

**Implementing Environmental Management:
The Impact of Organisational
Internal/External Factors and the Outcome
on Product Innovation Among
Manufacturing Firms**

**Lancaster
University**



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**This dissertation is submitted for the degree of
Doctor of Philosophy**

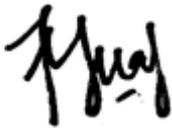
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Declaration

This dissertation has not been submitted in support of an application for another degree at this or any other university. It is the result of my own work and includes nothing that is the outcome of work done in collaboration except where specifically indicated. Many of the ideas in this thesis were the product of discussion with my supervisors Dr. Danny Soetanto and Professor Sarah Jack.

MUHAMMAD MUAZ BIN MAHMUD

A handwritten signature in black ink, appearing to read 'Muaz', written in a cursive style.

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For All, Thank you

Abstract

This dissertation investigated the antecedent and outcome of environmental management. The study started with a comprehensive literature review on the antecedent of environmental management (Study 1). For this, I focused on how firms' level of decentralisation can influence environmental management practices and how external factors (social relationship, global awareness and technological dynamic) moderated these relationships (Study 2). Furthermore, I looked into the configuration approach to firms' environmental management practices that accounted for their internal resources (absorptive capability, decentralisation, firm size and social ties with customers) and external involvement (global awareness on the environment) (Study 3). To address the topic on the outcome of environmental management, the study focused on how product innovations (product exploration and product exploitation) were influenced by environmental management and the extent to which dynamic capabilities (absorptive capability and transformative capability) moderated these relationships (Study 4). Based on surveys among manufacturing firms in the United Kingdom (UK) (n=106) and Malaysia (n=107), this study found that highly decentralised firms encouraged the practice of environmental management, which further positively influenced firms' product exploration and product exploitation. Besides that, this study found that a combination of presence of internal resources and external involvements promoted high environmental management.

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CHAPTER 1: INTRODUCTION

1.1 Research Problem

Many scholars believe that close scrutiny of environmental management and its antecedents/outcomes in different contexts is important towards solving environmental problems (e.g. Li et al., 2016; Alt et al., 2015; Pinzone et al., 2015; Basha and Lal, 2019). While there has been much effort to address this topic, many other factors related to environmental management have been left unexplored and still debatable by academics and managers alike (Boiral et al., 2018; Hofer et al., 2012). Although the topic of environmental management has been the subject of many empirical and conceptual studies in which the contradictory findings do not necessarily improve understanding about the topic. Hence, this study set out to understand important factors related to environmental management that have been least explored or unexplored.

In this study, I define environmental management as actions taken by organisations, including formal standards and common practices, aimed at reducing the negative impact on the natural environment. The activity ranges from reactive regulatory compliance to proactive pollution prevention and environmental leadership (Aragón-Correa et al., 2008). A reactive strategy merely focuses on aiming to meet legal requirements and implement pollution controls as a quick response to fulfil demands from stakeholders, whereas a proactive strategy include voluntary practices going beyond regulatory compliances.

First, a few notable studies have explicitly recognised the importance of firms having process and manufacturing flexibilities in the adaptation to environmental practices (e.g. López-Gamero et al., 2008; Klassen and Angell, 1998). According to Darnall et al., (2010), firms' success at responding to environmental issues are fuelled by their ability to make faster decisions and respond quicker to matters related to their industry as a result of stronger structural flexibility and simpler decision-making process (i.e. decentralised decision-making). Since there are limited numbers of studies on firms' structural flexibility in the field of environmental management, this study sets out to explore this relationship (decentralisation-environmental management).

Furthermore, this study explored the impact of external pressure towards the firm flexibility-environmental management relationship. The process of environmental management is complex where firms are needed to align external sources with their internal structure (Ormazabal and Sarriegi, 2014). From global trends to customers' demand, external influences drive firms' choice to implement environmental management (Wong et al., 2020). Hence, through recognising external influences, they can leverage their level of flexibility to facilitate the diffusion of environmental management throughout their organisation.

Second, in most empirical studies on antecedents of environmental management, the method of regression is adapted. Although the regression logic is effective at identifying symmetric relationships, the relationships among the observations are not always symmetrical (Ryan and Berbegal-Mirabent, 2016). One of the most prominent methods is fuzzy-set qualitative comparative analysis (fsQCA) that is used to supplement the regression analysis when the relationships between the dependent and independent variables are asymmetric (Hughes et al., 2018). Several articles acknowledged and described inconsistencies in factors related to environmental management (e.g. Darnall et al., 2010 vs Brammer et al., 2012). In real life contexts, environmental management issues rarely support an antecedent-outcome symmetry stance where different routes can potentially lead to the same outcome. Hence, this research contributes valuably to understanding the different configurations of internal resources and external influence in this firm domain and helps overcome the simplistic narrative of linear relations for antecedents of environmental management that dominate the literature.

