

**SUSTAINABLE BUSINESS DEVELOPMENT THROUGH
SUFFICIENCY ECONOMY PRACTICE: A CASE STUDY
OF THAI LISTED COMPANIES**

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**A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy in Environment, Development
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วัตถุประสงค์ของการวิจัยคือเพื่อศึกษาผลการดำเนินงานตามหลักปรัชญาของเศรษฐกิจพอเพียงผ่านรายงานประจำปีและรายงานการพัฒนาที่ยั่งยืนประจำปีและลดความซับซ้อนของการแสดงผลลัพธ์โดยการนำเสนอผ่านระบบการให้คะแนนองค์ประกอบแต่ละรายการตามหลักปรัชญาของเศรษฐกิจพอเพียงถูกจัดให้สอดคล้องกับหัวข้อย่อยแต่ละหัวข้อตามมาตรฐาน global reporting initiative (GRI) เพื่อสร้างระบบการให้คะแนนผ่านการประเมินผลการดำเนินงานตามหลักปรัชญาของเศรษฐกิจพอเพียง การวิจัยนี้ทดสอบความสัมพันธ์ระหว่างผลการดำเนินงานตามหลักปรัชญาของเศรษฐกิจพอเพียงและความเสี่ยงเฉพาะบริษัท (firm-specific risk) ของ 34 บริษัทจดทะเบียนไทยตั้งแต่ปี 2556 ถึง 2561 ผ่านการวิเคราะห์ข้อมูลแบบข้อมูลช่วงเวลา (panel data) มาตรฐาน GRI ถูกใช้เป็นพื้นฐานในการสร้างระบบการให้คะแนนเนื่องจากมาตรฐาน GRI ถูกใช้อย่างแพร่หลายและเป็นที่ยอมรับในภาควิชาการและภาคธุรกิจ ผลจากการวิเคราะห์ข้อมูลแบบตัวแปรเดียวแสดงให้เห็นว่าบริษัทที่มีการปฏิบัติตามหลักปรัชญาของเศรษฐกิจพอเพียงเป็นอย่างมากจะมีอัตราส่วนผลตอบแทนต่อส่วนของผู้ถือหุ้นที่สูงกว่าและมีการจ่ายเงินปันผลไปยังผู้ถือหุ้นสูงกว่าบริษัทที่ปฏิบัติตามหลักปรัชญาของเศรษฐกิจพอเพียงน้อย คะแนนผลการดำเนินงานตามหลักปรัชญาของเศรษฐกิจพอเพียงถูกใช้เพื่อทดสอบสองสมมติฐานของการลดความเสี่ยง (risk reduction) และการฉวยโอกาสในการบริหารจัดการ (managerial opportunism) สมมติฐานดังกล่าวถูกทดสอบผ่านการวิเคราะห์การถดถอยผลกระทบที่และผลลัพธ์สนับสนุนสมมติฐานการลดความเสี่ยง (risk reduction) ผลลัพธ์จากการวิเคราะห์ดังกล่าวแสดงให้เห็นว่าการปฏิบัติตามหลักปรัชญาของเศรษฐกิจพอเพียงนี้ช่วยลดความเสี่ยงเฉพาะบริษัทได้ และเพื่อตรวจสอบความถูกต้องของผลลัพธ์การวิเคราะห์ถดถอยกำลังสองน้อยสุดสองขั้นตอน (2SLS-IV) ถูกสร้างขึ้นเพื่อประมาณความสัมพันธ์เชิงสาเหตุระหว่างประสิทธิภาพของผลการดำเนินงานตามหลักปรัชญาของเศรษฐกิจพอเพียงและความเสี่ยงเฉพาะของบริษัท ผลลัพธ์ยังคงมีความสัมพันธ์เชิงลบและมีความสัมพันธ์อย่างมีนัยสำคัญซึ่งแสดงให้เห็นว่าการปฏิบัติตามหลักปรัชญาของเศรษฐกิจพอเพียงนี้ช่วยกระตุ้นความยั่งยืนของธุรกิจ การค้นพบนี้ชี้ให้เห็นว่าระบบการให้คะแนนผลการดำเนินงานตามหลักปรัชญาของเศรษฐกิจพอเพียงผ่านรายงานประจำปีและรายงานการพัฒนาที่ยั่งยืนประจำปีสามารถจับประสิทธิภาพผลการดำเนินงานได้และการปฏิบัติตามหลักปรัชญาของเศรษฐกิจพอเพียงนี้มีความสำคัญเป็นอย่างยิ่งที่จะสามารถช่วยลดความเสี่ยงเฉพาะบริษัท ซึ่งสอดคล้องกับสมมติฐานการลดความเสี่ยง หลักปรัชญาของเศรษฐกิจพอเพียงมีความสำคัญเป็นอย่างมากที่จะนำไปใช้ในการลดความเสี่ยงเฉพาะของบริษัทและยังสามารถเพิ่มผลการดำเนินงานของบริษัทให้ดีขึ้น รวมถึงสร้างความยั่งยืนและสร้างความแข็งแกร่งให้บริษัทจากการใช้หลักการสามห่วงและสองเงื่อนไขเป็นพื้นฐาน

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Veerawin Korphaibool : SUSTAINABLE BUSINESS DEVELOPMENT THROUGH SUFFICIENCY ECONOMY PRACTICE: A CASE STUDY OF THAI LISTED COMPANIES. Advisor: Assoc. Prof. Pattanaporn Chatjuthamard, Ph.D.

The purpose of the research is to determine the sufficiency economy philosophy (SEP) performance through annual and sustainable development reports and simplify the outcomes by representing through a scoring system. Each of the SEP elements was aligned with each GRI sub-topic to generate a SEP scoring system. Then, the results from the scoring system were verified by testing the relationship between SEP performance and firm-specific risk of 34 Thai listed companies from 2013 to 2018 via panel data analysis. The global reporting initiative (GRI) standards were used as the fundamental scoring system as it's widely used and accepted in academic and business sectors. Univariate analysis results suggested that firms with high SEP scores generated a higher return on equity and paid a higher dividend payout ratio to the shareholders. The SEP scores were used to test two hypotheses of risk reduction and managerial opportunism. The hypotheses were tested using fixed effects regression and the results supported the risk reduction hypothesis and this practicing SEP reduced firm-specific risk. To validate the results, a two-stage least squares instrumental variable (2SLS-IV) analysis was performed to estimate the causal relationship between SEP performance and firm-specific risk. The results remained negatively and significantly correlated, indicating that SEP practice stimulated business sustainability. The findings suggested that the SEP scoring system was able to capture SEP performance and practicing SEP appeared to reduce firm-specific risk, which was consistent with the risk reduction hypothesis of the stakeholder theory. In summary, The SEP practice had a significant impact on reducing firm-specific risk and increased firm profitability. Implementing SEP can lead firms toward sustainability and increase strength from adopting the SEP three cores and two underlying conditions.

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Development and
Sustainability

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Student's Signature

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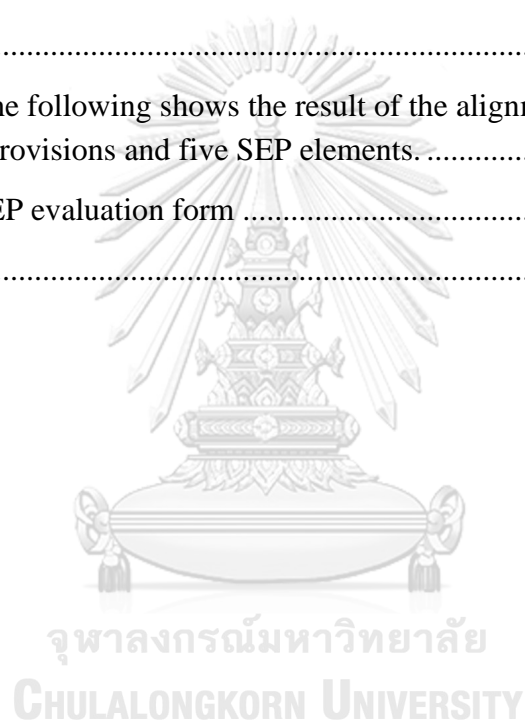
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Chapter I

Introduction

1.1 History of the alternative development theories

It is important to learn about the history of development to truly understand the problem related to sustainable development subject. Development can be traced back from colonization to decolonization and industrialization to globalization. While development provides prosperity among specific individuals, communities, and nations, inequality simultaneously emerges (Allen & Thomas, 2000; McMichael & Weber, 2020; Smith, 1776; Stilwell, 2011). Inequality comes in many forms and can be described as more-developed and less-developed countries, first world and third world, rich and poor, and North and South which emphasizes the extreme separation between two groups (Allen & Thomas, 2000; Smith, 1776). Historically, more-developed countries took political and economic control over less developed countries, they fiercely took advantage of less developed countries through unfair trade, slavery, and seized natural resources (McMichael & Weber, 2020). More powerful countries became the ruler and less powerful countries inevitably had to obey. For example, during the colonization period, European countries did not view non-European as equal and non-European countries were deprived of owning properties or lands. As a result, non-European were placed in a lower-level society. Natural resource, which was perceived as a high-value commodity, were consumed and transferred from non-European countries and unfortunate people were traded and enslaved. From the late 18th century, colonialism has been challenged and eventually decolonized in many countries, but the world remains separated into different societies and classes (McMichael & Weber, 2020). The first world country viewed the outsiders especially the third world as low technology country. The first-world country takes advantage of the third world through a technology transfer framework. Unaware of being taken advantage of, the third world country sells cheap resources and buyback expensive products from first world country (McMichael & Weber, 2020). Because of unfair trade, government policy and strategy can directly influence inequality in the economic aspect. Neoclassical economists assume that the economic mechanisms such as price, trade, market supply, and market demand would be

efficient enough to create a single global economy and reach an economic equilibrium state. Unfortunately, the development hasn't turn out as the Neoclassical economists expected.

In general, trade, investment, market stabilization under appropriate regulation, and financial discipline are the key elements to generate economic growth but with all factors implemented we still experience economic crisis and income inequality. The problem started from economic inequality which led to the social disparity (Smith, 1776). Undeniably economic and social aspects are interconnected and treating one without another would not bring sustainable results. For example, environmental impacts occurred as a result of economic inequality and social disparity. Advanced economic countries consume vast resources to serve economic growth, high standard of wellbeing, and excessive comfortableness. Energy consumption is another simple way to classify economic growth (Rostow, 1959). As the demand for products and services increases, production and service activities require more energy to generate higher outputs thus this directly requires more energy. Also, waste and pollution are generated along with economic growth (Tahvonen & Kuuluvainen, 1993). For example, viewing the earth from space at night, we can see the bright light-concentrating in the developed areas as they consume a large amount of electricity. A large amount of electricity requires more power plants which consume natural resources to the point of depletion and generate pollution into the atmosphere. For underdeveloped and developing countries, agriculture is generally the source of income (Johnston & Mellor, 1961). However, excessive use of pesticides and fertilizers causes contamination and degradation of water and soil. Waste is another issue for nearly every undeveloped and developing country (Hasan, 2004). Unable to control proper waste disposal and waste management, hazardous waste contamination has become a global issue. Catastrophic impact on large-scale ecosystems such as the Deepwater Horizon oil spill and the Great Pacific Garbage Patch is evidence that economic and social development has a direct effect on the environmental aspect (Beyer et al., 2016; Lebreton et al., 2018). In conclusion, economic development indirectly creates negative impacts on economic,

social, and environmental aspects as shown in Figure 1. As a result, unsustainable development becomes an issue in the world today.

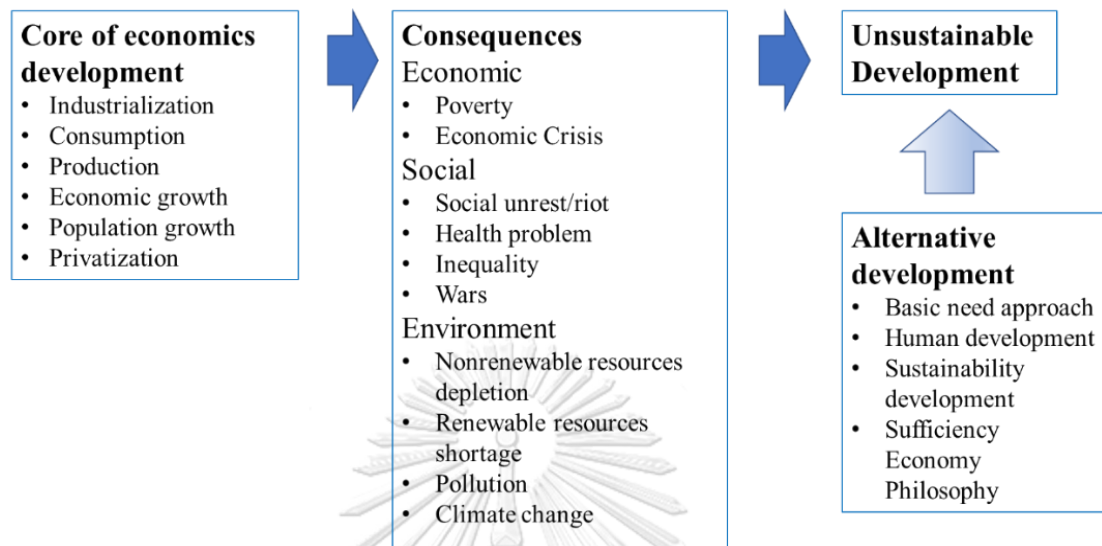


Figure 1 The development of unsustainable development

Alternative development emerged around the 1970s intending to resolve unsustainable development by considering and improving other aspects of social and environmental (Peet & Hartwick, 2015; Programme, 2010). In 2015, 193 countries adopted 17 Sustainable Development Goals (SDGs from 2015 to 2030) which were the continuation of Millennium Development Goals (MDGs from 2000 to 2015) developed by the United Nations (Solberg, 2015). The SDGs directly aimed to resolve or cope with unsustainable development issues such as poverty and climate change which are directly related to production and consumption in business activities. From the success of MDGs, achieving sustainable development required simplification, clear direction, additional synergy, quality of action, and support from the national government (Solberg, 2015). Another important alternative development theory is the Sufficiency Economy Philosophy (SEP) endorsed by His Majesty the King Bhumibol Adulyadej the Great (Buranapin & Rattawatankul, 2015; Isarangkun & Potrakool, 2001; Kantabutra, 2007; Khunthongjan & Wiboonpongse, 2010; Mongsawad, 2012; Sasin, 2010; Song, 2020; Sornsri, 2016; Suttipun, 2019; Wibulswasdi et al., 2011). The SEP was first mentioned during the graduation ceremony at Kasetsart University on July 18th, 1974. Today the philosophy is one of the most recognized alternative

development approaches. Figure 2 shows the timeline of several well-known alternative development theories.

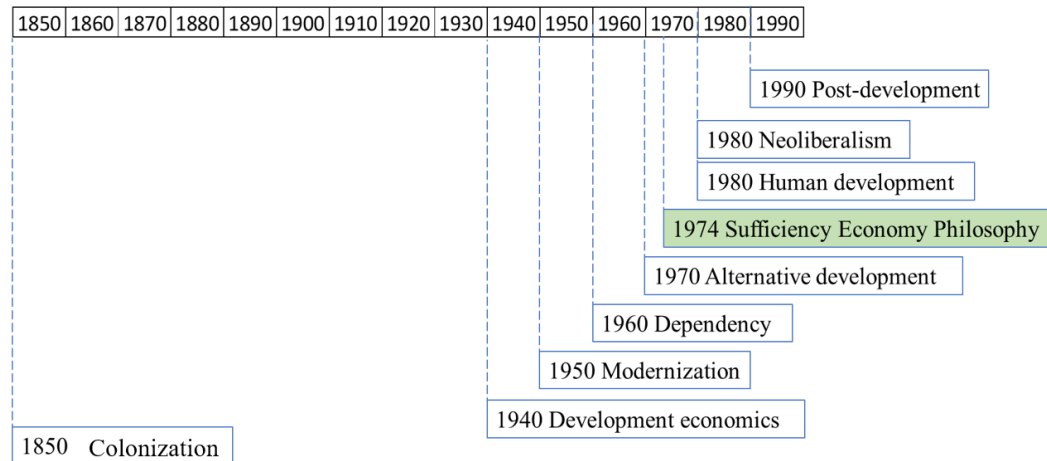


Figure 2 The development of alternative development theories

1.2 Sufficiency economy philosophy and research objective

The Sufficiency Economy Philosophy (SEP) was officially adopted by the Thai Government and included in the National Economic and Social Development Plan (NESDP) since 2002 (NESDB, 2007). The SEP requires two underlying conditions of knowledge and morals together with three core principles of moderation, reasonableness, and resilience to generate the results in four dimensions of economic, social, environmental, and culture (Buranapin & Rattawatankul, 2015; Isarangkun & Pootrakool, 2001; Jitsuchon, 2019; Kantabutra, 2007; Khunthongjan & Wiboonpongse, 2010; Mongswad, 2012; Sasin, 2010; Song, 2020; Sornsri, 2016; Suttipun & Saefu, 2017; Wibulswasdi et al., 2011). Rooted from Buddhism, the SEP emphasizes the middle path which harmonizes with Thai society and culture. Following NESDP, the agriculture sector in Thailand has been practicing the SEP for more than decades which resulted in a higher standard of living and reduce absolute poverty of Thai farmers (NESDB, 2007). After the economic crisis in 1997, Small and Medium Enterprises (SMEs) in Thailand have practiced the SEP to increase the competitive advantage, flexibility, and adaptability of their firms to strengthen themselves from future negative impacts (Isarangkun & Pootrakool, 2001; Wibulswasdi et al., 2011). Practicing the SEP allows the SMEs to be more prepared

for changes that increase the survivability rate during an economic crisis, social unrest, or natural disaster.

The SEP practice emphasizes developing and strengthening the basic foundation, represented by Primary Sufficiency Economy Philosophy practice, before improving or expanding, represented by Advance Sufficiency Economy Philosophy practice (Isarangkun & Pootrakool, 2001; Wibulswasdi et al., 2011). Primary SEP is implemented according to resource availability, accessibility, and constraint of individual or organization. In other words, individual or organization can implement primary SEP bases on own strength, condition and limitation by using wisdom, virtues, middle path, good governance, and risk management as the core values. Once the foundation is strong, improvement is executed with the added value of sharing and perseverance. It is known that the SEP can be implemented with other modern management theories without conflict (Sasin, 2010). The Royal Development Project such as Pid-Thong-Lang-Phra Foundation has repeatedly initiated projects to improve the standard of living of Thai rural farmers by applying the SEP as the fundamental framework to resolve any issues. After the primary SEP, the local continues the practice to maintain positive results and move to the advanced level. For example, Pid-Thong-Lang-Phra Foundation improved financial household conditions from the loan shark cycle (Somjit & Boonsritun, 2020). A typical problem of Thai household's financial deficit cycle is represented in Figure 3.

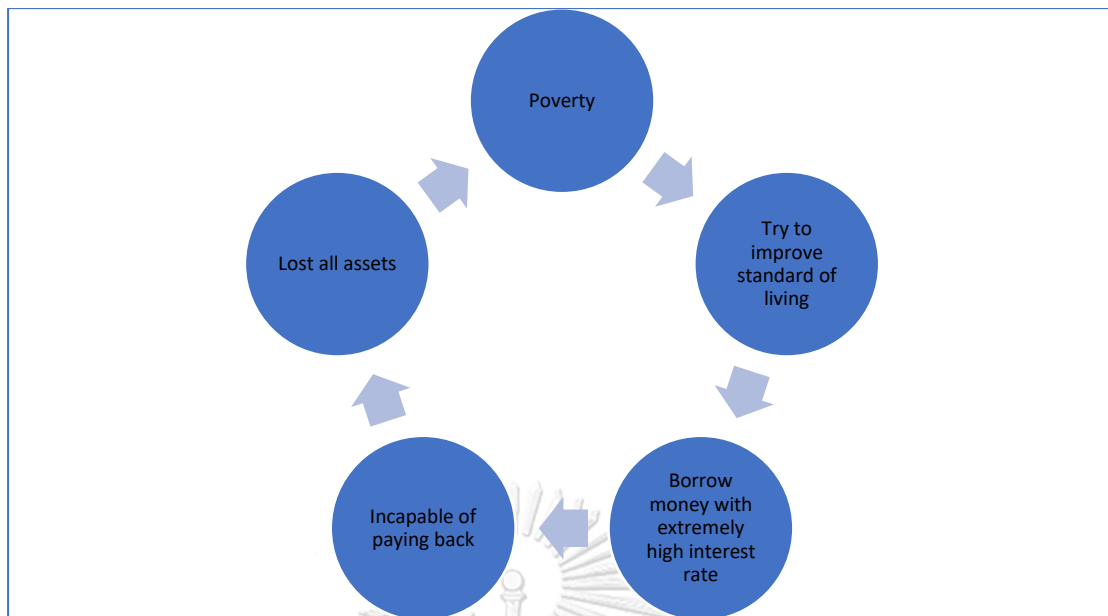


Figure 3 Thailand loan shark cycle

With the vicious cycle, Thai farmers will never get out of the fiscal deficit and continue to live in poverty. The Royal Development Foundation educated the farmers with the SEP. In the beginning, they learn to live a sufficient lifestyle and starting to record cash inflows and outflows through basic household accounting "BanShe-Krua-Ruean" (Somjit & Boonsritun, 2020). They reduce unnecessary expenses as they monitor the money inflows and outflows until they become financially neutral. Necessary support from the local government official was provided to help to deal with local loan shark representatives. Through negotiation, the loan shark would receive the principle in full but the interest would be reduced to the legal rate. This generates a win-win situation and to avoids extreme conflict between the local farmers and the loaner in the future. Using basic knowledge such as household accounting equipped with other farming skills, the farmers could increase productivity consistently and eventually achieve a financial surplus. Their standard of living improved without borrowing money. After their financial condition is stabilized, the advance step is executed. As more farmers in the community continued to improve productivity and remain in financial surplus, they were suggested to group together to gain competitiveness and bargaining power (Isarangkun & Pootrakool, 2001; Piboolsravut, 2004; Wibulswasdi et al., 2011). The primary SEP is simply explained as an improvement from borrowing money to buy basic needs "Gu-gin Gu-chai", to

having sufficient cash balance to purchase basic needs "Por-gin Por-chai". Then the advance SEP is described as the improvement from financial neutral to financial surplus and receiving a better standard of living "Gin-dee U-dee" (Avery & Bergsteiner, 2020; Isarangkun & Pootrakool, 2001; Wibulswasdi et al., 2011).

Another well-known Royal initiative project has been done under the concept of the New Theory of Agriculture with aiming to improve agriculture productivity by solving problems such as weather fluctuation, product market price, and lack of man-power due to migration of younger generation. The New Theory of Agriculture has been structured into three basic stages (Wibulswasdi et al., 2011). The first stage aims to unsolved any issue the farmers may be facing. For example, if the farmers were facing an irrigation problem, creating a reservoir to reserve water may be the solution (Wibulswasdi et al., 2011). To encounter weather fluctuation and water scarcity, product market price and lack of man-power, the New Theory of Agriculture model suggested that land should be managed and divided into four parts. The first part includes around 30% of the land, the farmers dig a pond which acts as a water reserve, and fishery livestock. The second and third parts of the land are divided into approximately 30% for growing rice and another 30% for growing fruit and vegetables which can be consumed by the farmers and sales the excessive stocks (Wibulswasdi et al., 2011). The last 10% of the land provides shelter and daily living space. By applying the model, the individual family can provide food, shelter and generate a small income for themselves. The second stage involves developing an organization within the community. By joining together with other farmers, the community can expand and diversify its products. Also, as a community, the farmers create buyer and supplier bargaining powers which can help reduce production costs and increase the selling price. The final stage involves larger corporate from the private sector working with the community to expand the market and commercialize the local products (Wibulswasdi et al., 2011). From the example, step-by-step implementation is essential for SEP to achieve sustainable development.

From the examples, it is clear to perceive that practicing SEP can improve financial status at household and community levels but it is unclear how the result of the SEP practice can be measured and regenerated in other sectors. Measuring SEP

performance is a limitation. Most existing studies measure SEP through surveys and questionnaires. The existing tools may not be appropriate in real-world operation since it does not measure the result of action but only capture the presence of the SEP. It is essential to quantify SEP performance into a scoring system since it can be used to evaluate the outcomes and specifically capture strengths and weaknesses. Most research on business practice under the influence of the SEP has been qualitatively studied with limited scope in the agriculture sector or SMEs. The existing studies show that farmers practicing SEP reduce unnecessary expenses and lower debt levels thus create a better standard of living among the individual and community (Avery & Bergsteiner, 2020; Buranapin & Rattawatankul, 2015; Chalapati, 2008; Isarangkun & Pootrakool, 2001; Janmaimool & Denpaiboon, 2016; Jitsuchon, 2019; Kantabutra, 2007; Khunthongjan & Wiboonpongse, 2010; Mongsawad, 2012; NESDB, 2007; Piboolsravut, 2004; Wibulswasdi et al., 2011). Examples of SMEs practicing SEP also show similar results as in the agriculture sector (Khunthongjan & Wiboonpongse, 2010; Suttipun & Arwae, 2020; จันทร์ et al., 2011). However, without empirical evidence, larger corporate may face difficulty adopting the SEP although they are aware of the successful results and benefits. Because large corporates comprise complex management structure and strategy, adopting new business management practices requires solid evidence for top management approval. Therefore, empirical research and quantified outcomes concentrate in the business sector are essential to persuade large corporates to adopt the SEP into corporate's strategy and practice SEP.

Most research on business practice under the influence of the Sufficiency Economy Philosophy has been qualitatively studied with limited scope in the agriculture sector or SMEs. The studies in the business sector measure SEP through survey and questionnaire which involves interviewing top management of a firm (Chatjuthamard et al., 2016; Kantabutra, 2007, 2014; Sasin, 2010; Suttipun & Saefu, 2017). This may not be appropriate in real-world operation since it does not measure the result of action but only capture the presence of the SEP and may yield inconsistent outcomes. As a result, it is essential to quantify SEP performance into scoring system standards by evaluating the strength and weaknesses based on the outcomes. To overcome this limitation, the research's first objective aims to

quantitatively measure SEP performance. Also, to verify that the initiated SEP performance measurement is practical and reliable, the measurement is put into the test. This becomes the second objective of the study as to study the relation of different levels of SEP performance and firm-specific risk.

