SUSTAINABILITY RISK MANAGEMENT, ITS DETERMINANTS AND OUTCOME IN PALM OIL MILLS IN MALAYSIA

By

SHAZRUL EKHMAR ABDUL RAZAK

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the Degree of Doctor of Philosophy

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June 2022

Chairperson : Mazlina Mustapha, PhD
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Palm oil industry in Malaysia is under greater attention due to the claim of sustainability issues arising from palm oil productions. Sustainability issues, such as gas emissions, solid waste, labour issues, etc., indirectly expose Malaysian palm oil to sustainability risks, such as boycott, reputational, and regulation risks. There is now heighten pressure on the industry to adopt a more sustainable stance towards reducing sustainability issues. Prior studies claimed that sustainability risk management is regarded as an important tool to address sustainability risks arising from sustainability issues. Therefore, this study examines the management of sustainability risks by implementing SRM. This study also investigates the influence of internal and external determinants on SRM implementation and its impact on sustainability performance. In total, 407 questionnaires were distributed between July and December 2020, with a response rate of 28.9%. Data was analysed using Failure Mode Effect Analysis and Structural Equation Modelling. Findings indicate that sustainability risk is identified as having a major impact on the palm oil mill operations, occurs infrequently, and is moderately easy to detect and recognise. Risk control and risk avoidance are the most risk response strategies employed to address the sustainability risk. Overall, palm oil mills have placed an adequate system to monitor the emergence of sustainability risks. The findings unveil that sustainability strategy, business size, top management support, regulatory pressure, and competitive pressure have positive and significant relationship on the SRM implementation. In return, the implementation of SRM has a positive and significant impact on sustainability performance. The findings indicate that the relationship between sustainability strategy, business size, top management support, regulatory pressure and competitive pressure and sustainability performance is indirectly through SRM implementation. The findings contribute to current knowledge and provide useful insight to policymakers on SRM implementation, its determinants, and sustainability performance.

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PENGURUSAN RISIKO KEMAMPANAN, PENENTU DAN HASILNYA DI KILANG MINYAK SAWIT DI MALAYSIA

Oleh

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Industri minyak sawit di Malaysia mendapat liputan meluas berikutan isu kemampanan yang timbul daripada pengeluaran minyak sawit. Isu kemampanan, seperti pelepasan gas, sisa pepejal, isu buruh, dan lain-lain, secara tidak langsung mendedahkan industry minyak sawit Malaysia kepada risiko kemampanan, seperti risiko boikot, risiko reputasi, dan risiko peraturan. Disebabkan itu, terdapat tekanan yang tinggi ke atas industry minyak sawit untuk mengurangkan isu-isu kemampanan. Kajian terdahulu mendakwa bahawa pengurusan risiko kemampanan (SRM) dianggap sebagai alat penting untuk menangani risiko kemampanan yang timbul daripada isu kemampanan. Oleh itu, kajian ini bertujuan mengkaji pengurusan risiko kemampanan dengan melaksanakan SRM. Selain itu, kajian ini juga bertujuan mengkaji pengaruh penentu dalaman dan luaran terhadap pelaksanaan SRM dan kesan pelaksanaanya terhadap prestasi kemampanan. Secara keseluruhan, 407 soal selidik telah diedarkan antara Julai dan Disember 2020 dengan kadar respons sebanyak 28.9%. Data dianalisis menggunakan Analisis Kesan Mod Kegagalan dan Model Persamaan Berstruktur. Dapatan kajian menunjukkan bahawa risiko kemampanan dikenal pasti sebagai memberi kesan besar kepada operasi kilang kelapa sawit, jarang berlaku, dan agak mudah dikesan dan dikenali. Kawalan risiko dan penghindaran risiko adalah strategi tindak balas risiko yang paling banyak digunakan untuk menangani risiko kemampanan. Secara keseluruhan, kilang minyak sawit telah melaksanakan sistem yang sesuai untuk memantau kemunculan risiko kemampanan. Dapatan kajian juga menunjukkan strategi kemampanan, saiz perniagaan, sokongan pengurusan atasan, tekanan pengawalseliaan, dan tekanan daya saing mempunyai hubungan positif dan signifikan terhadap pelaksanaan SRM. Pelaksanaan SRM pula mempunyai kesan positif dan signifikan terhadap prestasi kemampanan. Strategi kemampanan, saiz perniagaan, sokongan pengurusan tertinggi, tekanan kawal selia dan tekanan daya saing menjadi pengantara antara pelaksanaan SRM dan prestasi kemampanan. Penemuan ini menyumbang kepada pengetahuan semasa dan memberikan pandangan yang berguna kepada pembuat dasar mengenai pelaksanaan SRM, penentunya, dan prestasi kemampanan.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
CR	Composite Reliability
BSC	Balanced Scorecard
CFA	Confirmatory Factor Analysis
CHRA	Chemical Health Risk Assessment
COD	Chemical Oxygen Demand
COSO	Committee of Sponsoring Organisations of the Treadway Commission
CPO	Crude Palm Oil
CPKO	Crude Palm Kernel Oil
DOSH	Department of Occupational Safety and Health
EES	Economic, Environmental, and Social
EFB	Empty Fruit Bunch
EIA	Environmental Impact Assessment
EMA	Environmental Management Accounting
ERM	Enterprise Risk Management
EU	European Union
FELCRA	Federal Land Consolidation and Rehabilitation Authority
FELDA	Federal Land Development Authority
FMEA	Failure Mode Effect Analysis
FFB	Fresh Fruit Bunches
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GMP	Good Mill Processing

