financial Accounting*, 8(1), 75-96.
- Cañibano, L., Garcia-Ayuso, M., & Sanchez, P. (2000). Accounting for intangibles: a literature review. *Journal of Accounting literature*, 19, 102-130.
- Cerbioni, F., & Parbonetti, A. (2007). Exploring the effects of corporate governance on intellectual capital disclosure: an analysis of European biotechnology companies. *European Accounting Review*, 16(4), 791-826.
- Chartered Institute of Management Accountants (CIMA). (2001). *Managing the Intellectual Capital within Today's Knowledge-based Organizations*, September, Technical Briefing.
- Cenciarelli, V. G., Greco, G., & Allegrini, M. (2018). Does intellectual capital help predict bankruptcy?. *Journal of intellectual capital*, 19(2), 321-337.
- Cerbioni, F., & Parbonetti, A. (2007). Exploring the effects of corporate governance on intellectual capital disclosure: an analysis of European biotechnology companies. *European Accounting Review*, 16(4), 791-826.
- Clarke, M., Seng, D., & Whiting, R. H. (2011). Intellectual capital and firm performance in Australia. *Journal of Intellectual Capital*, 12(4), 505-530.

- Chang, S. C., Chen, S. S., & Lai, J. H. (2008). The effect of alliance experience and intellectual capital on the value creation of international strategic alliances. *Omega*, 36(2), 298-316.
- Chang, W. S. (2010). The Different Proportion of IC Components and Firms' Market Performance: Evidence from Taiwan. *The International Journal of Business and Finance Research*, 4(4), 121-134.
- Chang, W. S., & Hsieh, J. J. (2011). Intellectual capital and value creation-is innovation capital a missing link?. *International Journal of Business and Management*, 6(2), 3-12.
- Chen, M. C., Cheng, S. J., & Hwang, Y. (2005). An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance. *Journal of Intellectual Capital*, 6(2), 159-176.
- Cheng, M. Y., Lin, J. Y., Hsiao, T. Y., & Lin, T. W. (2008). Censoring model for evaluating intellectual capital value drivers. *Journal of Intellectual Capital*, 9(4), 639-654.
- Cheng, M., & Subramanyam, K. R. (2008). Analyst following and credit ratings. *Contemporary Accounting Research*, 25(4), 1007-1044.
- Chen, J., Zhu, Z., & Xie, H. Y. (2004). Measuring intellectual capital: a new model and empirical study. *Journal of Intellectual capital*, 5(1), 195-212.
- Chen, S., & Dodd, J. L. (2001). Operating income, residual income and EVA™: Which metric is more value relevant?. *Journal of Managerial Issues*, 65-86.
- Choong, K. K. (2008). Intellectual capital: definitions, categorization and reporting models. *Journal of Intellectual Capital*, 9(4), 609-638.
- Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of Management*, 37(1), 39-67.
- Dadashi, I., Zarei, S., Dadashi, B., & Ahmadlou, Z. (2013). Information voluntary disclosure and cost of debt case of Iran. *International Research Journal of Applied and Basic Sciences*, 4(6), 1478-1483.
- Dalwai, T., & Mohammadi, S. S. (2020). Intellectual capital and corporate governance: an evaluation of Oman's financial sector companies. *Journal of Intellectual Capital*, 21(6), 1469-1930.

- Dashtbayaz, M. L., Salehi, M., Mirzaei, A., & Nazaridavaji, H. (2020). The impact of corporate governance on intellectual capitals efficiency in Iran. *International Journal of Islamic and Middle Eastern Finance and Management*, 13(4), 749-766.
- Detthamrong, U., Chancharat, N., & Vithessonthi, C. (2017). Corporate governance, capital structure and firm performance: Evidence from Thailand. *Research in International Business and Finance*, 42, 689-709.
- Demsetz, H., & Lehn, K. (1985). The structure of corporate ownership: Causes and consequences. *Journal of Political Economy*, 93(6), 1155-1177.
- Dewi, K., Young, M., & Sundari, R. (2014). Firm characteristics and intellectual capital disclosure on service companies listed in Indonesia stock exchange period 2008-2012. *Merit Research Journal of Accounting, Auditing, Economics and Finance*, 2(2), 22-35.
- Dhaliwal, D., Hogan, C., Trezevant, R., & Wilkins, M. (2011). Internal control disclosures, monitoring, and the cost of debt. *The Accounting Review*, 86(4), 1131-1156.
- Diez, J. M., Ochoa, M. L., Prieto, M. B., & Santidrián, A. (2010). Intellectual capital and value creation in Spanish firms. *Journal of Intellectual Capital*, 11(3), 348-367.
- Djamil, A. B., Razafindrambinina, D., & Tandean, C. (2013). The impact of intellectual capital on a firm's stock return: Evidence from Indonesia. *Journal of Business Studies Quarterly*, 5(2), 176-183.
- Dobija, D., & Rosolinska, A. (2007). Intellectual entrepreneurship and credit risk assessment: the Polish experience. *Learning and Intellectual Capital*, 7(1), 23-39.
- Duffie, D., & Lando, D. (2001). Term structures of credit spreads with incomplete accounting information. *Econometrica*, 69(3), 633-664.
- Edvinsson, L. (1997). Developing intellectual capital at Skandia. *Long Range Planning*, 30(3), 366-373.
- Edvinsson, L., & Malone, M. S. (1997). *Intellectual Capital: The Proven Way to Establish your Company's Real Value by Finding its Hidden Brainpower*. English : Piatkus.

- Fama, E. F., & Jensen, M. C. (1983). Agency problems and residual claims. *The Journal of Law and Economics*, 26(2), 327-349.
- Fan, J. P., & Wong, T. J. (2005). Do external auditors perform a corporate governance role in emerging markets? Evidence from East Asia. *Journal of Accounting Research*, 43(1), 35-72.
- Fathi, M. (Ed.). (2013). *Integration of Practice-Oriented Knowledge Technology: Trends and Prospectives*. Retrieved from <https://books.google.co.th/books?id=b4QJjxyQRxsC&pg=PA5&lpg=PA5&dq=Sveiby+and+Skandia&source=bl&ots=d8o2iC2Ifp&sig=ACfU3U1eTiPers6mtvfXwLcDJgjlFMh8rw&hl=en&sa=X&ved=2ahUKEwi0qfbNw4roAhUOXn0KHUmfDKUQ6AEwDnoEAcQAQ#v=onepage&q=Sveiby%20and%20Skandia&f=false> [8 March 2020].
- Fathi, S., Farahmand, S., & Khorasani, M. (2013). Impact of intellectual capital on financial performance. *International Journal of Academic Research in Economics and Management Sciences*, 2(1), 6-17.
- Firer, S., & Williams, S. M. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of Intellectual Capital*, 4(3), 348-360.
- Firer, S., & Williams, S. M. (2005). Firm ownership structure and intellectual capital disclosures. *South African Journal of Accounting Research*, 19(1), 1-18.
- Fijałkowska, J. (2014). Value Added Intellectual Coefficient (VAIC™) as a Tool of Performance Measurement. *Przedsiębiorczość I Zarządzanie*, 15(1), 129-140.
- Fosberg, R. H. (2004). Agency problems and debt financing: leadership structure effects. *Corporate Governance: The International Journal of Business in Society*, 4(1), 31-38.
- Francis, J. R., Khurana, I. K., & Pereira, R. (2005). Disclosure incentives and effects on cost of capital around the world. *The Accounting Review*, 80(4), 1125-1162.
- Gamayuni, R. R. (2015). The effect of intangible asset, financial performance and financial policies on the firm value. *International Journal of Scientific and Technology Research*, 4(1), 202-212.
- Gao, S. S., Heravi, S., & Xiao, J. Z. (2005). Determinants of corporate social and environmental reporting in Hong Kong: a research note. *Accounting Forum*, 29(2), 233-242.

- García-Meca, E. (2005). Bridging the gap between disclosure and use of intellectual capital information. *Journal of Intellectual Capital*, 6(3), 427-440.
- García-Meca, E., & Sanchez-Ballesta, J. P. (2010). The association of board independence and ownership concentration with voluntary disclosure: A meta-analysis. *European Accounting Review*, 19(3), 603-627.
- Gavious, A., & Elitzur, R. (2003). Contracting, signaling, and moral hazard: a model of entrepreneurs, 'angels,' and venture capitalists. *Journal of Business Venturing*, 18(6), 709-725.
- Ge, W., & Liu, M. (2015). Corporate social responsibility and the cost of corporate bonds. *Journal of Accounting and Public Policy*, 34(6), 597-624.
- Gigante, G. (2013). Intellectual capital and bank performance in Europe. *Accounting and Finance Research*, 2(4), 120-129.
- Goebel, V. (2019). Drivers for voluntary intellectual capital reporting based on agency theory. *Journal of Intellectual Capital*, 20(2), 264-281.
- Gray, P., Koh, P. S., & Tong, Y. H. (2009). Accruals quality, information risk and cost of capital: Evidence from Australia. *Journal of Business Finance & Accounting*, 36(1-2), 51-72.
- Guidara, A., Khlif, H., & Jarboui, A. (2014). Voluntary and timely disclosure and the cost of debt: South African evidence. *Meditari Accountancy Research*, 22(2), 149.
- Guimón, J. (2005). Intellectual capital reporting and credit risk analysis. *Journal of Intellectual Capital*, 6(1), 28-42.
- Gujarati, D. N. & Porter, D. C. (2009). *Basic Econometrics*, 5<sup>th</sup> ed. New York : McGraw-Hill, Singapore.
- Gupta, K., & Raman, T. V. (2020). The nexus of intellectual capital and operational efficiency: the case of Indian financial system. *Journal of Business Economics*, 1-20.
- Guthrie, J., & Petty, R. (2000). Intellectual capital: Australian annual reporting practices. *Journal of Intellectual Capital*, 1(3), 241-251.
- Guthrie, J., Petty, R., Yongvanich, K., & Ricceri, F. (2004). Using content analysis as a research method to inquire into intellectual capital reporting. *Journal of Intellectual Capital*, 5(2), 282-293.