1.3 The Stock Exchange of Thailand and scope of the study

The Stock Exchange of Thailand (SET) was established in 1975 as a result of the second National Economic and Social Development Plan to support economic growth, provide a secure platform for economic development, and improve the standard of living of Thai people. Thai listed companies annually submit financial performance reports to the SET. Financial performance fluctuates each year which depends on the global business environment as well as the firm's operating and managing strategies. According to the rules and regulations of the SET, all listed companies are required to periodically disclose essential information to the public for transparency and to protect all related stakeholders. The disclosed information consists of quarterly and yearly financial statements, annual registration statements, and annual reports which eventually become publicly available (Thailand, 2005). Statements and reports indicate the internal and external environment in which the firm operates, the firm latest financial performance, strategy including strength, weakness, and risks, and the condition or health of the firm (F. I. a. O. P. D. T. S. E. o. Thailand, 2019; Thailand, 2005). Thai listed companies operate in 8 industry groups and 28 sectors which have been defined by the SET as shown in Table 1.

Table 1 Industry and sector classification (effective from February 19, 2015)

Industry Group	Business Sector	Description of Business
Agro & Food Industry Businesses relating to farming, forestation, livestock, processing agricultural products, and food and beverage production	Agribusiness	The businesses that operate the farms, livestock, fishing, forest, process, carve and store agricultural products, as well as the distributors of agricultural products primarily for other industries, except the businesses relating to chemical fertilizer and pesticides and those relating to textiles.
	Food & Beverage	Producing the food by processing agricultural products, operating the restaurants, distributing the food, as well as producing beverages.
Consumer Products Businesses relating to the production and distribution of consumer products, both necessity and luxury goods.	Fashion	Producers, designers, and distributors of the following: <ul style="list-style-type: none"> - Apparels, shoes, leatherware, bags - Cutting and processing gemstones and accessories - Producing the raw materials for the industry e.g. textile, yarn, tanning.
	Home & Office Products	Operate businesses relating to household or office products: <ul style="list-style-type: none"> - Producers and distributors of household products such as furniture, decorating items, sports equipment, toys, and kitchen appliances. - Producers and distributors of the lighting products, household or office appliances e.g. televisions, sound equipment, and photocopiers.

		- Producers of office supplies e.g. pens, folders, etc.
	Personal Products & Pharmaceuticals	Producers and distributors of: - Products for personal consumption e.g. cosmetics, skincare products, perfume, napkins, and toilet paper. - Medicine, medical equipment, products produced from biotechnology.
Financials Industries relating to different types of financial service providers	Banking	Operators of the banking business as per the Commercial Banking Act and related laws, as well as the businesses established under the special law.
	Finance & Securities	Operators of these businesses: Finance, leasing, hire-purchase (not selling the services or products directly to customers), factoring, credit card, consumer loan, securities company, investment management company, asset management company, and other asset services.
	Insurance	Operators as per the Insurance Act, Life Assurance Act, as well as other similar businesses established under the special law.
Industrials Business relating to the production and distribution of general raw materials used in various industries, primary and	Automotive	The operators of these businesses: - Production or assembly of cars, and various automotive - Production, distribution, or assembly of the auto parts and spare parts - Auto repair and maintenance services - Distribution and being a distribution center for new and used cars

intermediate products, machines, and equipment used in the production industry and the automotive industry.	Industrial Materials & Machine	<p>The operators of these businesses:</p> <ul style="list-style-type: none"> - Production and distribution of light and heavy machines and equipment - Equipment or basic parts of electrical appliances e.g. cables and wires, light bulbs, insulators, and motors. - Raw materials used in several industries <p>Exception: Companies that produce tools or equipment for special business only, not for application in other businesses.</p>
	Packaging	Producers and distributors of packaging products, including the packing parts, materials, or products used to produce the packages, and those not classified in other sectors.
	Paper & Printing Materials	<p>Producers and distributors of:</p> <ul style="list-style-type: none"> - Pulp and paper, and paper products - Ink used for printing
	Petrochemicals & Chemicals	<p>Producers and distributors of:</p> <ul style="list-style-type: none"> - Petrochemical products, plastic compound, molded plastic products - Chemicals, basic chemicals, and processed chemical products, fertilizer, and pesticides. <p>Exception: Production of molded plastic to be used as parts or accessory of finished goods or any specific goods</p>
	Steel	Producers, processors, or distributors of steel products, or products mostly made of steel such as stainless steel.
Property &	Construction	Producers and distributors of:

Construction Industries relating to the producers of construction material, the developers and managers of real estate, as well as the construction and engineering services.	Materials	Construction material, non-steel decorating material, as well as sanitary ware.
	Construction Services	Providers of services and advice about: - Construction of the residence and other types of buildings e.g. residential construction, condominiums, industrial estates, shopping centers, roads, bridges, and interior decoration services - The construction projects regarding the engineering system, and civil design
	Property Development	Producers and distributors of the following: - Real estate developers for sale or lease, as well as managing the real estate e.g. the juristic person of condominium, housing estate, or land - Representatives or agents for selling or leasing the property
	Property Fund & Real Estate Investment Trusts	- Mutual funds or trust funds to invest in the property and gain revenue from the rent, interest, and property trade
Resources Businesses relating sourcing and managing the resources such as production and allocation of energy and mining.	Energy & Utilities	Operators of the following businesses: - Production, exploration, drilling, refining, and distributing natural energy in various forms such as oil and natural gas. - Utility provides e.g. electricity, water, and gas
	Mining	Mining surveyor, operator, smelter, and distributor. The minerals can be either metal or non-metal but excluding the energy minerals.

<p>Services</p> <p>Businesses in the service industry, except financial service and IT, are classified into different groups.</p>	<p>Commerce</p>	<p>Two factors are taken into consideration:</p> <ul style="list-style-type: none"> - Providers of goods to consumers, retail and wholesale, with physical stores e.g. shops, department stores, convenient stores, discount stores, superstores, or without a physical store i.e. electronic medium - Products for sale must be the finished goods for consumers and can be from different sectors.
	<p>Health Care Services</p>	<p>Providers of medical services, dental services, cosmetic surgery, rehabilitation, and other physical fitness.</p>
	<p>Media & Publishing</p>	<p>Producers and distributors of these media:</p> <ul style="list-style-type: none"> - Various type of media: <ol style="list-style-type: none"> 1) Entertainment media e.g. music, film, play, entertainment programs, cinemas, and the playhouse. 2) Broadcaster of radio and television 3) Producer of advertising media - Print media e.g. printing house, publishing house, and producers of the magazines, newspapers, and other prints.
	<p>Professional Services</p>	<p>Providers of specific services not specified in any other sectors e.g. education, business consultancy, waste management, as well as the services to the business not categorized in any sector.</p>
	<p>Tourism & Leisure</p>	<p>Comprise of:</p> <ul style="list-style-type: none"> - Operators of the hotel and temporary accommodation, as well as travel service e.g.

		<p>tour agency</p> <ul style="list-style-type: none"> - Operators of recreation, relaxation, and study tour places e.g. zoo, entertainment venue, exercise and fitness, and sports arena
	<p>Transportation & Logistics</p>	<p>Comprise of:</p> <ul style="list-style-type: none"> - Transportation businesses in all channels e.g. air transport (airports, airlines), water transport (ports, shipping companies), train and other land transports, and integrated logistics services. - Product storage service, warehouse rental, and other related services.
<p>Technology</p> <p>Businesses relating to IT products, including all primary, intermediate and final products, and the providers of IT and telecommunication services.</p>	<p>Electronic Components</p>	<p>Producers of electrical components used in electrical appliances or other electrical equipment e.g. IC, PCB, and semiconductors (except for the components produced to be specifically used in computers)</p>
	<p>Information & Communication Technology</p>	<p>Comprise of:</p> <ul style="list-style-type: none"> - Providers of IT services relating to the management of information and communication e.g. providers of telecommunication network, satellite, cable, IT system design and implementation, internet network providers, designer and implementing the internet network. - Producers or providers of installation services for computers or the mainframe servers. - Producers or distributors of IT equipment used for this technology e.g.

		telecommunication devices, hardware, computer parts, and software developers.
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Source: the stock exchange of Thailand

https://www.set.or.th/en/regulations/simplified_regulations/industry_sector_p1.html

The Thai listed companies on the SET can represent the overall Thai economy since, in 2014, over 500 listed companies in the SET accounted for 88% of Thai Gross Domestic Product. As of December 12th, 2016, Thai listed companies have a market value of 17,037,113.47 million baht and expect to continue growing. They also possess and consume large resources and dominate most industry they operate in. As a result, they can be considered as a Thai market-leading group and have a high impact on economics, social and environmental. Figure 4 and 5 represents the overall market value of each industry and the number of companies registered within the industry. Agro and Food Industry consists of 49 companies with an industry value of 1,123 million THB which accounted for 4.46% of the SET total market value. Consumer Products consists of 17 companies with the lowest industry value of 14 million THB which accounted for only 0.06% of SET's total market value. 59 companies operate in the Financials industry with an industry value of 2,948 million THB which accounted for 11.71% of SET's total market value. Industrials consists of 90 companies with an industry value of 1,171 million THB which accounted for 4.65% of the SET total market value. Property and Construction consist of 156 companies with an industry value of 3,613 million THB which accounted for 14.34% of the SET total market value. Resources consist of 50 companies with the largest industry value of 7,025 million THB which accounted for 27.89% of the SET total market value. Services consist of 109 companies with an industry value of 6,536 million THB which accounted for 25.95% of SET's total market value. The technology consists of 40 companies with an industry value of 2,760 million THB which accounted for 10.96% of the SET total market value.

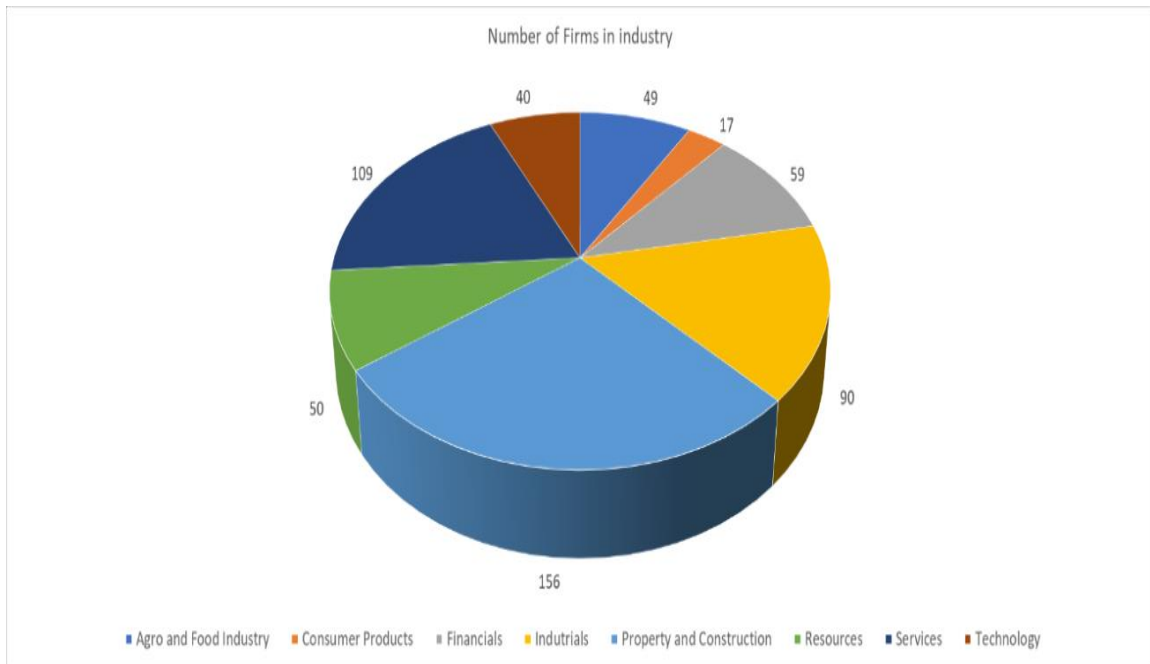


Figure 4 Number of Firms in Industry

Source: the stock exchange of Thailand https://www.set.or.th/en/about/annual/annual_p1.html

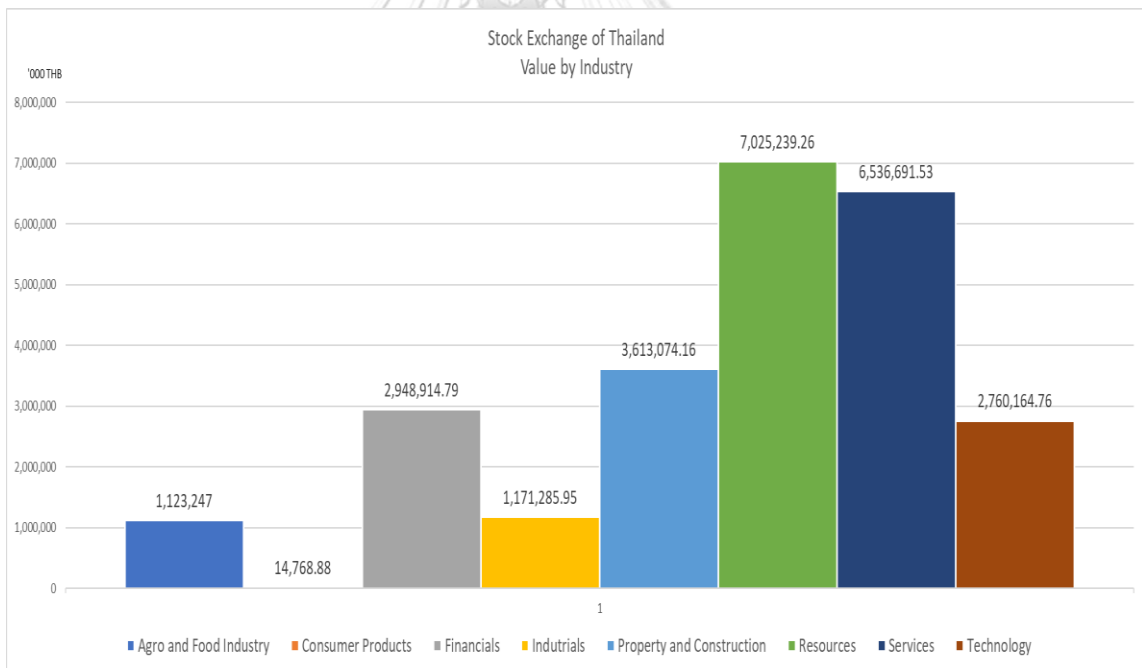


Figure 5 Market Value of Industry

Source: the stock exchange of Thailand https://www.set.or.th/en/about/annual/annual_p1.html

Thai listed companies operate under the supervision of the Stock Exchange of Thailand and Securities (SET) and Exchange Commission and their common stocks are traded on a composite index called SET index. The SET has grouped the top 100 firms with the largest market capital into a SET100 index and firms voluntarily

disclose data based on Thailand Sustainability Investment (THSI) criteria are grouped into the SETTHSI index (T. S. E. o. Thailand, 2019). Since the SET can represent the Thai economy, the sample of the study was selected from the SET. From 2013 to 2017, there had been several domestic and international events that hurt the Thai economy. For example, in the 2013 Syria war, US government QE, and the Thai shutdown have pushed the SET index down by nearly 20% (1597 in May to 1298 in December which is -299 points) in 6 months from May to December. Another, in 2014, Thailand's political instability ended in a military coup in May 2014. In 2015, a terrorist attack in the heart of the Bangkok "Ratchaprasong Intersection" in October 2015. These events suggest that selecting data from 2013 to 2017 will cover the most important events from both domestic and international that could have impacted the economic, environmental, and social performance of the selected firms, and thus appear in the results. In summary, this study emphasizes the quantitative study of the evaluation of SEP performance and the relationship between SEP performance and firm-specific risk from 2013 to 2018.

1.4 Research methodology

There are three main variable groups used in the study. First, firm-specific risk is the dependent variable. Second, the SEP score is the independent variable and last the control variables. Based on Fama-French three factor model, firm-specific risk was calculated using data from DataStream. Initially, to overcome the lack of SEP performance measuring method that could be related to international standards, the SEP scoring system was developed based on existing academic literature in the field. Both general context and business context of SEP definitions were collected through literature review and summarized. Then international standards related to sustainable development three aspects (i.e., economic, environmental, and social) in business practice were reviews to map the relationship between SEP and international standards. The mapping result between SEP and international standards could be used to construct a SEP scoring system to capture SEP performance. To validate the SEP scoring system, it was tested by evaluating selected firms. Here the annual and sustainable development reports, secondary data, were gathered as the basic

information for evaluation. After evaluating the selected samples, the final SEP score is entered into a spreadsheet to generate SEP scores.

Descriptive statistics, correlation matrix, univariates analysis, and regression analysis would be performed to test the relationship between SEP performance and firm-specific risk. The relation is presented in different dimensions; economic, environmental, and social to evaluate strength and weakness in the sustainable development view. Also, the relation is presented in terms of SEP three core and two conditions to specify the practice level of each element. There are six control variables used in the regression analysis. The data used for calculating control variables were collected from DataStream and Bloomberg. Data analysis was performed through Stata software. In summary, this research is the first empirical research to quantify SEP performance based on international standards by constructing a SEP scoring system. The scoring system is tested by evaluating 34 Thai listed companies and form panel data. The data was later used to determine the relation between SEP performance and firm-specific risk.

1.5 Research contributions

This research contributes to 3 aspects. First, generate an alternative SEP measurement. Our SEP scoring system can be conducted using existing sustainable development (SD) and annual reports. As a result, studying large-scale research can be done with fewer resources and time. Moreover, our initiated SEP scoring system, based on the global reporting initiative (GRI) standards, was tested by evaluating 34 Thai listed firms. Second, the research was conducted through a multidisciplinary approach from social science, corporate finance, econometrics, and statistics to validate our proposed hypotheses that explain the unknown relationship between SEP performance and firm-specific risk. Our findings academically support the previous SEP studies with empirical evidence that practicing SEP strengthens a firm's performance by reducing firm-specific risk. Moreover, our results disproved the possibility of negative effects from SEP practice. Although previous SEP studies showed promising positive effects, our proposed hypothesis tested the reverse relationship. However, our results did not support the managerial hypothesis. Academically, this research functions as an expansion of previous studies and fulfills

the missing empirical results from larger corporates. The study results provide strong evidence to support the corporate who has strong intention but hesitate to adopt and practice Sufficiency Economy Philosophy. Finally, this research is well-aligned with the 12th National Economic and Social Development Plan (12th NESDP) and Thailand's 20-year Strategic Plan which adopted the Sufficiency Economy Philosophy as its root. The study outcomes provide empirical evidence that practicing SEP is beneficial for business operation by reducing firm-specific risk. The authority and regulator such as SEC can adopt the SEP scoring system to capture the SEP practice level of a firm to help reduce risk. The SEP scoring is based on a widely accepted international standard so firms outside of Thailand can easily adopt the system.

1.6 Thesis organization

This thesis consists of five chapters. The first chapter provides the history and background of sustainable development and SEP. Chapter 2 describes the relevant literature reviews which relate to the research framework. Also, the proposed conceptual model and hypotheses of the Sustainable Business Development through Sufficiency Economy Philosophy practice are included. Chapter 3 explains the methodology used in the research. This includes detail of sample selection, variables for measurement, statistics, and data collection methods in the chapter. The result and discussion are shown in chapter 4 and the conclusion with a recommendation in chapter 5.

Chapter II

Literature review

2.1 Sufficiency economy philosophy (SEP)

In 1974 outline of the SEP was first given by His Majesty King Bhumibol Adulyadej the Great at the Kasetsart University Commencement Ceremony as follows,

"...The development of the country must be fostered in stages. It must start with the construction of infrastructure, that is, the provision of food and necessities for the people by methods, which are economic, cautious, and conforming with principles. Once the foundation is firmly established, progress can be continually, carefully, and economically promoted. This approach will prevent incurring mistakes and failures, and lead to the certain and complete achievement of the objectives..."

Source: National Economic and Social Development Board, 2007

Over decades, His Majesty had delivered the philosophy to Thai people repeatedly and implemented the philosophy into Royal Initiative projects around Thailand. On November 29th, 1999 His Majesty approved the official working definition for the Office of the National Economic and Social Development Board (NESDB) which was then adopted into the 9th NESDP and continued to be the fundamental philosophy until the 12th NESDP (NESDB, 2007).

The SEP by His Majesty King Bhumibol Adulyadej the Great emphasizes on "middle path" as the foundation of life. This concept can be practiced from individuals, families, communities, and national levels. "Sufficiency" in the context of the philosophy refers to "moderation, reasonableness, and the need of self-immunity for sufficient protection from impact arising from internal and external changes." Thus, this requires the application of knowledge and integrity as fundamental. Also, patience, perseverance, diligence, wisdom, and prudence are all necessary to promote and appropriately handle the impacts from socioeconomic, environmental, and cultural changes (NESDB, 2007). The NESDB also identified sufficiency economy

practitioners in a business context as having a long-term vision over short-term profit, knowledgeable in their field of work with the capability of learning new things, make a decision with care, conduct business with honesty and integrity, and responsible for social and environmental impacts. Research and Development Institute of Sufficiency Economy Philosophy Foundation (RSEPF) summarized the SEP into six fundamentals (Piboolsravut, 2004). The first fundamental is a rational action and consideration that future consequence is the result of today's action. In other words, good consequence comes from good action. The second fundamental is saving which applies to any type of resource and capital. In a business context, reducing unnecessary waste will increase productivity which is another way of saving. The third fundamental is to have mindfulness in all dimensions of knowledge fact, reasonableness without bias, and carefulness without rushing. Forth fundamental is to know limitations and conditions to prevent extremeness, extravagance, and waste. The fifth fundamental is that development in all three dimensions of economic, social, and environmental must be done to avoid unbalance in the system, Final fundamental refers to the development of knowledge and mind simultaneously. To prevent using knowledge in the wrong way (Mongsawad, 2012).

Generally, the SEP is described to be based on three core principles and two underlying conditions. The three core principles consist of moderation, reasonableness, and self-immunity. The two underlying conditions, that act as a prerequisite of the three core principles, consist of knowledge and morality (Isarangkun & Pootrakool, 2001; Mongsawad, 2012; NESDB, 2007; Piboolsravut, 2004; Song, 2020; Wibulswasdi et al., 2011). The expected outcomes from practicing the SEP are balanced of economic, social, environmental, and cultural aspects (Avery & Bergsteiner, 2020; Kantabutra, 2007). In other words, practicing SEP leads the sustainable development. In a business context, the balance outcomes are simply measured through corporate performance. Figure 6 shows the structure of the SEP.

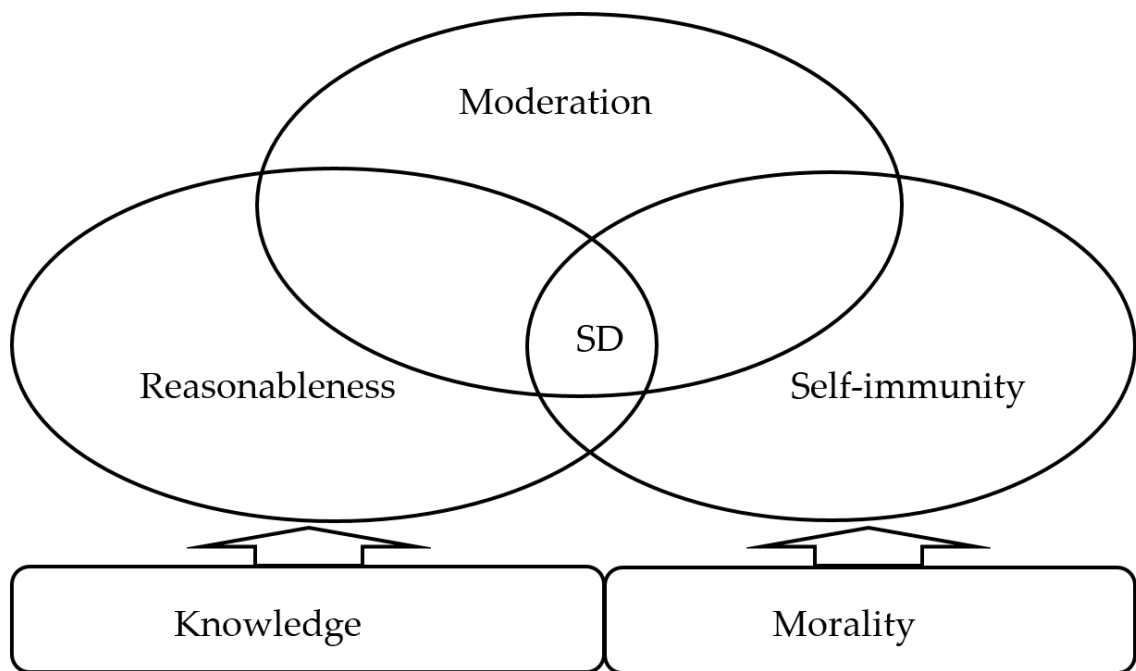


Figure 6 Three core principles and two underlying conditions of the sufficiency economy philosophy

Source: the sufficiency economy philosophy

2.1.1 Knowledge

Knowledge consists of four categories; knowledge identification, knowledge implementation, knowledge information, and knowledge generation. Knowledge identification is the ability to identify that the individual or corporate has the necessary knowledge of the task. Knowledge can come from academic study or skills accumulated over time. If the knowledge is not put into action, it remains useless. Knowledge implementation can be done in the area of management, planning, and operation as a foundation of decision-making. For example, sustainable SMEs operating under the influence of the SEP use appropriate technology generated through local knowledge (Khunthongjan & Wiboonpongse, 2010; Suttipun & Arwae, 2020; จันทน์ et al., 2011). Knowledge information is the ability to source and use information, database, and scientific tools for analysis. Using valuable information can create a competitive advantage for the individual or companies (Kantabutra, 2007, 2014, 2019). For example, sustainable enterprises maintain organization-specific knowledge as an important Key Success Factor in business operation (Sasin, 2010). The product variety is generated through innovation which comes from accumulated

in-house knowledge (Kantabutra, 2006, 2007). Knowledge generation relates to continuous development. Every individual is encouraged to create and receive knowledge through training, learning, and suggestion to continue the improvement. Forming knowledge management and making a decision under knowledge consideration reflects knowledge condition alignment in business operations (Chatjuthamard et al., 2016).