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HIRARC	Hazard Identification, Risk Assessment and Risk Control
ISCC	International Sustainability and Carbon Certification
JKEUPM	Ethics Committee for Research of Universiti Putra Malaysia
KETENGAH	Lembaga Kemajuan Terengganu Tengah
MAS	Management Accounting Systems
MCAR	Missing Completely at Random
MCCG	Malaysian Code on Corporate Governance
MCO	Movement Control Order
MCS	Management Control System
MNAR	Missing Not at Random
MPOB	Malaysian Palm Oil Board
MPOC	Malaysian Palm Oil Council
MSPO	Malaysian Sustainability Palm Oil
NDPE	No Deforestation, No Peat, No Exploitation
NGOs	Non-Profit Organisations
OER	Oil Extraction Rate
PEU	Perceived Environmental Uncertainty
PMS	Performance Management System
POMA	Palm Oil Mills Association
POME	Palm Oil Mill Effluent
PPE	Personal Protective Equipment
PORAM	Palm Oil Refinery Association of Malaysia
RPN	Risk Priority Number
RSPO	Roundtable Sustainability Palm Oil
SALCRA	Sarawak Land Consolidation and Rehabilitation Authority

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SCCS	Supply Chain Certification Standard
SEM	Structural Equation Modelling
SRM	Sustainability Risk Management
SIA	Social Impact Assessment
SSRM	Sustainable Supply Chain Risk Management
UiTM	Universiti Teknologi Mara Malaysia
UPM	Universiti Putra Malaysia
US	United State
VIF	Variance Inflation Factor

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter consists of ten sections. Section 1.1 presents the background of the study. Section 1.2 discusses the problem statement. Section 1.3 and Section 1.4 outline the research objectives and research questions respectively. Section 1.5 explains the motivation of the study. Section 1.6 provides the significance of the study. Section 1.7 briefly describes the scope of the study. Section 1.8 outlines the definition of key terms. It is followed by the organization of the study in Section 1.9. Finally, this chapter ends with the chapter summary in Section 1.10.

1.2 Background of the Study

The management of sustainability risks has become one of the principal topics among academics and practitioners (Abdul Aziz et al., 2015; Anderson & Anderson, 2009; Schulte & Knuts, 2022; Wijethilake & Lama, 2018; Wong, 2014). The attention to sustainability risks has been growing due to the increasing sustainability issues because of company's activities (Wijethilake & Lama, 2018). Although sustainability issues emerge from natural phenomenon, any solutions for sustainability issues must involve companies (Sakhel, 2017). In addition, continuing uncertainty for the world economy, advancement in information technology and business trends such as stricter sustainability legislation, changing customer demands for sustainable product, and increasing sustainable awareness (Giannakis & Papadopoulos, 2016; Zimmer et al., 2017) have become difficult or even impossible to forecast, contributing critically to the rising of sustainability risks (Rostamzadeh et al., 2018). Companies that contribute to sustainability issues or fail to adapt to the inevitable demand for sustainability will significantly expose their long-term sustainability performance and survival at risk (Abdul Aziz et al., 2016b; Wijethilake & Lama, 2018; Wong, 2014).

Because of these concerns, sustainability risk management (SRM) has become an important MCS in addressing the multifaceted sustainability risk arising from sustainability issues (Abdul Aziz et al., 2015). SRM's focus is not only on addressing economic risk but also includes environmental and social risks, covering the three dimensions of sustainability. In fact, the concept of sustainability in SRM is broaden from merely highlighting the environmental risk to include the issues of social responsibility and other important risks such as national growth, socio-economic condition, stakeholder activism, and reputational risk. The main objective of SRM is at addressing, managing, and minimising the adverse impact of sustainability risks on organisation's survival

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and sustainability in the market (Abdul Aziz et al., 2015). Hence, implementing the SRM enables organisations to address sustainability risk as well as provide opportunities that can increase organisational value (Bui & de Villiers, 2017). As such, SRM has gained considerable attention due to its capability in managing sustainability risk at the same time enhancing organisation's sustainability performance.