- Guthrie, J., Petty, R., Ferrier, F., & Wells, R. (1999, June). There is no accounting for intellectual capital in Australia: a review of annual reporting practices and the internal measurement of intangibles. *OECD Symposium on Measuring and Reporting of Intellectual Capital*, 9030, 1-134.
- Guthrie, J., Petty, R., & Ricceri, F. (2006). The voluntary reporting of intellectual capital. *Journal of Intellectual Capital*, 7(2), 254-271.
- Guthrie, J., Ward, L., & Cuganesan, S. (2008). Intellectual capital reporting media in an Australian industry. *International Journal of Learning and Intellectual Capital*, 5(1), 48-62.
- Gyamerah, S., & Agyei, A. (2016). OECD principles of corporate governance: Compliance among Ghanaian listed companies. *International Journal of Advanced Multidisciplinary Research*, 3(11), 82-92.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. *Multivariate Data Analysis Seventh Edition* Prentice Hall, 2010. Upper Saddle River, New Jersey.
- Haji, A. A. (2015). The role of audit committee attributes in intellectual capital disclosures. *Managerial Auditing Journal*, 30(8), 756-784.
- Haji, A. A., & Ghazali, N. A. M. (2013). A longitudinal examination of intellectual capital disclosures and corporate governance attributes in Malaysia. *Asian Review of Accounting*, 21(1), 27-52.
- Hasan, I., Hoi, C. K., Wu, Q., & Zhang, H. (2017). Social capital and debt contracting: Evidence from bank loans and public bonds. *Journal of Financial and Quantitative Analysis*, 52(3), 1017-1047.
- Hassan, H., & Yaacob, N. M. (2019). Corporate Governance Mechanisms and Intellectual Capital Efficiency: Evidence from Malaysia. *International Journal of Economics and Finance*, 11(1), 83-95.
- Hatane, S. E., Wijaya, A. T., William, A., & Haryanto, A. D. (2018). Factors affecting intellectual capital disclosures: A case of primary sectors in Thailand. *Journal of Economics and Business*, 1(4), 513-523.
- Harris, M., & Raviv, A. (1990). Capital structure and the informational role of debt. *The Journal of Finance*, 45(2), 321-349.

- Heidari, M., & Felden, C. (2015). *Financial Footnote Analysis: Developing a Text Mining Approach*. In *Proceedings of the International Conference on Data Science*. The steering committee of the world congress in computer science, computer engineering and applied computing.
- Hejazi, R., Ghanbari, M., & Alipour, M. (2016). Intellectual, human and structural capital effects on firm performance as measured by Tobin's Q. *Knowledge and Process Management*, 23(4), 259-273.
- Hidalgo, R. L., García-Meca, E., & Martínez, I. (2011). Corporate governance and intellectual capital disclosure. *Journal of Business Ethics*, 100(3), 483-495.
- Hirth, S., & Uhrig-Homburg, M. (2010). Investment timing, liquidity, and agency costs of debt. *Journal of Corporate Finance*, 16(2), 243-258.
- Ho, S. S., & Wong, K. S. (2001). A study of the relationship between corporate governance structures and the extent of voluntary disclosure. *Journal of International Accounting, Auditing and Taxation*, 10(2), 139-156
- Ho, Y. K., Tjahjapranata, M., & Yap, C. M. (2006). Size, leverage, concentration, and R&D investment in generating growth opportunities. *The Journal of Business*, 79(2), 851-876.
- Hunter, L., Webster, E., & Wyatt, A. (2005). Measuring intangible capital: a review of current practice. *Australian Accounting Review*, 15(36), 4-21.
- Husin, N. M., Hooper, K., & Olesen, K. (2012). Analysis of intellectual capital disclosure-an illustrative example. Analysis of intellectual capital disclosure-an illustrative example. *Journal of Intellectual Capital*, 13 (2), 196-220.
- The International Financial Reporting Standards Foundation (IFRS). (2020). *International Accounting Standard 38 Intangible Assets*, International Accounting Standards Board. Retrieve from [https://www.icab.org.bd/icabweb/webNews/NoticeCir/viewPdf?fileWithPath=/app/share\\_Storage/Attachments/icabwebcommonupload/images/upload/webupload/general\\_file/general\\_file/IAS\\_38\\_2017.pdf](https://www.icab.org.bd/icabweb/webNews/NoticeCir/viewPdf?fileWithPath=/app/share_Storage/Attachments/icabwebcommonupload/images/upload/webupload/general_file/general_file/IAS_38_2017.pdf) [21 December 2020].
- Iazzolino, G., Migliano, G., & Gregorace, E. (2013). Evaluating intellectual capital for supporting credit risk assessment: An empirical study. *Investment Management and Financial Innovations*, 10(2), 44-54.

- Iazzolino, G., Laise, D., & Migliano, G. (2014). Measuring value creation: VAIC and EVA. *Measuring Business Excellence*, 18(1), 8-21.
- International Federation of Accountants (IFAC). (1998). *The Measurement and Management of Intellectual Capital: An Introduction Study 7*. New York :IFAC.
- Iranmahd, M., Moeinaddin, M., Shahmoradi, N., & Heyrani, F. (2014). The effect of intellectual capital on cost of finance and firm value. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4(2), 1-8.
- Ishak, Z., & Al-Ebel, A. M. (2013). Board of directors, information asymmetry, and intellectual capital disclosure among banks in gulf co-peration council. *Jurnal Pengurusan*, 37, 33-43.
- Isnalita, N. I. D. N., & Romadhon, F. (2018). The Effect of Company Characteristics and Corporate Governance on the Practices of Intellectual Capital Disclosure. *International Research Journal of Business Studies*, 11(3), 217-230.
- Jantadej, K. (2017). Corporate Governance Code for Listed Companies 2017. *Journal of Accounting Professional*, 14(41), 73-93.
- Jantadej, K., & Wattanatorn, W. (2020). The effect of corporate governance on the cost of debt: Evidence from Thailand. *The Journal of Asian Finance, Economics, and Business*, 7(9), 283-291.
- Jan-Erik, G., & Ulf, J. (1998). Current development in human resource costing and accounting. Reality present, researchers absent?. *Accounting, Auditing & Accountability Journal*, 11(4), 495-506
- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2), 323-329.
- Jensen, M., & Meckling, W. (1976). Theory of the firm: Management behavior, agency costs and capital structure. *Journal of Financial Economics*, 3(4), 305-360.
- Jensen, M. C., & Meckling, W. H. (1979). Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Economics Social Institutions*, 3(4), 305-360.
- Jensen, M. C., & Smith, C. W. (2000). Stockholder, manager, and creditor interests: Applications of agency theory. *Theory of the Firm*, 1(1). 1-45.



- Jiraudomsarod, P. (2019). *The Relationship between Intellectual Capital and Firm's Market*. The Degree of Doctor of Philosophy (Accountancy). Dhurakij Pundit University.
- Joshi, M., Cahill, D., Sidhu, J., & Kansal, M. (2013). Intellectual capital and financial performance: an evaluation of the Australian financial sector. *Journal of Intellectual Capital*, 14(2), 264-285.
- Jurczak, J. (2008). Intellectual capital measurement methods. *Economics and Organization of Enterprise*, 1(1), 37-45.
- Kamath, G. B. (2014). A Theoretical Framework for Intellectual Capital Disclosure. *Pacific Business Review International*, 6(8), 50-54.
- Kamath, B. (2017). Determinants of intellectual capital disclosure: evidence from India. *Journal of Financial Reporting and Accounting*, 15(3), 367-391.
- Kamel, H., & Shahwan, T. (2014). The association between disclosure level and cost of capital in an emerging market: evidence from Egypt. *Afro-Asian Journal of Finance and Accounting*, 4(3), 203-225.
- Kamukama, N., Ahiauzu, A., & Ntayi, J. M. (2011). Competitive advantage: mediator of intellectual capital and performance. *Journal of Intellectual Capital*, 12(1), 152-164.
- Kanda, H. (1992). Debtholders and equityholders. *The Journal of Legal Studies*, 21(2), 431-448.
- Kaplan, R. S., & Norton, D. P. (2004). Measuring the strategic readiness of intangible assets. *Harvard Business Review*, 82(2), 52-63.
- Karchegani, M. R., Sofian, S., & Amin, S. M. (2013). The relationship between intellectual capital and innovation: A review. *International Journal of Business and Management Studies*, 2(1), 561-581.
- Kavida, V., Harun, Y., & Murshid, E. (2019). Audit committee mechanism on intellectual capital disclosure evidence from Indian listed companies. *International Journal of Management and Economics*, 1(30), 8-16.
- Keenan, J., & Aggestam, M. (2001). Corporate governance and intellectual capital: some conceptualisations. *Corporate Governance: An International Review*, 9(4), 259-275.

- Kennedy, P. (2008). *A Guide to Econometrics*, 6<sup>th</sup> ed. New York : John Wiley & Sons.
- Khalique, M., Bontis, N., bin Shaari, J. A. N., & Isa, A. H. M. (2015). Intellectual capital in small and medium enterprises in Pakistan. *Journal of Intellectual Capital*, 16(1), 224-238.
- Kim, W. S., & Sorensen, E. H. (1986). Evidence on the impact of the agency costs of debt on corporate debt policy. *Journal of Financial and Quantitative Analysis*, 21(2), 131-144.
- Klawtanong, A. (2017). *The Relationship between Intellectual Capital Disclosures on Earnings Quality and Market Values of THAI Listed Companies in Technology Sector*. Dhurakij Pundit University, college of innovative business and accountancy.
- Kristandl, G., & Bontis, N. (2007). Constructing a definition for intangibles using the resource based view of the firm. *Management Decision*, 45(9), 1510-1747.
- Krippendorff, K. (1980). *Validity in Content Analysis*. Retrieve from [http://repository.upenn.edu/asc\\_papers/291](http://repository.upenn.edu/asc_papers/291)[21 May 2020].
- Krippendorff, K. (2004). Reliability in content analysis: Some common misconceptions and recommendations. *Human Communication Research*, 30(3), 411-433.
- Laing, G., Dunn, J., & Hughes-Lucas, S. (2010). Applying the VAIC™ model to Australian hotels. *Journal of Intellectual Capital*, 11(3), 269-283.
- Lambert, R. A. (2001). Contracting theory and accounting. *Journal of Accounting and Economics*, 32(1-3), 3-87.
- Lari Dashtbayaz, M., Salehi, M., & Nazari Davaji, H. (2020). The impact of corporate governance on intellectual capitals efficiency in Iran. *International Journal of Islamic and Middle Eastern Finance and Management*, 13,(4), 749-799.
- Leland, H. E. (1994). Corporate debt value, bond covenants, and optimal capital structure. *The Journal of Finance*, 49(4), 1213-1252.
- Lev, B., & Zambon, S. (2003). Intangibles and intellectual capital: an introduction to a special issue. *European Accounting Review*, 12(4), 597-603.
- Lev, B., & Radhakrishnan, S. (2005). *The Valuation of Organization Capital. In Measuring Capital in the New Economy*. University of Chicago Press.