2.1.2 Morality

Morality is believed to increase value for business management which in turn increases economic value. Morality can be described as caring, honesty, ethics, and virtues. For example, promoting business ethics in the organization is one of the common practices found in sustainable enterprises (Kantabutra, 2006). Decision-making should be based on honesty toward stakeholders to create trust. Successful SMEs under the SEP emphasize their business practice on honesty in entire business operation such as fairness to consumers, workers, customers, and suppliers can be found among (Khunthongjan & Wiboonpongse, 2010; Suttipun & Arwae, 2020; จันทร์ et al., 2011). Morality can be built upon educating and training so corporate is encouraged to provide all employees at every level to be trained. The target of morality is to create an honesty mindset and everyone should see the value of being honest. Sharing takes an important part in morality since sharing behavior requires the individual to overcome excessive exploitation (Sasin, 2010). Sharing can come in the form of knowledge sharing, experience sharing, and asset sharing. The fundamental concept emphasizes the increasing benefit of the overall society.

2.1.3 Moderation

Moderation implies a middle path. Being consistent or harmonious with the surrounding environment, avoiding extreme, and not making a decision based on want are the simple terminologies used to explain moderation. For business context, this refers to knowing the capability and limits before deciding as to avoid over or under actions. According to Sasin, moderation as one of the three pillars of Corporate Sustainability under the SEP emphasizes business growth through careful consideration of using available and existing resources (Sasin, 2010). Puntasen et al.,

2003 also suggested that one important business practice for SMEs under the SEP is to avoid extreme and not to aim for short-term profit but consider long-term results. This includes avoiding creating unmanageable debt (Avery & Bergsteiner, 2020; Kantabutra, 2007; จันทร์ et al., 2011).

2.1.4 Reasonableness

Reasonableness directly relates to good governance in a business context (Sasin, 2010). It can be achieved through regulations, rules, and laws which control the action within the scope. Reasonableness considers the cause and effect of actions (Avery & Bergsteiner, 2020; Kantabutra, 2007; Khunthongjan & Wiboonpongse, 2010; Mongsawad, 2012; Piboolsravut, 2004; Suttipun & Arwae, 2020; Wibulswasdi et al., 2011). As Chatjuthamard et al., 2016 suggested that knowing the cause and effect before making a business decision and being aware and cautious of the consequence of decisions are also important parts of reasonableness (Chatjuthamard et al., 2016). Reasonableness in a business context implies careful consideration of the decision-making process which takes all stakeholders into account (Sasin, 2010).

2.1.5 Self-immunity

Self-immunity directly relates to risk management in business operations (Chatjuthamard et al., 2016; Sasin, 2010). Self-immunity or risk management helps mitigate the impact of sudden changes. Preparation for downside risk management is among seven important business practices of the SEP on SMEs who survived through the 1997 economic crisis (Kantabutra, 2007; จันทร์ et al., 2011).

2.2 The SEP practice in a business context

Based on Chatjuthamard's study, firms implementing the SEP five core factors, Moderation factor, Reasonableness factor, Self-Resilience factor, Knowledge factor, and Integrity factor, tend to lower firm-specific risk (Chatjuthamard et al., 2016). Wibulswasdi et al., 2011 analyzed Sufficiency Economy Philosophy using syntax analysis (parsing) to determine that if whether or not the philosophy is suitable to be the foundation for economic theory framework (Wibulswasdi et al., 2011). The syntax analysis consists of five elements; thinking framework, attribute, definition, condition, methodology, and expected result. The thinking framework of the SEP is

based on the traditional lifestyle of Thai people. The philosophy emphasizes on economic life-guiding principle toward the dynamic evolution society system with the target to generate sustainability development. The middle path is the attribute of the SEP. The SEP was defined to consist of three holistic characteristics; moderation, reasonableness, and self-immunity and the condition of the SEP action require knowledge and morality (Avery & Bergsteiner, 2020; Buranapin & Rattawatankul, 2015; Isarangkun & Pootrakool, 2001; Kantabutra, 2007; Khunthongjan & Wiboonpongse, 2010; Mongsawad, 2012; NESDB, 2007; Piboolsravut, 2004; Wibulswasdi et al., 2011). Practicing the SEP will create a development path that leads to well-balance results in economic, social, and environmental. This represents the methodology and expected result of the framework. The SEP is certainly fully qualified to be the foundation for the theoretical framework for the research.

From the literature review, it is concluded that Sufficiency Economy development consists of two phases; primary and advance Sufficiency Economy. Primary Sufficiency Economy Development in a business context can be described as adopting the SEP to corporate vision, mission, objectives, and strategy and aim to create internal strength from existing foundation, conditions, and resources (Isarangkun & Pootrakool, 2001; Wibulswasdi et al., 2011). This initial phase relies mostly on human resources to generate the actions and outcomes, especially on the economic dimension. The advance phase aims to improve the other two dimensions of social, and environment by working with stakeholders under the surrounding environment, culture, and geography. This can be done by resource sharing such as knowledge, assets, and budget and development programs such as community service and environmental conservation.

SEP practice in the business sector supports corporate to achieve sustainable business development. Sustainable business development refers to a company with three conditions "(1) has strong financial performance, (2) can endure economic and social difficulties over time, and (3) can maintain a leadership position"(Avery & Bergsteiner, 2020). Kantabutra's study revealed that despite operating in different industries of paper, jewelry, and cement, three case studies showed the similarity of three sustainable business development conditions (Kantabutra, 2006, 2007).

According to International Institute for Sustainable Development, Sustainable enterprise is defined as “For the business enterprise, sustainable development means adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future” (Mongsawad, 2012). Reasonableness and moderation from the SEP encourage employees throughout the organization to pursue the same goals and targets which represent a key success factor for cross-functional management while self-resilience creates problem-solving skills which is a key factor for survivability during a crisis (Buranapin & Ratthawatankul, 2015; Kantabutra, 2007; Khunthongjan & Wiboonpongse, 2010; Mongsawad, 2012; Sasin, 2010). The study reflects that the philosophy is suitable for practice in the business sector and adopting the philosophy can generate business sustainability (Buranapin & Ratthawatankul, 2015).

Several surveys on directors of Thai listed companies suggested that the directors viewed that practicing the SEP would benefit their business (Kantabutra, 2006, 2007). Although the majority of the directors have a positive attitude toward adopting the philosophy, lack of empirical evidence and clear procedure in applying the SEP remains a major limitation in real-world practice (Kantabutra, 2006). A study on Small and Medium Enterprises (SMEs) showed that adopting and practicing the SEP generates competitive advantage through self-innovation of products which leads to lower production costs with equal product quality and product diversification (Khunthongjan & Wiboonpongse, 2010).

In 2010, a leading business school in Thailand, Sasin Graduate Institute of Business Administration of Chulalongkorn University study showed that four Thai companies who have been practicing the SEP before the 1997 economic crisis have successfully survived through the impacts and continue to operate and grow (Sasin, 2010). Sasin suggested the concept of measurement tool called "Corporate Sustainability under the Sufficiency Economy Philosophy" with three pillars of "corporate governance" representing reasonableness, "sustainability" representing moderation and "risk management" representing self-resilience, and two foundations of business knowledge and business ethic which similarly represent two underlying

conditions of knowledge and morality in Sufficiency Economy Philosophy (Sasin, 2010). A study conducted by Chatjuthamard et al., 2016 using the Sufficiency Economy Philosophy score (SEP score) to evaluate the listed companies on SET 50 within one year revealed a connection between SEP score and risk measures (Chatjuthamard et al., 2016). The result indicates that adopting and practicing the philosophy can stimulate firm performance while reducing risk.

Previous studies have provided a fundamental concept of the SEP in business practice. Studies also revealed that Sufficiency Economy Philosophy practice generates positive outcomes toward sustainable development. Also, the SEP practice has a relationship with modern business practices such as corporate governance, social responsibility, and risk management. Practicing the Sufficiency Economy also helped SMEs to survive the crisis in the past and increase the value of the enterprises from their capability (Avery & Bergsteiner, 2020; Kantabutra, 2007; Khunthongjan & Wiboonpongse, 2010; Suttipun & Arwae, 2020). The SEP practice doesn't conflict with economic growth or market expansion as the enterprises practicing the Sufficiency Economy continue to grow strong and lead the market (Chatjuthamard et al., 2016).

2.3 The SEP practice and sustainable business development

His Majesty the King Bhumibol Adulyadej the Great first espoused the Sufficiency Economy Philosophy (SEP) at Kasetsart University in 1974. The vision behind the King's thinking was a stronger society (NESDB, 2007). HM aimed to prepare and strengthen Thai people at all levels, from the individual and family on up to the national level to achieve flexibility, adjustability, adaptability, and resilience in the face of developing economic, social, environmental, and cultural challenges. Such challenges might arise either externally or internally, from human action or that of mother nature (Isarangkun & Pootrakool, 2001; Wibulswasdi et al., 2011).

Development under capitalism emphasizes economic growth which has undeniably resulted in both pros and cons (Allen & Thomas, 2000; Smith, 1776). For example, prosperity comes with a tradeoff such as natural resources overconsumption which resulted in climate change. Unbalanced economic growth creates inequality

which develops social unrest or even wars. To cope with the negative impacts, other development schemes such as Alternative Development, Human Development, and Sustainable Development have emerged with the expanded highlight on social and environmental aspects (Allen & Thomas, 2000; Alshehhi, 2017; Anand & Sen, 2000; Jitsuchon, 2019; Nahman et al., 2016; Peet & Hartwick, 2015; Rights, 2006). For example, the 1987 Brundtland report emphasizes that for Sustainable Development environment and society are as important as an economic pillar and should be treated equally to fulfill the necessity of existing requirements and preserved for next generations (Solberg, 2015).

Sustainable Development is defined in the Brundtland report in 1987 as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." In 2000 the world's first development goals were declared as the Millennium Development Goals (MDGs) which was well aligned with the human development concept. The MDGs consist of eight goals with the highlight on combating extreme poverty and its related issues. On September 25th, 2015 during the United Nations General Assembly at the United Nations (UN) headquarters in New York, the world leader of 193 countries adopted 17 Sustainable Development Goals (SDGs), "Transforming our world: the 2030 Agenda for Sustainable Development" (SDG, 2018). The SDGs can be considered as the continuous MDGs with wider dimensions as the SDGs equally emphasize economic, social, and environmental aspects (SDG, 2018; Solberg, 2015). The SDGs include the business sector, government, and civil society as essential actors with equal responsibility (SDG, 2018; Solberg, 2015). The undeniably private sector has the ability and resources to generate and steer the transformation of the business to achieve SDGs targets. During the SDGs designing process, industry leaders took part with other important parties such as political leaders and civil society representatives to generate practical targets. This reflects an essential role of the business sector in achieving SDGs (Scheyvens et al., 2016).

2.4 Thai listed companies' information disclosures and the SEP

According to the Securities and Exchange Act of 1992 (SEA), the Stock Exchange of Thailand operated under the supervision of the Securities and Exchange of Commission (SEC) with the SET Board of Governors controlling responsible for the policies and operations. Thai listed companies operate under the regulation which emphasizes on disclosure of information to provide all investors with "correct, sufficient, timely and equal information." As a result, the management of listed companies is obliged to provide "correct, accurate, complete, and up-to-date information" (F. I. a. O. P. D. T. S. E. o. Thailand, 2019). Management should emphasize good corporate governance in policies, strategies, and corporate structures to ensure corporate transparency. There are three information disclosures that management of listed companies should follow; compulsory, recommended, and optional disclosures (F. I. a. O. P. D. T. S. E. o. Thailand, 2019; Thailand, 2005).

Compulsory disclosures are quarterly financial statements, yearly financial statements, annual registration information, and annual reports. The information must be disclosed periodically (Thailand, 2005). Also, significant information such as merge and acquisition (M&A), sales of assets, dividends issues, and changes in share per values are required to be disclosed immediately by the management (F. I. a. O. P. D. T. S. E. o. Thailand, 2019; Thailand, 2005). Recommended disclosures relate to rumors, inaccurate, or misleading information which management of listed companies should clarify and respond appropriately. Moreover, announcements of a third party such as regulatory authority or government official related to a company that may affect market values or business performance should be disclosed by the management. Optional disclosures are financial projections and view about probable important future events (F. I. a. O. P. D. T. S. E. o. Thailand, 2019; Thailand, 2005).

In addition to the importance of disclosures, some information is prohibited to be disclosed to the public such as financial forecasts and future expected income or profit (F. I. a. O. P. D. T. S. E. o. Thailand, 2019; Thailand, 2005). Since January 1st, 2014 the Stock Exchange of Thailand instruct listed companies to disclose their Corporate Social Responsibility (CSR) activities in either an annual registration statement or a sustainability report (Wuttichindanon, 2017). Thai listed companies

periodically disclose annual reports (Form 56-1) which includes important data as structured by the Securities and Exchange Commission as shown in Table 2.

To create sustainable development of the capital market, SET has established the Corporate Governance Center (CG Center) and Social Responsibility Center (SR Center) (Prommin et al., 2014). SR center was established in 2007 and has been responsible for providing guidelines related to sustainable development for stakeholders in the capital market. SET has been promoting sustainable development by encouraging listed companies to adopt and integrate sustainable development principles into management, practice, and report sustainability information through sustainability reports. Also SET provide training on sustainable development to listed companies and hold a seminar to share useful knowledge and experience of benefit from the implementation of sustainability practice. SET also provide consultant through Corporate Sustainability Advisors Program to develop proper sustainability framework. SET has initiated Sustainability Awards to encourage listed companies to practice sustainable development (T. S. E. o. Thailand, 2019). Listed companies joining Sustainability Award activity can benefit from using the sustainability assessment questionnaire, receive feedback and recommendation related to the business management process to respond to economic, social, and environmental issues (T. S. E. o. Thailand, 2019).

Table 2 Disclosure information of Thai listed companies

Disclosure information
1. Policy and Business overview
2. Nature of Business Operation
3. Risk factors
4. Assets used in business operation
5. Legal Disputes
6. General information and other relevant information
7. Company information and Shareholders
8. Management Structure
9. Good Corporate Governance
10. Corporate Social Responsibilities
11. The internal control and Risk Management
12. Related Party Transaction
13. Financial position and operation results
14. Management Discussion and Analysis
15. Detail of the Board of Director

Source: the stock exchange of Thailand (Thailand, 2005)

2.4.1 Corporate Governance

One of the mandatory disclosures is corporate governance. Corporate Governance (CG) has been implemented throughout the world especially by the listed companies because practicing corporate governance generates confidence for investors thus influences stock market liquidity (Prommin et al., 2014). This creates value add to the listed companies operating in the capital market. In many cases, CG was implemented as a recovery tool from a crisis. For example, CG was initiated in Turkey in the financial sector after the banking crisis in 2002 before applying Turkey Corporate Governance Index in 2007 with five components or 46 elements used for evaluation (Ararat et al., 2017). After the 1997 Asian Financial Crisis, CG has become more important in the Thai business sector. Due to ineffective Board of Directors, weakness of management, and insufficient protection for minor shareholder benefit, in 1999 the Stock Exchange of Thailand (SET) established "a Code of Best Practice for Directors of Listed Companies" along with additional rules relating to independent directors in the board seats and audit committee. The Principles of Good Corporate Governance for Listed Companies 2012 by the Stock Exchange of Thailand provides guidelines for corporate governance practice which covers five categories; rights of shareholders, the equitable treatment of shareholders, the role of

stakeholders, disclosure and transparency, and responsibility of the Board (Prommin et al., 2014). The SET has continued to issue CG principles overtime to ensure the practice of CG of listed companies until the most recent announcement in 2017 of "Corporate Governance Code 2017." In addition to the SET announcement, Security and Exchange Commission (SEC) Thailand provides "the Institutional Investor Code" to support the practice as well.

According to Thailand's Sustainable Business Guide, CG emphasizes on "distribution of rights and responsibilities among the different participants in the organization" and the action is proceeded according to the corporate procedure to ensure best practice (Grossman, 2015). CG aims to create checks, balances, and incentives to control conflict of interests between corporate insiders and external stakeholders. CFA Institute defines corporate governance as "the system of internal controls and procedures by which individual companies are managed."

In general, there are three main parties involved in CG practice; the Board, management, and shareowner. As the stakeholders are at the center stage. To generate successful CG outcomes, companies need to create a strong relationship, gain trust and confidence from stakeholders which require long-term action (Grossman, 2015). Several researchers have used the CG index to indicate the CG implementation level of the firm (Ararat et al., 2017; Bebchuk et al., 2009; Gompers et al., 2003; Grossman, 2015; Prommin et al., 2014). Moreover, the Investor Responsibility Research Center (IRRC), a non-profit organization, emphasizes CG evaluation using the CG index under 24 governance provisions which have been used extensively in CG-related researches (Center, 1994). Sasin uses CG as one of the three foundations in practicing Corporate Sustainability under the Sufficiency Economy as CG signifies reasonableness in the Sufficiency Economy Philosophy (Sasin, 2010).

2.4.2 Corporate social responsibility (CSR)

Another important topic in the mandatory disclosure list is CSR. Corporate Social Responsibility emphasizes the impact and interest of all stakeholders related to the economic growth generated by the company's activities (Binuomoyo, 2016; Hu et al., 2019). The basic concept of CSR is that corporates realize the impact of their

business activities on social and environmental. It is necessary to disclose CSR activities and performances because investors pay attention to the information which directly related to the investment decision. As a result, CSR creates a competitive advantage for the company (Goyal & Kumar, 2017).

According to literature review, CSR relates to internal and external social and environmental aspects (Goyal & Kumar, 2017). Important characteristics found in corporate practicing CSR are, clearly define CSR policy, strategies, and goals, the establishment of a specialized CSR team to manage CSR program and budget, and the activity involve a community, education, environment, and health development. Another study by Wisse et al. found similar commonality characteristics but more concentrated toward internal stakeholders such as work engagement, retention, improve employee relations, and employee satisfaction (Wisse et al., 2018). Sasin suggests that practicing CSR can lead to business sustainability which implies that CSR functions as a procedure and guides direction toward sustainable development (Sasin, 2010). In most cases, CSR covers both social and environmental aspects. CSR framework has been established to lead the business sector toward sustainable development. Thai listed companies are encouraged to practice and enforced disclosure CSR activities by the Stock Exchange of Thailand. Also, CSR elements can be aligned with Sufficiency Economy Philosophy practice which will be used as the key concept in this research.

2.5 Global reporting initiative (GRI), sufficiency economy philosophy (SEP), and the sustainable development goals (SDGs)

Corporate sustainability measurement has been studied using qualitative and quantitative methods. Based on the Triple Bottom Line concept, corporate sustainability consists of economic, social, and environmental performances, so measuring sustainability needs to capture all three aspects (Hubbard, 2009; Savitz, 2013; Žak, 2015). Economic performance can be quantified into values. Economic indicators are normally measured by the government and related institutes such as World Bank and National Statistic Department. Social and environmental outcomes remain difficult to measure as a limited number of indicators exist. The United Nations-supported Principles for Responsibility Investment (UNPRI) has revealed

that members of Principles for Responsibility Investment have dramatically increased investment in corporate concerning Environmental, Social and Governance (ESG). As investment toward sustainability increased, the need of proper measuring methods and indicators required.

In 1997, the Coalition for Environmentally Responsible Economies (CERES), the Tellus Institute, and the United Nations Environment Program (UNEP) established the Global Reporting Initiative (GRI), which aimed to provide sustainability guidance for companies to follow. The three main GRI standards are associated with economics, environmental, and social aspects, which are referred to as GRI 200s, GRI 300s, and GRI 400s, respectively (Initiative, 2018). The three GRI series captures topic-specific disclosures while GRI 100 series emphasizes on management approach. The first step to follow GRI structure, first, firms need to follow GRI 102 and GRI 103 as they described general disclosures and management approach requirements before going to GRI 200s, GRI 300s, and GRI 400s which are topic-specific disclosures. GRI standards provide clear details of overview, two basic approaches for using GRI, requirements, recommendations, and guidance, and background context of the reporting topics (Initiative, 2018).

According to the global reporting initiative, GRI 200 series can be explained in detail as follows; GRI 201 requires a firm to disclose financial information that is usually disclosed in the financial statement in the annual report. For example, the direct economic value on an accrual basis, risk management, employee benefit plans, and retirement plans, and related financial transactions from the government are presented in the annual report of the listed company. GRI 202 requires a firm to disclose information related to standard level wages categorized by gender and compared to the local standard. This disclosure also requires a firm to disclose the ratio of local hiring in the senior management level of the firm. GRI 203 emphasizes indirect economic impacts from the firm's investment and voluntary engagement of the firm. GRI 204 concerns the level of the firm's spending on local suppliers. GRI 205 highlights risk management such as risk assessment, training risk policies and procedures, and incidents that occurred related to corruption and actions taken on the incidents. GRI 206 engages in the disclosure of legal actions for anti-competitive

behavior, anti-trust, and monopoly acts. Table 3 shows the main economic aspect disclosures required by the GRI 200 series (Initiative, 2018).

Table 3 GRI 200 series and related disclosure requirements

GRI series	Related subject	Number of disclosures	
		Main topic	Subtopic
201	Economic performance (2016)	4	8
202	Market presence (2016)	2	8
203	Indirect economic impacts (2016)	2	5
204	Procurement practices (2016)	1	3
205	Anti-corruption (2016)	3	11
206	Anti-competitive behavior (2016)	1	2
		13	37

Source: global reporting initiative

Based on the global reporting initiative GRI 300 series can be explained in detail as follows; GRI 301 requires a firm to disclose information related to the material used by the firm. The topic emphasizes renewable, non-renewable, and recycled materials used as raw and packaging materials. GRI 302s involve energy consumption within and outside the organization and information related to energy reduction. GRI 303s highlight information related to impact occur by water consumption and discharge as well as water management by the firm. GRI 304s concern the firm's operation, activities, products, and services that impact biodiversity and its habitats. This includes conservation areas and protected species according to IUCN Red List and national protection list. GRI 305s focus on greenhouse gas (GHG) emissions both from direct (scope 1) and indirect (scope 2 and 3). The disclosure includes amount and source of emission, type of gas emitted, and standards, methodology, assumption, and/or calculation used for the disclosed data. Disclosure of the GHG emission intensity and reduction is required to be disclosed. A specific gas emission related to ozone-depletion substance (ODS) and climate change such as trichlorofluoromethane (CFC-11), nitrogen oxide (NOx), and sulfur oxides (SOx) is required to be disclosed. GRI 306s involve the quantity and quality of water effluents and waste disposal methods (i.e., reuse, recycling, recovery, landfill, and transportation). This topic covers incidents of material spills and their impact. GRI 307 emphasizes the incident related to non-compliance with environmental laws and regulations that may occur by the organization. GRI 308s focus on the corporate

supply chain management on an environmental aspect such as new supplier screening and supplier assessment. Table 4 presents the main environmental disclosures required by GRI 300 series (Initiative, 2018).

Table 4 GRI 300 series and related disclosures requirement

GRI series	Related subject	Number of disclosures	
		Main topic	Subtopic
301	Materials (2016)	3	4
302	Energy (2016)	5	21
303	Water and effluents (2018)	5	18
304	Biodiversity (2016)	4	8
305	Emissions (2016)	7	37
306	Effluents and waste (2016)	5	12
307	Environmental compliance (2016)	1	2
308	Supplier environmental assessment (2016)	2	6
		32	108

Source: global reporting initiative

According to the global reporting initiative, GRI 400 series can be described in detail as follows; GRI 401s require a firm to disclose information related to employment such as turnover rate and standard welfare provided by the organization (i.e., health care, insurance, retirement provision, and parental leave). Disclosure of parental leave is further emphasized in the view of equality between genders (i.e., the total number of employees entitled to parental leave, by gender is the disclosure requirement). GRI 402 focuses on the minimum time firm provides to their employee before notice periods of operational changes and the involvement of the employee in the changes (i.e., bargaining power during the negotiation regarding changes). GRI 403s concerns occupational health and safety and the management of the risk in the working place (i.e., hazard assessment and investigate work-related incidents and cases). The topics also concern the disclosure of worker involvement in occupational health and safety such as participation, communication, training, and consultation provided to the employee to prevent and mitigate the impact that may occur from the occupational health and safety. The topic further requires the disclosure of the amount of work-related injuries and illnesses of workers who are employees and non-employee. GRI 404s emphasize the knowledge and skill improvement of the employee through training and performance evaluation. GRI 405s focus on employee

diversity and equality of the basic salary. GRI 406 deals with discrimination subjects (i.e., number of incidents and actions taken by the organization). GRI 408 and 409 concern about the risk of child labor and the incident of forced labor of the operations and suppliers respectively. GRI 410 to 412s involve human rights training, assessment, and violation. GRI 413s require a firm to disclose information related to positive and negative impacts on the local community by the firm's activities. GRI 414s focus on the corporate supply chain management on social impacts (i.e., new supplier screening and social impact assessment caused by the supply chain's operation). GRI 415 concerns financial support toward political including the estimated contribution value. GRI 416s and 417s require a firm to disclose information related to products and services such as health and safety, non-compliance incident relating to health and safety, labeling requirement, and non-compliance incident relating to labeling and marketing communication. GRI 418 highlights customer confidentiality. GRI 419 covers the disclosure of non-compliance with laws and regulations in the social and economic aspects. Table 5 summarizes the main social disclosure required by GRI 400 series (Initiative, 2018).