The alarming sustainability issues, such as environmental impact of BP Deepwater horizon oil spill in Mexico and the social issues of poor working condition in Apple manufacturing as well as Rana Plaza have also further intensified the interest in the implementation of SRM (Soin & Collier, 2013; Giannakis & Papadopoulus, 2016). These business crises do not only threaten their sustainability but also leave long-term social and environmental effects on where the companies operate. Most importantly, the crises have accentuated the weakness and poor risk management as a control system in ensuring business survival (Bromiley, McShane, Nair, & Rustambekov, 2015). This also provides indicator that companies' existing risk management may place greater attention in managing economic risks. Within the face-changing business environment, organisations are more vulnerable as they face a variety of risks that are not confined with economics risks, exposing their survival to a higher level of risk (Abdul Aziz, Abdul Manab, & Othman, 2015; Giannakis & Papadopoulos, 2016; Rasid et al., 2014). Thus, the SRM is needed to cope with changing business environment (Abdul Aziz et al., 2015; Wong, 2014).

SRM is not a new framework. It provides value-added improvement to the current risk management framework. Risk management framework comprises risk identification, risk assessment and analysis, risk response and risk monitoring. This framework is regarded as an important management control system for every organisation due to the capacity it has in controlling organisational behaviour and operational activities to ensure the safety, soundness, and survival of the organisations (Bhimani, 2009; Rasid et al., 2014). Risk management framework is not conceptually wrong when an organisation has poor risk management, but it is due to the failure in implementing the framework properly (Gendron et al., 2016). The components in risk management framework should be holistically implemented to manage the risk appetite defined by the organisation (Mishra et al., 2019). In this regard, SRM broadens the risk appetite of risk management framework by managing broad scope of sustainability risk including economic risks (quantifiable risks) and also environmental and social risks (non-quantifiable risks) (Abdul Aziz et al., 2015). By incorporating sustainability risk into risk management framework, organisations can holistically identify sustainability risks, assess and analyse their impact, employ suitable response strategy and conduct monitoring mechanism to ensure company's viability and survival (Abdul Aziz et al., 2016b; Giannakis & Papadopoulos, 2016).

This study intends to implement the SRM in Malaysian context particularly in palm oil mills. For the past few years, palm oil mills have been in the limelight due to the adverse impacts of sustainability risk bring upon their performance as

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a result of sustainability issues arising from palm oil production. There are now heightened demands from importing countries to address the sustainability issues in palm oil production. Deriving from risk management framework, thus, this study intends to provide useful insights on the management of sustainability risks and their associated issues by implementing SRM that includes risk identification, risk assessment and analysis, risk response and risk monitoring. Since efforts in implementing SRM may involve major changes in organisational practices, it is imperative to investigate the influence of internal and external environment in which the palm oil mills operate as determinants to implement the SRM. Besides, this study also seeks to examine the importance of implementing SRM on mills' sustainability performance. Overall, this study is anchored by risk management framework, contingency theory and institutional theory.

1.3 Problem Statement

Palm oil industry in Malaysia particularly palm oil mills has been criticised due to the sustainability issues arising from the production of palm oil that severely impacts environmental and social sustainability (Abdullah et al., 2017; Lim, Biswas, & Samyudia, 2015). Sustainability issues such as gas emissions, solid waste, improper treatment of POME and labour issues have exposed palm oil mills to the sustainability risks in the form of boycott, reputation and regulation risks. Wong (2014) asserts that companies which fail to address or ignore the sustainability issues may create significant sustainability risks to the company survival. The sustainability issues have caused a significant decline in total export revenue of palm oil mills for two consecutive years from RM51.85 billion in 2017 to RM42.75 billion and RM42.44 billion in 2018 and 2019, respectively, as a result of the anti-palm oil campaign and protectionist trade regulations by the EU and the US (Naidu & Moorthy, 2021). In 2017, EU passed two resolutions to ban the use of palm oil in its biofuel programmes and to introduce new sustainability regulation to be complied by exporting countries to enter EU market. The US has blocked the imports of Malaysian palm oil and palm oil products from entering the country. This has indirectly threatened the livelihood of 650,000 small growers who are depending on the palm oil's export revenue (Saideed, 2017). Above all, the action of the EU and the US to boycott and to impose stricter regulation on Malaysian palm oil may tarnish Malaysian reputation as it may cause a snowball effect to other countries to follow (MPOC, 2018). Thus, there is a need to manage sustainability risks by addressing the sustainability issues in mills' operation in order to maintain the sustainability of palm oil industry.