- Li, F. (2008). Annual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics*, 45(2-3), 221-247.
- Li, J., Pike, R. H., & Haniffa, R. M. (2007). *Intellectual Capital Disclosure in Knowledge Rich Firms: The Impact of Market and Corporate Governance Factors*. Bradford University School of Management Working Paper Series.
- Li, J., Pike, R., & Haniffa, R. (2008). Intellectual capital disclosure and corporate governance structure in UK firms. *Accounting and Business Research*, 38(2), 137-159.
- Li, J., Mangena, M., & Pike, R. (2012). The effect of audit committee characteristics on intellectual capital disclosure. *The British Accounting Review*, 44(2), 98-110.
- Liao, P. C., Chan, A. L. C., & Seng, J. L. (2013). Intellectual capital disclosure and accounting standards. *Industrial Management & Data Systems*, 113(8), 1189-1205.
- Lim, S. C., Macías, A. J., & Moeller, T. (2017). Intangible assets and capital structure. *Journal of Banking and Finance*, 118(9), 5-58.
- Lippman, S. A., & Rumelt, R. P. (2003). A bargaining perspective on resource advantage. *Strategic Management Journal*, 24(11), 1069-1086.
- Liu, Q. (2000). *Growth Opportunities, Knowledge Capital, and Leverage: Evidence from Us Biotech Firms*. Retrieve from <https://ssrn.com/abstract=248908> or <http://dx.doi.org/10.2139/ssrn.248908> [21 May 2020].
- Löfgren, K. G., Persson, T., & Weibull, J. W. (2002). Markets with asymmetric information: the contributions of George Akerlof, Michael Spence and Joseph Stiglitz. *The Scandinavian Journal of Economics*, 104(2), 195-211.
- Maaloul, A., & Zéghal, D. (2015). Financial statement informativeness and intellectual capital disclosure: An empirical analysis. *Journal of Financial Reporting and Accounting*, 13(1), 66-90.
- Madi, H. K., Ishak, Z., & Manaf, N. A. A. (2014). The impact of audit committee characteristics on corporate voluntary disclosure. *Procedia-Social and Behavioral Sciences*, 164, 486-492.
- Maditinos, D., Chatzoudes, D., Tsairidis, C., & Theriou, G. (2011). The impact of intellectual capital on firms' market value and financial performance. *Journal of Intellectual Capital*, 12(1), 132-151.

- Mangena, M., & Pike, R. (2005). The effect of audit committee shareholding, financial expertise and size on interim financial disclosures. *Accounting and Business Research*, 35(4), 327-349.
- Mangena, M., Liu, J., & Li, J. (2014). Capital market pressures and the format of intellectual capital disclosure in intellectual capital intensive firms. *Journal of Applied Accounting Research*, 15(3), 339-354.
- Mansi, S. A., Maxwell, W. F., & Miller, D. P. (2011). Analyst forecast characteristics and the cost of debt. *Review of Accounting Studies*, 16(1), 116-142.
- Martín-de Castro, G., Díez-Vial, I., & Delgado-Verde, M. (2019). Intellectual capital and the firm: evolution and research trends. *Journal of Intellectual Capital*, 20(4), 555-580.
- Masri, I., & Martani, D. (2014). Tax avoidance behaviour towards the cost of debt. *International Journal of Trade and Global Markets*, 7(3), 235-249.
- Markopoulou, M. K., & Papadopoulos, D. L. (2010). The capital structure of companies listed in the greek stock exchange. *EuroEconomica*, 21(2), 73-89.
- Marr, B. (Ed.). (2005). *Perspectives on Intellectual Capital*. Retrieved from [https://books.google.co.th/books?id=KKjyMEFQOtkC&pg=PA61&lpg=PA61&dq=intellectual+capital+proxy+Tobin+q&source=bl&ots=4jJxOAO8GU&sig=ACfU3U3iNadMOBnJLImHyPdRuIFQJVIn5Q&hl=en&sa=X&ved=2ahUKEwjB0\\_\\_SjtTpAhUr7HMBHVN6DRcQ6AEwDHoECAkQAQ#v=onepage&q=intellectual%20capital%20proxy%20Tobin%20q&f=false](https://books.google.co.th/books?id=KKjyMEFQOtkC&pg=PA61&lpg=PA61&dq=intellectual+capital+proxy+Tobin+q&source=bl&ots=4jJxOAO8GU&sig=ACfU3U3iNadMOBnJLImHyPdRuIFQJVIn5Q&hl=en&sa=X&ved=2ahUKEwjB0__SjtTpAhUr7HMBHVN6DRcQ6AEwDHoECAkQAQ#v=onepage&q=intellectual%20capital%20proxy%20Tobin%20q&f=false)[27 May 2020].
- Marr, B. (2008). *Impacting future Value: How to Manage your Intellectual Capital*. Retrieved from [https://www.cimaglobal.com/Documents/ImportedDocuments/tech\\_mag\\_impacting\\_future\\_value\\_may08.pdf](https://www.cimaglobal.com/Documents/ImportedDocuments/tech_mag_impacting_future_value_may08.pdf)[11 March 2020].
- Mazumdar, S. C., Sarin, A., & Sengupta, P. (2000). *To Tell or Not to Tell: The Value of Corporate Disclosure*. Retrieved from <https://www.researchgate.net/publication/228558621>[27 May 2020].
- Mazumdar, S. C., & Sengupta, P. (2005). Disclosure and the loan spread on private debt. *Financial Analysts Journal*, 61(3), 83-95.
- Meek, G. K., Roberts, C. B., & Gray, S. J. (1995). Factors influencing voluntary annual report disclosures by US, UK and continental European multinational corporations. *Journal of International Business Studies*, 26(3), 555-572.

- Meles, A., Porzio, C., Sampagnaro, G., & Verdoliva, V. (2016). The impact of the intellectual capital efficiency on commercial banks performance: Evidence from the US. *Journal of Multinational Financial Management*, 36, 64-74.
- Meritum. (2002). Measuring intangibles to understand and improve innovation management. *Spanish Journal of Finance and Accounting*, 32(115), 324-327.
- Moghadampour, J., Hamed, B., & Behzad, N. (2016). Intellectual capital: genealogy and models. *American Journal of Social Science Research*, 2(1), 1-6.
- Mohd-Saleh, N., & Che Abdul Rahman, M. R. (2009). Ownership structure and intellectual capital performance in Malaysia. *Asian Academy of Management Journal of Accounting and Finance*, 5(1), 1-29.
- Morck, R., Shleifer, A., & Vishny, R. W. (1988). Management ownership and market valuation: An empirical analysis. *Journal of Financial Economics*, 20, 293-315.
- Morris, R. (1994). Computerized content analysis in management research: A demonstration of advantages & limitations. *Journal of Management*, 20(4), 903-931.
- Morris, R. D. (1987). Signalling, agency theory and accounting policy choice. *Accounting and Business Research*, 18(69), 47-56.
- Morse, W. J. (1973). A note on the relationship between human assets and human capital. *The Accounting Review*, 48(3), 589-593.
- Moro, A., Lucas, M., Bazzanella, C., & Grassi, E. (2009). *The Short-Term Debt vs. Long Term Debt Puzzle: A Model for the Optimal Mix*. In 5<sup>th</sup> Conference on Performance Measurement and Management Control, 23-25 Sep 2009.
- Muttakin, M. B., Khan, A., & Belal, A. R. (2015). Intellectual capital disclosures and corporate governance: An empirical examination. *Advances in Accounting*, 31(2), 219-227.
- Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5(2), 147-175.
- Nazari, J. A., & Herremans, I. M. (2007). Extended VAIC model: measuring intellectual capital components. *Journal of Intellectual Capital*, 8(4), 595-609.
- Nelson, C. R., & Siegel, A. F. (1987). Parsimonious modeling of yield curves. *Journal of Business*, 60(4), 473-489.

- Nerantzidis, M. (2015). Comparing intellectual capital disclosure among the Greek listed companies: does sector and capitalisation matter?. *International Journal of Learning and Intellectual Capital*, 12(2), 146-169.
- Neysi, S. H., Mazraeh, S., & Mousavi, Z. (2012). The importance of intellectual capital disclosure. *International Journal of Business and Social Science*, 3(15), 307-310.
- Nikolaev, V., & Van Lent, L. (2005). The endogeneity bias in the relation between cost-of-debt capital and corporate disclosure policy. *European Accounting Review*, 14(4), 677-724.
- Nimtrakoon, S. (2015). The relationship between intellectual capital, firms' market value and financial performance. *Journal of Intellectual Capital*, 16(3), 587-618.
- Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Retrieved from [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1496713](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1496713) [8 March 2020].
- Nurunnabi, M., Hossain, M., & Hossain, M. (2011). Intellectual capital reporting in a South Asian country: evidence from Bangladesh. *Journal of Human Resource Costing & Accounting*, 15(3), 196-233.
- Oliveira, L., Rodrigues, L., & Craig, R. (2010). Intellectual capital reporting in sustainability reports. *Journal of Intellectual Capital*, 11(4), 575-594.
- Oikonomou, I., Brooks, C., & Pavelin, S. (2014). The effects of corporate social performance on the cost of corporate debt and credit ratings. *Financial Review*, 49(1), 49-75.
- Oliveras, E., Gowthorpe, C., Kasperskaya, Y., & Perramon, J. (2008). Reporting intellectual capital in Spain. *Corporate Communications: An International Journal*, 13(2), 168-181.
- Orens, R., Aerts, W., & Lybaert, N. (2009). Intellectual capital disclosure, cost of finance and firm value. *Management Decision*, 47(10), 1536-1554.
- Orens, R., Aerts, W., & Cormier, D. (2010). Web-based non-financial disclosure and cost of finance. *Journal of Business Finance & Accounting*, 37(9-10), 1057-1093.

- Ousama, A. A., Fatima, A. H., & Majdi, A. R. (2011). Usefulness of intellectual capital information: preparers' and users' views. *Journal of Intellectual Capital*, 12(3), 430-445.
- Ousama, A. A., Al-Mutairi, M. T., & Fatima, A. H. (2019). The relationship between intellectual capital information and firms' market value: a study from an emerging economy. *Measuring Business Excellence*, 24(1), 39-51.
- Pal, K., & Soriya, S. (2012). IC performance of Indian pharmaceutical and textile industry. *Journal of Intellectual Capital*, 13(1), 120-137.
- Panda, B., & Leepsa, N. M. (2017). Agency theory: Review of theory and evidence on problems and perspectives. *Indian Journal of Corporate Governance*, 10(1), 74-95.
- Park, H. M. (2011). *Practical Guides to Data Modeling: A Step-by-step Analysis Using Stata*. Public Management and Policy Analysis Program, Graduate School of International Relations, International University of Japan.
- Papula, J., & Volná, J. (2012). *A Content Analysis of Intellectual Capital Reporting Within Slovak Companies*. In Proceedings of the European Conference on Intellectual Capital, Academic Publishing International, Helsinki.
- Petchchedchoo, P., (2016). A Guideline on Intellectual capital Codification and Measurement. *Journal of Accounting Profession*, 12(33), 135-147.
- Phusavat, K., Comepa, N., Sitko-Lutek, A., & Ooi, K. B. (2011). Interrelationships between intellectual capital and performance: Empirical examination. *Industrial Management & Data Systems*, 111(6), 810-829.
- Piriyakul, M. (2016). Panel Data Analysis. *Ramkhamhaeng Research Journal of Science and Technology*, 30(2), 41-54.
- Promptong, N., (2020). Relationship between board characteristics and performance of listed companies of the market for alternative investment. *Journal of Business Administration and Accountancy*, 4(1), 117-136.
- Pulic, A. (1998, January). *Measuring the Performance of Intellectual Potential in Economy*. In 2<sup>nd</sup> McMaster word congress on measuring and managing intellectual capital by the Austrian Team for Intellectual Potential.
- Pulic, A. (2000). VAIC™ an accounting tool for IC management. *International Journal of Technology Management*, 20(5-8), 702-714.