Table 5 GRI 400 series and related disclosures requirement

GRI	Related subject	Number of disclosures	
		Main topic	Subtopic
401	Employment (2016)	3	9
402	Labor-management relations (2016)	1	2
403	Occupational health and safety (2016)	10	28
404	Training and education (2016)	3	4
405	Diversity and equal opportunity (2016)	2	4
406	Non-discrimination (2016)	1	2
407	Freedom of association and collective bargaining (2016)	1	2
408	Child labor (2016)	1	3
409	Forced or compulsory labor (2016)	1	2
410	Security practices (2016)	1	2
411	Rights of indigenous peoples (2016)	1	2
412	Human rights assessments (2016)	3	5
413	Local communities (2016)	2	2
414	Supplier social assessments (2016)	2	6
415	Public policy (2016)	1	2
416	Customer health and safety (2016)	2	3
417	Marketing and labeling (2016)	3	6
418	Customer privacy (2016)	1	3
419	Socioeconomic compliance (2016)	1	3
		40	90

Source: global reporting initiative

Sustainable development (SD) reports follow GRI standards and reveal valuable economic, environmental, and social activities of the firm. They are often used to indicate environmental and social performance, as well as the business sustainability score (Clarkson et al., 2008; Morhardt et al., 2002; Naciti, 2019; Yadava & Sinha, 2016). For example, Clarkson et al. used environmental information disclosures based on the Global Reporting Initiative guidelines to show that firms with higher environmental disclosure levels have stronger environmental performance (Clarkson et al., 2008). Corporate environmental responsibility is an activity that was once perceived as a financial burden but has been shown to add financial value to a firm (Hart & Ahuja, 1996; Li et al., 2017).

Since GRI standards were jointly developed between the CERES, the Tellus Institute, and the UNEP, the standards have been mapped with sustainable development goals (SDGs) (Initiative, 2020). The top three goals that are related to

the most numbers of GRI sub-topics are SDG 8, SDG 16, and SDG 12. SDG8 "decent work and economic growth" is related to 45 GRI sub-topics, SDG16 "peace, justice, and strong institutions" is related to 23 GRI sub-topics, and SDG12 "responsible consumption and production" is related to 20 GRI sub-topics. The three goals that are related to the least number of GRI sub-topics are SDG9, SDG4, and SDG11. SDG9 "industry, innovation and infrastructure" is related to two GRI sub-topics, SDG4 "quality education" is related to one GRI sub-topic, and SDG11 "sustainable cities and communities" is related to one GRI sub-topic. Table 6 shows the relationship between 17 SDGs and the GRI standards.



Table 6 The relationship between 17 SDGs and the GRI standards

SDG	SDG Topic	GRI sub-topics
SDG 1	No poverty	<ul style="list-style-type: none"> • GRI202-1 • GRI203-2 • GRI207-1, GRI207-2, GRI207-3, GRI207-4 • GRI413-2
SDG 2	Zero hunger	<ul style="list-style-type: none"> • GRI411-1 • GRI413-2
SDG 3	Good health and well-being	<ul style="list-style-type: none"> • GRI203-2 • GRI305-1, GRI305-2, GRI305-3, GRI305-6, GRI305-7 • GRI306-1, GRI306-2, GRI306-3, GRI306-4 • GRI401-2 • GRI403-6a, GRI403-6b, GRI403-10a, GRI403-10b, GRI403-10c, GRI403-9b, GRI403-9c
SDG4	Quality education	<ul style="list-style-type: none"> • GRI404-1
SDG5	Gender equality	<ul style="list-style-type: none"> • GRI202-1 • GRI203-1 • GRI401-1, GRI401-2, GRI401-3 • GRI405-1, GRI405-2 • GRI406-1 • GRI414-1, GRI414-2
SDG6	Clean water and sanitation	<ul style="list-style-type: none"> • GRI303-1a, GRI303-1c, GRI303-2, GRI303-3c, GRI 303-4, GRI303-5a, GRI303-5b • GRI304-1, GRI304-2, GRI304-3, GRI304-4 • GRI306-1, GRI306-2, GRI306-3, GRI306-5
SDG7	Affordable and clean energy	<ul style="list-style-type: none"> • GRI302-1, GRI302-2, GRI302-3, GRI302-4, GRI302-5
SDG8	Decent work and economic growth	<ul style="list-style-type: none"> • GRI201-1 • GRI202-1, GRI202-2 • GRI203-2 • GRI204-1 • GRI301-1, GRI301-2, GRI301-3 • GRI302-1, GRI302-2, GRI302-3, GRI302-4, GRI302-5 • GRI401-1, GRI401-2, GRI401-3 • GRI402-1 • GRI403-1a, GRI403-1b, GRI403-2b, GRI403-2c, GRI403-2d, GRI403-3, GRI403-4a, GRI403-4b, GRI403-5, GRI403-7, GRI403-8, GRI403-9a, GRI403-9b, GRI403-9c, GRI403-10a, GRI403-10b, GRI403-10c • GRI404-1, GRI404-2, GRI404-3 • GRI405-1, GRI405-2 • GRI408-1

		<ul style="list-style-type: none"> • GRI409-1, GRI406-1, GRI407-1, GRI414-1, GRI414-2
SDG9	Industry, innovation, and infrastructure	<ul style="list-style-type: none"> • GRI201-1 • GRI203-1
SDG10	Reduced inequalities	<ul style="list-style-type: none"> • GRI207-1, GRI207-2, GRI207-3, GRI207-4 • GRI401-1, GRI404-1, GRI404-3 • GRI405-2
SDG11	Sustainable cities and communities	<ul style="list-style-type: none"> • GRI203-1
SDG12	Responsible consumption and production	<ul style="list-style-type: none"> • GRI301-1, GRI301-2, GRI301-3 • GRI302-1, GRI302-2, GRI302-2, GRI302-4, GRI302-5 • GRI303-1a, GRI303-1c, • GRI305-1, GRI305-2, GRI305-3, GRI305-6, GRI305-7 • GRI306-1, GRI306-2, GRI306-3, GRI306-4 • GRI417-1
SDG13	Climate action	<ul style="list-style-type: none"> • GRI201-2 • GRI302-1, GRI302-2, GRI302-3, GRI302-4, GRI302-5 • GRI305-1, GRI305-2, GRI305-3, GRI305-4, GRI305-5
SDG14	Life below water	<ul style="list-style-type: none"> • GRI304-1, GRI304-2, GRI304-3, GRI304-4 • GRI305-1, GRI305-2, GRI305-3, GRI305-4, GRI305-5, GRI305-7 • GRI306-1, GRI306-3, GRI306-5
SDG15	Life on land	<ul style="list-style-type: none"> • GRI304-1, GRI304-2, GRI304-3, GRI304-4 • GRI305-1, GRI305-2, GRI305-3, GRI305-4, GRI305-5, GRI305-7 • GRI306-3, GRI306-5
SDG16	Peace, justice, and strong institutions	<ul style="list-style-type: none"> • GRI205-1, GRI205-2, GRI205-3 • GRI206-1 • GRI307-1 • GRI403-4a, GRI403-4b, GRI403-9a, GRI403-9b, GRI403-9c, GRI403-10a, GRI403-10b, GRI403-10c • GRI408-1 • GRI410-1 • GRI414-1, GRI414-2 • GRI415-1 • GRI416-2 • GRI417-2, GRI417-3 • GRI418-1 • GRI419-1

SDG17	Partnerships for the goals	GRI207-1, GRI207-2, GRI207-3, GRI207-4
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Source: <https://www.globalreporting.org/media/lbvnxb15/mapping-sdgs-gri-update-march.pdf>

Moreover, SDG can be directly related to the SEP. For example, SDG1 "no poverty", SDG2 "zero hunger", and SDG3 "good health and well-being" is aligned with the example of the royal initiative projects solving farmers' financial deficit and improving the community's well-being. The royal initiative project has been providing education toward the rural community and building infrastructure so the locals can continue their education that related to SDG4 "quality education". Quality education also directly aligned with knowledge element of the SEP. A study has shown that practicing SEP isn't against growth as some may argue but, supports economic growth, and thus align with SDG 8 "decent work and economic growth" (Chatjuthamard et al., 2016). One of the preconditions for SEP practice is the knowledge element that is directly emphasized on using accumulated knowledge and associates with SDG9. Another precondition for SEP practice is morality that is aligned with SDG16 "peace, justice and strong institutions". The advanced phase of SEP practice emphasizes working with stakeholders under the surrounding environment and culture, and thus related to SDG17 "partnerships for the goals". These examples provide strong evidence that SEP practice is, directly and indirectly, related to SDGs and GRI standards.

2.6 Firm-specific risk and sufficiency economy philosophy

A trade-off between risk and return occurs in all business decisions. For example, buying a new computer for a cheaper price or higher price will provide us different product quality. A cheaper product may not be as reliable as a more expensive one so the purchaser will take that into account when making a decision. When a firm concentrates on maximizing profit and growth, they often overlook risk. Investors mostly are risk-averse meaning they don't like taking a high risk. For the same return rate, investors look for the lowest risk.

Capital Asset Pricing Model (CAPM) combines risk and return for assets which are widely used for financial decision making. Total risk comprises systematic

risk (also known as non-diversifiable risk or market risk) and unsystematic risk (also known as diversifiable risk or firm-specific risk). Systematic risk represents the risk that all firms in the market experience (i.e. global economic crisis) while unsystematic risk particularly affects a specific firm or industry (i.e. corruption or accident) (Gitman et al., 2015). The firm-specific risk can be avoided by diversification in the portfolio while the market risk is unavoidable. Market risk represents the risk that every firm experience such as a global economic crisis while firm-specific risk can be internal accident or sales loss. Risks have a direct impact on corporate performance however risk can be managed and some risks can be avoided. According to probability theory, Normal Distribution, the risk is the uncertainty and can be measured using the standard deviation. A higher standard deviation reflects higher risk as the asset is more volatile. Over time, two assets may not perform in the same direction, low or negative correlated, so combining two assets with the lowest correlation can significantly reduce the portfolio risk without compromising the average return (Gitman et al., 2015).

$$\text{Total risk} = \text{Systematic risk} + \text{Unsystematic risk}$$

The standard deviation of return is commonly used to measure risk (Gitman et al., 2015; Jo & Na, 2012; Ross, 2014). For example, systematic risk can be calculated by multiplying the standard deviation of market return by the volatility of the stock relative to the overall market (β). Sharpe-Lintner CAPM made necessary assumptions to generate the model which later has been challenged relating to results' bias. Despite the arguments made against the flaws of CAPM, they mostly relate to the excess expected return, not the risk (β). As this complication is not related to the subject of this study, we consider firm-specific risk from CPAM remain valid and appropriate for risk measurement. The basic concept can be presented as follows;

$$R_{it} = \alpha_i + \beta_{im} R_{mt} + \varepsilon_{it}$$

Where R_{it} is the return of the stock of firm i during period t . β_{im} is the volatility of the stock return with respect to overall market return, and R_{mt} represents market return during time t , and ε_{it} is an error in the estimation.

The firm-specific risk varies among firms and represents the uniqueness of each firm's management behaviors (Bouslah et al., 2018). Corporate SD performance involves three dimensions of economic, social, and environmental such as financial performance, Corporate Social Responsibility (CSR) engagement level, or environmental engagement index (Cai et al., 2016; Hu et al., 2019; Jo & Na, 2012). The relationship between firm risk and sustainable development performance has been extensively studied. Several leading research papers have found that sustainable development activities such as environmental preservation or social campaign are negatively correlated with firm risk. For example, risk reduction is essential in the strategic management of firms to increase firm value to meet investor expectations (Bouslah et al., 2018; Cai et al., 2016; Hu et al., 2019; Jo & Na, 2012; Ullmann, 1985). In 2019, Hu et al. found that corporate social responsibility disclosure has a strong tendency to mitigate information asymmetry and fraud committed by the organization to reduce firm risk (Hu et al., 2019)

A risk factor is one of the disclosed information by Thai listed companies (Thailand, 2005). The firm performs risk assessment as part of its risk management and internal control strategy. Most firms appear to perform risk management and report the risk assessment results in the annual reports. The objectives of their risk management appear to reduce and mitigate any risks that they may be experiencing. The SEP practice is also known to mitigate risk through applying the three core principles and two underlying conditions.

2.7 Corporate financial management

Financial Statement record the transaction when goods sold and services took place while it will not record any legal agreement or commitment. There are four key financial statements that Thai listed companies annually disclose; balance sheet statement, income statement, statement of shareholder equity, and statement of cash flows. The balance sheet statement shows the number of the company's assets and the money coming from using the assets at a point in time. Income statement (Profit and Loss) attempts to measure the increase in the value of the company due to business activities in the accounting period (Gitman et al., 2015). Statement of shareholder equity or statement of retained earnings can be included in the balance sheet

statement, income statement, or appear in a separate statement (Gitman et al., 2015). It tells us how much of the net income has been retained by the company and how much has been paid out to the shareholders. Statement of cash flows explains the adjustment of the three activities of the other three statements (Gitman et al., 2015). Once use accrual accounting, growing profitable operations doesn't always ensure positive cash flow. Statement of cash flows includes cash flows from operating, investing, and financing activities.

A firm's performance can be determined through financial ratios (Hammond & Slocum, 1996). Financial ratios are generally presented in five categories as liquidity ratio, activity ratio, debt ratio, profitability ratio, and market ratio (Gitman et al., 2015). The liquidity ratio measures the ability of the firm to pay its short-term obligation. Activity ratio measures the speed that various accounts are converted into sales, cash inflows, and cash outflows. The debt ratio measures the liability of the firm. The profitability ratio measures the ability of the firm to generate profit from its activities. The market ratio measures the investor perception of the firm's value in terms of risk and return. Each category relates to the different activities of the firm and can be used as benchmarking with other firms in the same industry to indicate the firm's performance. Moreover, financial ratios help determine the problem of the firm in each activity and assess the firm future risk. Investors use financial ratios to review the operating, investing, and financing activities of the firm and reflect the confidentiality and perception about the firm through market price value. Also, financial ratios are used to indicate both past and future performances of the firm which reflects the management decision-making and risk preferences. Academically, financial ratios are widely used in modeling as main interest and support value (Faello, 2015). The financial performance of a firm can be described through 5 financial ratio categories, i.e., liquidity, activity, debt, profitability, and market ratios (Gitman et al., 2015). Significant and widely recognized financial ratios were selected and used as a specific proxy.

2.8 Stakeholder theory, managerial opportunism, and the SEP

Freeman's stakeholder theory (1984) has been a fundamental concept in the field of business ethics, which focuses on creating value for all stakeholders (Freeman

et al., 2010). It has become a customary practice for listed companies to perform stakeholder engagements together with corporate governance since they state compulsory disclosures in their annual reports. Similarly, the three core principles of SEP directly aim to generate coexistence between corporate and other stakeholders under mutual benefits and shared value (Song, 2020). Because businesses and stakeholders can morally cooperate, a conflict between parties can be reduced, and thus firms experience less risk. According to the stakeholder theory, practicing SEP reduces firm-specific risk and thus we can deploy the following hypothesis:

Hypothesis 1. SEP practice level is negatively related to firm-specific risk.

Managerial opportunism views the relationship between firms and stakeholders differently. The opportunistic managers operate businesses for their benefits to magnify their reputations or to generate personal interests (Chalmers et al., 2002; Jiraporn & Ning, 2006). Barnea and Rubin argued that managers may overly invest in CSR (corporate social responsibility) activity at an unjustified spending level just to be appreciated as a good corporate citizen toward their employees and society in general (Barnea & Rubin, 2010). As a result, business operations under the managerial opportunism hypothesis increase firm risk.

Hypothesis 2. SEP practice level is positively related to firm-specific risk.

Chapter III

Research methodology

3.1 Sample selection

One of the most cited studies of the Sufficiency Economy Philosophy in the business sector was done by Puntasen et al. determined 296 Thai SMEs (จันทร์ et al., 2011). Initially, there were 13 industry groups as classified by Thailand Productivity Institute (1999), the research group reclassified into the most relevant six industry groups. The number of SMEs operating in each industry group range from 41 to 64 companies in each group. Another study conducted by Chatjuthamad et al., (2016) determined 50 Thai companies listed in the SET 50 index operate in 7 industry groups excluded Consumer Products (Chatjuthamad et al., 2016). A recent study on the Sufficiency Economy Philosophy as a Thai approach questioned 298 Thai Chief Executive Officers (CEOs) on a Thai approach of corporate sustainability (Kantabutra, 2014). The study has selected Thai listed companies as the target group since they represent large corporates that operate in multi-market environments and a vast variety of industries which provide ideal market diversification for the research. The study will initially use the specified 8 industry groups and 28 sectors according to the Stock Exchange of Thailand which consists of 570 companies as of December 12th, 2017. The sample size of individual industry group ranges from 17 to 156 companies per industry group, so in some particular industry group, the sample size may be too small and need to be rearranged after initial correlation analysis.

Initially, the research aimed to study listed companies on the SET100 index from 2008 to 2017. There are 192 distinctive companies (exclude financial sector) that have been listed on the SET100 index from 2008 to 2017 (based on the result of a reevaluation of the companies on the list every 6 months). After collecting data of listed companies on the SET100 index, there were only 8 out of 192 companies disclosed sustainability reports from 2008 to 2017. However, if the period was shortened to 2013 to 2017, 31 listed companies have disclosed sustainable development reports. Based on the information, selecting the sample of 8 firms for ten years (from 2008 to 2017) would give 80 observations while selecting the sample of 31 firms for five years would give 155 observations. As a result, a shorter study

period provides a larger number of observations while remaining the panel data structure. Also, the SETTHSI index which represents listed companies who voluntarily join the Thailand Sustainability Investment survey was initiated in 2015. There are 23 distinctive companies (exclude financial sector) that have been listed on the SETTHSI index from 2015 to 2017 (similarly the index is reevaluated every 6 months). After collecting data of listed companies on the SETTHSI index, 4 companies have disclosed sustainability reports from 2013 to 2017. In summary, selecting 35 listed companies (exclude the financial sector) from SET100 and SETTHSI from 2013 to 2017 provided the largest number of observations. Table 7 shows the summary of firm selection results from SET100 and SETTHSI indices and SD reports disclosure by industry.

Table 7 The outcomes of company selection from SET100 and SETTHSI

Industry	SET100 (2008- 2018)	SETTHSI (2015- 2018)	SET100 and SETTHSI	Firms disclose SD Reports 2013-2018
Agro & Food Industry	17	4	21	4
Consumer Products	2	4	6	0
Industrials	16	5	21	3
Property & Construction	57	3	60	5
Resources	30	4	34	11
Services	47	1	48	8
Technology	22	2	24	3
Total companies	191	23	214	34

3.2 Variables measurement

3.2.1 Measuring the SEP performance

The SEP performance represented by SEP_{score} is measured through information disclosure based on GRI standards. We review and align each GRI subtopic to SEP three core principles and two underlying conditions which have been defined in a business context by previous literature (Chatjuthamard et al., 2016;

Kantabutra, 2007; Sasin, 2010; Sornsri, 2016; Suttipun, 2019; Suttipun & Arwae, 2020; Suttipun & Saefu, 2017) as shown in Table 8 The alignment results suggest that if the specific GRI disclosure was related to the SEP element (i.e., moderation, reasonableness, self-immunity, knowledge, and morality).

We then construct an information disclosure checklist as our scoring system to evaluate the level of disclosure. Following Morhardt et al. 2002 and Yadava and Sinha 2015, GRI score is evaluated according to the following criteria; Zero when the specific indicator is not mentioned, one when the specific indicator was partly mentioned (i.e. not all sub-questions were mentioned) or given generic statements (i.e. company production processes do not have an environmental impact), two when the specific indicator was provided with detail but not comparable (i.e. restricted to specific facility or coverage only 1 year), and three when the specific indicator was described in full (i.e. coverage of all sub-question) and incomparable form (i.e. coverage of more than 1 year) (Morhardt et al., 2002; Yadava & Sinha, 2016). In 2002, Morhardt et al. considered each GRI subtopic equally important (Morhardt et al., 2002) To keep the simplicity of the scoring model, this study weighted each subtopic evenly as the preceding study. After evaluates the sample, the SEP score was calculated.

Table 8 Summary of SEP definitions in a business context

SEP five elements	SEP in a business context
Moderation	<ul style="list-style-type: none"> (a) produce as planned/targeted/demand (b) produce within capability (c) efficient and effective use of resources and core competencies (d) set appropriate price of product and service (e) focus on long-term result over short-term (f) create business alliances with stakeholders (g) not to overleveraged (h) use local resources or available resources (i) appropriate consumption, satisfaction, and growth
Reasonableness	<ul style="list-style-type: none"> (a) decision making and action based on understanding the business and market (b) decision making and action based on rational or result of situation analysis (c) stakeholders' interest is considered upon making a business decision (d) focus on long-term mutual benefits of the firm and stakeholders such as employee, supplier, customer, and community (e) make a decision based on knowledge and being aware of the consequences (f) make a decision based on cause and effects
Self-immunity	<ul style="list-style-type: none"> (a) related to risk management (b) product and services diversification to reduce risk (c) diversification of business-related input and output (i.e., material sourcing and product sales) (d) internal audit, assessment, and evaluation function (e) monitoring and identifying business-related changes, threats, and risks (f) use knowledge and information learned to plan for volatility
Knowledge	<ul style="list-style-type: none"> (a) training, R&D, orientation, innovation

	(b) accumulate information and implementation overtime for a better understanding of the business environment
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Morality	(a) related to corporate governance, ethics, morality, code of conduct, integrity, perseverance
	(b) conducting responsible business (i.e., corporate Social Responsibility or environmental preservation)
	(c) employee welfare (i.e., fair remuneration or provident fund)
	(d) compliance with laws

Each raw score is mapped with the aligning results. If the GRI provision was not aligned with the SEP element, the final score became zero. On the other hand, if the GRI provision was aligned with the SEP element, the final score remained. After the alignment between GRI standards and the five SEP elements, the evaluated outcomes are categorized into 15 categories (i.e., five SEP elements for each of the sustainable development three aspects). The alignment on the economic aspect of GRI 201 to GRI 206 consists of moderation_economic, reasonableness_economic, self-immunity_economic, knowledge_economic, and morality_economic categories. Where moderation_economic is the sum of the GRI disclosures on an economic aspect that aligned with moderation definitions, reasonableness_economic is the sum of the GRI disclosures on an economic aspect that aligned with reasonableness definitions, self-immunity_economic is the sum of the GRI disclosures on an economic aspect that aligned with self-immunity definitions, knowledge_economic is the sum of the GRI disclosures on an economic aspect that aligned with knowledge definitions, morality_economic is the sum of the GRI disclosures on an economic aspect that aligned with morality definitions.

The alignment on the environmental aspect of GRI 301 to GRI 308 consist of moderation_environmental, reasonableness_environmental, self-immunity_environmental, knowledge_environmental, and morality_environmental categories. Where moderation_environmental is the sum of the GRI disclosures on an environmental aspect that aligned with moderation definitions, reasonableness_environmental is the sum of the GRI disclosures on an environmental

aspect that aligned with reasonableness definitions, self-immunity_environmental is the sum of the GRI disclosures on an environmental aspect that aligned with self-immunity definitions, knowledge_environmental is the sum of the GRI disclosures on an environmental aspect that aligned with knowledge definitions, morality_environmental is the sum of the GRI disclosures on an environmental aspect that aligned with morality definitions.

The alignment on the social aspect of GRI 401 to GRI 419 consists of moderation_social, reasonableness_social, self-immunity_social, knowledge_social, and morality_social. Where moderation_social is the sum of the GRI disclosures on a social aspect that aligned with moderation definitions, reasonableness_social is the sum of the GRI disclosures on a social aspect that aligned with reasonableness definitions, self-immunity_social is the sum of the GRI disclosures on a social aspect that aligned with self-immunity definitions, knowledge_social is the sum of the GRI disclosures on a social aspect that aligned with knowledge definitions, morality_social is the sum of the GRI disclosures on a social aspect that aligned with morality definitions. Then each outcome is divided by the maximum score of each category and multiply by 100 to generate the scores range from zero to 100 and become the SEP sub-score. The maximum scores for each of the SEP sub-score used for the calculation are presented in Table 9 The SEP sub-scores in zero to 100 scale are the fundamental score used for SEP scoring calculation and consists of MOD_{eco}, REA_{eco}, SEL_{eco}, KNO_{eco}, ETH_{eco}, MOD_{env}, REA_{env}, SEL_{env}, KNO_{env}, ETH_{env}, MOD_{soc}, REA_{soc}, SEL_{soc}, KNO_{soc}, and ETH_{soc}.

Table 9 The maximum scores of the SEP sub-score (15 categories)

	Moderation	Reasonableness	Self-immunity	Knowledge	Morality
Economic	66	66	111	36	96
Environment	69	30	324	3	111
Social	147	141	270	45	222

The final SEP scoring system is presented in two dimensions. First through sustainable development three aspects (i.e., economic, environmental, and social aspects). Second through five SEP elements (i.e., moderation, reasonableness, self-immunity, knowledge, and morality).