In order to adopt a more sustainable stance, Minister of Plantation Industries and Commodities of Malaysia in Palm Oil Conference 2018 keynote speech proclaimed that for Malaysian palm oil to overcome the sustainability issues and to remain globally competitive, the palm oil mills need to look into implementing the necessary risk management framework. In addition, the government through MPOB has introduced sustainability practices to be complied by palm oil mills which also outlining the risk management for palm oil mills in controlling their

operation in producing palm oil (Choong & Mckay, 2014; Lim et al., 2015; Nambiappan et al., 2018). Despite this effort, it is reported that palm oil mills in Malaysia have weak performance in complying with the industrial sustainability practices (Jamaludin et al., 2018). In fact, it is also found that the effort to comply with the sustainability practices outlined by the mills themselves is practically low (Abdullah et al., 2017). Poor compliance with sustainability practices indirectly shows that palm oil mills have poor risk management which contributes to the sustainability issues.

Gendron et al. (2016) state that poor risk management is not associated with its framework but due to failure in defining reasonable risk appetite and improper implementation. This is evident when a survey by the World Business Council on Sustainable Development (WBCSD, 2017) found that 70% of practitioners believed that their risk management did not adequately address sustainability risks. Malaysia is no exception. In palm oil mills, relying only on environmental and social assessment impact in managing sustainability issues may contribute to the poor implementation of risk management. SRM has become an important tool in addressing the sustainability risk arising from sustainability issues (Abdul Aziz et al., 2015). SRM can assist companies to define and include broad spectrum of sustainability risks into company's attention and manages their associated issues using the risk management framework holistically. Many organisations already have risk management to deal successfully with traditional financial risks. The emergence of sustainability risks, however, provides greatest challenge for the company to manage them (Wong, 2014). Thus, understanding and identifying the nature of sustainability risks and their associated issues as well as the way to assess, respond and monitor them holistically by implementing SRM are vital for the managers of palm oil mills in addressing the sustainability issues.

In total, 89% of practitioners indicate that sustainability risks can have an adverse impact on their performance (WBCSC, 2017). This shows how important it is in managing sustainability risks. However, a survey found that environmental sensitive companies in Malaysia including palm oil mills are still in the infancy stage of improving their risk management towards managing sustainability risks and are not ready for SRM implementation (Abdul Aziz et al., 2016c). No specific guideline is one of the reasons why SRM is not widely implemented globally (Schulte & Knuts, 2022) let alone in Malaysia. Hence, companies' proactive initiative in managing sustainability risks, originated from their internal and external environment, may determine the implementation of SRM (Wijethilake & Lama, 2018). The exposure to sustainability risks differs across companies although they are from similar industry (Rostamzadeh et al., 2018), Thus, different companies may have different determinants to guide them in implementing the SRM. In this regard, the implementation of SRM in palm oil mills may be influenced by and dependent on internal and external determinants in which they operate. However, empirical evidences on the influence of company's internal and external determinants remain silent and unclear (Subramaniam et al., 2015). Thus, there is a need to study the influence of internal and external determinants to effectively implement the SRM.

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Despite the evidence of negative impact sustainability risks can bring to companies and the benefits of implementing SRM, Malaysia companies are not ready to implement it. Lack of information on the positive influence of SRM on sustainability performance is found as a reason to affect the readiness of implementing SRM (Schulte & Knuts, 2022; Wong, 2014). Previous literature in risk management tends to focus on financial performance (*see* Gordon et al., 2009; Hoyt & Liebenberg, 2011; Paape & Speklé, 2012). Palm oil mills are demanded to improve their sustainability performance in the area of social, environment, and economic. By implementing the SRM, palm oil mills can control their behaviour and activities in addressing sustainability issues which in turn, improves sustainability performance. Thus, the extent to which the SRM implementation positively influences sustainability performance in Malaysian palm oil mills is worthwhile to be investigated.

Gordon et al. (2009) argued that the impact of risk management on performance is dependent upon the appropriate match between risk management and several organisation-specific determinants. This is in line with the mediation form of fit under the contingency theory which posits that performance is not the result of only implementing MCS but also depends upon the match between the MCS and organisation's specific determinants (Mikes & Kaplan, 2015). It means that the appropriate fit between organisation-specific determinants and risk management implementation will improve performance. Literature has documented the relation between risk management-performance and specific determinants with main focus are given on risk management and firm financial performance in financial institutions (Beasley et al., 2005; Gordon et al., 2009; Soltanizadeh et al., 2016). Given that SRM research is still emerging in Malaysia as well as globally (Abdul Aziz et al., 2016a), sufficient supportive evidence is needed to study the determinants-SRM-performance mediation form of fit to provide useful insight on the key specific determinants that can assist palm oil mills to effectively implement SRM which in turn positively improves their sustainability performance.