- Pulic, A. (2008). *The Principles of Intellectual Capital Efficiency-A Brief Description*. London : Faber & Faber.
- Puntillo, P. (2009). Intellectual capital and business performance. Evidence from Italian banking industry. *Electronic Journal of Corporate Finance*, 4(12), 97-115.
- Ramana, D. V. (2005). *Market Value Added and Economic Value Added: Some Empirical Evidences*. In 8<sup>th</sup> Capital Markets Conference, Indian Institute of Capital Markets Paper.
- Rodrigues, L. L., Tejedo-Romero, F., & Craig, R. (2017). Corporate governance and intellectual capital reporting in a period of financial crisis: Evidence from Portugal. *International Journal of Disclosure and Governance*, 14(1), 1-29.
- Rossi, F. M., Nicolò, G., & Polcini, P. T. (2018). New trends in intellectual capital reporting Exploring online intellectual capital disclosure in Italian universities. *Journal of Intellectual Capital*, 19(4), 814-835.
- Rostamy, A. A. A., Amoghini, R. Z., & Deljou, M. (2012, May). *Empirical Examination of the Relationship Between " Intellectual Capital" with" the Operating Cash Flow and Weighted Average Cost of Capital*. In The 10<sup>th</sup> Annual Iranian Accounting Conference.
- Ross, S. A. (1973). The economic theory of agency: The principal's problem. *The American Economic Review*, 63(2), 134-139.
- Roos, G., Bainbridge, A., & Jacobsen, K. (2001). Intellectual capital analysis as a strategic tool. *Strategy & Leadership*, 29(4), 21-21.
- Roos, G., & Roos, J. (1997). Measuring your company's intellectual performance. *Long Range Planning*, 30(3), 413-426.
- Ross, S. A., Westerfield, R. W. & Jaffe, J. (2013). *Corporate Finance*. 10<sup>th</sup> ed. New York: McGraw-Hill.
- Saeed, S., Rasid, S. Z. A., & Basiruddin, R. (2016). Relationship between intellectual capital and corporate performance of top Pakistani companies: an empirical evidence. *International Journal of Learning and Intellectual Capital*, 13(4), 376-396.



- Salehi, M., Enayati, G., & Javadi, P. (2014). The relationship between intellectual capital with economic value added and financial performance. *Iranian Journal of Management Studies*, 7(2), 259-283.
- Salehi, M., & Shirazi, M. (2016). Audit committee impact on the quality of financial reporting and disclosure: Evidence from the Tehran Stock Exchange. *Management Research Review*, 39(12), 1639-1662.
- Samaha, K., Khlif, H., & Hussainey, K. (2015). The impact of board and audit committee characteristics on voluntary disclosure: A meta-analysis. *Journal of International Accounting, Auditing and Taxation*, 24, 13-28.
- Secundo, G., Massaro, M., Dumay, J., & Bagnoli, C. (2018). Intellectual capital management in the fourth stage of IC research. *Journal of Intellectual Capital*, 19(1), 157-177.
- Sengupta, P. (1998). Corporate disclosure quality and the cost of debt. *Accounting Review*, 73(4), 459-474.
- Shahveisi, F., Khairollahi, F., & Alipour, M. (2017). Does ownership structure matter for corporate intellectual capital performance? An empirical test in the Iranian context. *Eurasian Business Review*, 7(1), 67-91.
- Shakina, E., & Barajas, A. (2013). The contribution of intellectual capital to value creation. *Contemporary Economics*, 7(4), 41-56.
- Sianipar, M. (2012). Intellectual Capital and Its Impact on Financial Profitability and Investors' capital Gain on Shares. *Journal of Economic, Business, & Accountancy Ventura*, 15(1), 101-116.
- Sim, J., Kadyrzhanova, D., & Falato, A. (2013). Rising intangible capital, Shrinking debt capacity, and the US corporate savings glut. *Journal of Finance*, *Forthcoming*, 1-41.
- Sim-im, P., Phajongwong, P., & Svetalekth, T. (2019). The relationship between intellectual capital and sustainable growth on listed company in the Stock Exchange of Thailand. *Rajaoark Journal*, 13(30), 216-227.
- Singh, I., & Mitchell Van der Zahn, J. L. W. (2008). Determinants of intellectual capital disclosure in prospectuses of initial public offerings. *Accounting and Business Research*, 38(5), 409-431.

- Singh, S., & Kansal, M. (2011). Voluntary disclosures of intellectual capital: an empirical analysis. *Journal of Intellectual Capital*, 12(2), 301-318.
- Singh, S., Sidhu, J., Joshi, M., & Kansal, M. (2016). Measuring intellectual capital performance of Indian banks: A public and private sector comparison. *Managerial Finance*, 42(7), 635-655.
- Sitar, A. S., & Vasić, V. (2005). *Measuring Intellectual Capital*. Doctoral dissertation, Univerza na Primorskem, Fakulteta za management.
- Soetanto, T., & Liem, P. F. (2019). Intellectual capital in Indonesia: Dynamic panel approach. *Journal of Asia Business Studies*, 13(2), 240-262.
- Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, 87(3), 355-374.
- Spence, M. (2002). Signaling in retrospect and the informational structure of markets. *American Economic Review*, 92(3), 434-459.
- Sporleder, T. L., & Moss, L. E. (2004). Knowledge capital, intangible assets, and leverage: evidence from US Agricultural Biotechnology Firms. *International Food and Agribusiness Management Review*, 7(1030-2016-82669), 26-36.
- Ståhle, P., Ståhle, S., & Aho, S. (2011). Value added intellectual coefficient (VAIC): a critical analysis. *Journal of Intellectual Capital*, 12(4), 531-551.
- Starovic, D., & Marr, B. (2003). *Understanding Corporate Value: Managing and Reporting Intellectual Capital*. CIMA. Cranfield university school of management.
- Stewart, T. A. (1997). Intellectual capital: the new wealth of rganizations. Knowledge management, Retrieved from <https://books.google.co.th/books?id=xKNXlgaeCjAC&printsec=frontcover#v=onepage&q&f=true>[7 March 2020].
- Stewart, T. A. (2010). *Intellectual Capital: The new Wealth of Organization*. New York: Crown Business.
- Stiglitz, J. E. (2002). Information and the change in the paradigm in economics. *American Economic Review*, 92(3), 460-501.
- Striukova, L., Unerman, J., & Guthrie, J. (2008). Corporate reporting of intellectual capital: Evidence from UK companies. *The British Accounting Review*, 40(4), 297-313.

- Stropnik, N., Korošec, B., & Tominc, P. (2017). The Relationship Between the Intellectual Capital Disclosure and Cost of Debt Capital—A Case of Slovenian Private Audited Organisations. *Naše Gospodarstvo/Our Economy*, 63(4), 3-16.
- Suherman, R. (2017). The impact of intellectual capital toward firm's profitability and market value of retail companies listed in indonesia stock exchange (IDX) from 2013-2016. *IBuss Management*, 5(1), 345-378.
- Sujan, A., & Abeysekera, I. (2007). Intellectual capital reporting practices of the top Australian firms. *Australian Accounting Review*, 17(42), 71-83.
- Suttipun, M. (2018). Association between Board Composition and Intellectual Capital Disclosure: An Evidence from Thailand. *Journal of Business Administration*, 41(160), 74-97.
- Sveiby, K. E. (1997). *The New Organizational Wealth: Managing & Measuring Knowledge-Based Assets*. New York: Berrett-Koehler.
- Sydler, R., Haeffliger, S., & Pruksa, R. (2014). Measuring intellectual capital with financial figures: Can we predict firm profitability? *European Management Journal*, 32(2), 244-259.
- Talbi, D., & Omri, M. A. (2014). Voluntary disclosure frequency and cost of debt: an analysis in the Tunisian context. *International Journal of Managerial and Financial Accounting*, 6(2), 167-174.
- Taliyang, S. M., & Jusop, M. (2011). Intellectual capital disclosure and corporate governance structure: evidence in Malaysia. *International Journal of Business and Management*, 6(12), 109-117.
- Tan, H. P., Plowman, D., & Hancock, P. (2007). Intellectual capital and financial returns of companies. *Journal of Intellectual Capital*, 8(1), 76-95.
- Tarus, T. K., Nehemiah, C., & Geoffrey, B. (2014). Do profitability, firm size and liquidity affect capital structure? Evidence from Kenyan listed firms. *European Journal of Business and Management*, 6(28), 119-124.
- Tejedo-Romero, F., Araujo, J. F. F. E., & Emmendoerfer, M. L. (2017). Corporate governance mechanisms and intellectual capital. *Review of Business Management*, 19(65), 394-414.

