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Article

Do reported intangible assets create a better information environment?

Global Business & Finance Review (GBFR)

Provided in Cooperation with:

People & Global Business Association (P&GBA), Seoul

Suggested Citation: Nittikorn Suwansin; Likitwongkajon, Napaporn; Pinprapa Sangchan (2024) : Do reported intangible assets create a better information environment?, Global Business & Finance Review (GBFR), ISSN 2384-1648, People & Global Business Association (P&GBA), Seoul, Vol. 29, Iss. 4, pp. 55-69,

https://doi.org/10.17549/gbfr.2024.29.4.55

This Version is available at: https://hdl.handle.net/10419/305983

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GLOBAL BUSINESS & FINANCE REVIEW, Volume. 29 Issue. 4 (MAY 2024), 55-69 pISSN 1088-6931 / eISSN 2384-1648 | Https://doi.org/10.17549/gbfr.2024.29.4.55 © 2024 People and Global Business Association

GLOBAL BUSINESS & FINANCE REVIEW

www.gbfrjournal.org for financial sustainability and people-centered global business

Do Reported Intangible Assets Create a Better Information Environment?

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ABSTRACT

Purpose: This study investigates whether the identifiable intangible assets (IIA), goodwill (GW), and research and development expense (R&D) reported in the financial statements and annual reports of firms on the Stock Exchange of Thailand (SET) can improve the information environment, as represented by a narrower bid-ask spread in the capital market. Additionally, this study explores the impact of intangible asset disclosure scores on the information environment.

Design/methodology/approach: This study tests the association between reported intangible assets, intangible asset disclosure score, and bid-ask spread. The sample is 2,691 firm-year observations in SET from 2012-2021, and ordinary least squares (OLS) regression is used to test the hypothesis.

Findings: The results found that IIA and R&D are associated with the information environment. It is reported that IIA and bid-ask spread have a positive relationship, whereas R&D and bid-ask spread have a negative relationship. In addition, the intangible asset disclosure score can also reduce bid-ask spread.

Research limitations/implications: This study highlights the benefits of intangible assets, which can help bridge the information gap. However, the intangible asset disclosure score is determined through self-index construction. This process involves discretion and may be prone to errors. Furthermore, using the bid-ask spread as the sole indicator of the information environment might be inadequate.

Originality/value: Research on information asymmetry about intangible assets in Thailand is scarce. This study provides empirical evidence to support the benefit of some intangible assets in reducing asymmetric information among investors. By utilizing the intangible asset disclosure score, including mandatory and voluntary disclosure, it is also possible to observe how different disclosure quality levels impact the information environment.

Keywords: Intangible Assets, Information Environment, Bid-ask Spread

I. Introduction

Nowadays, intangible assets play a critical role

in the growth and prosperity of businesses (Kumari & Mishra, 2020; Cui & Jin, 2020). Value relevance literature suggests that any event that could potentially affect a current and future firm's financial position should be recorded and reported in financial statements, as the users of financial statements tend to use such information to make decisions (Oliveira

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Received: Mar. 3, 2024; Revised: Apr. 1, 2024; Accepted: Apr. 22, 2024

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et al., 2010). However, current accounting standards on intangible assets (IAS 38 Intangible Assets) do not accept recognizing all intangible assets if they do not comply with the recognition criteria. This might result in the financial statements failing to accurately reflect the firm value (IASB, 2005; Wyatt, 2005; Ahmed & Falk, 2006; Russell, 2017). This may cause investors to be uncertain about the value of the firm's intangible assets and cause information asymmetry issues.

When one side has access to better information than the other, there is asymmetric information, thus enabling them to make superior decisions and gain advantages (Aboody & Lev, 2000; Mohd, 2005; Chivachantana et al., 2013). Previous studies have demonstrated that information asymmetry, both general information and information regarding intangible assets, may enable investors to profit from insider information or underestimate firm assets, which can alter firm value and stock liquidity (Mohd, 2005; Tsai, 2008). Intangibles are more closely related to the issue of information asymmetry than any other assets. This is because information on changes in the value of intangible assets is insufficient compared to changes in the values of other assets. This situation can lead to underestimating firm value (Aboody & Lev, 2000; Brahim & Arab, 2012). The asymmetric information among market players would result in increased transaction costs. The needed rate of return for the investor may rise, resulting in mispricing and decreasing stock liquidity (Gregoriou et al., 2005; Vavanos & Wang, 2012). Therefore, more accurate disclosure of intangible assets will give investors the necessary information to assess firm value and investment risk, enabling stock prices closer to intrinsic value, better trading liquidity, and a narrower bid-ask spread.

Therefore, managers of a growing firm are likely to signal to investors the growth opportunities presented by reported intangible assets or by further disclosing other intangible asset information because investors may place weight on these assets when valuing a firm. This signal may be a channel for managers to disseminate inside information to investors, potentially reducing information asymmetry (Mohd, 2005; Dainelli et al., 2013). More disclosure in annual reports helps minimize information asymmetry by reducing insider information (Brown & Hillegeist, 2007). Listed firms with high disclosure will contribute to a better information environment, i.e., higher trading volume and narrower bid-ask spread. Therefore, if disclosure is supposed to minimize information asymmetry, the amount of reported intangible assets or strong disclosure quality should be related to decreased information asymmetry.

This study analyzes IIA (excluding goodwill and R&D) over the past decade (2012-2021) since Thailand adopted IAS 38 in 2011. In their financial statements, 92% of firms disclosed IIA, predominantly acquired intangible assets, during this period. Furthermore, 52% of firms reported external goodwill, indicating a significant volume of M&A activities. Internally developed intangible assets, notably R&D, are less frequently recorded on firms' balance sheets. They are usually reported in the firms' annual reports as approximately 55% of the total. The proportion of intangible assets (IA) relative to total assets (TA) has markedly risen from 8.7% in 2012 to 15% in 2021, averaging 12.8% over the decade and signaling a significant financial landscape shift. While this proportion may not yet surpass that of tangible assets, it is crucial to acknowledge the accelerating importance of intangible assets in financial statements, signaling the need for evolving accounting practices. Over a decade, the proportions of IIA, GW, and R&D to IA were 54.5%, 42%, and 3.5% respectively. IIA remained at 57.5% in the first five years (2012-2016) and declined to 51% in the latter half (2017-2021). GW/IA increased from 38% to 46% over the period, while RD/IA slightly decreased from 4% to 3%. R&D exposure remains relatively low compared to other intangible assets (Datastream and authors' own calculations, 2024).