1.4 Research Objectives

The general objective of this study is to provide empirical evidence of the management of sustainability risks in palm oil mills by implementing SRM. Moreover, this study also aims to investigate the extent of internal and external determinants that influence the implementation of SRM and the impact of SRM implementation on sustainability performance.

Based on the general research objective, this study is aimed at achieving the following specific objectives:

1. To investigate the management of sustainability risk by implementing SRM in palm oil mills.

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2. To investigate the relationship between internal determinants (namely sustainability strategy, business size, top management support) and the implementation of SRM in palm oil mills.

3. To investigate the relationship between external determinants (namely environment uncertainty, regulatory pressure, competitive pressure, normative pressure) and the implementation of SRM in palm oil mills.

4. To investigate the impact of SRM implementation on sustainability performance of palm oil mills.

5. To investigate the mediating effect of SRM implementation on the relationship between internal and external determinants and sustainability performance.

1.5 Research Questions

Based on the research objectives, this study attempts to answer the following research questions:

1. How can SRM implementation assist palm oil mills in managing sustainability risks?

2. What are the relationships between internal determinants (namely business size, sustainability strategy, top management support) and the implementation of SRM in palm oil mills?

3. What are the relationships between external determinants (namely environment uncertainty, regulatory pressure, normative pressure, competitive pressure) and the implementation of SRM in palm oil mills?

4. What is the relationship between the implementation of SRM and sustainability performance of palm oil mills?

5. Does the implementation of SRM mediate the relationship between internal and external determinants and sustainability performance?

1.6 Motivation of the study

The alarming sustainability issues as a consequence of companies' activities as well as demands for sustainability practices from various stakeholders have exposed companies in numerous industries to the emergence of sustainability risks that comprise economic, environmental and social risks. Sustainability risks often put company's sustainability performance and survival at risk. This has encouraged this study to explore an appropriate MCS to control companies' activities and to provide sound information for the managers to anticipate and

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meet the sustainability demands from various stakeholders as well as maintaining the company's sustainability performance. Literature (e.g., Bhimani, 2009; Rasid et al., 2014; Themsen & Skærbæk, 2018) claims that risk management that consists of risk identification, risk assessment and analysis, risk response, and risk monitoring, as an appropriate MCS that has the ability to control companies' activities. Review of literature found that studies in risk management widely focus on the level of implementation, the determinants of risk management and the impact of risk management on financial performance. review of literature also found that there was lack of research studying the management of sustainability risk. However, several literatures claim that the risk management currently employed by companies is inadequate to manage sustainability risks (e.g., Bromiley et al., 2015a; Gendron et al., 2016; Soin & Collier, 2013) due to the main focus on managing financial risks (Wong, 2014). This is evident in the recent risk events which have accentuated the poor of and casted doubt on the existing risk management in companies to ensure the company's safety and survival. This motivates this study to explore the new emerging topic of sustainability risk management. In order to achieve business sustainability, it is important to highlight that managing financial risks is not adequate to gauge business performance. Sustainability risk management is perceived as vital approach for companies to sustain themselves over long-term period due to its capacity to manage broad spectrum of sustainability risks. Although there is a growing interest in sustainability risk management research among scholars and practitioners, previous studies only focused on the conceptual and theoretical explanation without systematic empirical evidence (*see* Abdul Aziz et al., 2015, 2016b; Anderson & Anderson, 2009; Soomro & Lai, 2017; Thöni et al., 2013; Yilmaz & Flouris, 2010). Several studies have attempted to advance the study in this new field (e.g., Bui & de Villiers, 2017; Hofmann et al., 2014; Rostamzadeh et al., 2018; Sakhel, 2017; Zimmer et al., 2017). However, the management of sustainability risks among these studies is limited to managing environmental risk, social risk or economic risks separately without discussing the sustainability risks for a specific industry. In addition, the implementation of the SRM in managing the sustainability risks is also limited to the risk management in isolated approach. This motivates the present study to investigate the management of sustainability risks comprising the economic, environmental and social risks using the complete risk management framework that includes risk identification, risk assessment and analysis, risk response and risk monitoring. Literature asserted that companies may have to manage different set of sustainability risk based on their business activities and environment. Hence, the implementation of SRM to effectively manage the sustainability risks is determined by different determinants, which in turn will have a significant impact on the companies' sustainability performance. SRM is an emerging topic. It is imperative to provide empirical evidence on the implementation of SRM, its determinants and performance. Therefore, this study is motivated to examine the relationship between internal and external determinants of SRM, the implementation of SRM, and sustainability performance in a specific industry context from the perspective of developing countries.