- Tejedo-Romero, F., & Esteves, J. F. F. (2018). Management strategy and intellectual capital disclosure: influence of corporate governance. *Contaduría y Administración*, 63(2), 347-365.
- Terra, P. R. S. (2011). Determinants of corporate debt maturity in Latin America. *European Business Review*, 23(1), 45-70.
- Titisari, K. H. (2018). Mediation effect of value added intellectual capital (VAIC) in corporate governance (CG) and financial performance relations. *Journal of Management and Business*, 17(2), 36-42.
- Thamprasart, P., & Phajongwong, P. (2018). The relationship between intellectual capital and firm performances of listed companies on the Stock Exchange of Thailand. *MUT Journal of Business Administration*, 15(1), 171-192.
- The Federation of Accounting Professions of Thailand (TFAC), T. (2015). *The Thai Accounting Standards (TAS) No.38: Intangible*. Retrieved from <https://www.tfac.or.th/upload/9414/mGr6h9D6ux.pdf> [1 May 2021].
- The Market for Alternative Investment (MAI), T. (2020). *Consideration to be Listed on SET and MAI*. Retrieved from [http://www.set.or.th/en/products/listing2/listing\\_set\\_p3.html](http://www.set.or.th/en/products/listing2/listing_set_p3.html) [1 August 2020].
- The National Corporate Governance Committee. (2017). *Corporate Governance Code for Listed Companies 2017*. Retrieved from <https://ecgi.global/node/6197> [1 August 2020].
- The Organization for Economic Cooperation and Development (OECD), T. (2006). *Creating Value from Intellectual Assets*. Retrieved from <http://www.oecd.org/sti/ino/36701575.pdf>[9 March 2020].
- The Organization for Economic Cooperation and Development (OECD), T. (2020). *Financing SMEs and Entrepreneurs 2020*. Retrieved from <https://www.oecd-ilibrary.org/docserver/061fe03d-en.pdf?expires=1595914715&id=accname=guest&checksum=0AF2A5A3BB5E73A8F10E3EB44BD4CD7F>[15 July 2020]
- The Organization for Economic Cooperation and Development (OECD), T. (2004). *The OECD Principles of Corporate Governance*. Contaduría y Administración.

- The Stock Exchange of Thailand (SET), T. (2012). *The Principles of Good Corporate Governance for Listed Companies 2012*. Retrieved from [https://www.set.or.th/sustainable\\_dev/th/cg/files/2013/CGPrinciple2012Thai-Eng.pdf](https://www.set.or.th/sustainable_dev/th/cg/files/2013/CGPrinciple2012Thai-Eng.pdf)[29 June 2020].
- The Stock Exchange of Thailand (SET), T. (2020). *What are the differences between The Stock Exchange of Thailand and Market for Alternative Investment?*. Retrieved from [https://www.set.or.th/en/products/listing2/listing\\_set\\_p3.html](https://www.set.or.th/en/products/listing2/listing_set_p3.html)[1 July 2020].
- The Securities and Exchange Commission (SEC), T. (2017). *Corporate Governance Code for Listed Companies*. Retrieved from <http://www.cgthailand.org/microsite/Documents/cgcode.pdf>[19 October 2020].
- Thomsen, S., & Pedersen, T. (2000). Ownership structure and economic performance in the largest European companies. *Strategic Management Journal*, 21(6), 689-705.
- Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking*, 1(1), 15-29.
- Tran, N. P., Van, L. T. H., & Vo, D. H. (2020). The nexus between corporate governance and intellectual capital in Vietnam. *Journal of Asia Business Studies*, 8(3), 208-229.
- Tsakalerou, M. (2015). A meta-study of intellectual capital and firm performance: when the whole is more than the sum of its parts. *International Journal of Learning and Intellectual Capital*, 12(3), 287-299.
- Tsai, H., & Hua, M. (2013). The Effects of Intangible Assets on the Loan Interest Rates for SMEs in Taiwan. *Journal of Modern Accounting and Auditing*. 9(7), 881-888.
- Tulung, J. E., Saerang, I., & Pandia, S. (2018). The influence of corporate governance on the intellectual capital disclosure: a study on Indonesian private banks. *Banks and Bank Systems*, 13(4). 345-362.
- Ulum, I., Ghazali, I., & Purwanto, A. (2014). Intellectual capital performance of Indonesian banking sector: a modified VAIC (M-VAIC) perspective. *International Journal of Finance & Accounting*, 6(2), 103-123.

- Uğurlu, M. (2000). Agency costs and corporate control devices in the Turkish manufacturing industry. *Journal of Economic Studies*, 27(6), 566-599.
- van Liempd, D., Haug, A., & Zachariassen, F. (2014). Intellectual capital and the financial institutions' credit-granting for SMEs: Can intellectual capital statements help Danish SMEs attract capital?. *Danish Journal of Management and Business*, 2014(1), 27-41.
- Veltri, S., & Mazzotta, R. (2016). The association of board composition, intellectual capital and firm performance in a high ownership concentration context: evidence from Italy. *International Journal of Business and Management*, 11(10), 317-331.
- Vergauwen, P. G., & van Alem, F. J. (2005). Annual report IC disclosures in The Netherlands, France and Germany. *Journal of Intellectual Capital*, 6(1), 89-104.
- Vergauwen, P., Bollen, L., & Oirbans, E. (2007). Intellectual capital disclosure and intangible value drivers: an empirical study. *Management Decision*, 45(7), 1163-1180.
- Villalonga, B. (2004). Intangible resources, Tobin'sq, and sustainability of performance differences. *Journal of Economic Behavior & Organization*, 54(2), 205-230.
- von Alberti-Alhtaybat, L., Hutaibat, K., & Al-Htaybat, K. (2012). Mapping corporate disclosure theories. *Journal of Financial Reporting and Accounting*, 10(1), 73-94.
- Warrad, L. H., & Oqdeh, S. K. (2018). Do liquidity and firm size affect profitability and does capital structure play a moderator role: Study based on jordanian data. *International Research Journal of Finance and Economics*, 52(170), 135-146.
- Wang, K., Sewon, O., & Claiborne, M. C. (2008). Determinants and consequences of voluntary disclosure in an emerging market: Evidence from China. *Journal of International Accounting, Auditing and Taxation*, 17(1), 14-30.
- Watts, R. L., & Zimmerman, J. L. (1983). Agency problems, auditing, and the theory of the firm: Some evidence. *The Journal of Law and Economics*, 26(3), 613-633.

- White, G., Lee, A., & Tower, G. (2007). Drivers of voluntary intellectual capital disclosure in listed biotechnology companies. *Journal of Intellectual Capital*, 8(3), 517-537.
- Whiting, R. H., & Woodcock, J. (2011). Firm characteristics and intellectual capital disclosure by Australian companies. *Journal of Human Resource Costing & Accounting*, 15(2), 102-126.
- Williams, R. (2015). Panel Data 4: Fixed Effects vs. Random Effects Models. University of Notre Dame. In World Economic Forum, Retrieved from <https://www3.nd.edu/~rwilliam/stats3/Panel04-FixedVsRandompdf> [1 April 2021].
- Wu, A. (2005). The integration between Balanced Scorecard and intellectual capital. *Journal of Intellectual Capital*, 6(2), 267-284.
- Wyatt, A. (2008). What financial and non-financial information on intangibles is value-relevant? A review of the evidence. *Accounting and Business Research*, 38(3), 217-256.
- Xu, J., & Li, J. (2019). The impact of intellectual capital on SMEs' performance in China. *Journal of Intellectual Capital*, 20(4), 488-509.
- Xu, J., & Wang, B. (2019). Intellectual capital performance of the textile industry in emerging markets: A comparison with China and South Korea. *Sustainability*, 11(8), 1-16.
- Yallwe, A. H., & Buscemi, A. (2014). An era of intangible assets. *Journal of Applied Finance and Banking*, 4(5), 17-26.
- Yang, C., & Chen, T. Y. (2010). Evaluating the efficiency of intellectual capital management for Taiwan IC design industry. *African Journal of Business Management*, 4(15), 3366-3373.
- Yıldız, S., Meydan, C., & Güner, M. (2014). Measurement of intellectual capital components through activity reports of companies. *Procedia-Social and Behavioral Sciences*, 109(8), 614-621.
- Yosano, T., & Koga, C. (2008). *Influence of Intellectual Capital Information on Credit Risk Rating Process/Criterion and Credit Conditions—Survey Analysis of Japanese Financial Institutions*. Proceedings of 4<sup>th</sup> workshop on visualising, measuring and Managing Intangibles and Intellectual Capital.

- Young, C. S., Su, H. Y., Fang, S. C., & Fang, S. R. (2009). Cross-country comparison of intellectual capital performance of commercial banks in Asian economies. *The Service Industries Journal*, 29(11), 1565-1579.
- Yu, F. (2005). Accounting transparency and the term structure of credit spreads. *Journal of Financial Economics*, 75(1), 53-84.
- Yu, K. Y., Ng, H. T., Wong, W. K., Chu, S. K. W., & Chan, K. H. (2010). *An Empirical Study of the Impact of Intellectual Capital Performance on Business Performance*. The 7<sup>th</sup> International Conference on Intellectual Capital, Knowledge Management & Organizational Learning.
- Zakariaa, Z., Purhanudinb, N., Wahidudinc, A. N., & Chind, K. Y. (2020). Does intellectual capital influence a firm's financial health?. *International Journal of Innovation, Creativity and Change*, 12(12), 457-474.
- Zanjirdar, M., & Kabiribalajadeh, A. (2011). Examining relationship between ownership structure and performance of intellectual capital in the stock market of Iran. *Indian journal of Science and Technology*, 4(10), 1369-1377.
- Zéghal, D., & Maaloul, A. (2010). Analysing value added as an indicator of intellectual capital and its consequences on company performance. *Journal of Intellectual Capital*, 11(1), 39-60.



## **APPENDICES**

## **Appendix A**

**The number of intellectual capital items were used in the prior literature**

Table 15 The number of intellectual capital items were used in the prior literature.

Name of study/ Items	Human capital	Structural capital	Relational capital
Total number of items	24 items		
Guthrie and Petty (2000)	6 items <ul style="list-style-type: none"> <li>- <b>Know-how, Education</b></li> <li>- Vocational qualification</li> <li>- <b>Work-related knowledge</b></li> <li>- <b>Work-related competencies, Entrepreneurial spirit</b></li> </ul>	9 items <ul style="list-style-type: none"> <li>- <b>Copyrights</b></li> <li>- <b>Patents</b></li> <li>- <b>Trademarks</b></li> </ul> Infrastructure assets <ul style="list-style-type: none"> <li>- <b>Management philosophy</b></li> <li>- <b>Corporate culture</b></li> <li>- <b>Management processes</b></li> <li>- <b>Information systems</b></li> <li>- <b>Networking systems</b></li> <li>- <b>Financial relations</b></li> </ul>	9 items <ul style="list-style-type: none"> <li>- <b>Brands</b></li> <li>- <b>Customers</b></li> <li>- <b>Customer loyalty</b></li> <li>- Company names</li> <li>- <b>Distribution channels</b></li> <li>- <b>Business collaborations</b></li> <li>- <b>Licensing agreements</b></li> <li>- Favorable contracts</li> <li>- <b>Franchising agreements</b></li> </ul>
Bozzolan et al. (2003)	5 items <ul style="list-style-type: none"> <li>- <b>Know-how</b></li> <li>- <b>Education</b></li> <li>- Employees</li> <li>- <b>Work-related knowledge</b></li> <li>- <b>Work-related competencies</b></li> </ul>	8 items <ul style="list-style-type: none"> <li>- <b>Copyrights</b></li> <li>- <b>Patents</b></li> <li>- <b>Trademarks</b></li> <li>- <b>Corporate culture</b></li> <li>- <b>Management processes</b></li> <li>- <b>Information systems</b></li> <li>- <b>Networking systems</b></li> <li>- Research projects</li> </ul>	9 items <ul style="list-style-type: none"> <li>- <b>Brands</b></li> <li>- <b>Customers</b></li> <li>- <b>Customer loyalty</b></li> <li>- Company names</li> <li>- <b>Distribution channels</b></li> <li>- <b>Business collaborations</b></li> <li>- <b>Research collaborations</b></li> <li>- Financial contacts</li> <li>- <b>Licensing agreements</b></li> <li>- <b>Franchising agreements</b></li> </ul>
	22 items		