Disclosure of intangible assets in the Thai industrial sectors is still relatively low. According to the GIFT report (Brand Finance, 2017), the ratio of disclosed intangible assets to total intangible assets in Thailand was 17.1% and relatively stable in 2018-2020. This

indicates a high proportion of undisclosed intangible assets in Thailand. The fact that some information is not disclosed may cause users to make incorrect decisions. In addition, more than 60 % of firms listed on SET are family businesses (SET, 2021). Therefore, there is a tendency to encounter problems of information asymmetry among investors. Moreover, there is a lack of empirical evidence in emerging markets such as Thailand. Research on intangible assets in Thailand often tests value relevance using stock price or returns (Thessrimuang & Kaewprapa, 2018; Varnaprux, 2019). There's a gap in research regarding information asymmetry and intangible assets in Thailand. Assessing disclosure scores can illuminate the impact of disclosure quality on the information environment, an area with limited study. This motivates our investigation to address this gap.

This study explores whether intangible assets (IIA, GW, R&D) can reduce bid-ask spreads, thereby enhancing the information environment. Additionally, it examines how the disclosure score of intangible assets, encompassing both mandatory and voluntary disclosure, impacts the information environment. The study finds a negative association between R&D, intangible asset disclosure scores (IA Disc), and bid-ask spreads, indicating their potential to narrow spreads and enhance the information environment. This suggests that disclosing R&D and IA Disc alongside other information could reduce information asymmetry, benefiting investors, Nonetheless, IIA and bid-ask spread are positively associated, while no significant relationship is found between GW and bid-ask spread. This research builds on previous studies investigating the benefit of intangible asset information (e.g., Mohd, 2005; Shah et al., 2013; Ji & Lu, 2014; Tahat et al., 2018; Cordazzo & Rossi, 2020) by studying in Thailand.

The remaining sections of this study are organized as follows: Section 2 covers literature evaluation and hypothesis creation, Section 3 suggests the research methodology, and Section 4 shows the findings. The discussion section comprises the final section.

II. Literature Review and Hypothesis Development

Three types of intangible assets will be discussed in this study: IIA (e.g., patents, copyrights, intellectual property, trademarks), goodwill, and R&D. Previous studies have favored investigating the value relevance of these types of intangible assets (e.g., Ledoux & Cormier, 2013; Ji & Lu, 2014; Gong & Wang, 2016; Tahat et al., 2018; Cordazzo & Rossi, 2020). In the investment decisions of investors in emerging market countries, including Thailand, it has been found that IIA, GW, and R&D data are used to consider firm stock trading, just like in developed capital markets. Aulia et al. (2020) show that Indonesian investors consider intangible assets (IIA, including goodwill) when buying stocks. As in Saudi Arabia and Qatar, research has found the value relevance of IIA (Al-Ani & Tawfik, 2021). Oryina and Suleiman (2020) found that IIA was positively associated with the price of Nigeria-listed firms. Like in Thailand, IIA was significantly related to stock return (Thessrimuang & Kaewprapa, 2018). Satt and Chetioui (2017) found that goodwill positively affected stock returns in the MENA region, such as Bahrain and Egypt. As in the developed markets, a positive relationship exists between goodwill and stock prices (Bauman & Shaw, 2018; Cordazzo & Rossi, 2020). However, goodwill had a negative and insignificant relationship with the stock price in some emerging markets (Oryina & Suleiman, 2020). Additionally, research shows that investment in R&D influences investors' stock investment decisions, both expensed R&D (Kumari & Mishra, 2019; Kym, 2023) and capitalized R&D (Kumari & Mishra, 2019; Koo & Kim, 2023). Binh et al. (2020) state that intangible assets such as R&D in Vietnam's stock market positively impact the firm's stock price, as in India (Kumari & Mishra, 2019).

Firms' management tends to have more insider information about intangible assets than outside investors. Proper signaling helps reduce information asymmetry issues (Aboody & Lev, 2000; Mohd, 2005). Disclosure of intangible assets may signal a firm's growth to investors and differentiate it from other firms. Prior research has demonstrated that companies have different motivations for recognizing intangible assets (Kallapur & Kwan, 2004; Wyatt, 2005; Markarian et al., 2008). If market participants believe that intangible asset information lacks reliability, the relationship between intangible assets and stock prices may decrease (Cazavan-Jeny & Jeanjean, 2006; Ji & Lu, 2014; Ji, 2018). In addition, Dahmash et al. (2009) found that data reported on GW and IIA showed value relevance but lacked reliability, particularly since GW was reported conservatively, whereas IIA was reported aggressively. Differences in approaches to perceptions of IIA, GW, and R&D may lead investors to value IIA differently from GW and R&D (Wyatt, 2005).

In cases of information asymmetry, undisclosed internal intangible assets may lead to erroneous trading decisions by outside users, impacting stock liquidity with wider bid-ask spreads. This often affects stocks categorized as illiquid due to insufficient information, influencing the overall information environment. Prior research has included several measures of the information environment, such as better information environment measured by firms with lower forecast dispersion, greater analyst coverage, or smaller forecast errors (Horton et al., 2013; Zhang & Toffanin, 2018), or observations from decreased bid-ask spread or increased trading volume (Armstrong et al., 2012; von Koch & Willesson, 2020). In conclusion, this research highlights a better information environment where users utilize more information for analysis and decision-making, leading to improved stock price forecasting, increased trading activity, and narrower bid-ask spreads (von Koch & Willesson, 2020; Dass et al., 2021).

Numerous studies have revealed issues stemming from information asymmetry regarding intangible assets, including underestimation of firm intangibles, reduced stock liquidity, financial manipulation, and increased insider profitability (Barth et al., 2001; Tsai, 2008; Martins & Alves, 2010; Baruffaldi et al., 2024). Previous research indicates that intangible assets facilitate better decision-making and firm valuation for investors (Ledoux & Cormier, 2013; Shah et al., 2013; Ji & Lu, 2014; Gong & Wang, 2016; Cordazzo & Rossi, 2020). Empirical evidence suggests that intangible assets are more relevant to information asymmetry issues than tangible assets (Brahim & Arab, 2012; Barker et al., 2021; Ferrer et al., 2022), leading to potential mispricing of stocks in intangibleintensive firms. In emerging markets like Thailand, information asymmetry typically exceeds that of developed markets (Capasso, 2006). Despite this, emerging markets often undergo rapid economic growth, wherein intangible assets play a significant role (Dutz et al., 2012). Consequently, enhancing the disclosure of intangible assets emerges as a key factor in alleviating information asymmetry in such markets. An intriguing aspect lies in evaluating whether reported intangible assets (IIA, GW) and R&D disclosed in annual reports of listed Thai firms can address this issue. According to the cited literature review, this study expects that intangible assets will reduce information asymmetry and increase liquidity, resulting in more trading volume and, finally, narrow bid-ask spreads, which implies a better information environment (Baik et al., 2018; von Koch & Willesson, 2020; Dass et al., 2021). This study, therefore, formulates the hypothesis as follows.

H1: Intangible assets (IIA, GW, and R&D) of firms listed on SET reduce bid-ask spread.