1.7 Significance of the Study

Recently, research on risk management and sustainability has received a particular attention. Specifically, there is an increasing attention being given towards the implementation of risk management system that can manage the emerging sustainability risks, as these risks can have a critical adverse impact to companies' sustainability. Sustainability risk management (SRM) represents an excellent mechanism for addressing these challenges across industry (Wong, 2014). However, previous studies mostly focused on the conceptual and theoretical explanation without systematic empirical evidence. Therefore, this study is significant to provide empirical evidence on the implementation of SRM within the context of industry specific sustainability risk, contributing to the growing research of SRM.

This study advances the SRM literature by managing the three sustainability elements using the four risk management components in an integrated manner. The management of sustainability risk documented by previous studies solely focused on environmental risks or social risks. In fact, the discussion of the four components of risk management framework as a controlling system is limited in isolated approach. Integrating sustainability risks and risk management is crucial to the management of companies' real risks and is essential for a sustainable and successful business. Towards establishing the strategic link between risk management and sustainability, both concepts are not mainly focusing on the mitigation of the sustainability risk issues, but also bringing opportunities in accelerating the business growth for gaining competitive advantage and business sustainability. Therefore, this study is significant to the body of knowledge in terms of providing findings on identification of sustainability risk, assessment of the impact of sustainability, appropriate response to sustainability risks, and risk monitoring, which in turn enhance company's sustainability performance.

Literature asserts that companies are exposed to different spectrum of sustainability risk under different circumstances. The argument is related to the implementation of SRM in managing sustainability risk that depends on the environment where the companies operate. Therefore, this study is vital to provide new light on SRM field particularly on the determinants to influence the implementation of SRM in companies. The combination of contingent variables and institutional pressures as proposed determinants of SRM implementation contributes to the understanding of SRM study. In fact, the use of contingency and institutional theory as underpinning theories would advance the theoretical knowledge in this filed, particularly in explaining the determinants variables that influence the SRM implementation. Moreover, this study provides significant contribution on the contingency theory as the mediating role of SRM is examined using this theory.

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This study is also significant to the Malaysian palm oil industry, especially the palm oil mills, by giving a better understanding on the importance of managing sustainability risk by implementing sustainability risk management. Despite the awareness, literature reveals that companies are still not ready to implement SRM. It might be due to lack of guideline and benchmark for implementing SRM. Therefore, the findings of this study are significant to assist palm oil mill managers in implementing sustainability risk management. Specifically, the findings of this study may provide greater understanding to the nature and impact of sustainability risks in palm oil mills, strategies used to respond to those risks, and the best risk monitoring tool to manage risk response.

Finally, the results of this study may be beneficial to several institutions in Malaysia, such as the Malaysian Palm Oil Board (MPOB), Malaysian Palm Oil Council (MPOC), Ministry of Plantation Industries and Commodities, and other relevant policy makers, to emphasise and strengthen the importance of risk management in addressing broad spectrum of risks – economic, environment, social – to maintain the sustainability of palm oil industry. The information provided in this study may be significantly useful to facilitate the implementation of SRM in palm oil mills. In addition, the proposed determinants in this study are crucial as they provide the information needed by the industry practitioners in planning and strategizing their SRM implementation. The determinants also highlight further attention and improvement needed in the policies such as focus on enhancing sustainability strategy with better regulation in the industry towards implementing SRM to improve sustainability performance. Overall, the research problems, research gaps, research objectives and research significance are summarised in Table 1.1.

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Table 1.1: Summary of research problems, research gaps, research objectives and research significance

Research Problem	Research Gap	Research objective (RO)	Research Significance
1. Inadequate risk management to address sustainability risks (WBCSD, 2017). 2. Poor implementation of risk management in Malaysian palm oil mills (Abdullah et al., 2017; Jamaluddin et al., 2018).	Many organisations already have risk management to deal successfully with traditional economic risks. The emergence of sustainability risks, however, provides greatest challenge for the company to manage them (Wong, 2014).	RO1: To investigate the management of sustainability risk by implementing SRM in palm oil mills.	This study is significance to provide empirical evidence on the implementation of SRM within the context of industry specific sustainability risk, contributing to the growing research of SRM.
1. 89% of companies indicate that sustainability risks have an adverse impact on their performance (WBCSC, 2017). 2. Environmental sensitive companies in Malaysia including palm oil mills are still in the infancy stage of improving their risk management towards managing sustainability risk (Abdul Aziz et al., 2016). 3. No specific guideline to implement SRM (Schulte & Knuts, 2022).	Empirical evidences on the influence of company's internal and external determinants remain silent and unclear (Subramaniam et al., 2015; Wijethilake & Lama, 2018).	RO2: To investigate the relationship between internal determinants and the implementation of SRM in palm oil mills. RO3: To investigate the relationship between external determinants and the implementation of SRM in palm oil mills.	This study is vital to provide new light on SRM field particularly on the determinants to influence the implementation of SRM in companies. The combination of contingent variables and institutional pressures as proposed determinants of SRM implementation contributes to the understanding of SRM study
1. 89% of companies indicate that sustainability risks have an adverse impact on their performance (WBCSC, 2017). 2. Companies in Malaysia including palm oil mills are not ready for implementing SRM (Abdul Aziz et al., 2016c).	Previous literature in risk management tends to focus on financial performance (*see* Gordon, Loeb, & Tseng, 2009; Hoyt & Liebenberg, 2011; Paape & Speklé, 2012).	RO4: To investigate the impact of SRM implementation on sustainability performance of palm oil mills.	This study is significance to the body of knowledge in terms of providing findings on the implementation of SRM and company's sustainability performance.