Name of study/ Items	Human capital	Structural capital	Relational capital
<p>1 Abeysekera and Guthrie (2005)</p>	<p>7 items</p> <ul style="list-style-type: none"> <li>- <b>Training and development</b> (know-how, vocational qualifications, career development and training programs),</li> <li>- Entrepreneurial skills,</li> <li>- Equity issues (race, gender, religion and disability issues),</li> <li>- Employee safety,</li> <li>- Employee relations (union activity, employees thanked, employees featured in annual report, employee involvement with the community),</li> <li>- <b>Employee welfare</b> (employee and executive compensation plans, employee benefits, and employee share and option ownership plans),</li> <li>- Employee-related measurements (value-added statements, employee numbers,</li> </ul>	<p>5 items</p> <ul style="list-style-type: none"> <li>- <b>Processes (management and technological)</b></li> <li>- <b>Systems (information and networking)</b></li> <li>- Philosophy and culture</li> <li>- <b>IC property</b></li> <li>- <b>Financial relations</b></li> </ul>	<p>5 items</p> <ul style="list-style-type: none"> <li>- <b>Brand building</b> (brands, customer satisfaction and quality standards)</li> <li>- Corporate image building (company names and favorable contracts)</li> <li>- <b>Business partnering</b> (business collaboration, licensing agreements, franchising agreements)</li> <li>- <b>Distribution channels</b></li> <li>- <b>Market Share</b></li> </ul>

Name of study/ Items	Human capital	Structural capital	Relational capital
	<ul style="list-style-type: none"> <li>professional experience,</li> <li>education levels, expert</li> <li>seniority, age of</li> <li>employees)</li> </ul>		
<p>Beattie and Thomson (2007)</p>	<p>20 items</p> <ul style="list-style-type: none"> <li>- Employee attitude</li> <li>- <b>Employee capability</b></li> <li>- <b>Employee commitment</b></li> <li>- Employee communicative activities</li> <li>- Employee experience</li> <li>- Employee motivation</li> <li>- Employee sensitivity</li> <li>- Employee skills</li> <li>- <b>Expert teams</b></li> <li>- Human assets</li> <li>- Productivity</li> <li>- Recruitment</li> <li>- Staff profile</li> <li>- Staff turnover</li> <li>- Taking responsibility</li> <li>- <b>Training</b></li> <li>- <b>Work-related Competencies</b></li> <li>- <b>Work-related Knowledge</b></li> <li>- <b>Equality</b></li> <li>- Employee development</li> </ul>	<p>59 items</p> <ul style="list-style-type: none"> <li>- Internal communicative Activities</li> <li>- <b>Corporate culture</b></li> <li>- Customer support</li> <li>- <b>Financial relations</b></li> <li>- Financial strategy</li> <li>- Infrastructure</li> <li>- Innovation</li> <li>- <b>Management philosophy</b></li> <li>- <b>Management processes</b></li> <li>- Operation process</li> <li>- <b>Organizational flexibility</b></li> <li>- <b>Organizational structure</b></li> <li>- Procedures</li> <li>- <b>Quality improvements</b></li> <li>- Remuneration procedures</li> <li>- Systems</li> </ul>	<p>23 items</p> <ul style="list-style-type: none"> <li>- <b>Brands</b></li> <li>- <b>Business collaborations</b></li> <li>- Client names</li> <li>- Client profile</li> <li>- Collaboration</li> <li>- Community</li> <li>- Competitor names</li> <li>- Competitors</li> <li>- Customer knowledge</li> <li>- <b>Customer</b></li> <li>- Customer satisfaction</li> <li>- <b>Distribution channels</b></li> <li>- Environmental activities</li> <li>- Ethical matters</li> <li>- External communicative activities</li> <li>- <b>Financial contracts</b></li> <li>- <b>Franchising agreements</b></li> <li>- Market channels</li> <li>- Market intensity</li> <li>- Negotiation</li> <li>- Social matters</li> <li>- <b>Stakeholders</b></li> <li>- <b>Suppliers</b></li> </ul>

Name of study/ Items	Human capital	Structural capital	Relational capital
	<ul style="list-style-type: none"> <li>- <b>Work-related Knowledge</b></li> </ul>		
Li et al., 2008	<p style="text-align: center;">61 items</p> <ul style="list-style-type: none"> <li>- Number of employees</li> <li>- Employee age</li> <li>- Employee diversity</li> <li>- <b>Employee equality</b></li> <li>- Employee relationship</li> <li>- <b>Employee education</b></li> <li>- Skills/know-how</li> <li>- <b>Employee work related competences</b></li> <li>- <b>Employee work related knowledge</b></li> <li>- Employee attitudes/behavior</li> <li>- <b>Employee commitments</b></li> <li>- Employee motivation</li> <li>- <b>Employee productivity</b></li> <li>- <b>Employee training</b></li> <li>- Vocational qualifications</li> <li>- Employee development</li> <li>- Employee flexibility</li> <li>- <b>Entrepreneurial spirit</b></li> <li>- <b>Employee capabilities</b></li> <li>- <b>Employee teamwork</b></li> <li>- Employee involvement with community</li> <li>- Other employee features</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Intellectual property</b></li> <li>- <b>Process</b></li> <li>- <b>Management philosophy</b></li> <li>- <b>Corporate culture</b></li> <li>- <b>Organization flexibility</b></li> <li>- <b>Organization structure</b></li> <li>- Organization learning</li> <li>- Research &amp; development (R&amp;D)</li> <li>- Innovation</li> <li>- Technology</li> <li>- Financial dealings</li> <li>- Customer support function</li> <li>- Knowledge-based infrastructure</li> <li>- Quality management &amp; improvement</li> <li>- Accreditations (certificate)</li> <li>- Overall infrastructure/capability</li> <li>- <b>Networking</b></li> <li>- Distribution network</li> </ul>	<p style="text-align: center;">21 items</p> <ul style="list-style-type: none"> <li>- <b>Customers</b></li> <li>- Market presence</li> <li>- Customer relationships</li> <li>- Customer acquisition</li> <li>- Customer retention</li> <li>- Customer training &amp; education</li> <li>- Customer involvement</li> <li>- Company Image/reputation</li> <li>- Company awards</li> <li>- Public relation</li> <li>- Diffusion &amp; networking</li> <li>- <b>Brands</b></li> <li>- <b>Distribution channels</b></li> <li>- <b>Relationship with suppliers</b></li> <li>- <b>Business collaboration</b></li> <li>- Business agreements</li> <li>- <b>Favorite contract</b></li> <li>- <b>Research collaboration</b></li> <li>- Marketing</li> <li>- <b>Relationship with stakeholders</b></li> <li>- Market leadership</li> </ul>

Name of study/ Items	
Bontis (2003)	<p style="text-align: center;">38 items</p> <ul style="list-style-type: none"> <li>- Business knowledge</li> <li>- Company reputation</li> <li>- Competitive intelligence</li> <li>- Corporate learning</li> <li>- Corporate university</li> <li>- Cultural diversity</li> <li>- Customer capital</li> <li>- <b>Customer knowledge</b></li> <li>- Economic value added</li> <li>- Employee expertise</li> <li>- <b>Employee know-how</b></li> <li>- Employee knowledge</li> <li>- <b>Employee productivity</b></li> <li>- Employee skill</li> <li>- Employee value</li> <li>- Expert networks</li> <li>- <b>Expert teams</b></li> <li>- Human assets</li> <li>- Human capital</li> <li>- Human value</li> <li>- IC</li> <li>- <b>Information systems</b></li> </ul> <ul style="list-style-type: none"> <li>- Intellectual Assets</li> <li>- Intellectual Capital</li> <li>- Intellectual Material</li> <li>- <b>Intellectual Property</b></li> <li>- Intellectual resources</li> <li>- KM</li> <li>- Knowledge assets</li> <li>- Knowledge management</li> <li>- Knowledge stock</li> <li>- Management quality</li> <li>- <b>Organizational culture</b></li> <li>- Organizational learning</li> <li>- Relational capital</li> <li>- Structural capital</li> <li>- Supplier knowledge</li> </ul>

**Note:** Bontis (2003), items are not classified in categories.

## **Appendix B**

**Empirical evidence of the intellectual capital's financial and non-financial  
information in developed market and emerging market**



Table 16 Empirical evidence of the intellectual capital's financial information in developed market

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
<b>Intellectual capital and relationship with firm performance</b>						
Tan et al. (2007)	Whether the association between the intellectual capital of firms and their financial performance.	Singapore	150 publicly listed companies in the years 2000 and 2002.	VAIC <sup>TM</sup>	company's performance (ROE, EPS and Annual stock return).	The significant positive relationship between intellectual capital and firm performance.
Zégha and Maaloul (2010)	whether value added (VA) of intellectual capital (IC), and its impact on the firm's economic, financial and stock market performance.	UK	300 listed companies in the year 2005.	VAIC <sup>TM</sup>	- firm's economic, financial (Operating income/sales (OI/S), return on assets). - stock market performance (MBV).	- The positive association between "value added intellectual capital coefficient" and economic performance, financial performance and stock market performance. - The positive association between physical and financial capital (CEE) and economic performance, financial performance and stock market performance.

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
<b>Intellectual capital and relationship with firm performance</b>						
Clarke, Seng and Whiting (2011)	Whether the relationship between intellectual capital and firm performance.	Australia	2,161 firms listed on the Australian Stock Exchange from the 2003 to 2008.	VAIC™	Firm performance (Return on assets (ROA), Return on Equity (ROE), Revenue Growth, and Employee Productivity)	- The positive relationship between all intellectual capital and firm performance. - The positive relationship between physical and financial capital (CEE) and firm performance.
Puntillo (2009)	Whether the relation between the value creation efficiency and firms' market valuation and financial performance.	Italy	21 banks listed in the Milan Stock Exchange, during 2005-2007	VAIC™	financial performance (ROA, ROI), firm's market valuation (MBV)	The positive relationship between physical/financial capital (CEE) and financial performance.
Diez et al. (2010)	Whether the human capital and structural capital on the creation of business value.	Spain	1,911 firms in the year 2005	VAIC™	value creation measured by sales growth	The human capital and structural capital were positively relation value creation.
Gigante (2013)	Whether the effects of intellectual capital performance on profitability.	European countries	64 banks in selected European countries (Czech Republic,	VAIC™	Financial performance (ROAA, ROAE and MVBV)	-All intellectual capital was positively with ROAA,ROAE - The cross-country was difference in the use of intellectual capital.