In addition, this study will examine how intangible asset disclosure affects the information environment. Intangible assets disclosure here means information about intangible assets disclosed in the notes, annual reports, or websites, both information disclosed following the criteria set forth by IAS 38 (mandatory disclosure, specifically in paragraph 118 of IAS 38) and information disclosed voluntarily. Firms with extensive information disclosure are perceived as higher quality than those with limited disclosure. Better disclosure quality gives investors clearer insights into the firm, lowering information processing costs and attracting more uninformed investors to trade in the firm's shares (Brown & Hillegeist, 2007). Enhanced accounting disclosure quality has been shown to reduce information asymmetry, enhance market liquidity, lower risks, and increase corporate values (Jeny et al., 2019; Ho et al., 2022). Haggard et al. (2008) discovered that voluntary disclosure lowers information acquisition costs, enhances firm transparency, reduces stock price volatility, and improves investors' ability to forecast stock returns. Similarly, Orens et al. (2009) found that disclosing intellectual capital on firms' websites, such as human capital and innovative research, reduces information asymmetry by boosting trading volume and narrowing bid-ask spreads.

Companies holding undisclosed intangible assets face increased information asymmetry among investors (Aboody & Lev, 2000; Russell, 2017). Therefore, enhancing intangible asset disclosure can mitigate this issue in capital markets (Nichita, 2019). Moreover, disclosures aid in aligning investor valuation needs with financial reporting information, particularly in intangible asset valuation for stock prices (Labidi & Gajewski, 2019). Despite IAS 38's requirement for intangible asset disclosure, it may not furnish investors with sufficient data for effective decisionmaking. A survey across countries indicates relatively low average disclosure rates, even when mandatory, possibly stemming from a lack of awareness among managers and accountants regarding the benefits of disclosure (Azevedo et al., 2019). Disclosure might be perceived as potentially entailing competitive disadvantages and high proprietary costs (Devalle et al., 2016; Azevedo et al., 2019). However, the disclosures required by IAS 38 and additional

Table	1.	Sample	selection
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voluntary disclosures provide investors with information for projecting the estimated future cash flows from intangible assets. According to Healy & Palepu (2001), firms that publish information more frequently in line with accounting standards and voluntarily tend to attract more analysts and have more market liquidity.

Thus, the disclosure may lessen information asymmetry between investors, resulting in more trading volume and a narrow bid-ask spread. In addition to expecting intangible assets (IIA, GW, R&D) to be associated with the bid-ask spread, further disclosure scores of mandatory and voluntary intangible assets will also reduce the bid-ask spread. This leads to hypothesis 2.

III. Research Method

This study used quantitative research methods. The data comes from the Datastream, annual reports, and self-index construction. OLS is used as a tool to test the hypothesis. This study used STATA 17.0 to analyze various statistics in this study. The sample used in the study was from firms listed on SET between 2012 and 2021. In Table 1, this study collected data from Datastream in August 2022 by selecting listed firms on SET, with 737 initial firms.

Sample selection	Year 2012-2021
Starting number of firms	737
Subtract	
- Investment trusts, Equity investment instruments, Unclassified, mai	222
- Financials (Banking, Finance & Securities, Insurance)	67
- Firms missing intangible asset disclosure data	63
Final firms	385
Final firm-year observations	2,691

Source: Refinitiv Eikon Datastream (August, 2022)

H2: Intangible asset disclosure scores, mandatory and voluntary, reduce bid-ask spread.

Then, this study subtracted 222 firms identified as Investment trusts, Equity investment instruments, and firms in the Market for Alternative Investment (mai) until there were 8 industry groups left. After that, there were 7 industrial groups left after the financial sector (67 firms) was eliminated. Subsequently, this study excluded 63 firms that did not invest in at least one of the three intangible assets (IIA, GW, and R&D), bringing the total to 385. During the 10 years (2012-2021), a sample of 2,691 firm-year observations was obtained for this research. When dividing the sample by industry, it was found that it consisted of Agro & Food (11.2%), Consumer Products (5.9%), Industrials (18.2%), Property & Construction (18.3%), Resources (10.2%), Services (26.2%), and Technology (10.0%).

This study selected a sample covering almost every industry in SET. When separated by industry, it was found that the Technology, Services, Industrials, Agro & Food sectors had the highest proportion of IA to TA (21.11%, 20.53%, 14%, and 13.2%). IIA/IA has the highest proportion in the Technology, Resources, and Services sectors (92.39%, 64.09%, and 43.28%, respectively). Meanwhile, GW/IA was highest in industrials, Agro & food, and property (80.94%, 75%, and 65.48%). The highest R&D/IA is in Consumer Products, Services, and Resources (12%, 4%, and 3.4%) (Authors' own calculations, 2024). The study found a distribution of IIA, GW, and R&D among the selected sectors. This suggests that investors can use information about intangible assets from the abovementioned industries to make investment decisions in buying and selling firms' stocks in each industry.

Regression models are shown as follows:

$$\begin{split} \text{Bid-ask Spread}_{it} &= b_0 + b_1 \text{IIA}_{it} + b_2 \text{GW}_{it} + b_3 \text{R\&D}_{it} \\ &+ b_4 \text{E}_{it} + b_5 \text{Volatility}_{it} + b_6 \text{Turnover}_{it} \end{split}$$

+
$$b_7$$
Market cap_{it} + b_8 Free float_{it} + b_9 Big4_{it}
+ b_{10} Ind_{it} + b_{11} Year_{it} + e_{it} (2)

Equations 1 and 2 aim to study the impact of three intangible assets that may affect bid-ask spread (H1). This study collects the daily bid and ask prices from Datastream, calculates the difference between the two prices (ask minus bid), and divides by the mid-price (Mohd, 2005; Vergauwe & Gaeremynck, 2019). Then, this study calculates the daily average of those spreads one month after the earnings announcement date. IIA are identifiable and reported intangible assets divided by total assets. GW is the reported goodwill divided by total assets. IIA+GW is IIA, including GW scaled by total assets. Some Thai-listed firms report IIA and GW together as one item in their statement of financial position, while others report the two items separately. Therefore, this study separates the model into Equation 1 (combining them) and Equation 2, which separates these two items to reflect whether investors perceive this information differently. R&D is the research and development expense disclosed in the annual report divided by total assets. All three intangible asset variables are expected to reduce the bid-ask spread, implying that intangible assets improve the information environment. The variable definitions are in Table 2.