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Table 1.1: Continued

3.	Lack of information on the influence of SRM on sustainability performance (Wong, 2014; Schulte, 2022) especially from the local context.			
1.	SRM implementation is relatively new in Malaysia	Literature has documented the relation between risk management-performance and firm-specific determinants with specific focus are given on risk management and financial performance in financial institutions (Beasley et al., 2005; Gordon et al., 2009; Soltanizadeh et al., 2016).	RO5: To investigate the mediating effect of SRM implementation on the relationship between internal and external determinants and sustainability performance.	This study is significance to enrich the importance of contingency theory in explaining the mediating role of SRM implementation, contributing to the risk management and management control system literature.

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1.8 Scope of the Study

This study focuses on the palm oil mills in Malaysia. Palm oil mills are chosen because mills are responsible producing the main units in palm oil industry which is crude palm oil (CPO). As a result of consistent mills production, Malaysia is currently the second largest producer in the world. Malaysian palm oil industry is export-oriented industry. The total export of CPO alone is more than 70% out of total export of palm oil products. Correspondingly, the export of CPO has significantly contributed to the total export revenue which has been identified as the backbone of palm oil industry and Malaysian economy. This can be shown by the significant contributions played by palm oil mills that has propelled the palm oil industry to be a leading driving force of agricultural sector as the third largest contributor to Malaysian GDP in 2020. Therefore, the sustainability of palm oil mills is crucial to continuously play a significant role to the growth of Malaysian palm oil industry.

The sustainability issues from the production of CPO in palm oil mill have exposed palm oil mills to the sustainability risks that threaten the mills' sustainability performance. Consequently, palm oil mills should place a greater concern for their sustainability risk management. Also, due to increasing demand for sustainability palm oil production from various stakeholders, the SRM is expected to be diverse and extensive in palm oil mills. Hence, the answer related to management of sustainability by implementing SRM is crucial in providing counter evidence to the claim made by stakeholders on the sustainability issues as a result of palm oil production.

The target sample is palm oil mills across Malaysia, including both in Peninsular and East Malaysia. The is due to the number of palm oil mill in Peninsular and East Malaysia that is relatively balance with 54% from Peninsular and 46% from Sabah and Sarawak, including palm oil mills from both geographical areas that are capable in boosting the response rate. In addition, the answer from these two different geographical areas enrich the findings of this study. The study's target respondents are operation managers, including assistant managers, executives, sustainability officer, and safety officer, due to their participation in the operations, and their vital roles in the decision-making of sustainable palm oil production.

1.9 Definition of Key Terms

The following are operational definitions of key term, presented in alphabetical order.

Business Size (BS)

Business size is defined as the capacity to process FBB per hour (Azman, 2014).

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Competitive Pressure (CP)

Competitive pressure is defined as the replication of a company to proven techniques or practices of successful competitors in the industry when faced with ambiguous and uncertain situations (Chu et al., 2018; Jamil et al., 2015).

Normative Pressure (NP)

Normative pressure refers to the collective expectations, norms, and standards within a particular organisational context originated from professional groups that push companies to adopt any prevailing behaviours and practices to conform with social legitimacy concerns (Jalaludin et al., 2011; Strauss et al., 2013; S. Wang et al., 2018).

Perceived Environmental Uncertainty (PEU)

Perceived environmental uncertainty refers to predictability, certainty and stability in organisation's business environment with respect to sustainable development (Duncan, 1972; Jusoh, 2010; Pondeville et al., 2013).

Regulatory Pressure (RP)

Regulatory pressure is defined as the formal and informal pressure from the environment that provides rules, rewards, and sanctions as to influence the actions of a company (Jalaludin et al., 2011). Among the sources of regulatory pressure are governmental legislation, as well as other organisations upon which the company is dependent (S. Wang et al., 2018).

Sustainability Performance (SP)

Sustainability performance refers to the development that meets the needs of present generation, while protecting the human and natural resources for the future generations to meet their need (Lintukangas et al., 2019; Rajesh, 2020). Sustainability performance comprises three elements: economic, environmental, and social (EES) performance. For companies to become relevant in the 21st century, sustainability performance is all about incorporating environmental performance, economic efficiency, and social equity into companies' operations.