3.2.1.1 Sustainable development three aspects consist of three scores

SEP_{eco} is the average of the five SEP sub-scores on an economic aspect that can be presented as follows,

$$SEP_{eco} = \frac{MOD_{eco} + REA_{eco} + SEL_{eco} + KNO_{eco} + ETH_{eco}}{5}$$

SEP_{env} is the average of the five SEP sub-scores on an environmental aspect that can be presented as follows,

$$SEP_{env} = \frac{MOD_{env} + REA_{env} + SEL_{env} + KNO_{env} + ETH_{env}}{5}$$

SEP_{soc} is the average of the five SEP sub-scores on a social aspect that can be presented as follows,

$$SEP_{soc} = \frac{MOD_{soc} + REA_{soc} + SEL_{soc} + KNO_{soc} + ETH_{soc}}{5}$$

3.2.1.2 Five SEP elements consist of five scores

MOD is the average of the moderation element on sustainable development three aspects that can be presented as follows,

$$MOD = \frac{MOD_{eco} + MOD_{env} + MOD_{soc}}{3}$$

REA is the average of the reasonableness element on sustainable development three aspects that can be presented as follows,

$$REA = \frac{REA_{eco} + REA_{env} + REA_{soc}}{3}$$

SEL is the average of the self-immunity element on sustainable development three aspects that can be presented as follows,

$$SEL = \frac{SEL_{eco} + SEL_{env} + SEL_{soc}}{3}$$

KNO is the average of the moderation element on sustainable development three aspects that can be presented as follows,

$$KNO = \frac{KNO_{eco} + KNO_{env} + KNO_{soc}}{3}$$

ETH is the average of the moderation element on sustainable development three aspects that can be presented as follows,

$$ETH = \frac{ETH_{eco} + ETH_{env} + ETH_{soc}}{3}$$

3.2.1.3 The SEP scores

The SEP_{score} measure the SEP practice performance can be calculated two ways as follows,

$$SEP_{score} = \frac{SEP_{eco} + SEP_{env} + SEP_{soc}}{3}$$

Or

$$SEP_{score} = \frac{MOD + REA + SEL + KNO + ETH}{5}$$

3.2.2 Measuring firm-specific risk

Fama and French (1993) has extended Sharpe-Linter Capital Asset Pricing Model to be known as Fama-French three-factor model as follows;

$$R_{it} - R_{ft} = \alpha_{it} + \beta_1 (R_{mt} - R_{ft}) + \beta_2 \text{SMB}_t + \beta_3 \text{HML}_t + \varepsilon_{it}$$

where R_{it} is the return of the stock of firm i during period t , R_{ft} is the risk-free rate of return at time t and R_{mt} represents market return during period t . By subtracting the risk-free rate of return at time t from the total return of a stock i at time t ($R_{it} - R_{ft}$) would result in expected excess return. Also subtracting the total risk-free rate of return of stock i at time t from total market portfolio return at time t ($R_{mt} - R_{ft}$) results in an excess return on the market portfolio. SMB_t is the difference in returns on small firms and large firms during time t which captures the risk factors related to firm size. HML_t is the difference in returns of firms with high book-to-market value ratios with low book-to-market value ratios firms which captures the risk factors related to book-to-market value ratio (Fama & French, 1996). The remaining risk factors which are not captured by the market factor, size factor, and value factor are shown in residual. We regress monthly data from January 2009 to January 2019 and use the median of the monthly residual values to represent the residual value of firm i in year t . Squaring the residual (ε_{it})² results in firm-specific risk in estimating Fama and French three-factor model. The data for estimating risks consist of the stock closing price of firm i , the number of shares outstanding, the SET market, and the book value of firm i . Data for risk calculation are collected from the DataStream database.

3.2.3 Selection of Control Variables

Control variables were selected based on reference to leading literature in the social science and corporate finance fields. Different firm sizes have different abilities to recover from the economic impact, as a result, the size of a firm has been used to determine its risk-related (Ben-Zion & Shalit, 1975; Perez-Quiros & Timmermann, 2000). We include total assets (TA) as a control variable for firm size. Financial literature studies asymmetric information use dividend payouts as part of their empirical models to evaluate shareholder strength (Jiraporn & Ning, 2006; Miller & Rock, 1985). We use dividend payout ratios (DPR) as a control variable for

shareholder strength. Profitability is another important indicator for firm performance and business conditions (Jiraporn et al., 2006; Jo & Na, 2012; Orlitzky & Benjamin, 2001). We control the return on equity (ROE) for the profitability of a firm. An investor's view on firm future growth or under distress conditions reflects on market value so we control the price-to-book ratio (PB) for an opportunity to grow (Hu et al., 2019; Sila et al., 2016). The risk appetite of a firm can be evaluated through leverage level (Sila et al., 2016). Thus, we include total debt total assets (TDTA) as a control variable. Firm gains knowledge over time which can increase the firm's perseverance so we consider firm age (Age), calculated from the year of the establishment until the year of study, as our control variable (Hu et al., 2019; Mishra & Modi, 2013). In summary, TA (natural logarithm term), DPR, ROE, PB, TDTA, and Age (natural logarithm term) are controlled in the regression since they may influence firm-specific risk.

3.2.4 Selection of instrumental variable

Since the sample was limited to 34 Thai listed firms, we performed two-stage least squares instrumental variable (2SLS-IV) to ensure the causal effects (Maydeu-Olivares et al., 2019). Incorporate finance study, Jiraporn claimed that finding truly exogenous instrumental variables can be difficult, the author continues to search for proper endogenous relation between firm-specific risk and the SEP score (Jiraporn & Ning, 2006). Kantabutra claimed that sustainable enterprises have similar characteristics of applying the knowledge into practice and emphasizes business ethics (Kantabutra, 2006, 2007, 2019). Moreover, a prerequisite of the SEP practice is known to be the two underlying conditions (i.e., knowledge and morality). From the evidence, we argued that the score of the two underlying conditions likely correlated with the SEP_{score} . As a result, the author uses the combined score of knowledge and morality, referred to as twocon_AVE, as an instrumental variable for the endogenous variable (i.e., the SEP_{score}).

3.3 Data collection process

Figure 7 presents data collecting process of each variable. Three sufficiency economy philosophy experts with business management backgrounds evaluated the 34 samples. All three experts were provided with a hard copy of annual and

sustainable development reports in either English or Thai versions. All three experts are influence in English with experience in business sector and SEP practice. Two of the experts have a master degree from the United States and are conducting an agriculture project under the New Theory in Nakhon Ratchasima province for over a decade. The project has been used to teach the local as well as a visitor from the New York. Another expert has a Ph.D. relating to sustainable marketing and is currently teaching at Panyapiwat Institute of Management. The author explained the evaluation process and SEP criteria to all three experts. All three of them were provided with an appropriate timeline and asked to submit the results at the end of the timeline. Each expert was required to record page number to provide the location of the evidence-related information disclosure. This also provides traceability of the results.

Sustainable development report, annual report, annual registration statement (Form 56-1), and audited quarterly and annual financial statements from 2007 to 2017 are publicly available on websites provided by the Stock Exchange of Thailand, the Security, Exchange Commission Thailand, or individual Thai listed company. Other statistical information can be gathered from secondary data sources such as Bloomberg.

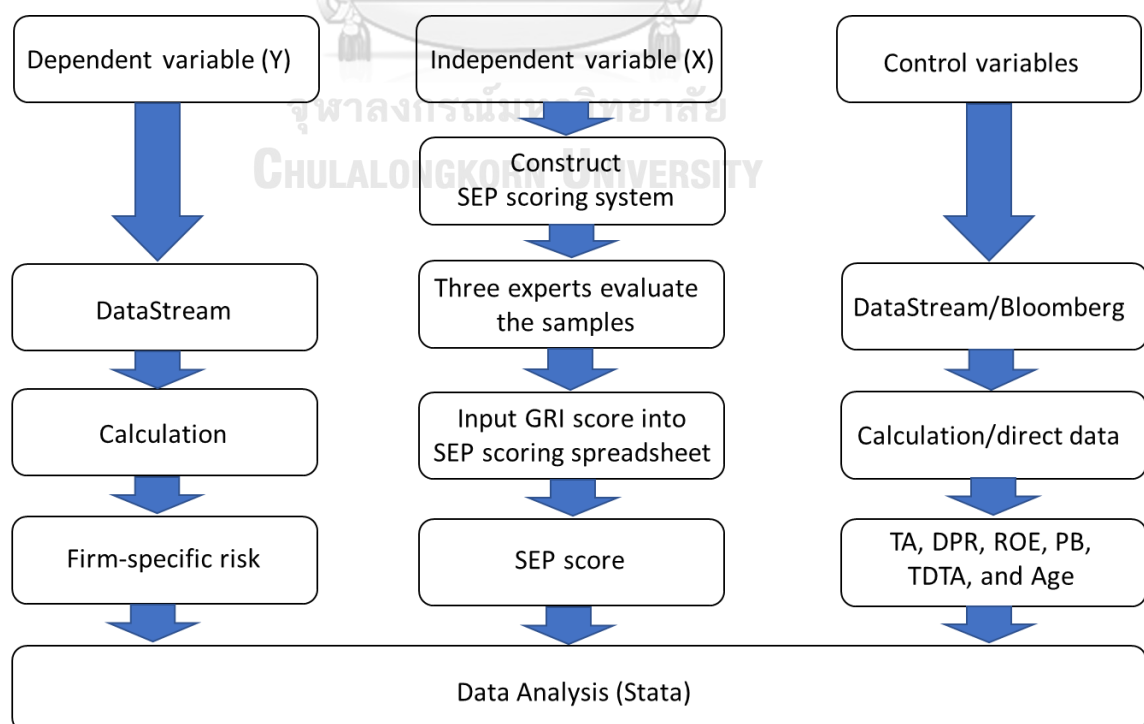


Figure 7 Data collecting diagram for each variable

3.4 Method of data analysis

3.4.1 Descriptive statistics

The basic descriptive statistics provide a general idea about the collected data, dependent variable, independent variable, and control variables through the mean, median, standard deviation, maximum, minimum, and observation numbers. The SEP scores are calculated after at least two out of three experts agreed on the final scores before entering them into the spreadsheet. The regression results of the Fama and French three-factor model also input into the spreadsheet for further calculation. Control variables are collected from Bloomberg and DataStream databases. All of the proxies are input into the spreadsheet and calculated using Stata software to generate descriptive statistics.

3.4.2 Correlation matrix

Independent variables, dependent variables, and control variables are structured in a table to show their correlation coefficients. The correlation matrix is generated using Stata software as this provides an initial view of the relationship between variables for further regression analysis. This correlation matrix also provides a correlation between independent variables to indicate a multicollinearity issue.

3.4.3 Univariate analysis

The sample of 204 Thai listed firms was categorized into two groups separated by the average SEP_{score} where the first group is referred to as the High SEP_{score} and the second group as the Low SEP_{score} . The High SEP_{score} is the sample with SEP_{score} higher or equal to the average SEP_{score} and the Low SEP_{score} is the sample with SEP_{score} lower than the average SEP_{score} . The univariate analysis is commonly used in empirical research as it describes the pattern in the data by assigning a condition and generate a category. For this study, the two categories would be compared and analyzed for significant changes that may occur between the groups.

3.4.4 Panel regression analysis

The objective of our study is to determine the relationship between the level of the firm practicing SEP and firm-specific risk. The sample involves 34 Thai listed companies (cross-section) from 2013 to 2018 (time series) so we construct our model based on the standard regression for panel data model as follows,

$$Y_{it} = \alpha_i + \beta_1 X_{it} + \varepsilon_{it}$$

Where Y_{it} is the dependent variable for firm i (firm 1 to 34) and time t (the year 2013 to 2018), β is the regression coefficient vector, X_{it} is the independent variable for firm i (firm 1 to 34), and time t (the year 2013 to 2018), α_i is an intercept of firm i , and ε_{it} is an error term. First, we perform Pooled Ordinary Least Squares (OLS) to test the relationship between SEP_score and Firm_risk as well as the relationship between the three sustainability aspects and SEP five elements and firm-specific risk.

3.4.5 Hausman test

For panel data, the Hausman test was performed to evaluate whether fixed-effects or random-effects models are the appropriate estimations. The null hypothesis of the Hausman test is that Random Effects (RE) is a preferred model and the alternative hypothesis is that the preferred model is Fixed Effects (FE). The criteria of the test are that if the p-value is statistically significant we can reject the null hypothesis.

3.4.6 Two-stage least squares instrumental variable

Since the objective of this study is interested in determining the impact between SEP_{score} and $Firm_risk$ which vary over time, FE allows us to assess the net effect of the SEP_{score} on the $Firm_risk$ by removing the time-invariant effects. To overcome the problem of omitted variable bias, we perform 2SLS regression by introducing IV which is probably correlated with our SEP_{score} but shouldn't be correlated with $Firm_risk$ (Maydeu-Olivares et al., 2019). All regressions are performed on STATA and the commands are available upon request. Table 10 shows the definition of the main variables used in regression analysis.

Table 10 definition of variables

Variable	Definition
SEP _{eco}	SEP performance on the economic aspect
SEP _{env}	SEP performance on the environmental aspect
SEP _{soc}	SEP performance on the social aspect
MOD	SEP score on moderation
REA	SEP score on the reasonableness
SEL	SEP score on self-immunity
KNO	SEP score on a knowledge
ETH	SEP score on morality
SEP _{score}	SEP performance represented based on the scoring system
TA	Total assets of a firm
l_TA	Natural log of total assets
ROE	Return on equity ratio
TDTA	Total debt to total assets ratio
Age	Age of the firm (years)
l_Age	Natural log of Age
DPR	The dividend payout ratio is the dividend per share divided by earning per share
PB	Price to Book Value is the share price divided by the book value per share of a firm.
Firm_risk	Firm-specific risk is the square of residual of Fama-French 3 factor model
Twocon_AVE	The average of two underlying conditions is the six-year average of knowledge and morality scores

Chapter IV

Results and discussion

4.1 SEP scoring system

After mapping each GRI subtopic with each of the SEP five elements, we find that out of 37 GRI disclosures on economic aspect 22 disclosures align with moderation, another 22 disclosures align with reasonableness, 37 disclosures align with self-immunity, 12 disclosures align with the knowledge and 32 disclosure align with morality. There is a total of 108 GRI disclosures on environmental aspect and 23 disclosures align with moderation, another 10 disclosures align with reasonableness, all 108 disclosures align with self-immunity, only 1 disclosure align with knowledge, and 37 disclosures align with morality. The social aspect consists of 90 GRI disclosures and 47 of them align with moderation, 47 disclosures align with reasonableness, all 90 disclosures align with self-immunity, 15 disclosures align with knowledge, and 74 disclosures align with morality. Note that some of the GRI disclosures may align with more than one SEP element. We conclude that the maximum SEP score is 579 points where 125 points are from GRI 201 to 206 (i.e., economic aspect), 179 points come from GRI 301 to 308 (i.e., environmental aspect), and 275 points from GRI 401 to 419 (i.e., social aspect). Table 11 presents the summary relationship between sustainable development three aspects, GRI standards, and five SEP elements. The full results of GRI and SEP alignment are presented in appendix A.

Table 11 The relationship between SD three aspects, GRI standards, and five SEP elements

Aspects	GRI series	GRI disclosures	SEP alignment					Total
			MOD	REA	SEL	KNO	ETH	
Economic	201-206	37	22	22	37	12	32	125
Environment	301-308	108	23	10	108	1	37	179
Social	401-419	90	49	47	90	15	74	275
Total		235	94	79	235	28	143	579

Recalling Table 2.1 “Disclosure information of Thai listed companies”, the disclosed information controlled by the SET has some overlapping with the GRI

standards. "Risk factors" and "the internal control and risk management" strongly overlap with GRI 201-2 "Financial implication and other risks opportunities due to climate change", GRI 205-1 "Operation assessed for risks related to corruption" and GRI 205-2 "Communication and training about anti-corruption policies and procedures", and GRI 403-2 "Hazard identification, risk assessment, and incident investigation". "Legal disputes" directly overlap with GRI 205-3 "Confirmed incidents of corruption and action was taken", GRI 206-1 "Legal actions for anti-competitive behavior, anti-trust, and monopoly practices", GRI 306-3 "Significant spills", GRI 307 "Non-compliance with environmental laws and regulations", GRI 416-2 "Incident of non-compliance concerning the health and safety impacts of products and services", GRI 417-2 "Incident of non-compliance concerning product and service information and labeling", GRI 417-3 "Incidents of non-compliance concerning marketing communications", and GRI 419-1 "Non-compliance with laws and regulations in the social and economic area". Since the disclosure information based on SET is only related to legal cases, the firm is not required to disclose the incident, and thus, the firm voluntarily disclosing the incident indicates a firm with strong alignment with GRI standards and SEP.

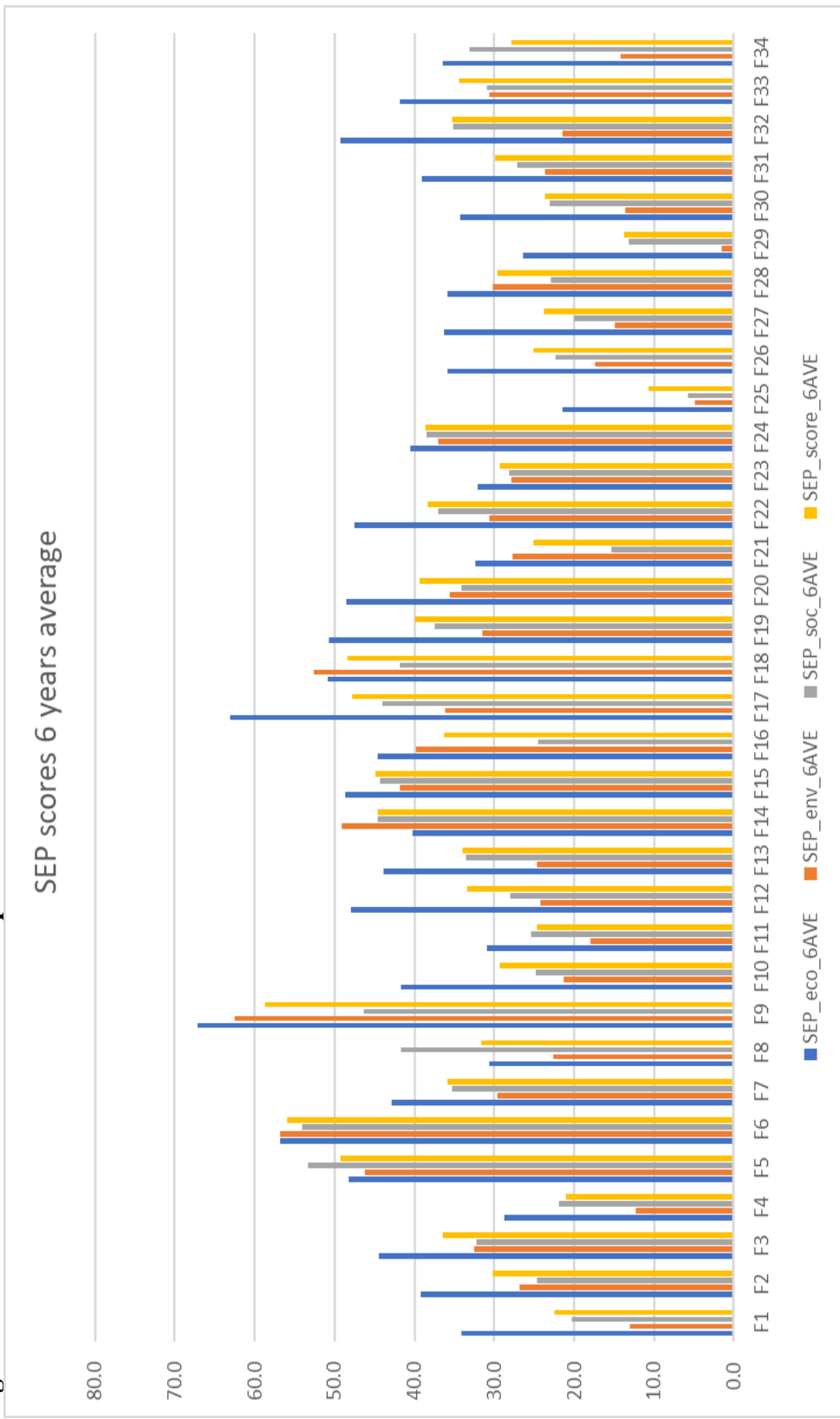
"Company information and shareholders" directly related to GRI 201-4 "Financial assistance received from the government". "Related party transaction" directly relates to GRI 201-4 "Financial assistance received from the government" and GRI 415-1 "Political contribution". "Financial position and operation results" is related to GRI 201-1 "Direct economic value generated and distributed", GRI 201-4 "Financial assistance received from the government", and GRI 401-2 "Benefits provided to full-time employees that are not provided to temporary or part-time employees". "Good corporate governance" is strongly related to GRI 205-1 "Operations assessed for risk related to corruption" and GRI 205-2 "Communication and training about anti-corruption policies and procedures". "Corporate social responsibility" is associated with GRI 203-1 "Infrastructure investments and services supported" and GRI 413-1 "Operations with local community engagement, impact assessments, and development programs. This alignment indicates that some of the

GRI provisions are mandatory disclosure and the firm may score higher in the specific subjects.

The SEP score of each firm is presented in Figure 8. All 30 firms have the SEP_{eco} score as their highest score among all three aspects. This supports the fact that the alignment between the SET mandatory disclosure and GRI standards mostly falls within the economic aspect and thus firms disclose economic information in the annual and sustainable development reports. Another two firms have their SEP_{env} as their highest score and the other two have SEP_{soc} as their highest scores.



Figure 8 SEP scores of 34 Thai listed companies



4.2 Descriptive Statistics

Table 12 shows descriptive statistics of SEP measures, the risk measures, and the control variables for all 34 Thai listed firms (excluded firms in the financial sector) from 2013 to 2018. Panel A shows the descriptive statistics of SEP_{score} with an average value of 33.82 with a maximum value of 62.66 and a minimum value of 8.84. In Panel B, the information represents the SEP performance on sustainable development three aspects SEP_{eco} , SEP_{env} , and SEP_{soc} . Among the three aspects, the economic aspect has the highest average score (41.5) followed by social (31.3) and environmental aspects (28.6) respectively. This suggests that on average listed firms disclose more information on the economic aspect than the other two aspects. The maximum score of SEP_{eco} is the highest at 68.0 while SEP_{soc} has the lowest maximum score of 60.1. The minimum score of SEP_{eco} is also the highest at 19.7 while SEP_{env} has the lowest minimum score of 1.06. This evidence is supported by the fact that SET under the supervision of the Securities and Exchange of Commission (SEC) controls listed companies to mandatory disclose financial statements and financial performance periodically. Although risk factors, risk management, legal disputes, corporate governance, and corporate social responsibilities are compulsory disclosed information of the listed firms, they share a small portion of the GRI disclosure requirements and thus have a minor impact on the SEP score results. The overall maximum score of all three aspects SEP_{eco} , SEP_{env} , and SEP_{soc} are at the same level between 60.1 to 68.0. However, the author noticed that the average minimum scores of SEP_{eco} , SEP_{env} , and SEP_{soc} vary between 1.06 to 19.7. This suggests that a certain firm may underperform on the disclosure information on the environmental aspect.

Panel C shows the SEP three cores (MOD, REA, and SEL) and two underlying conditions (KNO and ETH). MOD, REA, and SEL have an average score between 33.33 to 33.53. In other words, the SEP three cores have the average score nearly the same. This suggests that on average the samples practice the SEP three core at the same level. The maximum scores of all three cores are at the same level between 61.6 to 65.2. The minimum scores range between 7.92 to 10.7. The average score of KNO is 35.8 and ETH is 33.0. The maximum score of KNO (66.9) is higher than ETH (59.3) but the minimum score of KNO (3.70) is lower than ETH (11.1). The

average SEP_{score} of 34 Thai listed firms is 33.8 with a maximum score of 62.7 and a minimum score of 8.84.

Panel D shows detail of 15 SEP fundamental scores that were used for the calculation. MOD_{env} , REA_{env} , SEL_{env} , SEL_{soc} , ETH_{env} , and ETH_{soc} have the average scores range between 24.75 to 28.63. MOD_{soc} , REA_{soc} , KNO_{eco} , KNO_{env} , and KNO_{soc} have the average scores range between 31.31 to 36.93. MOD_{eco} , REA_{eco} , SEL_{eco} , and ETH_{eco} have an average score between 40.69 to 47.17. The data support Panel B that the economic aspect has the highest average score and the environmental aspect have the lowest average score. From five SEP elements, knowledge is the only element that has an average score on all sustainable development three aspects higher than 30.

Panel E shows the descriptive statistics of firm-specific risk. On average the sample has a firm-specific risk level of 0.0015 with a maximum firm-specific risk of 0.0254 and a minimum of 0. Panel F shows the descriptive statistics of all control variables used for the regression estimates. The sample average total assets are 188,000,000,000 baht with the maximum of 2,330,000,000,000 baht and minimum of 2,468,152,000 baht. This suggests that on average the sample consists of a large firm size. The samples have an average price to book value ratio (PB) of 2.44 with a maximum PB ratio of 32 and a minimum of 0.55. This indicates that on average investors view the sample as having a value 2.44 times higher than its book value. In other words, investors view that the sample firms' value may increase in the future. The samples have an average total debt to total assets (TDTA) of 32.4 with a maximum TDTA of 32.4 and a minimum of 0. This suggests that on average the sample leverage at 32.4 times its total assets. The samples have an average return on equity (ROE) of 10.7 with maximum ROE of 90.3 and a minimum of -176.8. This suggests that the sample are profitable firms. The samples have an average firm age (Firm_Age) of 32.6 years with the oldest firms at 105 years and the youngest firm at 2 years. This indicates that the sample has been operating on average longer than three decades. The samples have an average dividend payout ratio (DPR) of 54.4% with the highest DPR of 648% and the lowest of 0. This suggests that on average the samples pay a dividend to shareholders more than half of its profit.

Table 12 Descriptive Statistics of main variables

Variable	Mean	Median	Std. Dev.	Min	Max	Obs
Panel A: SEP performance						
SEP _{score}	33.82	34.72	11.97	8.84	62.66	204
Panel B: Sustainable development three aspects						
SEP _{eco}	41.54	41.91	11.17	19.67	68.01	204
SEP _{env}	28.60	29.10	15.78	1.06	65.85	204
SEP _{soc}	31.32	31.45	12.41	3.97	60.08	204
Panel C: Five SEP elements						
MOD	33.48	33.95	11.95	8.89	65.25	204
REA	33.33	33.90	12.83	7.92	64.74	204
SEL	33.52	33.83	12.04	10.67	61.61	204
KNO	35.80	36.20	14.60	3.70	66.85	204
ETH	32.97	32.59	10.87	11.09	59.31	204
Panel D: SEP sub-topic 15 categories						
MOD _{eco}	40.69	42.42	11.93	16.67	68.18	204
MOD _{env}	28.44	28.99	14.99	2.90	72.46	204
MOD _{soc}	31.31	31.63	12.82	4.08	63.27	204
REA _{eco}	40.69	42.42	11.93	16.67	68.18	204
REA _{env}	26.98	26.67	17.76	0.00	70.00	204
REA _{soc}	32.33	32.62	13.11	4.26	65.96	204
SEL _{eco}	47.17	46.85	9.93	25.23	68.47	204
SEL _{env}	24.75	23.46	16.67	0.62	64.20	204
SEL _{soc}	28.63	28.33	11.73	5.19	56.67	204
KNO _{eco}	34.06	36.11	13.80	11.11	69.44	204
KNO _{env}	36.93	33.33	27.04	0.00	100.0	204
KNO _{soc}	36.41	37.78	15.23	0.00	73.33	204
ETH _{eco}	45.08	44.79	10.24	22.92	67.71	204
ETH _{env}	25.92	25.68	14.58	1.80	63.96	204
ETH _{soc}	27.91	27.25	10.56	6.31	52.25	204
Panel E: Firm-specific risk						
Firm _{risk}	0.00153	0.00087	0.00220	0.00003	0.0254	204
Panel F: Control variables						
TA	188.0	69.54	370.0	2.47	2,330	204
PB	2.44	1.81	2.60	0.55	32.04	204
TDTA	32.40	32.97	14.32	0.00	65.49	204
ROE	10.69	11.97	22.24	-176.8	90.29	204
Firm _{Age}	32.62	29.00	17.99	2.00	105.0	204
DPR	54.36	50.09	68.88	-250.0	647.6	204

TA is in 1,000,000,000 (billion baht) and TA outliers are 1,787, 1,769, 2,163, 2,221, 2,326 from PTT 2013, PTT 2014, PTT 2015, PTT 2016, PTT 2017, and PTT 2018 respectively. Firm-specific risk outlier is 0.0254 from THAI 2016.