Earnings (E), commonly used to study the value relevance of accounting information (Ji, 2017), is the first control variable in this research. It is expected to be negatively related to bid-ask spread. Volatility, or the daily stock return standard deviation, is another control variable that measures stock liquidity (Muller & Riedl, 2002; Cormier, 2014; Vergauwe & Gaeremynck, 2019). Next, Turnover is the ratio of stocks traded divided by total stocks. It is also a measure of stock liquidity (Yassin et al., 2015; Vergauwe & Gaeremynck, 2019). It is expected that if the volatility of daily stock returns is low and the ratio of shares traded is high, information asymmetry is reduced, or the information environment is improved. Next, Market Cap is the market capitalization. This variable represents the size of the entity that controls the information environment (Leuz & Verrecchia, 2000). Free Float is the percentage of stocks traded in the market by individual investors (Leuz & Verrecchia, 2000). If Market Cap and Free Float variables are high, information asymmetry is expected to decrease. The final control variable is Big4. Big4 is the four largest accounting firms that audit other firms. However, it is unclear how Big4 relates to audit quality and information environment. Therefore, it could positively or negatively affect the dependent variable. The next step is to test how the intangible assets disclosure score (IA_Disc) will affect the bid-ask spread according to H2 using equations (3) and (4). IA_Disc is the variable of interest used to test H2, which this study expects to reduce the bid-ask spread.

- + b5Market capit + b6Free floatit
- + b_7Big4_{it} + b_8Ind_{it} + b_9Year_{it} + e_{it} (3)

 $Bid-ask \ spread_{it} = b_0 + b_1 IIA_{it} + b_2 GW_{it} + b_3 R\&D_{it}$

- + $b_4IA_Disc_t$ + b_5E_{it} + $b_6Volatility_{it}$
- + b₇Turnover_{it} + b₈Market cap_{it}
- + $b_9Free \ float_{it}$ + $b_{10}Big4_{it}$ + $b_{11}Ind_{it}$
- $+ b_{12} Y ear_{it} + e_{it}$ (4)

Table 2. Variable definitions

Variables	Definitions and estimation
Bid-ask spread	The difference between bid and ask price. Subtract the bid price from the ask price and divide it by the mid-price, then calculate the daily average of that spread for one month following the earnings announcement date.
IIA	Identifiable intangible assets reported in the financial statement (goodwill and R&D are not included) scaled by total assets.
GW	Goodwill reported in the financial statement scaled by total assets.
IIA+GW	Identifiable intangible assets, including goodwill, scaled by total assets.
R&D	Research and development expenses disclosed in annual reports are scaled by total assets.
Е	The log of earnings at year-end.
Volatility	The log of the standard deviation of daily returns over one month after an earnings announcement.
Turnover	The log of the average ratio of daily stocks traded by stocks outstanding over one month.
Market cap	The log of the average daily market capitalization over one month.
Free float	The average stock percentage is readily available for trading over one month.
Big4	If the Big Four accounting firms are auditing the company, this variable is 1; if not, it is 0.
IA_Disc	 The intangible asset disclosure score is divided into information disclosed according to IAS38 (5 items) and another five voluntary disclosures. Information was collected from annual reports and various news sources outside financial statements. Scores of 0-2 will be assigned based on qualitative or quantitative characteristics. The ten items are Useful life of intangible assets. Amortization method, the beginning and ending of BV. Increased intangible assets (developed independently/acquired separately/combined). There is a classification of intangible assets. Goodwill Information/ Impairment of intangible assets/Impairment loss/reversal of impairment. Research and development information and related intellectual property (such as patents and copyrights). Human resources/Human capital information. Advertising expenses/ branding/trademark and related intellectual property. Customer loyalty/customer relations/ customer satisfaction. Competitive advantage of the firm.
Ind	(Wyatt, 2008; Castilla-Polo & Gallardo-Vázquez, 2016; Agyei-Mensah, 2019; Azevedo et al., 2019) Industry 1=Food&Agro, 2=Consumer Products, 3=Industrials, 4= Construction & Property, 5=Resources,
	o=Services, and /=recinology

IV. Data Analysis and Results

A. Descriptive Statistics

Table 3 provides an overview of all the variables' descriptive statistics. All the continuous variables were winsorized at 3 and 97% to minimize the potential influence of extreme values. Panel A displays descriptive statistics for quantitative variables. The variables in the form of a logarithm are bid-ask spread, E, turnover, volatility, and market cap (this study followed Vergauwe & Gaeremynck, 2019). Bid-ask spread had a maximum value of -3.1007 and a minimum of -5.3639. The price range of the firms' stocks in the Thai stock market was highly different. It ranges from less than one baht to several hundred baht per share. However, when winsorizing and logarithm, it was found that the bid-ask spread data had quite similar mean and median values of -4.666 and -4.796, respectively. The values of all

three intangible assets (IIA, GW, and R&D) in the table were divided by total assets. The IIA had the highest overall average, followed by GW and R&D. The R&D from the annual report is quite low compared to GW and IIA. This may be because Thai-listed firms have relatively few research and development expenses. Or there may be research and development expenses, but not much information has been revealed. This is in line with earlier information that showed Thailand's disclosed intangible asset to the total intangible asset ratio is still low. Next, the intangible asset disclosure score (IA_Disc) had a mean of 10.61 (out of 20) and a median of 10. The highest and lowest scores were 19 and 2, respectively.

The variables representing the firm's size (Market cap) indicated that the sample had a significant difference in size. However, all variables tended to be normally distributed and could be used for regression analysis. For the discontinuous variable in panel B, Big4 is another control variable, where

Table 3. Descriptive statistics

Variables	Mean	Median	S.D.	Min.	Max.	Obs.			
Panel A: Continuous Variables									
Bid-ask spread	-4.666	-4.796	0.5667	-5.3639	-3.1007	2,691			
IIA	0.0186	0.0038	0.0354	0.0002	0.1374	2,691			
GW	0.0094	0.0016	0.0226	0	0.0889	2,691			
IIA+GW	0.0374	0.0051	0.0766	0.0002	0.3301	2,691			
R&D	0.0013	0.00068	0.0025	0	0.0099	2,691			
IA_Disc	10.6139	10	3.061	2	19	2,691			
Е	5.8404	5.7473	1.6702	2.4066	9.3914	2,691			
Volatility	0.6434	0.6158	0.6084	-0.8251	2.0914	2,691			
Turnover	-6.7819	-6.4329	1.9013	-11.8006	-3.1395	2,691			
Market cap	8.8618	8.6181	1.6152	6.1544	13.0043	2,691			
Free float	50.6716	48	20.6079	1	99	2,691			
Remark: Continuous	s variables are t	ested for normal	distribution by	checking skewness	(should not ex	ceed $+/-3$) and			

kurtosis (should not exceed +/-7) (Hair et al., 2010).

Panel Ba	Discontinuous	Variable
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m: 1)

1) Big Four auditor (Big4)		
Description	Firms-year obs	Percentage
Big4	1,802	66.96
Non-Big4	889	33.04
Total	2,691	100

) **D' D**

a value of 1 had a frequency of 1,802, representing 66.96%, while firms that were not audited by Big4 had a value of 0 with a frequency of 889, representing 33.04%.