Sustainability Risk

Risks that are categorised into economic risks, environmental risks and social risks emerging from sustainability issues encompassing economic issues, environmental issues, and social issues as a result of companies' internal activities and interaction with external environment. Sustainability Risk Management (SRM)

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Sustainability risk management is defined as a risk management framework that manages the three elements of sustainability by using the four risk management components, namely risk identification, risk assessment and analysis, risk response and risk mitigation.

SRM Implementation

The practice of implementing risk identification, risk assessment and analysis, risk response, and risk monitoring to manage sustainability risk comprising economic, environmental and social risk. SRM and SRM implementation carry the same objective of managing sustainability risks using the four components of risk management framework. Thus, the terms SRM and SRM implementation are used interchangeably in this study.

Sustainability Strategy (SS)

Sustainability in palm oil manufacturing heavily focuses on producing sustainable palm oil at the same time minimising the sustainability issues. In this study, sustainability strategy refers to the integration of sustainability with the firm's strategic planning that aims to reduce the impact of operations on the economic, environmental and social sustainability through products, processes and corporate policies (Banerjee et al., 2003; Latan et al., 2018).

Top management Support (TMS)

Top management support refers commitment of top management to necessary supports towards addressing the sustainability issues and achieving sustainable palm oil.

1.10 Organisation of the Thesis

The construction of thesis study is organised into eight chapters and briefly explained as follows.

Chapter 1 introduces the research by presenting the background of the study and the problem statement. Then, the chapter presents the research objectives and research questions. The chapter then explains the significance of the study to academic and practitioners. This is followed by the scope of the study and ends with thesis organisation.

Chapter 2 provides discussion on review of all the relevant literature pertaining to sustainability and risk management. It starts with the sustainability concept. Then, it is followed by issues in sustainability that lead to the emergence of sustainability risk. In order to understand the way to manage sustainability risk,

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this study covers the conceptual and empirical studies on risk management. It also highlights the evolution of risk management practice in company from silo-based to holistic risk management approach. Due to the limitations of current risk management practice, which is widely known as Enterprise Risk Management (ERM), the review of literature continues to the sustainability risk management. Overall, this chapter intends to indicate the point of departure of this study.

Chapter 3 presents the theoretical and conceptual framework for this study. It details out the component of conceptual framework. All variables involved in the conceptual framework are identified and discussed further. This is followed by the development of hypotheses tested in this study.

Chapter 4 thoroughly explains the research context of the study. This chapter begins with the development of the palm oil in Malaysia, the importance of palm oil mills and the contribution of palm oil mills. Subsequently, the discussion continues with some sustainability issues in palm oil production that attracts the need of risk management. Overall, the purposes of this chapter are to provide necessary background to the research and the reasons this research context is chosen.

Chapter 5 covers the methodology that employed in this study which covers the data collection, survey design and data analysis methods. The chapter starts with the justification of research design in this study. The next focus of this chapter is the explanation of the development of the survey questionnaire which also includes the measurement of research variables. This is followed by the discussion on data sources as well as the sampling strategy. This chapter ends with some explanations on the data analysis that employed in this study.

Chapter 6 discusses the findings of this study. It covers the results of response rate, respondent's and mill's profiles. Before the main analysis took place, the multivariate assumptions had been conducted to test normality, linearity, multicollinearity, and homoscedasticity assumptions. Once the multivariate assumptions had been fulfilled, the analysis proceeded to the main analysis using failure mode effect analysis (FMEA) and structural equation modelling (SEM). The chapter ends with a short summary of the chapter.

Chapter 7 presents the discussion of the findings. The discussion is presented in accordance with the research objective. In order for the discussion to be well explained, support from literature and useful insights from the industry are also presented.

Chapter 8 concludes the overall study. This chapter discusses the conclusion of the study by stating the research issue, research objective, literature review, methodology, and the findings of this study. Next, this chapter provides

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theoretical and managerial contributions. Finally, limitations and future recommendations end this chapter.

1.11 Summary

The chapter provides an overview of the entire study. It starts with the background of the study that provides explanation on the SRM as the main focus of the study. It is developed with the problem statement that illustrates the problem of sustainability performance of palm oi mills, the reason why the US & EU boycott Malaysia palm oil, the problem in palm oil mills, and the problem of risk management in palm oil mills. Deriving from the problem statement, this study develops the research objectives and research questions. It is followed by the motivation and significance of the study. Next, the study briefly describes the scope of the study where the details explanation is described in research context chapter. The study also outlines the definition of key terms for the reference of the readers. Finally, this study ends with the organisation of the whole thesis.

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