4.3 Correlation matrix

Table 13 shows the correlations between dependent, independent, control variables. The table also shows the variable of interest related to SEP performance in different views. SEP_{score} is positively and highly correlated SEP three aspects (i.e., SEP_{eco} , SEP_{env} , and SEP_{soc}), five SEP elements (i.e., MOD, REA, SEL, KNO, ETH), and all 15 SEP sub-topics. As expected, SEP_{score} is negatively associated with firm-specific risk (Firm_risk). SEP_{score} is positively correlated with firm age and total assets. In other words, firms with higher SEP performance tend to be older and have more assets. SEP_{score} is negatively correlated with the price-to-book value ratio (PB). SEP performance is positively associated with total debt to total assets (TDTA), return on equity (ROE), and dividend payout ratio (DPR). Although the correlation matrix doesn't provide a significant level nor causal relationship between variables, it indicates an important point that the SEP performance isn't strongly correlated to the firm-specific risk and selected control variables. Since in linear regression, independent variables with high correlation indicate that the linear regression estimates may be unreliable and experiencing multicollinearity.

Table 13 Correlation matrix

	SEP _{core}	SEP _{eco}	SEP _{env}	SEP _{sc}	MOD	REA	SEL	KNO	ETH	MOD _{eco}	MOD _{env}	MOD _{sc}	REA _{eco}	REA _{env}	REA _{sc}	SEL _{eco}	SEL _{env}	SEL _{sc}	KNO _{eco}	KNO _{env}	KNO _{sc}	ETH _{eco}	ETH _{env}	ETH _{sc}	TDTA	ROE	Firm_Age	DPR			
SEP _{core}	1.000																														
SEP _{eco}	0.893	1.000																													
SEP _{env}	0.932	0.748	1.000																												
SEP _{sc}	0.904	0.732	0.751	1.000																											
MOD	0.983	0.880	0.904	0.900	1.000																										
REA	0.975	0.862	0.903	0.897	0.978	1.000																									
SEL	0.975	0.886	0.879	0.905	0.960	0.947	1.000																								
KNO	0.900	0.789	0.888	0.763	0.828	0.816	0.822	1.000																							
ETH	0.984	0.888	0.903	0.898	0.978	0.968	0.984	0.825	1.000																						
MOD _{eco}	0.904	0.988	0.774	0.741	0.899	0.881	0.891	0.795	0.893	1.000																					
MOD _{env}	0.871	0.712	0.916	0.715	0.916	0.878	0.828	0.718	0.871	0.741	1.000																				
MOD _{sc}	0.888	0.711	0.737	0.992	0.890	0.889	0.888	0.737	0.886	0.717	0.703	1.000																			
REA _{eco}	0.904	0.988	0.774	0.741	0.899	0.881	0.891	0.795	0.893	1.000	0.741	0.717	1.000																		
REA _{env}	0.852	0.678	0.895	0.715	0.861	0.920	0.799	0.689	0.844	0.708	0.891	0.708	0.708	1.000																	
REA _{sc}	0.887	0.711	0.734	0.991	0.887	0.887	0.887	0.738	0.884	0.717	0.695	0.999	0.717	0.702	1.000																
SEL _{eco}	0.900	0.976	0.765	0.751	0.877	0.861	0.910	0.785	0.911	0.957	0.708	0.735	0.957	0.679	0.755	1.000															
SEL _{env}	0.936	0.805	0.912	0.825	0.922	0.903	0.968	0.787	0.945	0.821	0.864	0.806	0.821	0.811	0.805	0.831	1.000														
SEL _{sc}	0.912	0.759	0.765	0.981	0.903	0.905	0.934	0.749	0.917	0.767	0.723	0.966	0.767	0.734	0.966	0.777	0.858	1.000													
KNO _{eco}	0.745	0.920	0.573	0.597	0.737	0.715	0.725	0.682	0.727	0.877	0.575	0.573	0.877	0.536	0.575	0.841	0.632	0.622	1.000												
KNO _{env}	0.600	0.426	0.752	0.395	0.492	0.494	0.491	0.841	0.505	0.449	0.490	0.385	0.449	0.482	0.388	0.453	0.522	0.387	0.281	1.000											
KNO _{sc}	0.847	0.679	0.698	0.950	0.841	0.822	0.834	0.763	0.817	0.694	0.675	0.916	0.694	0.640	0.914	0.689	0.761	0.902	0.556	0.388	1.000										
ETH _{eco}	0.889	0.967	0.760	0.734	0.865	0.850	0.899	0.774	0.903	0.950	0.697	0.721	0.950	0.671	0.721	0.994	0.820	0.763	0.816	0.462	0.667	1.000									
ETH _{env}	0.927	0.777	0.945	0.781	0.935	0.916	0.918	0.768	0.948	0.795	0.947	0.767	0.795	0.887	0.763	0.796	0.947	0.808	0.615	0.527	0.714	0.785	1.000								
ETH _{sc}	0.897	0.734	0.749	0.983	0.892	0.901	0.901	0.737	0.906	0.740	0.708	0.979	0.740	0.733	0.978	0.751	0.818	0.978	0.605	0.383	0.891	0.735	0.786	1.000							
Firm_risk	-0.187	-0.151	-0.232	-0.110	-0.165	-0.155	-0.204	-0.182	-0.194	-0.137	-0.206	-0.094	-0.137	-0.176	-0.092	-0.164	-0.239	-0.150	-0.128	-0.174	-0.101	-0.175	-0.234	-0.106	1.000						
TA	0.422	0.340	0.438	0.358	0.394	0.414	0.446	0.355	0.432	0.331	0.381	0.350	0.331	0.419	0.347	0.357	0.475	0.395	0.300	0.248	0.309	0.335	0.466	0.366	-0.088	1.000					
PB	-0.265	-0.270	-0.175	-0.301	-0.237	-0.278	-0.253	-0.254	-0.251	-0.261	-0.101	-0.303	-0.261	-0.202	-0.306	-0.264	-0.179	-0.301	-0.275	-0.126	-0.257	-0.240	-0.162	-0.319	0.005	-0.098	1.000				
TDTA	0.085	-0.007	0.183	0.020	0.082	0.081	0.037	0.132	0.066	0.029	0.157	0.019	0.029	0.141	0.021	0.004	0.069	0.013	-0.065	0.243	0.006	-0.021	0.130	0.045	0.172	-0.024	0.009	1.000			
ROE	0.134	0.119	0.093	0.161	0.144	0.146	0.131	0.087	0.143	0.119	0.121	0.150	0.119	0.133	0.142	0.115	0.106	0.155	0.101	-0.012	0.179	0.128	0.118	0.155	-0.185	-0.083	-0.312	-0.313	1.000		
Firm_Age	0.083	0.192	0.076	-0.030	0.112	0.069	0.074	0.066	0.082	0.188	0.152	-0.040	0.188	0.059	-0.048	0.114	0.109	-0.024	0.294	-0.035	-0.015	0.105	0.121	-0.017	-0.030	0.169	0.005	0.117	-0.043	1.000	
DPR	0.104	0.084	0.107	0.090	0.144	0.112	0.118	0.018	0.129	0.114	0.175	0.092	0.114	0.097	0.094	0.086	0.141	0.091	0.016	-0.023	0.076	0.090	0.161	0.088	-0.081	-0.005	-0.018	-0.084	0.168	-0.066	1.000

4.4 Univariate

Using the average SEP_{score} from Table 14 where the average SEP_{score} is 33.82 as the condition for univariate analysis shown in Table 4.4. The High SEP_{score} consists of 108 samples and the Low SEP_{score} consists of 96 samples. The average SEP_{score} of the High SEP_{score} group has increased from 33.819 to 42.929 and the Low SEP_{score} group has decreased to 23.569. In other words, the average SEP performance score of the High SEP_{score} group has increased by 26.9% and the Low SEP_{score} group has decreased by 30.3%. For the sustainable development three aspects, the average SEP_{eco} of the High SEP_{score} group has increased from 41.536 to 49.173 and the Low SEP_{score} group has decreased to 32.944. In other words, the average SEP performance score of the High SEP_{score} group has increased by 18.4% and the Low SEP_{score} group has decreased by 20.7% on the economic dimension. The average SEP_{env} of the High SEP_{score} group has increased from 28.603 to 39.628 and the Low SEP_{score} group has decreased to 16.199. In other words, the average SEP performance on the environmental aspect of the High SEP_{score} group has increased by 38.5% and the Low SEP_{score} group has decreased by 43.4%. The average SEP_{soc} of the High SEP_{score} group has increased from 31.318 to 39.987 and the Low SEP_{score} group has decreased to 21.565. In other words, the average SEP score on the social dimension of the High SEP_{score} group has increased by 27.7% and the Low SEP_{score} group has decreased by 31.1%.

For the three core principles, the average MOD of the High SEP_{score} group has increased from 33.479 to 42.374 and the Low SEP_{score} group has decreased to 23.472. In other words, the average moderation score of the High SEP_{score} group has increased by 26.6% and the Low SEP_{score} group has decreased by 29.9%. The average REA of the High SEP_{score} group has increased from 33.332 to 42.031 and the Low SEP_{score} group has decreased to 22.420. In other words, the average reasonableness score of the High SEP_{score} group has increased by 29.1% and the Low SEP_{score} group has decreased by 32.7%. The average SEL of the High SEP_{score} group has increased from 33.519 to 42.709 and the Low SEP_{score} group has decreased to 23.180. In other words, the average self-immunity score of the High SEP_{score} group has increased by 27.4% and the Low SEP_{score} group has decreased by 30.8%. For the two underlying

conditions, the average KNO of the High SEP_{score} group has increased from 35.796 to 45.353 and the Low SEP_{score} group has decreased to 25.044. In other words, the average knowledge score of the High SEP_{score} group has increased by 26.7% and the Low SEP_{score} group has decreased by 30.0%. The average ETH of the High SEP_{score} group has increased from 32.967 to 41.178 and the Low SEP_{score} group has decreased to 23.731. In other words, the average morality score of the High SEP_{score} group has increased by 24.9% and the Low SEP_{score} group has decreased by 28.0%.

In the 15 category SEP sub-topics, the average MOD_{eco} of the High SEP_{score} group has increased from 40.686 to 48.990 and the Low SEP_{score} group has decreased to 31.345. In other words, the average moderation score on the economic aspect of the High SEP_{score} group has increased by 20.4% and the Low SEP_{score} group has decreased by 23.0%. The average MOD_{env} of the High SEP_{score} group has increased from 28.438 to 38.003 and the Low SEP_{score} group has decreased to 17.678. In other words, the average moderation score on the environmental aspect of the High SEP_{score} group has increased by 33.6% and the Low SEP_{score} group has decreased by 37.8%. The average MOD_{soc} of the High SEP_{score} group has increased from 31.313 to 40.130 and the Low SEP_{score} group has decreased to 21.393. In other words, the average moderation score on the social aspect of the High SEP_{score} group has increased by 28.2% and the Low SEP_{score} group has decreased by 31.7%. The average REA_{eco} of the High SEP_{score} group has increased from 40.686 to 48.990 and the Low SEP_{score} group has decreased to 31.345. In other words, the average reasonableness score on the economic aspect of the High SEP_{score} group has increased by 20.4% and the Low SEP_{score} group has decreased by 23.0%. The average REA_{env} of the High SEP_{score} group has increased from 26.977 to 38.765 and the Low SEP_{score} group has decreased to 13.715. In other words, the average reasonableness score on the environmental aspect of the High SEP_{score} group has increased by 43.7% and the Low SEP_{score} group has decreased by 49.2%. The average REA_{soc} of the High SEP_{score} group has increased from 32.332 to 41.338 and the Low SEP_{score} group has decreased to 22.200. In other words, the average reasonableness score on the social aspect of the High SEP_{score} group has increased by 27.9% and the Low SEP_{score} group has decreased by 31.3%. The average SEL_{eco} of the High SEP_{score} group has increased from 47.174 to 54.129

and the Low SEP_{score} group has decreased to 39.349. In other words, the average self-immunity score on the economic aspect of the High SEP_{score} group has increased by 14.7% and the Low SEP_{score} group has decreased by 16.6%. The average SEL_{env} of the High SEP_{score} group has increased from 24.750 to 37.120 and the Low SEP_{score} group has decreased to 10.835. In other words, the average self-immunity score on the environmental aspect of the High SEP_{score} group has increased by 50.0% and the Low SEP_{score} group has decreased by 56.2%. The average SEL_{soc} of the High SEP_{score} group has increased from 28.633 to 36.879 and the Low SEP_{score} group has decreased to 19.356. In other words, the average reasonableness score on the social aspect of the High SEP_{score} group has increased by 28.8% and the Low SEP_{score} group has decreased by 32.4%.

The average KNO_{eco} of the High SEP_{score} group has increased from 34.055 to 41.615 and the Low SEP_{score} group has decreased to 25.550. In other words, the average knowledge score on the economic aspect of the High SEP_{score} group has increased by 22.2% and the Low SEP_{score} group has decreased by 25.0%. The average KNO_{env} of the High SEP_{score} group has increased from 36.928 to 48.148 and the Low SEP_{score} group has decreased to 24.306. In other words, the average knowledge score on the environmental aspect of the High SEP_{score} group has increased by 30.4% and the Low SEP_{score} group has decreased by 34.2%. The average KNO_{soc} of the High SEP_{score} group has increased from 36.405 to 46.296 and the Low SEP_{score} group has decreased to 25.278. In other words, the average knowledge score on the social aspect of the High SEP_{score} group has increased by 27.2% and the Low SEP_{score} group has decreased by 30.6%. The average ETH_{eco} of the High SEP_{score} group has increased from 45.078 to 52.141 and the Low SEP_{score} group has decreased to 37.131. In other words, the average morality score on the economic aspect of the High SEP_{score} group has increased by 15.7% and the Low SEP_{score} group has decreased by 17.6%. The average ETH_{env} of the High SEP_{score} group has increased from 25.919 to 36.103 and the Low SEP_{score} group has decreased to 14.461. In other words, the average morality score on the environmental aspect of the High SEP_{score} group has increased by 39.3% and the Low SEP_{score} group has decreased by 44.2%. The average ETH_{soc} of the High SEP_{score} group has increased from 27.906 to 35.289 and the Low SEP_{score} group has

decreased to 19.599. In other words, the average morality score on the social aspect of the High SEP_{score} group has increased by 26.5% and the Low SEP_{score} group has decreased by 29.8%.

The average Firm_risk of the High SEP_{score} group has decreased from 0.00153 to 0.00109 and the Low SEP_{score} group has increased to 0.00202. In other words, the average firm-specific risk of the High SEP_{score} group has reduced by 28.8% and the Low SEP_{score} group has increased by 32.4%. The average total assets ratio of the High SEP_{score} group has increased from 1.880×10^8 to 2.992×10^8 and the Low SEP_{score} group has decreased to 6.239×10^7 . In other words, the average total assets ratio of the High SEP_{score} group has increased by 59.2% and the Low SEP_{score} group has decreased by 66.8%. The average price-to-book value ratio of the High SEP_{score} group has reduced from 2.445 to 2.062 and the Low SEP_{score} group has increased to 2.876. In other words, the average price-to-book value ratio of the High SEP_{score} group has reduced by 15.7% and the Low SEP_{score} group has decreased by 17.6%. The average total debt to total assets ratio of the High SEP_{score} group has decreased from 32.403 to 31.589 and the Low SEP_{score} group has increased to 33.317. In other words, the average total debt to total assets ratio of the High SEP_{score} group has reduced by 2.5% and the Low SEP_{score} group has increased by 2.8%. The average return on equity ratio of the High SEP_{score} group has increased from 10.694 to 13.885 and the Low SEP_{score} group has decreased to 7.104. In other words, the return on equity ratio of the High SEP_{score} group has increased by 29.8% and the Low SEP_{score} group has decreased by 33.6%. The average firm age of the High SEP_{score} group has decreased from 32.618 to 31.926 and the Low SEP_{score} group has increased to 33.396. In other words, the average age of the firm of the High SEP_{score} group has reduced by 2.1% and the Low SEP_{score} group has increased by 2.4%. The average dividend payout ratio of the High SEP_{score} group has increased from 54.362 to 64.247 and the Low SEP_{score} group has decreased to 43.241. In other words, the dividend payout ratio of the High SEP_{score} group has increased by 18.2% and the Low SEP_{score} group has decreased by 20.5%.

In summary, the overall SEP performance on all three aspects of the High SEP_{score} group are at the same level between 39.628 to 49.173 with the range of 9.545 but the SEP scores of the three aspects of the Low SEP_{score} group have a much larger

range of 16.7 (i.e., $32.994 - 16.199 = 16.745$). The SEP score of the Low SEP_{score} group on the environmental aspect is distinctively underperformed with the average score of only 16.199, and thus generates a larger range among the three aspects. Although the univariate analysis doesn't explain the causality of the variable, the evidence initiates a suspicion that the environmental aspect could play an important role in the SEP performance of the sample. The average scores among the five SEP elements in both the High SEP_{score} group and the Low SEP_{score} group are close together with the range of 4.175 (i.e., $45.353 - 41.178 = 4.175$) and 2.624 (i.e., $25.044 - 22.420 = 2.624$) respectively. This suggests that the five SEP performances are practiced with good balance. For the 15 category SEP sub-topics, the High SEP_{score} group best performs on the self-immunity on the economic aspect with the score of 54.129, and the lowest performance is in the morality on the social aspect with the score of 35.289. The Low SEP_{score} group also best perform on the self-immunity on economic aspect but the lowest performance of the group is on the self-immunity on the environmental dimension with the score of only 10.835.

As expected, that firm-specific risk is lower for the High SEP_{score} group and higher for the Low SEP_{score} group. This indicates a piece of evidence that higher SEP performance could have a relationship with lower firm-specific risk. The average total assets of the High SEP_{score} group is also much larger than the Low SEP_{score} group by 236 million baht. For price to book value ratio between the High-SEP_{score} group and the Low-SEP_{score} group suggests that the market price of the group is not exaggerated for the High SEP_{score} group since the ratio is lower than the Low SEP_{score} group. The High SEP_{score} group has a lower debt level than the Low SEP_{score} group. The return on equity ratio suggests that the High SEP_{score} group can generate profit at a much higher level than the Low SEP_{score} group. The firm age between the High SEP_{score} group and the Low SEP_{score} group is not much different since the average is only 1.470 ($33.396 - 31.926 = 1.470$) years apart. The High SEP_{score} group seems to pay a much higher dividend than the Low SEP_{score} group.

Table 14 Univariate analysis

	Mean of the High SEP _{score} group (N=108)	Mean of the Low SEP _{score} group (N=96)	Range (High-Low)
SEP _{score}	42.929	23.569	19.360
SEP _{eco}	49.173	32.944	16.229
SEP _{env}	39.628	16.199	23.429
SEP _{soc}	39.987	21.565	18.421
MOD	42.374	23.472	18.902
REA	43.031	22.420	20.611
SEL	42.709	23.180	19.530
KNO	45.353	25.044	20.309
ETH	41.178	23.731	17.447
MOD _{eco}	48.990	31.345	17.645
MOD _{env}	38.003	17.678	20.325
MOD _{soc}	40.130	21.393	18.737
REA _{eco}	48.990	31.345	17.645
REA _{env}	38.765	13.715	25.050
REA _{soc}	41.338	22.200	19.138
SEL _{eco}	54.129	39.349	14.780
SEL _{env}	37.120	10.835	26.285
SEL _{soc}	36.879	19.356	17.524
KNO _{eco}	41.615	25.550	16.065
KNO _{env}	48.148	24.306	23.843
KNO _{soc}	46.296	25.278	21.019
ETH _{eco}	52.141	37.131	15.010
ETH _{env}	36.103	14.461	21.641
ETH _{soc}	35.289	19.599	15.690
Firm_risk	0.00109	0.00202	-0.00093
TA	2.99	0.62	2.37
PB	2.062	2.876	-0.814
TDTA	31.589	33.317	-1.728
ROE	13.885	7.104	6.781
Firm_Age	31.926	33.396	-1.470
DPR	64.247	43.241	21.006

TA is in 1,000,000,000 (billion baht)

4.5 Hausman Test for Panel Data

We conduct the Hausman test to determine whether the RE regression or the FE regression is an appropriate estimation for the model. Since the criteria suggest that if the p-value is statistically significant we can reject the null hypothesis, our result with a low p-value (p-value < 0.01) indicates that we reject the null hypothesis thus fixed effects regression is an appropriate estimation as shown in Table 15. As a result, we extend our hypothesis testing by performing fixed effects regression.

$$\text{Firm_risk}_{it} = \beta_1 \text{SEP}_{\text{score } it} + \beta_2 \text{l_TA}_{it} + \beta_3 \text{PB}_{it} + \beta_4 \text{TDTA}_{it} + \beta_5 \text{ROE}_{it} + \beta_6 \text{l_Age}_{it} + \beta_7 \text{DPR}_{it} + \alpha_i + \varepsilon_{it}$$

where Firm_risk_{it} is the firm-specific risk of firm i and time t calculated using Fama-French 3 factor model, $\text{SEP}_{\text{score } it}$ is the measurement of SEP performance of firm i and time t . l_TA_{it} (natural log of total assets), PB_{it} (price-to-book value ratio), TDTA_{it} (total debt to total assets), ROE_{it} (return on equity), l_Age_{it} (natural log of firm's age), DPR_{it} (dividend payout ratio) is control variables of firm i and time t .

Table 15 Hausman test for panel data

Dependent Variable	Chi2	Prob>Chi2	Test Summary
Firm_risk	19.2	0.0076	Fixed effects

4.6 Regression Results

4.6.1 Three Aspects of Sustainable Development and Firm Risks

Models 1 to 3 in Table 16 show the pooled ordinary least squares regression results of SEP performance on the economic aspect (SEP_{eco}), environmental aspect (SEP_{env}), social aspect (SEP_{soc}), and firm-specific risk (Firm_risk). Models 4 to 6 in Table 4.6 present the result of the same variables set through fixed effects regression methods. The SEP_{eco} in model 1 is negatively and significantly at 5% related to Firm_risk . Only return on equity (ROE) is significantly and negatively related to Firm_risk at 10%. Other control variables are not significantly related to Firm_risk . The r-square of the OLS regression is at 7.6%. The SEP_{env} in model 2 is negatively and significantly at 1% associated with Firm_risk . The total debt to total assets ratio is the only control variable that is significantly and negatively related to Firm_risk .

Other control variables are not significantly related to Firm_risk. The r-square of the OLS regression is at 12.2%. The SEP_{soc} in model 3 is negatively but not significantly related to Firm_risk. The ROE is significantly and negatively related to Firm_risk at 10%. Other control variables are not significantly related to Firm_risk. The r-square of the OLS regression is at 6.6%.

The SEP_{eco} in model 4 is negatively but not significantly related to Firm_risk. Only dividend payout ratio (DPR) is negatively and significantly at 10% related to Firm_risk. Other control variables are not significantly related to Firm_risk. The r-square of the FE regression is at 6.3%. The SEP_{env} in model 5 is negatively and significantly at 5% associated with Firm_risk. All of the control variables are not significantly related to Firm_risk. The r-square of the FE regression is at 7.6%. The SEP_{soc} in model 6 is negatively but not significantly related to Firm_risk. Only dividend payout ratio (DPR) is negatively and significantly at 10% related to Firm_risk. Other control variables are not significantly related to Firm_risk. The r-square of the FE regression is at 5.6%. Based on FE regression, SEP_{env} seems to have the most impact on firm-specific risk. On the other hand, SEP_{soc} has no significant effect on Firm_risk. For control variables, total assets (l_TA) and price-to-book value (PB), total debt total assets (TDTA), return on equity (ROE), firm's age (l_Age) are not significant in all FE regressions, and thus have no impact on Firm_risk. The dividend payout ratio (DPR) seems to have an impact on Firm_risk.

Since the Hausman test result suggested that FE regression is an appropriate model, the result from FE is used to explain the relationship. In summary, from the three aspects of sustainable development, SEP performance on the environmental aspect (SEP_{env}) has the most impact on reducing firm-specific risk.

Table 16 Three aspects of sustainability scores

	Pooled OLS			Fixed effects		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
SEP _{eco}	-0.000026** (0.000)			-0.000041 (0.000)		
SEP _{env}		-0.000044*** (0.000)			-0.000046** (0.000)	
SEP _{soc}			-0.000013 (0.000)			-0.000014 (0.000)
l_TA	-0.000066 (0.000)	0.000097 (0.000)	-0.000086 (0.000)	-0.000619 (0.001)	-0.00046 (0.001)	-0.000765 (0.001)
PB	-0.000069 (0.000)	-0.000071 (0.000)	-0.000058 (0.000)	0.000215 (0.000)	0.000229 (0.000)	0.000214 (0.000)
TDTA	0.000020 (0.000)	0.000028* (0.000)	0.000021 (0.000)	0.000032 (0.000)	0.000028 (0.000)	0.000031 (0.000)
ROE	-0.000016* (0.000)	-0.000011 (0.000)	-0.000016* (0.000)	0.000033 (0.000)	0.000033 (0.000)	0.000033 (0.000)
l_Age	-0.000017 (0.000)	-0.00022 (0.000)	-0.000071 (0.000)	-0.000284 (0.001)	0.000279 (0.001)	-0.000925 (0.001)
DPR	-0.0000011 (0.000)	-0.0000005 (0.000)	-0.0000013 (0.000)	0.0000021* (0.000)	0.0000017 (0.000)	0.0000018* (0.000)
Constant	0.00358 (0.002)	0.00117 (0.003)	0.00342 (0.002)	0.0132 (0.012)	0.00823 (0.009)	0.0168 (0.011)
Observations	204	204	204	204	204	204
R-squared	0.076	0.122	0.066	0.063	0.076	0.056

Table 16 shows the results of the regressions using two methods: OLS for models 1 to 3 and FE for models 4 to 6. The dependent variable for models 1 to 6 is Firm_risk which represents firm-specific risk while independent variables are SEP_{eco} for models 1 and 4, SEP_{env} for models 2 and 5, and SEP_{soc} for models 3 and 6. Control variables for all 6 models are total assets (in natural log form l_TA), price to book ratio (PB), total debt to total assets ratio (TDTA), return on equity (ROE), firms age (in natural log form l_Age), and dividend payout ratio (DPR). Robust standard errors (clustered by the firm for OLS) are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels respectively.