B. Correlation Analysis

Table 4 considers the correlation between all variables used in this study. The correlation coefficient (r) showed that the variables that were significantly related to the dependent variable (bid-ask spread) (p < 0.01) were all three items of intangible assets (IIA, GW, and R&D), IA Disc, and the five control variables. Most of the variables were negatively correlated with bid-ask spread except for volatility, which was positively correlated. When considering the relationship among the independent variables, it was found that some variables had a statistically significant relationship. However, most did not find a high correlation level that caused multicollinearity problems, except for the market cap and E variables, which had a correlation coefficient of 0.858. However, when considering the VIF, it was found that the value was not more than 5, so it was considered that all independent variables had no problem with multicollinearity (Hair et al., 2010;

Table 4. Pearson correlation

James et al., 2017). Therefore, all variables were retained for regression analysis. This study examined the heteroskedasticity problem using the Breusch-Pagan/Cook-Weisberg test in Stata. Initially, this study found that there was a problem of heteroskedasticity. Therefore, this study estimated the OLS model with robust standard errors, providing a robust variance estimator and t-statistics to reduce this problem (McCullagh & Nelder, 1989).

C. Regression Results

Column 1 in Table 5 presents the effect of IIA+GW and R&D on bid-ask spread. The result demonstrated a positive association between IIA+GW and bid-ask spread (p < 0.01), while R&D had a negative association with the bid-ask spread (p < 0.01) (R&D supported H1). Column 2 in Table 5 (separates IIA and GW) presents the effect of IIA, GW, and R&D on bid-ask spread. The findings demonstrated that IIA and bid-ask spread had a positive relationship (p < 0.01), whereas R&D was negatively associated with bid-ask spread (p < 0.01) (R&D supported H1), while there was no significant association between goodwill (GW) and bid-ask spread. Column 3 presents the effect of IA Disc on bid-ask spread. The result

	Bid-ask spread	IIA	GW	IIA+GW	RD	IA_Disc	Е	Volatility	Turnover	Market cap	Free float	Big4
Bid-ask spread	1											
IIA	-0.152***	1										
GW	-0.163***	0.361***	1									
IIA+GW	-0.172***	0.839***	0.681***	1								
RD	-0.096***	0.283***	0.055	0.207***	1							
IA_Disc	-0.294***	0.287***	0.405***	0.352***	0.161***	1						
Е	-0.504***	0.237***	0.240***	0.254***	0.023	0.391***	1					
Volatility	0.205***	0.039	0.003	0.026	0.007	0.007	-0.136***	1				
Turnover	-0.524***	0.146***	0.120***	0.153***	0.077***	0.176***	0.159***	0.419***	1			
Market cap	-0.494***	0.313***	0.314***	0.343***	0.056	0.453***	0.858***	-0.105***	0.151***	1		
Free float	-0.183***	-0.032	0.021	-0.013	0.035	0.067**	0.072***	0.055	0.392***	0.011	1	
Big4	-0.199***	0.098***	0.068**	0.098***	-0.024	0.143***	0.277***	-0.061*	-0.003	0.277***	-0.107***	1

Pearson correlation coefficients are shown for all variables. The total number of samples consisted of 2,691 firm-year obs. Note: ***, **, * The statistical significance level is 1%, 5%, and 10%, respectively. The VIF of the independent variables was 1.34, 1.33, 1.11, 1.44, 3.96, 1.30, 1.57, 4.29, 1.23, and 1.11, respectively (IIA+GW not included).

indicated that IA_Disc and bid-ask spread had a negative relationship (p < 0.1). This partially supported H2. Column 4 showed the effect of IA_Disc together with IIA, GW, and R&D on bid-ask spread. It was found that IA_Disc was negatively associated with bid-ask spread (p < 0.05). IIA had a positive association with bid-ask spread (p < 0.01). In addition, R&D had a negative relationship with bid-ask spread (p < 0.01), while no significant association was found between GW and bid-ask spread. The result of IA_Disc supported H2. The findings imply that R&D and IA Disc create a better information environment.

Table 5. Regression analysis

Previously, this study used log transformation of IIA, GW, and R&D to reduce the skewness of these variables (untabulated results, n = 2,743, F = 308.21). The study found that IIA had a positive relationship with bid-ask spread (p < 0.1), while R&D had a negative relationship with bid-ask spread (p < 0.01). No significant relationship was found between GW and bid-ask spread. These results are consistent with the model in Table 5.

As for the control variables, the study found that earnings were negatively associated with bid-ask spreads, implying that earnings can create a better

Variables	(1) Bid-ask spread	(2) Bid-ask spread	(3) Bid-ask spread	(4) Bid-ask spread
IIA		0.790*** [4.00]		0.833*** [4.18]
GW		0.225 [0.72]		0.424 [1.33]
IIA+GW	0.352*** [4.10]			
R&D	-9.897*** [-4.27]	-10.884*** [-4.56]		-10.181*** [-4.24]
IA_Disc			-0.004* [-1.72]	-0.006** [-2.30]
Е	-0.039*** [-4.55]	-0.040*** [-4.62]	-0.040*** [-4.70]	-0.040*** [-4.65]
Volatility	0.432*** [23.04]	0.432*** [23.04]	0.434*** [23.09]	0.433*** [23.09]
Turnover	-0.206*** [-39.53]	-0.206*** [-39.58]	-0.205*** [-38.93]	-0.206*** [-39.41]
Market cap	-0.087*** [-9.97]	-0.087*** [-9.83]	-0.079*** [-8.89]	-0.082*** [-9.15]
Free float	0.002*** [5.39]	0.002*** [5.45]	0.002*** [5.22]	0.002*** [5.56]
Big4	-0.079*** [-4.90]	-0.080*** [-4.90]	-0.076*** [-4.72]	-0.079*** [-4.84]
Constant	-5.419*** [-72.36]	-5.422*** [-72.40]	-5.441*** [-72.25]	-5.399*** [-71.61]
Industry Dummy	Included	Included	Included	Included
Year Dummy	Included	Included	Included	Included
Observations	2,691	2,691	2,691	2,691
R-squared	0.6313	0.6316	0.6285	0.6322
Adj R ²	0.6281	0.6283	0.6254	0.6288
F-statistics	174.45	167.13	178.58	161.35

Robust t-statistics in brackets, *** p<0.01, ** p<0.05, * p<0.10

information environment for investors. Next, volatility and turnover are used in this study to measure stock liquidity, with the expectation that lower volatility and higher turnover contribute to reducing information asymmetry. In columns 1-4 of Table 5, the findings indicated that volatility is positively associated with bid-ask spread (p < 0.01). At the same time, the greater the volatility (or less liquidity) of stock returns, the greater the bid-ask spread. However, if volatility is lower (or high liquidity), the bid-ask spread will be narrower. Turnover, also a measure of stock liquidity, had a negative association with bid-ask spread (p < 0.01). In other words, the bid-ask spread will decrease if many stocks are traded (high liquidity). In addition, this research uses Market cap to control the information environment and Free float to control the investor environment. The findings indicated that as Market cap increases, bid-ask spread decreases (p < 0.01), which is as expected. However, when free float increases, the bid-ask spread increases (p < p0.01), which is not as expected (in the research by Vergauwe & Gaeremynck, 2019, the free float was positive but not significant to the bid-ask spread). In this instance, the free float can be explained as the percentage of stocks held by individual investors relative to the total stocks. If this figure is high, it could indicate that many small investors own the shares. Many shareholders may cause a high difference in perception of information between individuals, leading to information asymmetry. For Big4 variables, this research did not determine the exact relationship between Big4 and bid-ask spread. However, the result showed that Big4 was negatively associated with bid-ask spread (p < 0.01). Therefore, if the Big Four company audits the firm, there will be less information asymmetry, resulting in a narrower bid-ask gap.