Third, while the outcome of environmental management is important, studies on product development remain limited. Though adding environmental features to existing product development is risky, businesses may feel obliged to do so based on beliefs that it is the right thing to do and may bring competitive advantages (Walker et al., 2014). This issue deserves attention since businesses now are more aware of the importance of product development processes (Chen, 2011) and demands from consumers for products developed in an environmentally friendly manner is increasing (Purhoit, 2012). In this study, I extended the current studies on product development by examining two types of product innovation activities, namely product exploration and

product exploitation (Chan et al., 2016; Severo et al., 2017; Voss et al., 2008). In addition, this study explored how dynamic capability (absorptive capability and transformative capability) can be treated as a moderator for ensuring the positive impact of environmental management on product innovation activities. The critical importance of a firm's dynamic capabilities lies in the capability to dynamically integrate, build and reconfigure internal and external resources and skills to address a rapidly changing environment (Winter, 2003; Eisenhardt and Martin, 2000; Teece et al., 1997). According to Jiang et al., (2018), dynamic capabilities are tools in exploiting new ideas and encouraging innovativeness.

1.2 Background

Growing up in a village setting in the developing country of Malaysia has led my views on environmental issues to mature over time. I can still remember in the 1990s where the ambient temperatures were slightly cooler than now. I used to go out fishing in nearby rivers and ponds where fish of various species were still plentiful. A few years later housing projects started to proliferate in our village coupled with development of industrial areas. This was when I first started to become aware of the need for proper environmental management. The location of my village was strategic since the government had decided to shift the Malaysian government administration centre from Kuala Lumpur (the capital city of Malaysia) to Putrajaya. Since the village is bordering this new administrative centre, even the main gateway to the centre was developed in this area. This made my village a centre of attraction for housing projects and industrial areas which together created environmental issues. I witnessed the physical changes happening to the village where the rivers started to be polluted due to industrial waste being discharged and littering. Deforestation occurred to give way to new housing projects and industrial estates. Gradually, I could sense the climate change where year after year, the village morning mist started to disappear, and it became warmer due to uncontrolled felling of trees. Living in a country situated on the equator, we rely a lot on trees to protect and buffer us from the heat.

Being just a kid, I thought that these processes were normal. I had positive thoughts in my mind telling me that there were still natural reserves out there that could cope with the disturbances to the environment. Little did I know that the world was struggling with environmental issues. As I grew older, the reality slowly came into

perspective. It was my visit to Japan back in 2013 that gave me a wake-up call. I could not help but noticed the remarkable efforts they had made to “do their part” in helping with the environment. In big cities where land was scarce, certain building designs had compensated the carbon dioxide emission by having plants and trees installed inside and outside the buildings, including rooftops. This concept of urban agriculture is targeted at cultivating foods and plants in urban areas in order to reduce food miles (a mile over which a food item is transported during the journey from producer to consumer, as a unit of measurement of the fuel used to transport it) and at the same time help to bring in elements of the natural environment into these spaces. Offices and shops are mostly installed with auto on-off systems to help manage the usage of electricity. I remember visiting some manufacturing companies in a Japanese town named Kochi. It is situated nearby a river where the water was safe for drinking even though surrounded by industries.

From there onwards, I had so many questions that came to my mind. The environment we leave is an advance from our future generations. How can we make it sustainable for them? Businesses are needed to drive a country’s economy but how can they be successful without compromising the protection of the environment as well? What will motivate them to act accordingly?

These experiences were among the impetuses that lead me to venture into the topic of environmental management as my PhD undertaking.

1.3 Academic motivation

The literature combining areas of environmental management has been emerging over the last few decades (Aboelmaged and Hashem, 2019; A large body of research has sought to find out what drives firms to act sustainably (e.g. Singh et al., 2015; Yang et al., 2010) and the outcome for firms that act sustainably (e.g. Dubey et al., 2015; Nath and Ramanathan, 2016). While studies in this area have started to gain popularity among researchers, there are many unexplored managerial variables relating to the environmental domain. This was evident during the early process of developing my research framework. For example, one paper I read argued that principles of total quality management are translated in a given organisational setting where dominant models of organisation can be their organisational structure (Moore and Brown, 2006). The

principles of environmental management are relatively similar to total quality management, where elements of clean operations are the main focus (i.e. clean technology, optimisation of stock materials and reduction of unnecessary inputs in production processes). Hence, I found it interesting if my research could look into the influence of organisational structure on environmental management.