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
Intellectual capital and relationship with firm performance						
			Germany, Italy, Norway, Poland, Spain, Sweden), during the 2004-2007.			
Intellectual capital and relationship with cost of finance						
Liu (2000)	How the relation between knowledge capital and optimal debt.	US	107 biotech firms and 437 observations, during 1983-1992.	R&D expenditures	(1) total debt divided by total assets. (2) total debt divided by the sum of total debt and common equity (market value). (3) total liabilities divided by total assets.	R&D expenditures have a negative influence on a firm's leverage level.
Sporleder and Moss (2004)	Whether the knowledge capital and other intangible assets related with capital structure decisions.	US	6,671 firm-year observations from 748 agricultural	market-to-book value	(1) total debt divided by total assets. (2) total debt divided by the sum of total debt	Intangible assets were negatively related to firm leverage.

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
Hasan et al. (2017)	How the influences of social environment on debt contracting.	US	biotechnology firms, during 1990-2000. 32,425 observations. In the years 1990, 1997, 2005 and 2009.	The NRCRD dataset.	and common equity (market value). (3) total liabilities divided by total assets. - direct bank loan cost using loan spread. - public bond yields.	The influences of level social capital increases on a decrease loan spread both private and public lenders.
Lim et al. (2017)	Whether the relationship between intangible assets and leverage.	US	469 firms, between 2002 and 2014.	Market-based valuation of intangible assets.	The long-term debt divided by total assets.	Intangible assets were a negative effect on leverage.
Cenciarelli et al. (2018)	Whether a firm's intellectual capital performance reduces the probability of default and can help to predict bankruptcy	US	28,915 firm-year observations from 1985 to 2015.	VAIC™	The bankruptcy uses Ohlson's (1980) model and Altman's Z-score.	Firms were lower intellectual capital performance display a higher probability of bankruptcy.

Table 17 Empirical evidence of the intellectual capital's non-financial information in developed market

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Findings
Sengupta (1998)	Does the consequences of disclosure quality by providing evidence of a link between disclosure quality and the cost of debt	US	570 firm-year observations from 114 different firm, during 1987-1991.	AIMR score	cost of issuing debt (Bond yield, Interest)	The voluntary disclosure was negatively associated with the cost of debt.
Mazumdar and Sengupta (2005)	Whether a policy of detailed, timely and informative disclosures can reduce the interest rate a firm pays on its private debt contracts.	US	141 firm-year observations and 102 firms, during 1987-1992.	AIMR score	loan spread.	The bank evaluated a firm's disclosure quality into its default risk estimate and loan spread.
Nikolaev and Van lent (2005)	Whether the association between disclosure and cost-of debt capital.	US	358 firm-year observations from 100 firms, during 1986-1996	AIMR score	Yield to maturity.	A significant negative association between disclosure and yield to maturity.
Attig et al. (2013)	Whether information on CSR activities, as distinct from other information considered by rating agencies, can help explain firms' rating assessments.	US	11,662 firm-year observations representing 1,585 firms, during 1991-2010.	CSR from KLD STATS database, which IC extracted (community relations, diversity, employee relations, environmental performance, and product characteristics)	credit ratings compiled by S&P rating.	Disclosure in employee relations, diversity issues, product issues, community relations, and environmental issues positively affect firms' credit ratings, while the human rights dimension does not

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Findings
Ge and Liu (2015)	How a firm's corporate social responsibility performance is associated with the cost of its new bond issues.	US	4,260 observations from 2,317 firms, during 1992–2009.	CSR rating scores from the KLD STATS database, which IC extracted, product, diversity, employee relations, human rights.	bond yield	have a significant effect on firms' credit ratings. A higher CSR strength score was associated with lower bond yield.
Francis et al. (2005)	Why disclosure and the associate benefits of voluntary disclosure are not likely to occur in countries outside the US.	34 country	672 observations from 1991 to 1993.	CIFAR	The cost of debt, which was the interest rate expense, cost of equity was the ex-ante cost of equity.	Firm was higher disclosure level to receive a lower cost of both debt and equity capital.

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Findings
Orens, Aerts and Lybaert (2009)	Whether firm's cost of finance is associated with its extent of IC disclosure.	Continental Europe	267 non- financial listed firms from continental Europe split into 43 Belgian firms, 43 Dutch firms, 97 French firms and 84 Germany firms, In year 2000.	Follow to Kaplan and Norton (1996), Ittner and Larcker (1998) and Robb et al. (2001).	cost of equity capital, cost of debt (ratio between the interest expenses).	Intellectual capital disclosure in continental Europe was associated with lower information asymmetry, lower implied cost of equity capital and lower rate of interest paid.
Orens, et al. (2010)	Whether the extent of a firm's Web-based disclosure of nonfinancial information is associated with its cost of finance in an international context.	North America and Continental Europe	267 firms in Continental Europe, 628 firms in North America. In year 2002.	Follow to Botosan's (1997) index balanced scorecard framework of Kaplan and Norton (1996, 2004).	cost of equity capital and cost of debt capital.	The association was negative and significant for continental European firms, while it was not significant for North American firms (the USA, Canada).

Table 18 Empirical evidence of the intellectual capital's financial information in emerging market

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
<b>Intellectual capital and relationship with firm performance</b>						
Chen et al. (2005)	Whether intellectual capital contributes to firms' financial performance and can be used as a leading indicator for future financial performance.	Taiwan	4,254 firms listed, during 1992-2002.	VAIC <sup>TM</sup>	<ul style="list-style-type: none"> <li>- firm value (market-to-book value ratios).</li> <li>- firm performance (ROA, ROE, growth in revenues, employee productivity).</li> </ul>	<ul style="list-style-type: none"> <li>- Firms' intellectual capital was a positive impact on market value and financial performance.</li> <li>- Human capital efficiency (HCE) was a positive impact on market value and financial performance.</li> <li>- Capital employed efficiency (CEE) was a positive impact on market value and financial performance.</li> <li>- Structural capital efficiency (CEE) was a positive impact on financial performance.</li> </ul>



Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
Chang and Hsieh (2011)	Whether the role of innovation capital in the creation of value for business organizations.	Taiwan	367 listed companies, from 2000 to 2008.	MVAIC <sup>TM</sup>	gross profit margin (GPM), return on assets (ROA), return of equity earnings per share (EPS) and ROE.	<ul style="list-style-type: none"> <li>- The association between innovation capital which captured by R&amp;D expenditure efficiency (RDE), capital employed efficiency (CEE), and companies' operating, financial was significant.</li> <li>- R&amp;D expenditure efficiency RDE), capital employed efficiency (CEE) structural capital efficiency (SCE) and stock market performance was significant.</li> </ul>
Yu et al. (2010)	Whether the association between intellectual capital and business performance of the companies.	Hong kong	151 firms, during 2005 - 2008.	VAIC <sup>TM</sup>	market valuation (market to book value (MB), profitability (ROA) and productivity(asset turnover, ATO)	<ul style="list-style-type: none"> <li>- overall IC were positively with business performance (ROA) and negatively with asset turnover.</li> <li>- Capital Employed Efficiency (CEE), Structural Capital</li> </ul>

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
Firer and Williams (2003)	Do traditional measures of corporate performance effectively capture the same constructs of corporate performance as emerging intellectual capital-based measures.	South African	75 publicly traded firms in 2001.	VAIC™	and return on equity (ROE).	<p>Efficiency (SCE) and Human Capital Efficiency (HCE) were positively business performance (MB), profitability and productivity.</p> <p>- Human Capital Efficiency (HCE) not significant with ROA.</p> <p>- Overall IC was positively significant with Productivity and market valuation,</p> <p>- HCE was negatively significant with productivity and market valuation.</p> <p>- CEE was positively significant with market valuation.</p> <p>- SCE was positively significant with productivity.</p>
Maditinos et al. (2011)	Whether the impact of	Greek	96 firms listed in Athens Stock	VAIC™	financial performance (ROE, ROA, GR).	<p>Human capital efficiency was one of the three indicators of</p>

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
	intellectual capital on firms' market value and financial performance.		Exchange (ASE), during 2006 – 2008.			financial performance (ROE)
Pal and Soriya (2012)	Whether the association between intellectual capital efficiency with financial performance and market valuation.	India	unbalanced panel of 105 and 102 companies with 918 and 877 observations of pharmaceutical and textile industries, from 2000-2001 to 2009-2010.	VAIC™	firm performance (ROA,ROE,MB, ATO)	<ul style="list-style-type: none"> <li>- The positive relationship between IC and the profitability of firms measured in terms of ROA.</li> <li>- The positive relationship between IC and the profitability of firms in terms of ROE only Pharmaceutical industry.</li> </ul>
Hamdan (2018)	Whether the relation between intellectual capital and firm performance.	Saudi Arabia and Bahrain	171 firms from 15 sectors of the Saudi financial market and 27 firms from 6 sectors of Bahrain	VAIC™	<ul style="list-style-type: none"> <li>- The accounting-based performance ROA.</li> <li>- The market-based performance, the Tobin's Q.</li> </ul>	<ul style="list-style-type: none"> <li>- All IC and component of Saudi was positively ROA significant.</li> <li>- Bahrain showed Structural capital efficiency (SCE) was positively ROA and Human capital efficiency (HCE)</li> </ul>

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
			Bourse, during 2014– 2016.			positively Tobin q significant.
Intellectual capital and relationship with cost of finance						
Gamayuni (2015)	Whether the relationship between intangible assets, financial policies, and financial performance to the firm value at going-public company in Indonesia.	Indonesia	Indonesian Stock Exchange from 2007 to 2009.	Market-based valuation of intangible assets.	leverage ratio	Intangible assets have negative but not significant effect on debt policy.
Hsuehchang (2013)	Whether an SME's intangible assets affect its loan interest rates and debt ratios in an emerging market.	Taiwan	86 publicly listed SMEs with 952 annual observations, during 2001 - 2006.	R&D and advertising expenditures	Loan Interest Rates	SME's intangible assets was negatively affecting the interest rates on bank loans.
Rostamy et al. (2012)	Whether the relationship between intellectual capital both operating cash flow and weighted average cost of capital.	Iran	Tehran Stock Exchange, from 2005 to 2009.	Tobin q	Weighted Average Cost of Capital.	The significant and reverse relationship between IC and WACC, also the significant and positive relationship between IC and operating cash flow.
Iranmahd et al. (2014)	Whether the relationship between intellectual capital	Iran	84 firm listed in Tehran	VAIC™	- Weighted Average Cost of Capital.	- Intellectual capital and components were

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
	and financing costs, and the value of manufacturing companies listed in Tehran Stock Exchange.		Stock Exchange, the year 2005 and 2012.		- Market value.	negatively significant WACC. - Intellectual capital and components were not significant firm value.
Arjmandi and Abadi (2016)	Whether the relationship between the component of intellectual capital and cost of capital.	Iran	131 companies listed Tehran stock exchange, during 2009-2014.	VAIC <sup>TM</sup>	Weighted Average Cost of Capital.	- The relationship between capital employed and cost of capital significant. - Human capital and structural capital were not significant.
Zakariaa et al. (2020)	Does intellectual capital influence a firm's financial health.	eight countries (Bangladesh, India, Indonesia, Malaysia, Philippines, Pakistan, Thailand, and Vietnam)	503 construction and material firms, during 2010-2017.	VAIC <sup>TM</sup> , M-VAIC	Altman's Z score model.	- capital employed efficiency (CEE) and human capital efficiency (HCE) are the main components that contributed to financial health.