D. Additional Tests

This study used the fixed effect model to ensure the robustness of the conclusions (untabulated results, F = 171.03). The results showed that IIA had a positive relationship with bid-ask spread (p < 0.1), while R&D had a negative relationship with bid-ask spread (p <0.1), and no relationship was found between GW and bid-ask spread. The results of the fixed effect support the results of the study using OLS. Furthermore, this study delved into the impact of IA Disc on the relationship between reported intangible assets (IIA, GW, R&D) and bid-ask spread. The samples with IA Disc above the median were categorized as high disclosure, a crucial variable in the study. This study then examined the effect of interaction between intangible assets (IIA, GW, R&D) and IA Disc on bid-ask spread. The results (untabulated) revealed that R&D in the high IA Disc group reduced bid-ask spread more significantly than R&D in the low IA Disc group (p < 0.05). These findings underscore the importance and benefits of intangible asset disclosure.

V. Conclusion and Discussion

Based on the results, IIA positively associates with bid-ask spread, while R&D negatively associates with bid-ask spread. The first case states that a firm with more IIA information will either increase the bid-ask spread or deteriorate the information environment in the short term. This could explain that when used with other information, such IIA information may be irrelevant in reducing the information gap when sending an order to buy or sell stocks. Due to the concern of the accounting standard setter, the usefulness of accounting information has decreased as information on actual intangible assets is not reflected in financial statements. If investors doubt the management's reporting of intangible assets, they may reduce or not assess their value. Therefore, the reported intangible assets may be less useful (Wyatt, 2005; Markarian et al., 2008; Russell, 2017). Investors must, therefore, carefully interpret the signals the management sends regarding the value of intangible assets.

Goodwill may not reflect the firm's actual performance or may be overlooked if the investor decides to submit the trading price at that time. According to IAS 36, Impairment of Assets, goodwill is recorded as an intangible asset and is periodically assessed for impairment. This is different from the past, where goodwill was amortized annually. Impairment testing does not require a breakdown of the reported values of intangible assets, as opposed to amortization methods that must report the variables and inferences involved in intangible assets' amortization and useful life. The post-acquisition accounting treatment for goodwill allows management discretion that may affect the credibility of financial reports (Ferramosca & Allegrini, 2021). Thus, using the fair value approach and impairment testing does not necessarily make the goodwill information relevant to investors (Ramanna & Watts, 2012).

Meanwhile, it has been discovered that R&D and bid-ask spread are substantially negatively associated. R&D disclosure helps mitigate information risk; consequently, a better information environment results in narrow bid-ask spreads. This is consistent with Dass et al. (2021), which examined R&D disclosure in the form of patents and found a decrease in bid-ask spreads between investors. Moreover, it is consistent with Baruffaldi et al. (2024), who found that companies voluntarily reveal R&D information due to market information asymmetry. The advantage of R&D disclosure is that it lessens information asymmetry between investors. Such investors may more easily compare information between firms thanks to R&D reports, aiding their decision-making. The incentive for a firm's voluntary R&D disclosure may arise from the firm's desire to communicate more with investors. However, it will come at the cost that competitors may receive important information from disclosing such information, which is called proprietary cost (Annalisa, 2004; Jones, 2007). Therefore, it can be inferred from the findings of this study that a firm should responsibly disclose R&D information to the extent that the advantages outweigh the costs.

In addition, this study shows that the intangible

asset disclosure score creates a better information environment by narrowing bid-ask spreads in the capital market. This aligns with Labidi and Gajewski (2019), who found that publicly traded firms with better disclosure of intangible assets in the annual report than others had narrow bid-ask spreads. Moreover, the study results align with previous research on information disclosure that high disclosure reduces information asymmetry through reduced bid-ask spreads (Healy & Palepu, 2001; Brown & Hillegeist, 2007: Chivachantana et al., 2013: Jeny et al., 2019). Furthermore, the disclosure of intangible assets should comply with accounting standards (mandatory), and voluntary disclosure should be added as there are some intangible assets that current accounting standards do not clearly specify how they are recognized and reported. Voluntary disclosure, such as human capital, competitive advantage, customer relations, etc., will be an important channel for disseminating this information to outside investors for making decisions, along with the use of disclosed information in accordance with relevant accounting standards.

The practical contribution of this study is that if investors are found to overreact or underreact to intangible assets (IIA, GW, or R&D), firms may increase voluntary disclosures of intangible assets better to understand the value of current reported intangible assets. The results may motivate firms in Thailand to improve the disclosure of intangible assets to reduce information asymmetry. However, firms should know the benefits of investing in such intangible assets to provide reliable signals. If a firm's information about the usefulness of such assets is unclear or not more detailed than information that investors already know, sending such a signal may not reduce the problem of asymmetric information.

When analyzing the factors affecting bid-ask spreads, looking beyond the straightforward relationships between individual components is necessary. This requires investigating the intricate interactions between different components. Methods like Structural Equation Modeling (SEM) should be considered in these linkages. The analysis's depth and robustness in capturing the nuances of market behavior and information asymmetry can be greatly improved by using this method. This study leaves this for future research. Besides, using only bid-ask spread as a proxy to measure the information environment may not be enough to draw conclusions. There are other variables that can be proxied to measure the information environment and can be used to test asymmetric information, such as analyst coverage, forecast errors, forecast dispersion, trading volume, or the zero return days proportion. Expanding the range of asymmetric indicators could yield a more thorough comprehension of the information environment and its connection to disclosures of intangible assets. This would strengthen the study's conclusions and offer insights into the multifaceted nature of information asymmetry in capital markets.