4.6.2 Three core principles, two underlying conditions, and firm risks

Three core principles and firm-specific risk are presented in models 7 to 12. Models 7 to 9 in Table 17 show the pooled ordinary least squares (OLS) regression results between the moderation (MOD), reasonableness (REA), self-immunity (SEL), and Firm_risk. The control variables for all three models are total assets (TA), the price-to-book value (PB), total debt to total assets (TDTA), return on equity (ROE), firm age (l_Age), and Dividend payout ratio (DPR). The MOD in model 7 is negatively and significantly at 5% related to Firm_risk. All of the control variables are not significantly related to Firm_risk. The r-square of the OLS regression is at 8.0%. The REA in model 8 is negatively and significantly at 10% associated with Firm_risk. All of the control variables are not significantly related to Firm_risk. The r-square of the OLS regression is at 7.8%. The SEL in model 9 is negatively and significantly at 5% related to Firm_risk. All of the control variables are not significantly related to Firm_risk. The r-square of the OLS regression is at 9.6%.

Models 10 to 12 in Table 17 show the fixed effects (FE) regression results between the moderation (MOD), reasonableness (REA), self-immunity (SEL), and Firm_risk. The control variables for all three models are total assets (TA), the price-to-book value (PB), total debt to total assets (TDTA), return on equity (ROE), firm age (l_Age), and Dividend payout ratio (DPR). The MOD in model 10 is negatively and significantly at 10% related to Firm_risk. The dividend payout ratio is positively and significantly at 10% related to Firm_risk. Other control variables are not significantly related to Firm_risk. The r-square of the FE regression is at 6.6%. The REA in model 11 is negatively but not significantly associated with Firm_risk. The dividend payout ratio is positively and significantly at 10% related to Firm_risk. Other control variables are not significantly related to Firm_risk. The r-square of the FE regression is at 6.5%. The SEL in model 12 is negatively and significantly at 5% related to Firm_risk. The dividend payout ratio is positively and significantly at 10% related to Firm_risk. Other control variables are not significantly related to Firm_risk. The r-square of the FE regression is at 6.9%. In summary, moderation and self-immunity are the SEP's key drivers in reducing firm-specific risk.

Table 17 The SEP three core principles scores

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
MOD	-0.000032** (0.000)			-0.000056* (0.000)		
REA		-0.000029* (0.000)			-0.000050 (0.000)	
SEL			-0.000045** (0.000)			-0.000066** (0.000)
l_TA	-0.000005 (0.000)	-0.000005 (0.000)	0.000064 (0.000)	-0.000485 (0.001)	-0.000513 (0.001)	-0.000438 (0.001)
PB	-0.000068 (0.000)	-0.000073 (0.000)	-0.000083 (0.000)	0.000219 (0.000)	0.000209 (0.000)	0.000211 (0.000)
TDTA	0.000022 (0.000)	0.000022 (0.000)	0.000020 (0.000)	0.000030 (0.000)	0.000029 (0.000)	0.000032 (0.000)
ROE	-0.000014 (0.000)	-0.000014 (0.000)	-0.000013 (0.000)	0.000035 (0.000)	0.000034 (0.000)	0.000034 (0.000)
l_Age	-0.000097 (0.000)	-0.000109 (0.000)	-0.00016 (0.000)	0.000272 (0.001)	0.000175 (0.001)	0.000391 (0.001)
DPR	-0.000001 (0.000)	-0.000001 (0.000)	-0.000001 (0.000)	0.000002* (0.000)	0.000002* (0.000)	0.000002* (0.000)
Constant	0.00263 (0.002)	0.00261 (0.003)	0.00212 (0.003)	0.00916 (0.011)	0.00986 (0.011)	0.00823 (0.010)
Observations	204	204	204	204	204	204
R-squared	0.08	0.078	0.096	0.066	0.065	0.069

Table 17 reports the results of OLS and FE regressions for three cores of SEP. We remain using Firm_risk as the dependent variable for models 7 to 12 while independent variables are MOD for models 7 and 10, REA for models 8 and 11, and SEL for models 9 and 12. Control variables for all 4 models are total assets (in natural log form l_TA), price to book ratio (PB), total debt to total assets ratio (TDTA), return on equity (ROE), firms age (in natural log form l_Age), and dividend payout ratio (DPR). Robust standard errors (clustered by the firm for OLS) are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels respectively.

Two underlying conditions and firm-specific risk are presented in models 13 to 16. Models 13 and 14 in Table 18 show the pooled ordinary least squares (OLS) regression results between the knowledge (KNO), morality (ETH), and Firm_risk. The control variables for both models are total assets (TA), the price-to-book value (PB), total debt to total assets (TDTA), return on equity (ROE), firm age (l_Age), and Dividend payout ratio (DPR). The KNO in model 13 is negatively and significantly at 1% related to Firm_risk. All of the control variables are not significantly related to Firm_risk. The r-square of the OLS regression is at 9.6%. The ETH in model 14 is negatively and significantly at 5% associated with Firm_risk. All of the control variables are not significantly related to Firm_risk. The r-square of the OLS regression is at 9.2%.

Models 15 and 16 in Table 18 show the fixed effects (FE) regression results between the knowledge (KNO), morality (ETH), and Firm_risk. The control variables for both models are total assets (TA), the price-to-book value (PB), total debt to total assets (TDTA), return on equity (ROE), firm age (l_Age), and Dividend payout ratio (DPR). The KNO in model 15 is negatively and significantly at 10% related to Firm_risk. The control variables are not significantly related to Firm_risk. The r-square of the FE regression is at 7.0%. The ETH in model 16 is negatively and significantly at 5% associated with Firm_risk. The dividend payout ratio is positively and significantly at 10% related to Firm_risk. Other control variables are not significantly related to Firm_risk. The r-square of the FE regression is at 6.9%. In summary, knowledge, and morality are the SEP key drivers in reducing firm-specific risk.

Table 18 SEP two underlying conditions scores

	Pooled OLS		Fixed effects	
	Model 13	Model 14	Model 15	Model 16
KNO	-0.0000324*** (0.000)		-0.0000343* (0.000)	
ETH		-0.0000449** (0.000)		-0.0000696** (0.000)
l_TA	-0.000010 (0.000)	0.000033 (0.000)	-0.000502 (0.001)	-0.000403 (0.001)
PB	-0.000080 (0.000)	-0.000078 (0.000)	0.000218 (0.000)	0.000218 (0.000)
TDTA	0.000024 (0.000)	0.000022 (0.000)	0.000027 (0.000)	0.000030 (0.000)
ROE	-0.000014 (0.000)	-0.000013 (0.000)	0.000034 (0.000)	0.000034 (0.000)
l_Age	-0.000135 (0.000)	-0.000145 (0.000)	-0.000141 (0.001)	0.000425 (0.001)
DPR	-0.000001 (0.000)	-0.000001 (0.000)	0.000002 (0.000)	0.000002* (0.000)
Constant	0.00295 (0.002)	0.00256 (0.002)	0.0103 (0.010)	0.00765 (0.011)
Observations	204	204	204	204
R-squared	0.096	0.092	0.07	0.069

Table 18 shows that the two-underlying conditions of SEP are both negatively and significantly associated with Firm_risk. Control variables for all 4 models are total assets (in natural log form l_TA), price to book ratio (PB), total debt to total assets ratio (TDTA), return on equity (ROE), firms age (in natural log form l_Age), and dividend payout ratio (DPR). Robust standard errors (clustered by the firm for OLS) are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels respectively.

4.6.3 SEP performance and firm risk

The main objective of this research is to examine the relationship between the level of SEP practice and the firm-specific risk of a firm. Table 19 presents the result of model 17 using OLS, model 18 through fixed effects, and model 19 using Instrumental Variable (IV) Two-Stage Least Squares (2SLS) regressions. To test our main objective, Firm_risk is carried on to represent the dependent variable and SEP_{score} is now the independent variable for models 17 to 19. The control variables for all three models are total assets (TA), the price-to-book value (PB), total debt to total assets (TDTA), return on equity (ROE), firm age (l_Age), and Dividend payout ratio (DPR). The SEP_{score} in model 17 is negatively and significantly at 5% related to firm-specific risk. All of the control variables are not significantly related to Firm_risk. The r-square of the OLS regression is 9.1%. The SEP_{score} in model 18 is negatively and significantly at 5% related to firm-specific risk. The dividend payout ratio (DPR) is positively and significantly at 10% related to Firm_risk. Other control variables are not significantly related to Firm_risk. The r-square of the FE regression is 7.1%. The first two models, OLS and fixed effect show that SEP_{score} is negatively and significantly at 5% related to Firm_risk which supports the hypothesis based on stakeholder theory that practicing SEP reduces firm-specific risk.

The author performed IV (2SLS) regression to test bi-directional causality between Firm_risk and SEP_{score}. Besides the three core principles, the two underlying conditions are the requirement within the individual or firm to achieve business sustainability through practicing the SEP. The SEP_{score} is calculated from a weighted average of two sets of scores; the three core principles (MOD, REA, and SEL) and the two underlying conditions (KNO and ETH). Based on the SEP, the author argued that the score of two underlying conditions is probably correlated with SEP_{score} thus the score of two conditions is used as an instrumental variable for the endogenous variable which is SEP_{score}. The result of the IV (2SLS) supports that SEP_{score} is negatively and significantly associated with Firm_risk. The significant level of IV (2SLS) regression remains at 5% comparing to OLS and fixed effects regressions. In summary, practicing SEP benefits firms to face less risk which supports the risk reduction hypothesis.

Table 19 SEP score

	OLS	Fixed effects	2SLS
	Model 9	Model 18	Model 19
SEP _{score}	-0.000041** (0.000)	-0.000063** (0.000)	-0.000155** (0.000)
l_TA	0.000037 (0.000)	-0.000394 (0.001)	0.000550* (0.000)
PB	-0.000081 (0.000)	0.000214 (0.000)	-0.000183* (0.000)
TDTA	0.000022 (0.000)	0.000029 (0.000)	0.000026 (0.000)
ROE	-0.000013 (0.000)	0.000035 (0.000)	-0.000014 (0.000)
l_Age	-0.000145 (0.000)	0.000472 (0.001)	-0.000526* (0.000)
DPR	-0.0000008 (0.000)	0.0000020 (0.000)	0.0000009 (0.000)
Constant	0.00239 (0.003)	0.00717 (0.011)	-0.00173 (0.004)
Observations	204	204	204
R-squared	0.091	0.071	

Table 19 shows that the association between SEP performance and Firm_risk through OLS, FE, and 2SLS-IV regressions. Control variables for all 4 models are total assets (in natural log form l_TA), price to book ratio (PB), total debt to total assets ratio (TDTA), return on equity (ROE), firms age (in natural log form l_Age), and dividend payout ratio (DPR). Robust standard errors are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels respectively.

Chapter V

Conclusions

In recent years, a trade war between China and the US, as well as the COVID-19 pandemic, have placed additional pressure on the world's economic growth. Survivability of business is essential amid high market volatility. It becomes more essential for business enterprises to initiate an SD practice to help their organization through a difficult time. The SEP has been widely acknowledged to lead to sustainability through the Buddhist concept of the Middle Way. Readiness can be conducted at all levels, from the individual to larger communities, including the business sector. However, the lack of simple performance measuring tools prevents firms from adopting the SEP. Therefore, we constructed a SEP scoring system to measure SEP performance with a concept of simplicity. The SEP score, based on international standards such as GRI, can be accepted and adopted more widely since most listed firms already follow such standards. This is a key advantage of our SEP scoring system since it directly extracts disclosed information from SD reports. The scoring can be applied as an extension of the existing knowledge. As a result, the initiated SEP scoring system can be further conducted on larger-scale research. The result of the SEP scoring provides a clear and specific description that can be further used to improve the weakness of the evaluated firms. The SEP scoring gives higher practicality to future researchers who aim to study business sustainability via SEP practice. By merging the local knowledge, SEP, with international standard, Global Reporting Initiative (GRI), researchers can now evaluate the SEP performance of listed firms outside Thailand as long as they disclose annual and sustainable development reports. This will extend the research on the SEP subject well beyond the existing literature.

After achieving the final SEP scoring system, we put it to the test by evaluating 34 listed companies. This study is the first empirical research to explore the unknown relationship between SEP practice and firm-specific risk. The author proposed a theory using a multidisciplinary approach from social science, corporate finance, and econometrics to test the risk reduction hypothesis. The materials of the proposed theory consist of the three core principles and two underlying conditions of

the SEP, and firm-specific risk from Fama and French's three-factor model. Fixed-effects regression was performed to analyze the model and supplement statistics from the econometrics approach, the instrumental variable two-stage least squares assist our causal relation test. The findings revealed valid evidence that SEP practice reduces firm-specific risk, and thus supported the existing literature. The author also examined the possibility of negative impacts from SEP practice. Although previous SEP studies showed promising positive effects, one of the proposed hypotheses tested the reverse relationship. However, the results did not support the managerial hypothesis.

The research also validated the SEP performance results by performing a 2SLS-IV analysis to estimate the causal relationship between the SEP_{score} and firm-specific risk. The findings aligned with results from the existing literature showing that SEP has a positive impact on firms, suggesting that the initiated SEP scoring system can be properly applied in the real world. Moreover, with empirical results to verify the advantages of practicing SEP, regulators can confidently steer listed firms in a beneficial direction. For example, the findings suggest that firms disclosing environmental information can reduce firm-specific risk, and thus disclosing such information should no longer be voluntary. Since the findings provide empirical evidence that practicing SEP can reduce firm-specific risk, firms who want to reduce firm-specific risk can use the SEP scoring to evaluate their firms and improve their weaknesses as the SEP scoring provides specific practical guidelines on the strength and weakness according to GRI standards. The results favor previous literature on the positive impacts of SEP practice but discourage the skeptical argument on the negative effect. The contribution of this research goes beyond supporting the business practitioners, academic researchers, and SET regulators. The Thai government can adopt SEP scoring in the next national economic and social development plan (NESDP) and share knowledge with the local small and medium enterprises (SMEs) to strengthen the Thai economy.

Although the study provides valuable empirical results of the SEP practice, it is far from flawless. One limitation of this study is that the sample was still limited within Thailand. It is recommended for future researchers to extend the study to other

countries to evaluate the alignment of the foreign firm's disclosure and SEP practice. Expanding the study to international firms will provide insightful intellectual knowledge for the academic community with an alternative sustainable development theory.



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Appendix

Appendix A: The following shows the result of the alignment between GRI disclosure provisions and five SEP elements.

Economic aspect

Disclosure 201-1: Direct economic value generated and distributed

- a) Direct economic value generated and distributed (EVG&D) on an accruals basis, including the basic components for the organization's global operations as listed below. If data are presented on a cash basis, report the justification for this decision in addition to reporting the following basic components:
- b) Where significant, report EVG&D separately at country, regional, or market levels, and the criteria used for defining significance.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 201-2: Financial implications and other risks and opportunities due to climate change

- a) Risks and opportunities posed by climate change that have the potential to generate substantive changes in operations, revenue, or expenditure, including:

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	N

Disclosure 201-3: Defined benefit plan obligations and other retirement plans

- a) If the plan's liabilities are met by the organization's general resources, the estimated value of those liabilities.
- b) If a separate fund exists to pay the plan's pension liabilities:

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 201-4: Financial assistance received from government

- a) Total monetary value of financial assistance received by the organization from any government during the reporting period, including:
- b) The information in 201-4-a by country.
- c) Whether, and the extent to which, any government is present in the shareholding structure.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 202-1: Ratios of standard entry level wage by gender compared to local minimum wage

- When a significant proportion of employees are compensated based on wages subject to minimum wage rules, report the relevant ratio of the entry level wage by gender at significant locations of operation to the minimum wage.
- When a significant proportion of other workers (excluding employees) performing the organization's activities are compensated based on wages subject to minimum wage rules, describe the actions taken to determine whether these workers are paid above the minimum wage.
- Whether a local minimum wage is absent or variable at significant locations of operation, by gender. In circumstances in which different minimums can be used as a reference, report which minimum wage is being used.
- The definition used for 'significant locations of operation'.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 202-2: Proportion of senior management hired from the local community

- Percentage of senior management at significant locations of operation that are hired from the local community.
- The definition used for 'senior management'.
- The organization's geographical definition of 'local'.
- The definition used for 'significant locations of operation'.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 203-1: Infrastructure investments and services supported

- Extent of development of significant infrastructure investments and services supported.
- Current or expected impacts on communities and local economies, including positive and negative impacts where relevant.
- Whether these investments and services are commercial, in-kind, or pro bono engagements.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 203-2: Significant indirect economic impacts

- a) Examples of significant identified indirect economic impacts of the organization, including positive and negative impacts.
- b) Significance of the indirect economic impacts in the context of external benchmarks and stakeholder priorities, such as national and international standards, protocols, and policy agendas.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	Y	N

Disclosure 204-1: Proportion of spending on local suppliers

- a) Percentage of the procurement budget used for significant locations of operation that is spent on suppliers local to that operation (such as percentage of products and services purchased locally).
- b) The organization's geographical definition of 'local'.
- c) The definition used for 'significant locations of operation'.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 205-1: Operations assessed for risks related to corruption

- a) Total number and percentage of operations assessed for risks related to corruption.
- b) Significant risks related to corruption identified through the risk assessment.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 205-2: Communication and training about anti-corruption policies and procedures

- a) Total number and percentage of governance body members that the organization's anti-corruption policies and procedures have been communicated to, broken down by region.
- b) Total number and percentage of employees that the organization's anti-corruption policies and procedures have been communicated to, broken down by employee category and region.

- c) Total number and percentage of business partners that the organization's anti-corruption policies and procedures have been communicated to, broken down by type of business partner and region. Describe if the organization's anti-corruption policies and procedures have been communicated to any other persons or organizations.
- d) Total number and percentage of governance body members that have received training on anti-corruption, broken down by region.
- e) Total number and percentage of employees that have received training on anti-corruption, broken down by employee category and region.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 205-3: Confirmed incidents of corruption and actions taken

- a) Total number and nature of confirmed incidents of corruption.
- b) Total number of confirmed incidents in which employees were dismissed or disciplined for corruption.
- c) Total number of confirmed incidents when contracts with business partners were terminated or not renewed due to violations related to corruption.
- d) Public legal cases regarding corruption brought against the organization or its employees during the reporting period and the outcomes of such cases.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 206-1: Legal actions for anti-competitive behavior, anti-trust, and monopoly practices

- a) Number of legal actions pending or completed during the reporting period regarding anti-competitive behavior and violations of anti-trust and monopoly legislation in which the organization has been identified as a participant.
- b) Main outcomes of completed legal actions, including any decisions or judgments.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Environmental Aspect**Disclosure 301-1: Materials used by weight or volume**

- a) Total weight or volume of materials that are used to produce and package the organization's primary products and services during the reporting period, by:

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 301-2: Recycled input materials used

- a) Percentage of recycled input materials used to manufacture the organization's primary products and services.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	N	Y	N	Y

Disclosure 301-3: Reclaimed products and their packaging materials

- a) Percentage of reclaimed products and their packaging materials for each product category.
- b) How the data for this disclosure have been collected.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 302-1: Energy consumption within the organization

- a) Total fuel consumption within the organization from non-renewable sources, in joules or multiples, and including fuel types used.
- b) Total fuel consumption within the organization from renewable sources, in joules or multiples, and including fuel types used.
- c) In joules, watt-hours or multiples, the total:
- i. electricity consumption
 - ii. heating consumption
 - iii. cooling consumption
 - iv. steam consumption
- d) In joules, watt-hours or multiples, the total:
- i. electricity sold
 - ii. heating sold
 - iii. cooling sold
 - iv. steam sold

- e) Total energy consumption within the organization, in joules or multiples.
- f) Standards, methodologies, assumptions, and/or calculation tools used.
- g) Source of the conversion factors used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 302-2: Energy consumption outside of the organization

- a) Energy consumption outside of the organization, in joules or multiples.
- b) Standards, methodologies, assumptions, and/or calculation tools used.
- c) Source of the conversion factors used

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 302-3: Energy intensity

- a) Energy intensity ratio for the organization.
- b) Organization-specific metric (the denominator) chosen to calculate the ratio.
- c) Types of energy included in the intensity ratio; whether fuel, electricity, heating, cooling, steam, or all.
- d) Whether the ratio uses energy consumption within the organization, outside of it, or both.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 302-4: Reduction of energy consumption

- a) Amount of reductions in energy consumption achieved as a direct result of conservation and efficiency initiatives, in joules or multiples.
- b) Types of energy included in the reductions; whether fuel, electricity, heating, cooling, steam, or all.
- c) Basis for calculating reductions in energy consumption, such as base year or baseline, including the rationale for choosing it.
- d) Standards, methodologies, assumptions, and/or calculation tools used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	N	Y	N	Y

Disclosure 302-5: Reductions in energy requirements of products and services

- a) Reductions in energy requirements of sold products and services achieved during the reporting period, in joules or multiples.
- b) Basis for calculating reductions in energy consumption, such as base year or baseline, including the rationale for choosing it.
- c) Standards, methodologies, assumptions, and/or calculation tools used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	N	Y	N	Y

Disclosure 303-1: Interactions with water as a shared resource

- a) A description of how the organization interacts with water, including how and where water is withdrawn, consumed, and discharged, and the water-related impacts caused or contributed to, or directly linked to the organization's activities, products or services by a business relationship (e.g., impacts caused by runoff).
- b) A description of the approach used to identify water-related impacts, including the scope of assessments, their timeframe, and any tools or methodologies used.
- c) A description of how water-related impacts are addressed, including how the organization works with stakeholders to steward water as a shared resource, and how it engages with suppliers or customers with significant water-related impacts.
- d) An explanation of the process for setting any water-related goals and targets that are part of the organization's management approach, and how they relate to public policy and the local context of each area with water stress.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 303-2: Management of water discharge-related impacts

- a) A description of any minimum standards set for the quality of effluent discharge, and how these minimum standards were determined, including:
 - i. how standards for facilities operating in locations with no local discharge requirements were determined;
 - ii. any internally developed water quality standards or guidelines;
 - iii. any sector-specific standards considered;
 - iv. whether the profile of the receiving waterbody was considered.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 303-3: Water withdrawal

- a) Total water withdrawal from all areas in megaliters, and a breakdown of this total by the following sources, if applicable:
- i. Surface water;
 - ii. Groundwater;
 - iii. Seawater;
 - iv. Produced water;
 - v. Third-party water.
- b) Total water withdrawal from all areas with water stress in megaliters, and a breakdown of this total by the following sources, if applicable:
- i. Surface water;
 - ii. Groundwater;
 - iii. Seawater;
 - iv. Produced water;
 - v. Third-party water, and a breakdown of this total by the withdrawal sources listed in i-iv.
- c) A breakdown of total water withdrawal from each of the sources listed in Disclosures 303-3-a and 303-3-b in megaliters by the following categories:
- i. Freshwater ($\leq 1,000$ mg/L Total Dissolved Solids);
 - ii. Other water ($> 1,000$ mg/L Total Dissolved Solids).
- d) Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 303-4: Water discharge

- a) Total water discharge to all areas in megaliters, and a breakdown of this total by the following types of destination, if applicable:
- i. Surface water;
 - ii. Groundwater;
 - iii. Seawater;

- iv. Third-party water, and the volume of this total sent for use to other organizations, if applicable.
- b) A breakdown of total water discharge to all areas in megaliters by the following categories:
 - i. Freshwater ($\leq 1,000$ mg/L Total Dissolved Solids);
 - ii. Other water ($> 1,000$ mg/L Total Dissolved Solids).
- c) Total water discharge to all areas with water stress in megaliters, and a breakdown of this total by the following categories:
 - i. Freshwater ($\leq 1,000$ mg/L Total Dissolved Solids);
 - ii. Other water ($> 1,000$ mg/L Total Dissolved Solids).
- d) Priority substances of concern for which discharges are treated, including:
 - i. how priority substances of concern were defined, and any international standard, authoritative list, or criteria used;
 - ii. the approach for setting discharge limits for priority substances of concern;
 - iii. number of incidents of non-compliance with discharge limits.
- e) Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 303-5: Water consumption

- a) Total water consumption from all areas in megaliters.
- b) Total water consumption from all areas with water stress in megaliters.
- c) Change in water storage in megaliters, if water storage has been identified as having a significant water-related impact.
- d) Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used, including whether the information is calculated, estimated, modeled, or sourced from direct measurements, and the approach taken for this, such as the use of any sector-specific factors.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 304-1: Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas

- a) For each operational site owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas, the following information:
- i. Geographic location;
 - ii. Subsurface and underground land that may be owned, leased, or managed by the organization;
 - iii. Position in relation to the protected area (in the area, adjacent to, or containing portions of the protected area) or the high biodiversity value area outside protected areas;
 - iv. Type of operation (office, manufacturing or production, or extractive);
 - v. Size of operational site in km² (or another unit, if appropriate);
 - vi. Biodiversity value characterized by the attribute of the protected area or area of high biodiversity value outside the protected area (terrestrial, freshwater, or maritime ecosystem);
 - vii. Biodiversity value characterized by listing of protected status (such as IUCN Protected Area Management Categories, Ramsar Convention, national legislation).