Table 19 Empirical evidence of the intellectual capital's non-financial information in emerging market

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
Wang et al. (2008)	<ul style="list-style-type: none"> <li>- Whether the characteristics affecting corporate information disclosure in emerging economies.</li> <li>- Whether the association of voluntary disclosure and the companies' cost of debt capital.</li> </ul>	China	110 firms both domestic, namely A-share and foreign shares, namely B-share, the year 2005.	79 items were partitioned into (1) strategic, (2) non-financial, (3) financial information developed Gray, Meek and Roberts (1995).	cost of debt capital developed by Francis et al. (2005) Interest expenses divided by total debts.	There is no evidence, however, that companies benefit from extensive voluntary disclosure by having a lower cost of debt capital.
Dadashi et al. (2013)	Does the relationship between information voluntary disclosure and cost of debt.	Iran	52 firms listed in Tehran Stock Exchange, from 2001 to 2010.	36 items of disclosure are not required on the basis of the accounting standard of Iran	Cost of debt an average as the interest expense and debt.	The relationship between the amount of information voluntary disclosure and cost of debt insignificant.
Guidara et al. (2014)	Whether companies benefit from increased voluntary and timely disclosure through a lower cost of debt.	South Africa	20 non-financial companies listed in Johannesburg Stock Exchange, the period 2008-2011.	The disclosure index developed by self-constructed and adapted Chau and Gray (2002) which incorporates 12 categories, the total number of items were 113.	Cost of debt capital using the rate of interest paid.	The extent of voluntary disclosure was negatively and significantly associated with the cost of debt.

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
Kamel and Shahwan (2014)	Whether the cost of equity and debt capital is related to the extent of voluntary disclosure in the Egyptian stock market.	Egypt	73 Egyptian listed companies, the year 2005.	The final items were 36 based on the disclosure index employed in earlier studies (Meek et al., 1995; Botosan, 1997; Patel and Dallas, 2002; Leventis and Weetman, 2004b; Alsaeed, 2006; Kristandl and Bontis, 2007)	cost of equity cost of debt	Not significant association between the level of voluntary disclosure both the cost of equity capital and debt capital,
Talbi and Omri (2014)	Whether the impact of voluntary information disclosure on cost of debt capital.	Tunisian	22 firms listed in the Tunis stock exchange, from 1998 to 2004.	Adopted from Matoussi et al. (2004), Botosan (1997) and adapted to the Tunisian context.	cost of debt (the ratio of financial expenses on bank borrowings in the amount of borrowing)	the voluntary disclosure was negatively effect on the cost of debt significant.
Barus and Siregar (2015)	Whether the effect of voluntary disclosure of intellectual capital on both cost of equity and cost of debt.	Indonesia	103 technology-intensive industry listed firms.	Based on Li et al. (2008), final total 48 items.	cost of equity (following Francis et al.,2005) cost of debt (calculated)	A negative effect between intellectual capital disclosure and cost of equity. However, intellectual capital disclosure was

Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
			Firm 79 for cost of equity, 50 for cost of debt, during 2010-2011.		from total interest expense divided by average debt (Francis et al. 2005).	not significant effect on cost of debt.
Iazzolino et al. (2013)	Whether the model of credit risk evaluation in which the traditional financial ratios were integrated by indicators based on intellectual capital.	Greek	40 firms and no information of the year.	Three dimensions: human capital (3 items), structural capital (4 items) and relational capital (3 items) based on Edvinsson (1997).	credit scoring model based on Multi Discriminant Analysis (MDA).	The non-financial indicators of intellectual capital were significantly credit scoring.
Stropnik et al. (2017)	Whether intellectual capital disclosures of private audited organizations are associated with the cost of debt capital.	Slovenian	100 firms in the year 2014.	Intellectual capital index was 61 items adopted Li et al. (2008). Human capital was 22 items, Structural capital was 18 items, Relational capital 21 items.	Cost of debt, as the ratio of annual interest and other financial expenses to average annual short-term and long-term financial liabilities.	The all intellectual capital disclosure and the components are not statistically significant with cost of debt.



Author(s) (Year)	Research Question	Country	Sample	Use of index	Proxy of Dependent	Key Findings
Bouchareb and Kouki (2019)	Whether intellectual capital disclosure practices influence the cost of finance.	Tunisian (North African region)	The sample was 135 observations, 27 firm, during 2010–2014.	31 intellectual capital items divided into three categories: internal (structural) capital (9items), external (customer/relational) capital (13 items), and employee competence (human capital) (9 items). modifications on Guthrie and Petty's framework.	Cost of equity based on the Easton (2004) approach. Cost of debt equals the interest rate paid.	Intellectual capital disclosure negatively and significantly associated with the cost of equity and the cost of debt.

## **Appendix C**

### **Definition of the issue of intellectual capital reporting**

Table 20 Definition of items intellectual capital

Categories	The number of items	Key words of sub-categories	Definition
Human capital	11 items	Know-how	Know-how is consisting of knowledge, educational qualifications, experience, expertise or skill of directors and employees.
		Employee teamwork	Teamwork is person in organization working together cooperatively, it cover about of expert team, teamwork capacity, it enhance relationships between employees within/across department.
		Employee training	Refers to policies developed for training undertaken/provided by organization. It includes career development, training programs, training results/effectiveness.
		Entrepreneurial spirit	Refers to employee engagement such as employee suggestion systems, consultations. It relates creativity, innovativeness, knowledge sharing and employee proactive.
		Employee welfare	Refers to long term benefit, short term benefit, employee share and option ownership plan, health and safety working environment
		Employee commitment	It refers to employees being bounds emotionally/intellectually to the organization
		Employee equality	Equal treatment of people irrespective of social and cultural differences. Related disclosures include employee equality policy.
		Employee capability	It refers to the ability of employees.
		Employee productivity	It refers to the output of employees, an output which can be shown in physical. It shows the value-added and efficiency of employees.
		Working knowledge	Refers to the knowledge gained during on the job, the tacit knowledge. It mainly relates to knowledge that employee has related to their current job description.
		Work-related competencies	Refers to the current job useful their knowledge/skill, innovative capacity.
Structural capital	10 items	Intellectual property	It includes encompass patents, copy right, trademarks, designs, trade secrets, commercial right. It covers the asset of company which is protected by law.
		Management philosophy	It is related the way a firm management, the positive work and the influence of a manager's approach to motivation.

Categories	The number of items	Key words of sub-categories	Definition
		Corporate culture	Refers to beliefs, attitudes and understanding shared by people and group in organization. It covers the firm's corporate culture to build up about people, event and history conveying a story within firm.
		Management processes	Refers to management of organization. It is cover processes, procedures, planning, organizing, directing and operation.
		Information/Net working systems	Refers to the system available in the firm which can interaction of people via media and device. It covers to use application, computer network, database, software/hardware, voice mail, video conference and systems.
		Financial dealings	Refers to deal commitment among the investors, shareholders, banks and other finance providers, financial credit rating.
		Research and development	Refers to long-term activities in business practice. It covers policies on research and development, budget on R&D, output and successful rate, project to date.
		Knowledge-based infrastructure	Refers to shared database among employees. It includes knowledge management via sharing, learning, training programs.
		Organization structure	Reporting lines, hierarchies, and the way that workflows through the business, including such as management structure, business models.
		Quality improvement	Practices in maintaining and improving quality standards of products and services.
Relational capital	10 items	Brands	Refers to name, symbol or other feature that identifies one seller's good and service, the difference from other sellers. It covers brand names, brand image, brands building, brands loyalty, brands related sales.
		Business collaborations	Refers to collaborate with other business partners. It covers collaboration, joint venture, supplier and government collaboration.
		Customers	Refers to the recipient of a good, service, product and idea. It covers customer relation with company for attracting the customer.
		Customer loyalty	It includes policies and programmers for building customer relationships.
		Distribution channels	Refers to distribution goods and service reach users. It covers the business supply chain, delivery systems, distribution centers, market advertising and promotion activities.

Categories	The number of items	Key words of sub-categories	Definition
		Contracts	Refers to a contract of the specific marker position held by the firm. It covers the legal license to produce or sell goods, the favorable relationship.
		Relationship with stakeholders	Refers to relationship with stakeholders, investors relation does not cover the relationships with customers, suppliers, competitors.
		Relationship with suppliers	Refers to support of suppliers, knowledge of suppliers, supplier code of practice.
		Market share	Refers to the market share which a company has the various markets or top positions. It covers developing the proportion of the market share for products, services or company.
		Franchise/ Licensing agreements	It refers to business agreements such as licensing and franchising agreements. The transactions are not within a consolidated group of companies.

## **BIOGRAPHY**

<b>NAME</b>	Natthaporn Phurahong
<b>DATE OF BIRTH</b>	19 September 1984
<b>PLACE OF BIRTH</b>	Sukothai
<b>ADDRESS</b>	188/123, Muang District, Phitsanulok, Thailand
<b>POSITION</b>	Lecturer
<b>PLACE OF WORK</b>	Lecturer in Accounting program of Faculty of Management Science, Pibulsongkram Rajabhat University, Phitsanulok, Thailand
<b>EDUCATION</b>	2007 Bachelor of Accountancy, Naresuan University 2011 Master of Science in Information Technology in Business (Accounting Information System), Chulalongkorn University 2021 Doctor of Philosophy (Accounting), Mahasarakram University, Maha Sarakram, Thailand