References

- Aboody, D., & Lev, B. (2000). Information Asymmetry, R&D, and Insider Gains. *Journal of Finance*, 55(6), 2747-2766.
- Agyei-Mensah, B. K. (2019). IAS-38 disclosure compliance and corporate governance: evidence from an emerging market. *Corporate Governance*, 19(3), 419-437.
- Ahmed, K., & Falk, H. (2006). The value relevance of management's research and development reporting choice. *Journal of Accounting and Public Policy*, 25, 231-264.
- Al-Ani, M. K., & Tawfik, O. I. (2021). Effect of intangible assets on the value relevance of accounting information: Evidence from emerging markets. *The Journal of Asian Finance, Economics and Business,* 8(2), 387-399.
- Annalisa, P. (2004). Proprietary costs and determinants of voluntary segment disclosure: evidence from Italian listed companies. *European Accounting Review*, 13(2), 319-340.
- Armstrong, C. S., Balakrishnan, K., & Cohen, D. (2012). Corporate governance and the information environment. *Journal of Accounting and Economics*, 53(1-2), 185-204.
- Aulia, F. P., Koeswayo, P. S., & Bede, D. (2020). The relevance of Intangible Asset, Equity Book, and Earning Value on Stock Price in Information Technology Era. *Journal of Accounting Auditing and Business*, 3(1), 135-146.
- Azevedo, G., Oliveira, J., & Freitas Couto, M. (2019). Compliance with intangible assets disclosure requirements. *Contaduríay Administración*, 64(4), 1-34.

- Baik, B., Brockman, P. A., Farber, D. B., & Lee, S. (2018). Managerial ability and the quality of firms' information environment. *Journal of Accounting, Auditing and Finance*, 33(4), 506-527.
- Barker, R., Lennard, A., Penman, S., & Teixeira, A. (2021). Accounting for intangible assets: suggested solutions. *Accounting and Business Research*, 2, 1-30.
- Barth, M. E., Kasznik, R., & Mcnichols, M. (2001). Analyst Coverage and Intangible Assets. *Journal of Accounting Research*, 39(1), 1-34.
- Baruffaldi, S. H., Simeth, M., & Wehrheim, D. (2024). Asymmetric Information and R&D Disclosure: Evidence from Scientific Publications. *Management Science*, 70(2), 1052-1069.
- Bauman, M. P. & Shaw, K.W. (2018). Value relevance of customer-related intangible assets. *Research in Accounting Regulation*, 30(2), 95-102.
- Binh, Q., Minh Ha, N., & Trang, N. (2020). Application of an intangible asset valuation model using panel data for listed enterprises in Vietnam. *Investment Management* and Financial Innovations, 17(1), 304-316.
- Brahim, H. B., & Arab, M. B. (2012). The relevance of the information about intangibles. *International Journal* of Accounting and Financial Reporting, 2(1), 219-244.
- Brand Finance (2017). GIFT 2017 An annual review of the world's intangible value. https://brandfinance.com/wp-con tent/uploads/1/gift_report_2017_bf_version_high_res_ve rsion.pdf
- Brown, S., & Hillegeist, S. A. (2007). How disclosure quality affects the level of information asymmetry. *Rev Acc Stud*, 12, 443-477.
- Capasso, S. (2006). Stock Market Development and Economic Growth. [n.p.]: United Nations University.
- Castilla-Polo, F., & Gallardo-Vazquez, D. (2016). Accounting, The main topics of research on disclosures of intangible assets: a critical review. *Auditing & Accountability Journal*, 29(2), 323-356.
- Cazavan-Jeny, A., & Jeanjean, T. (2006). The negative impact of R&D capitalization: A value relevance approach. *European Accounting Review*, 15(1), 37-61.
- Chiyachantana, C. N., Nuengwang, N., Taechapiroontong, N., & Thanarung, P. (2013). The effect of information disclosure on information asymmetry. *Investment Management* and Financial Innovations, 10(1-1), 225-234.
- Cordazzo, M., & Rossi, P. (2020). The influence of IFRS mandatory adoption on value relevance of intangible assets in Italy. *Journal of Applied Accounting Research*, 21(3), 415-436.
- Cormier, D. (2014). The incidence of corporate governance and IFRS on information asymmetry and value relevance of earnings: some Canadian evidence. [n.p.]: Universite du Quebec a Montreal.
- Cui, G.-Q., & Jin, C.-H. (2020). The Impact of Corporate Top Executives' Intellectual Capital on Organizational Effectiveness: Moderating Effects of Cultural Values and

Business Performance. Global Business & Finance Review, 25(4), 73-90.

- Dahmash, F., Durand, R., & Watson, J. (2009). The value relevance and reliability of reported goodwill and identifiable intangible assets. *The British Accounting Review*, 41(1), 120-137.
- Dainelli, F., Bini, L., & Giunta, F. (2013). Signaling strategies in annual reports: Evidence from the disclosure of performance indicators. *Advances in Accounting*, 29(2), 267-277.
- Dass, N., Nanda, V., Park, H. D. & Xiao, S. C. (2021). Intellectual property protection and financial markets: Patenting vs. secrecy. *Rev. Finance*, 25(3), 669-711.
- Devalle, A., Rizzato, F., & Busso, D. (2016). Disclosure indexes and compliance with mandatory disclosure. *Advances in Accounting*, 35, 8-25.
- Dutz, M. A., Kannebley, S. Jr., Scarpelli, M., & Sharma, S. (2012). Measuring Intangible Assets in an Emerging Market Economy: An Application to Brazil. Washington, D.C.: World Bank.
- Ferramosca, S., & Allegrini, M. (2021). Impairment or amortization of goodwill? An analysis of CFO perceptions of goodwill accounting. *European Management Journal*, 39(6), 816-828.
- Ferrer, E., Santamaria, R. & Suarez, N. (2022). Complexity is never simple: Intangible intensity and analyst accuracy. *Business Research Quarterly*, 25(2), 143-172.
- Gong, J. J., & Wang, S. I. L. (2016). Changes in the value relevance of research and development expenses after IFRS adoption. *Advances in Accounting*, 35, 49-61.
- Gregoriou, A., Ioannidis, C. & Skerratt, L. (2005). Information Asymmetry and the Bid-Ask Spread. *Journal of Business Finance & Accounting*, 32(9-10), 1801-1826.
- Haggard, K. S., Martin, X., & Pereira, R. (2008). Does Voluntary Disclosure Improve Stock Price Informativeness? *Financial Management*, 37(4), 747-768.
- Hair, J., Black, W.C., Babin, B.J. & Anderson, R.E. (2010). *Multivariate data analysis* (7th ed.). Upper Saddle River, New Jersey: Pearson Educational International.
- Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting* and Economics, 31(1-3), 405-440.
- Ho, K. C., Lee, S. C., & Sun, P. W. (2022). Disclosure Quality, Price Efficiency, and Expected Returns. *The North American Journal of Economics and Finance*, 59, 144-158.
- Horton, J., Serafeim, G., & Serafeim, I. (2013). Does Mandatory IFRS Adoption Improve the Information Environment? *Contemporary Accounting Research*, 30(1), 388-423.
- IASB (2005). IAS 38 Intengible Assets. London: International Accounting Standard Board.
- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2017). An Introduction to Statistical Learning: With Applications in R. Springer.
- Jeny, A., Paugam, L., & Astolfi, P. (2019). The usefulness

of intangible assets' disclosure for financial analysts. Insights from Purchase Price Allocation conditional on deal quality. *Accounting Auditing Control*, 25, 5-53.