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 304-2: Significant impacts of activities, products, and services on biodiversity

- a) Nature of significant direct and indirect impacts on biodiversity with reference to one or more of the following:
- i. Construction or use of manufacturing plants, mines, and transport infrastructure;
 - ii. Pollution (introduction of substances that do not naturally occur in the habitat from point and non-point sources);
 - iii. Introduction of invasive species, pests, and pathogens;
 - iv. Reduction of species;
 - v. Habitat conversion;

- vi. Changes in ecological processes outside the natural range of variation (such as salinity or changes in groundwater level).
- b) Significant direct and indirect positive and negative impacts with reference to the following:
- i. Species affected;
 - ii. Extent of areas impacted;
 - iii. Duration of impacts;
 - iv. Reversibility or irreversibility of the impacts.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 304-3: Habitats protected or restored

- a) Size and location of all habitat areas protected or restored, and whether the success of the restoration measure was or is approved by independent external professionals.
- b) Whether partnerships exist with third parties to protect or restore habitat areas distinct from where the organization has overseen and implemented restoration or protection measures.
- c) Status of each area based on its condition at the close of the reporting period.
- d) Standards, methodologies, and assumptions used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	N	Y	N	Y

Disclosure 304-4: IUCN Red List species and national conservation list species with habitats in areas affected by operations

- a) Total number of IUCN Red List species and national conservation list species with habitats in areas affected by the operations of the organization, by level of extinction risk:
 - i. Critically endangered
 - ii. Endangered
 - iii. Vulnerable
 - iv. Near threatened
 - v. Least concern

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	N	Y	N	Y

Disclosure 305-1: Direct (Scope 1) GHG emissions

- a) Gross direct (Scope 1) GHG emissions in metric tons of CO₂ equivalent.
- b) Gases included in the calculation; whether CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃, or all.
- c) Biogenic CO₂ emissions in metric tons of CO₂ equivalent.
- d) Base year for the calculation, if applicable, including:
 - i. the rationale for choosing it;
 - ii. emissions in the base year;
 - iii. the context for any significant changes in emissions that triggered recalculations of base year emissions.
- e) Source of the emission factors and the global warming potential (GWP) rates used, or a reference to the GWP source.
- f) Consolidation approach for emissions; whether equity share, financial control, or operational control.
- g) Standards, methodologies, assumptions, and/or calculation tools used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 305-2: Energy indirect (Scope 2) GHG emissions

- a) Gross location-based energy indirect (Scope 2) GHG emissions in metric tons of CO₂ equivalent.
- b) If applicable, gross market-based energy indirect (Scope 2) GHG emissions in metric tons of CO₂ equivalent.
- c) If available, the gases included in the calculation; whether CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃, or all.
- d) Base year for the calculation, if applicable, including:
 - i. the rationale for choosing it;
 - ii. emissions in the base year;
 - iii. the context for any significant changes in emissions that triggered recalculations of base year emissions.

- e) Source of the emission factors and the global warming potential (GWP) rates used, or a reference to the GWP source.
- f) Consolidation approach for emissions; whether equity share, financial control, or operational control.
- g) Standards, methodologies, assumptions, and/or calculation tools used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 305-3: Other indirect (Scope 3) GHG emissions

- a) Gross other indirect (Scope 3) GHG emissions in metric tons of CO₂ equivalent.
- b) If available, the gases included in the calculation; whether CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃, or all.
- c) Biogenic CO₂ emissions in metric tons of CO₂ equivalent.
- d) Other indirect (Scope 3) GHG emissions categories and activities included in the calculation.
- e) Base year for the calculation, if applicable, including:
 - i. the rationale for choosing it;
 - ii. emissions in the base year;
 - iii. the context for any significant changes in emissions that triggered recalculations of base year emissions.
- f) Source of the emission factors and the global warming potential (GWP) rates used, or a reference to the GWP source.
- g) Standards, methodologies, assumptions, and/or calculation tools used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 305-4: GHG emissions intensity

- a) GHG emissions intensity ratio for the organization.
- b) Organization-specific metric (the denominator) chosen to calculate the ratio.
- c) Types of GHG emissions included in the intensity ratio; whether direct (Scope 1), energy indirect (Scope 2), and/or other indirect (Scope 3).
- d) Gases included in the calculation; whether CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃, or all.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 305-5: Reduction of GHG emissions

- a) GHG emissions reduced as a direct result of reduction initiatives, in metric tons of CO₂ equivalent.
- b) Gases included in the calculation; whether CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃, or all.
- c) Base year or baseline, including the rationale for choosing it.
- d) Scopes in which reductions took place; whether direct (Scope 1), energy indirect (Scope 2), and/or other indirect (Scope 3).
- e) Standards, methodologies, assumptions, and/or calculation tools used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 305-6: Emissions of ozone-depleting substances (ODS)

- a) Production, imports, and exports of ODS in metric tons of CFC-11 (trichlorofluoromethane) equivalent.
- b) Substances included in the calculation.
- c) Source of the emission factors used.
- d) Standards, methodologies, assumptions, and/or calculation tools used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 305-7: Nitrogen oxides (NO_x), sulfur oxides (SO_x), and other significant air emissions

- a) Significant air emissions, in kilograms or multiples, for each of the following:
 - i. NO_x
 - ii. SO_x
 - iii. Persistent organic pollutants (POP)
 - iv. Volatile organic compounds (VOC)
 - v. Hazardous air pollutants (HAP)
 - vi. Particulate matter (PM)
 - vii. Other standard categories of air emissions identified in relevant regulations
- b) Source of the emission factors used.

c) Standards, methodologies, assumptions, and/or calculation tools used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 306-1: Water discharge by quality and destination

a) Total volume of planned and unplanned water discharges by:

- i. destination;
- ii. quality of the water, including treatment method;
- iii. whether the water was reused by another organization.

b) Standards, methodologies, and assumptions used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 306-2: Waste by type and disposal method

a) Total weight of hazardous waste, with a breakdown by the following disposal methods where applicable:

- i. Reuse
- ii. Recycling
- iii. Composting
- iv. Recovery, including energy recovery
- v. Incineration (mass burn)
- vi. Deep well injection
- vii. Landfill
- viii. On-site storage
- ix. Other (to be specified by the organization)

b) Total weight of non-hazardous waste, with a breakdown by the following disposal methods where applicable:

- i. Reuse
- ii. Recycling
- iii. Composting
- iv. Recovery, including energy recovery
- v. Incineration (mass burn)
- vi. Deep well injection
- vii. Landfill

- viii. On-site storage
 - ix. Other (to be specified by the organization)
- c) How the waste disposal method has been determined:
- i. Disposed of directly by the organization, or otherwise directly confirmed
 - ii. Information provided by the waste disposal contractor
 - iii. Organizational defaults of the waste disposal contractor

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 306-3: Significant spills

- a) Total number and total volume of recorded significant spills.
- b) The following additional information for each spill that was reported in the organization's financial statements:
 - i. Location of spill;
 - ii. Volume of spill;
 - iii. Material of spill, categorized by: oil spills (soil or water surfaces), fuel spills (soil or water surfaces), spills of wastes (soil or water surfaces), spills of chemicals (mostly soil or water surfaces), and other (to be specified by the organization).
- c) Impacts of significant spills.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 306-4: Transport of hazardous waste

- a) Total weight for each of the following:
 - i. Hazardous waste transported
 - ii. Hazardous waste imported
 - iii. Hazardous waste exported
 - iv. Hazardous waste treated
- b) Percentage of hazardous waste shipped internationally.
- c) Standards, methodologies, and assumptions used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 306-5: Water bodies affected by water discharges and/or runoff

- a) Water bodies and related habitats that are significantly affected by water discharges and/or runoff, including information on:
- i. the size of the water body and related habitat;
 - ii. whether the water body and related habitat is designated as a nationally or internationally protected area;
 - iii. the biodiversity value, such as total number of protected species.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 307-1 Non-compliance with environmental laws and regulations

- a) Significant fines and non-monetary sanctions for non-compliance with environmental laws and/or regulations in terms of:
- i. total monetary value of significant fines;
 - ii. total number of non-monetary sanctions;
 - iii. cases brought through dispute resolution mechanisms.
- b) If the organization has not identified any non-compliance with environmental laws and/or regulations, a brief statement of this fact is sufficient.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 308-1 New suppliers that were screened using environmental criteria

- a) Percentage of new suppliers that were screened using environmental criteria.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 308-2 Negative environmental impacts in the supply chain and actions taken

- a) Number of suppliers assessed for environmental impacts.
- b) Number of suppliers identified as having significant actual and potential negative environmental impacts.
- c) Significant actual and potential negative environmental impacts identified in the supply chain.

- d) Percentage of suppliers identified as having significant actual and potential negative environmental impacts with which improvements were agreed upon as a result of assessment.
- e) Percentage of suppliers identified as having significant actual and potential negative environmental impacts with which relationships were terminated as a result of assessment, and why.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y



Social Aspect: The reporting organization shall report the following information

Disclosure 401-1 New employee hires and employee turnover

- a) Total number and rate of new employee hires during the reporting period, by age group, gender and region.
- b) Total number and rate of employee turnover during the reporting period, by age group, gender and region.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 401-2 Benefits provided to full-time employees that are not provided to temporary or part-time employees

- a) Benefits which are standard for full-time employees of the organization but are not provided to temporary or part-time employees, by significant locations of operation. These include, as a minimum:
 - i. life insurance;
 - ii. health care;
 - iii. disability and invalidity coverage;
 - iv. parental leave;
 - v. retirement provision;
 - vi. stock ownership;
 - vii. others.
- b) The definition used for 'significant locations of operation'.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 401-3 Parental leave

- a) Total number of employees that were entitled to parental leave, by gender.
- b) Total number of employees that took parental leave, by gender.
- c) Total number of employees that returned to work in the reporting period after parental leave ended, by gender.
- d) Total number of employees that returned to work after parental leave ended that were still employed 12 months after their return to work, by gender.
- e) Return to work and retention rates of employees that took parental leave, by gender.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 402-1 Minimum notice periods regarding operational changes

- a) Minimum number of weeks' notice typically provided to employees and their representatives prior to the implementation of significant operational changes that could substantially affect them.
- b) For organizations with collective bargaining agreements, report whether the notice period and provisions for consultation and negotiation are specified in collective agreements.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 403-1 Occupational health and safety management system

- a) A statement of whether an occupational health and safety management system has been implemented, including whether:
 - i. the system has been implemented because of legal requirements and, if so, a list of the requirements;
 - ii. the system has been implemented based on recognized risk management and/or management system standards/guidelines and, if so, a list of the standards/guidelines.
- b) A description of the scope of workers, activities, and workplaces covered by the occupational health and safety management system, and an explanation of whether and, if so, why any workers, activities, or workplaces are not covered.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 403-2 Hazard identification, risk assessment, and incident investigation

- a) A description of the processes used to identify work-related hazards and assess risks on a routine and non-routine basis, and to apply the hierarchy of controls in order to eliminate hazards and minimize risks, including:
 - i. how the organization ensures the quality of these processes, including the competency of persons who carry them out;
 - ii. how the results of these processes are used to evaluate and continually improve the occupational health and safety management system.

- b) A description of the processes for workers to report work-related hazards and hazardous situations, and an explanation of how workers are protected against reprisals.
- c) A description of the policies and processes for workers to remove themselves from work situations that they believe could cause injury or ill health, and an explanation of how workers are protected against reprisals.
- d) A description of the processes used to investigate work-related incidents, including the processes to identify hazards and assess risks relating to the incidents, to determine corrective actions using the hierarchy of controls, and to determine improvements needed in the occupational health and safety management system.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 403-3 Occupational health services

- a) A description of the occupational health services' functions that contribute to the identification and elimination of hazards and minimization of risks, and an explanation of how the organization ensures the quality of these services and facilitates workers' access to them.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 403-4 Worker participation, consultation, and communication on occupational health and safety

- a) A description of the processes for worker participation and consultation in the development, implementation, and evaluation of the occupational health and safety management system, and for providing access to and communicating relevant information on occupational health and safety to workers.
- b) Where formal joint management–worker health and safety committees exist, a description of their responsibilities, meeting frequency, decision-making authority, and whether and, if so, why any workers are not represented by these committees.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 403-5 Worker training on occupational health and safety

- a) A description of any occupational health and safety training provided to workers, including generic training as well as training on specific work-related hazards, hazardous activities, or hazardous situations.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 403-6 Promotion of worker health

- a) An explanation of how the organization facilitates workers' access to non-occupational medical and healthcare services, and the scope of access provided.
- b) A description of any voluntary health promotion services and programs offered to workers to address major non-work-related health risks, including the specific health risks addressed, and how the organization facilitates workers' access to these services and programs.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 403-7 Prevention and mitigation of occupational health and safety impacts directly linked by business relationships

- a) A description of the organization's approach to preventing or mitigating significant negative occupational health and safety impacts that are directly linked to its operations, products or services by its business relationships, and the related hazards and risks.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 403-8 Workers covered by an occupational health and safety management system

- a) If the organization has implemented an occupational health and safety management system based on legal requirements and/or recognized standards/guidelines:
- i. the number and percentage of all employees and workers who are not employees but whose work and/or workplace is controlled by the organization, who are covered by such a system;

- ii. the number and percentage of all employees and workers who are not employees but whose work and/or workplace is controlled by the organization, who are covered by such a system that has been internally audited;
 - iii. the number and percentage of all employees and workers who are not employees but whose work and/or workplace is controlled by the organization, who are covered by such a system that has been audited or certified by an external party.
- b) Whether and, if so, why any workers have been excluded from this disclosure, including the types of worker excluded.
- c) Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 403-9 Work-related injuries

- a) For all employees:
- i. The number and rate of fatalities as a result of work-related injury;
 - ii. The number and rate of high-consequence work-related injuries (excluding fatalities);
 - iii. The number and rate of recordable work-related injuries;
 - iv. The main types of work-related injury;
 - v. The number of hours worked.
- b) For all workers who are not employees but whose work and/or workplace is controlled by the organization:
- i. The number and rate of fatalities as a result of work-related injury;
 - ii. The number and rate of high-consequence work-related injuries (excluding fatalities);
 - iii. The number and rate of recordable work-related injuries;
 - iv. The main types of work-related injury;
 - v. The number of hours worked.
- c) The work-related hazards that pose a risk of high-consequence injury, including:
- i. how these hazards have been determined;

- ii. which of these hazards have caused or contributed to high-consequence injuries during the reporting period;
 - iii. actions taken or underway to eliminate these hazards and minimize risks using the hierarchy of controls.
- d) Any actions taken or underway to eliminate other work-related hazards and minimize risks using the hierarchy of controls.
 - e) Whether the rates have been calculated based on 200,000 or 1,000,000 hours worked.
 - f) Whether and, if so, why any workers have been excluded from this disclosure, including the types of worker excluded.
 - g) Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 403-10 Work-related ill health

- a) For all employees:
 - i. The number of fatalities as a result of work-related ill health;
 - ii. The number of cases of recordable work-related ill health;
 - iii. The main types of work-related ill health.
- b) For all workers who are not employees but whose work and/or workplace is controlled by the organization:
 - i. The number of fatalities as a result of work-related ill health;
 - ii. The number of cases of recordable work-related ill health;
 - iii. The main types of work-related ill health.
- c) The work-related hazards that pose a risk of ill health, including:
 - i. how these hazards have been determined;
 - ii. which of these hazards have caused or contributed to cases of ill health during the reporting period;
 - iii. actions taken or underway to eliminate these hazards and minimize risks using the hierarchy of controls.
- d) Whether and, if so, why any workers have been excluded from this disclosure, including the types of worker excluded.

- e) Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 404-1 Average hours of training per year per employee

- a) Average hours of training that the organization's employees have undertaken during the reporting period, by:
- i. gender;
 - ii. employee category.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 404-2 Programs for upgrading employee skills and transition assistance programs

- a) Type and scope of programs implemented and assistance provided to upgrade employee skills.
- b) Transition assistance programs provided to facilitate continued employability and the management of career endings resulting from retirement or termination of employment.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 404-3 Percentage of employees receiving regular performance and career development reviews

- a) Percentage of total employees by gender and by employee category who received a regular performance and career development review during the reporting period.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 405-1 Diversity of governance bodies and employees

- a) Percentage of individuals within the organization's governance bodies in each of the following diversity categories:
- i. Gender;
 - ii. Age group: under 30 years old, 30-50 years old, over 50 years old;
 - iii. Other indicators of diversity where relevant (such as minority or vulnerable groups).
- b) Percentage of employees per employee category in each of the following diversity categories:
- i. Gender;
 - ii. Age group: under 30 years old, 30-50 years old, over 50 years old;
 - iii. Other indicators of diversity where relevant (such as minority or vulnerable groups).

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 405-2 Ratio of basic salary and remuneration of women to men

- a) Ratio of the basic salary and remuneration of women to men for each employee category, by significant locations of operation.
- b) The definition used for 'significant locations of operation'.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	N

Disclosure 406-1 Incidents of discrimination and corrective actions taken

- a) Total number of incidents of discrimination during the reporting period.
- b) Status of the incidents and actions taken with reference to the following:
- i. Incident reviewed by the organization;
 - ii. Remediation plans being implemented;
 - iii. Remediation plans that have been implemented, with results reviewed through routine internal management review processes;
 - iv. Incident no longer subject to action.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 407-1 Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk

- a) Operations and suppliers in which workers' rights to exercise freedom of association or collective bargaining may be violated or at significant risk either in terms of:
- i. type of operation (such as manufacturing plant) and supplier;
 - ii. countries or geographic areas with operations and suppliers considered at risk.
- b) Measures taken by the organization in the reporting period intended to support rights to exercise freedom of association and collective bargaining.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 408-1 Operations and suppliers at significant risk for incidents of child labor

- a) Operations and suppliers considered to have significant risk for incidents of:
- i. child labor;
 - ii. young workers exposed to hazardous work.
- b) Operations and suppliers considered to have significant risk for incidents of child labor either in terms of:
- i. type of operation (such as manufacturing plant) and supplier;
 - ii. countries or geographic areas with operations and suppliers considered at risk.
- c) Measures taken by the organization in the reporting period intended to contribute to the effective abolition of child labor.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 409-1 Operations and suppliers at significant risk for incidents of forced or compulsory labor

- a) Operations and suppliers considered to have significant risk for incidents of forced or compulsory labor either in terms of:
- i. type of operation (such as manufacturing plant) and supplier;
 - ii. countries or geographic areas with operations and suppliers considered at risk.
- b) Measures taken by the organization in the reporting period intended to contribute to the elimination of all forms of forced or compulsory labor.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 410-1 Security personnel trained in human rights policies or procedures

- a) Percentage of security personnel who have received formal training in the organization's human rights policies or specific procedures and their application to security.
- b) Whether training requirements also apply to third-party organizations providing security personnel.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	N	Y	Y	Y

Disclosure 411-1 Incidents of violations involving rights of indigenous peoples

- a) Total number of identified incidents of violations involving the rights of indigenous peoples during the reporting period.
- b) Status of the incidents and actions taken with reference to the following:
 - i. Incident reviewed by the organization;
 - ii. Remediation plans being implemented;
 - iii. Remediation plans that have been implemented, with results reviewed through routine internal management review processes;
 - iv. Incident no longer subject to action.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 412-1 Operations that have been subject to human rights reviews or impact assessments

- a) Total number and percentage of operations that have been subject to human rights reviews or human rights impact assessments, by country.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 412-2 Employee training on human rights policies or procedures

- a) Total number of hours in the reporting period devoted to training on human rights policies or procedures concerning aspects of human rights that are relevant to operations.
- b) Percentage of employees trained during the reporting period in human rights policies or procedures concerning aspects of human rights that are relevant to operations.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	Y	Y

Disclosure 412-3 Significant investment agreements and contracts that include human rights clauses or that underwent human rights screening

- a) Total number and percentage of significant investment agreements and contracts that include human rights clauses or that underwent human rights screening.
- b) The definition used for ‘significant investment agreements’.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 413-1 Operations with local community engagement, impact assessments, and development programs

- a) Percentage of operations with implemented local community engagement, impact assessments, and/or development programs, including the use of:
 - i. social impact assessments, including gender impact assessments, based on participatory processes;
 - ii. environmental impact assessments and ongoing monitoring;
 - iii. public disclosure of results of environmental and social impact assessments;
 - iv. local community development programs based on local communities’ needs;
 - v. stakeholder engagement plans based on stakeholder mapping;
 - vi. broad based local community consultation committees and processes that include vulnerable groups;
 - vii. works councils, occupational health and safety committees and other worker representation bodies to deal with impacts;
 - viii. formal local community grievance processes.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 413-2 Operations with significant actual and potential negative impacts on local communities

- a) Operations with significant actual and potential negative impacts on local communities, including:
- i. the location of the operations;
 - ii. the significant actual and potential negative impacts of operations.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 414-1 New suppliers that were screened using social criteria

- a) Percentage of new suppliers that were screened using social criteria.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 414-2 Negative social impacts in the supply chain and actions taken

- a) Number of suppliers assessed for social impacts.
- b) Number of suppliers identified as having significant actual and potential negative social impacts.
- c) Significant actual and potential negative social impacts identified in the supply chain.
- d) Percentage of suppliers identified as having significant actual and potential negative social impacts with which improvements were agreed upon as a result of assessment.
- e) Percentage of suppliers identified as having significant actual and potential negative social impacts with which relationships were terminated as a result of assessment, and why.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 415-1 Political contributions

- a) Total monetary value of financial and in-kind political contributions made directly and indirectly by the organization by country and recipient/beneficiary.
- b) If applicable, how the monetary value of in-kind contributions was estimated.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 416-1 Assessment of the health and safety impacts of product and service categories

- a) Percentage of significant product and service categories for which health and safety impacts are assessed for improvement.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
Y	Y	Y	N	Y

Disclosure 416-2 Incidents of non-compliance concerning the health and safety impacts of products and services

- a) Total number of incidents of non-compliance with regulations and/or voluntary codes concerning the health and safety impacts of products and services within the reporting period, by:
- i. incidents of non-compliance with regulations resulting in a fine or penalty;
 - ii. incidents of non-compliance with regulations resulting in a warning;
 - iii. incidents of non-compliance with voluntary codes.
- b) If the organization has not identified any non-compliance with regulations and/or voluntary codes, a brief statement of this fact is sufficient.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 417-1 Requirements for product and service information and labeling

- a) Whether each of the following types of information is required by the organization's procedures for product and service information and labeling:
- i. The sourcing of components of the product or service;
 - ii. Content, particularly with regard to substances that might produce an environmental or social impact;
 - iii. Safe use of the product or service;
 - iv. Disposal of the product and environmental or social impacts;
 - v. Other (explain).
- b) Percentage of significant product or service categories covered by and assessed for compliance with such procedures.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 417-2 Incidents of non-compliance concerning product and service information and labeling

- a) Total number of incidents of non-compliance with regulations and/or voluntary codes concerning product and service information and labeling, by:
 - i. incidents of non-compliance with regulations resulting in a fine or penalty;
 - ii. incidents of non-compliance with regulations resulting in a warning;
 - iii. incidents of non-compliance with voluntary codes.
- b) If the organization has not identified any non-compliance with regulations and/or voluntary codes, a brief statement of this fact is sufficient.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 417-3 Incidents of non-compliance concerning marketing communications

- a) Total number of incidents of non-compliance with regulations and/or voluntary codes concerning marketing communications, including advertising, promotion, and sponsorship, by:
 - i. incidents of non-compliance with regulations resulting in a fine or penalty;
 - ii. incidents of non-compliance with regulations resulting in a warning;
 - iii. incidents of non-compliance with voluntary codes.
- b) If the organization has not identified any non-compliance with regulations and/or voluntary codes, a brief statement of this fact is sufficient.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 418-1 Substantiated complaints concerning breaches of customer privacy and losses of customer data

- a) Total number of substantiated complaints received concerning breaches of customer privacy, categorized by:
 - i. complaints received from outside parties and substantiated by the organization;
 - ii. complaints from regulatory bodies.
- b) Total number of identified leaks, thefts, or losses of customer data.

- c) If the organization has not identified any substantiated complaints, a brief statement of this fact is sufficient.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

Disclosure 419-1 Non-compliance with laws and regulations in the social and economic area

- a) Significant fines and non-monetary sanctions for non-compliance with laws and/or regulations in the social and economic area in terms of:
- i. total monetary value of significant fines;
 - ii. total number of non-monetary sanctions;
 - iii. cases brought through dispute resolution mechanisms.
- b) If the organization has not identified any non-compliance with laws and/or regulations, a brief statement of this fact is sufficient.
- c) The context against which significant fines and non-monetary sanctions were incurred.

Moderation	Reasonableness	Self-immunity	Knowledge	Moral
N	N	Y	N	Y

	GRI Disclosure standards	2018		2017		2016		2015		2014		2013	
		score	note	score	note	score	note	score	note	score	note	score	note
	d) Percentage of suppliers identified as having significant actual and potential negative environmental impacts with which improvements were agreed upon as a result of assessment.												
	e) Percentage of suppliers identified as having significant actual and potential negative environmental impacts with which relationships were terminated as a result of assessment, and why.												



	GRI Disclosure standards	2018		2017		2016		2015		2014		2013	
		score	note	score	note	score	note	score	note	score	note	score	note
G4-PR8	<p>Disclosure 418-1 Substantiated complaints concerning breaches of customer privacy and losses of customer data</p> <p>a) Total number of substantiated complaints received concerning breaches of customer privacy, categorized by:</p> <p>i. complaints received from outside parties and substantiated by the organization;</p> <p>ii. complaints from regulatory bodies.</p> <p>b) Total number of identified leaks, thefts, or losses of customer data.</p> <p>c) If the organization has not identified any substantiated complaints, a brief statement of this fact is sufficient.</p>												
G4-SO8 PR9	<p>Disclosure 419-1 Non-compliance with laws and regulations in the social and economic area</p> <p>a) Significant fines and non-monetary sanctions for non-compliance with laws and/or regulations in the social and economic area in terms of:</p> <p>i. total monetary value of significant fines;</p> <p>ii. total number of non-monetary sanctions;</p> <p>iii. cases brought through dispute resolution mechanisms.</p> <p>b) If the organization has not identified any non-compliance with laws and/or regulations, a brief statement of this fact is sufficient.</p> <p>c) The context against which significant fines and non-monetary sanctions were incurred.</p>												



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