- Ji, H. (2017). The Impact of K-IFRS Adoption on the Value Relevance of Accounting Information. *Global Business & Finance Review*, 22(2), 90-97.
- Ji, H. (2018). The value relevance and reliability of intangible assets: Evidence from South Korea. Global Business & Finance Review, 23(2), 98-107.
- Ji, X. D., & Lu, W. (2014). The value relevance and reliability of intangible assets. *Asian Review of Accounting*, 22(3), 182-216.
- Jones, D. A. (2007). Voluntary disclosure in R&D-intensive industries. Contemporary Accounting Research, 24(2), 489-522.
- Kallapur, S., & Kwan, S. Y. S. (2004). The Value Relevance and Reliability of Brand Assets Recognized by U.K. Firms. *The Accounting Review*, 79(1), 151-172.
- Koo, J. H., & Kim, S. I. (2023). The Joint Effects of ESG Ratings and R&D on Value Relevance. *Global Business* & *Finance Review*, 28(2), 53-68.
- Kumari, P., & Mishra, C. S. (2019). Value relevance of R&D reporting in India: significance of intangible intensity. *Journal of Financial Reporting and Accounting*, 17(3), 432-448.
- Kumari, P., & Mishra, C. S. (2020). Value relevance of aggregated and disaggregated earnings in India: Significance of intangible intensity. *Journal of International Accounting*, *Auditing and Taxation*, 39, 1-17.
- Kym, M. H. (2023). Sticky behavior of R&D Costs and Its Relevance to Firm Value: Evidence from Listed Companies in Korea. *Global Business & Finance Review*, 28(4), 77-89.
- Labidi, M., & Gajewski, J. F. (2019). Does increased disclosure of intangible assets enhance liquidity around new equity offerings? *Research in International Business and Finance*, 48, 426-437.
- Ledoux, M. J., & Cormier, D. (2013). Market assessment of intangibles and voluntary disclosure about innovation: The incidence of IFRS. *Review of Accounting and Finance*, 12(3), 286-304.
- Leuz, C., & Verrecchia, R.E. (2000). The economic consequences of increased disclosure. *Journal of Accounting Research*, 38(supplement), 91-124.
- Markarian, G., Pozza, L., & Prencipe, A. (2008). Capitalization of R&D costs and earnings management. *International Journal of Accounting*, 43, 246-267.
- Martins, J., & Alves, S. (2010). The impact of intangible assets on financial and governance policies: A literature review. *Portuguese Journal of Management Studies*, 15(1), 87-107.
- McCullagh, P., & Nelder, J.A. (1989). Generalized Linear Models (2nd ed.). London: Chapman & Hall/CRC.
- Mohd, E. (2005). Accounting for software development costs and information asymmetry. *The Accounting Review*,

80(4), 1211-1231.

- Muller, K. A. & Riedl, E. J. (2002). External monitoring of property appraisal estimates and information asymmetry. *Journal of Accounting Research*, 40(3), 865-881.
- Nichita, E. M. (2019). Intangible assets insights from a literature review. Accounting and Management Information Systems, 18(1), 4-24.
- Oliveira, L., Rodrigues, L. L., & Craig, R. (2010). Intangible assets and value relevance: Evidence from the Portuguese stock exchange. *The British Accounting Review*, 42(4), 241-252.
- Orens, R., Aerts, W., & Lybaert, N. (2009). Intellectual capital, cost of finance and firm value. *Management Decision*, 47(10), 1536-1554.
- Oryina, E., & Suleiman, S. (2020). Effect of intangible assets on value relevance: Evidence from listed manufacturing firms in Nigeria. *Journal of Economics and Sustainability*, 2(2), 13-13.
- Ramanna, K., & Watts, R. L. (2012). Evidence on the use of unverifiable estimates in required goodwill impairment. *Review of Accounting Studies*, 17, 749-780.
- Russell, M. (2017). Management incentives to recognize intangible assets. Accounting & Finance, 57(S1), 211-234.
- Satt, H., & Chetioui, Y. (2017). Does goodwill improve firm performance? Evidence from MENA Region. *Risk Governance & Control: Financial Markets & Institutions*, 7(2), 108-115.
- SET (2021). Company Summary. Bangkok: Stock Exchange of Thailand.
- Shah, S. Z. A., Liang, S., & Akbar, S. (2013). International Financial Reporting Standards and the value relevance of R&D expenditures: Pre and post IFRS analysis. *International Review of Financial Analysis*, 30, 158-169.
- Tahat, Y. A., Ahmed, A. H., & Alhadab, M. M. (2018). The impact of intangibles on firms' financial and market

performance: UK evidence. *Review of Quantitative Finance and Accounting*, 50(4), 1147-1168.

- Thessrimuang, S., & Kaewprapa, K. (2018). The Relationship between Intangible Assets and Abnormal Returns of Listed Companies in the Stock Exchange of Thailand. *Journal* of Accountancy and Management, 10(2), 178-188.
- Tsai, S. C. (2008). Information Asymmetry and Corporate Investment Decisions: A Dynamic Approach. *Financial Review*, 43, 241-271.
- Varnaprux, R. (2019). The effect of intangible assets on firm value through performance of Thai listed companies in the SET. *Sripatum Chonburi Journal*, 16(1), 23-32.
- Vayanos, D., & Wang, J. (2012). Liquidity and Asset Returns Under Asymmetric Information and Imperfect Competition. *The Review of Financial Studies*, 25(5), 1339-1365.
- Vergauwe, S., & Gaeremynck, A. (2019). Do measurementrelated fair value disclosures affect information asymmetry? *Accounting and Business Research*, 49(1), 68-94.
- von Koch, C., & Willesson, M. (2020). Firms' information environment measures: a literature review with focus on causality. *Managerial Finance*, 46(11), 1343-1372.
- Wyatt, A. (2005). Accounting Recognition of Intangible Assets: Theory and Evidence on Economic Determinants. *The Accounting Review*, 80(3), 967-1003.
- 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.
- Yassin, M., Ali, Y., & Hamdallah, M. (2015). The relationship between information asymmetry and stock return in the presence of accounting conservatism. *International Journal* of Business and Management, 10(5), 126-133.
- Zhang, L. Y., & Toffanin, M. (2018). The information environment of the firm and the market valuation of R&D. *Journal* of Business Finance & Accounting, 45(9-10), 1051-1081.