Driven by different stakeholders and internal improvement of their environmental efficiency, increasing numbers of firms are practicing environmental management (Delgado-Ceballos et al., 2012; Heras-Saizarbitoria et al., 2011). Regardless of this domain becoming more important, research on environmental management practices remains scarce (Cao and Chen, 2019) and in several existing studies weaknesses were detected that needed to be addressed. The key issues of frameworks, measurement and empirical studies of sustainability practices are too fragmented (Adams et al., 2015; Y Chen et al., 2015; Delmas, 2002) and inconclusive (He et al., 2015). The definitions of environmental management were also found to be diverse, depending on the context of each research study.

The studies on antecedents and outcomes of environmental management were also found to be important. Certain management scholars do believe that a close examination on drivers and outcomes of environmental management is important in addressing issues of economy and global environmental problems that require urgent attention (Walker et al., 2014). From a business perspective, environmental strategy is a central dimension in the discourse of corporate sustainability practices (Stadtler and Lin, 2017). However, there is no clear consensus among scholars on the main factors that drive firms to implement environmental management (Heras-Saizarbitoria et al., 2011). From the engagement with extant literature, I was able to conclude several limitations:

- 1) The terminology and understanding of environmental management are unclear depending on the context of the study.
- 2) The drivers and outcomes of environmental management have not been fully explored.

1.4 Overview of the Study and the Methodology

The study called attention to previously unexplored explanations within the environmental management domain. More specifically, this study is concerned about the role of decentralisation towards firms' environmental management practices and the outcome of product exploration and product exploitation.

The focus of the research, the issues examined by each study and the methodological approach used allows this dissertation to provide a significant contribution towards the existing literature. The whole dissertation consists of four different studies:

- 1) One (1) literature review on the antecedent of environmental management
- 2) Two (2) empirical studies on the antecedent of environmental management
- 3) One (1) empirical study on the outcome of environmental management

In order to achieve the objective of the study, a quantitative approach was adopted via primary data. I found it more practical to gather data using a quantitative approach that would assist me to fulfil the objective of the study. Furthermore, secondary data was also not an option due to the availability of existing data which was limited. Data was collected from manufacturing firms in the UK (n =106) and Malaysia (n=107). For database purposes, I used the Financial Analysis Made Easy (FAME) database (UK) and Federation of Malaysian Manufacturers' database (Malaysia). Both these databases are well-known and regularly used in studies involving manufacturers (e.g. Yu and Ramanathan, 2015 Wang and Ahmed, 2004; Nath and Ramanathan, 2016; Hsu, 2013). Self-administered questionnaires were developed, and pilot tested before launching the survey. The pilot-testing involved both academics and manufacturers. This effort was made to ensure that the questionnaire could be understood by the respondents and theoretically fit to represent the constructs proposed in the study. The full survey was conducted in Malaysia and the UK concurrently from August 2016 through to December 2016. Respondents were chosen among those positioned at managerial levels that had access to information required. All questionnaires were delivered via email to the respondents and answered online.

1.5 Studies Produced

The study mainly centres on my investigation into the antecedents and outcomes of environmental management. Figure 1.1 displays the framework of studies involved. I started off this thesis with an introduction and overview of my study that has been conducted (*Chapter 1*). Before proceeding with other empirical studies, I started off by conducting a literature review on environmental management (*Chapter 2*). Specifically, I explored studies looking into organisational traits (internal) that influenced adoption of environmental management among firms.

Following the literature review on environmental management, there was a missing gap identifying organisational internal structure as a means to practice environmental management. This led to the development of an empirical paper (*Chapter 3*) in which I explored the concept of decision-making authority (i.e. level of decentralisation) to determine a firm's environmental management strategy. The survival of a business is heavily dependent on a firm's effective management processes, such as the decision-making process and allocation of power (Kim et al., 2019). I adopted the concept of decentralisation that narrowly defines the decision-making level of authority in a firm. Though there are limited studies in environmental research related to levels of decentralisation, the influence of this factor on firm performance has been clearly established in the management literature (e.g. Martin et al., 2016; Joseph et al., 2016). In the context of my study, the process of environmental management is complex and requires employees' involvement at all hierarchical levels (López-Gamero et al., 2016). Hence, the issue of level of decentralisation is potentially related to the strength of environmental management commitment in a firm.

In most quantitative studies within the domain of environmental management, the selected method to address the research objectives is via regression. The limitation using this method is the ability to process unsymmetrical relationships among the observation variables (Fiss, 2011). In the field of management, causality is usually complex and requires alternative analytical methods (Ryan and Berbegal-Mirabent, 2016). In complementing the topic on antecedents of environmental management, I explored the possibility of configuration of internal resources and external involvement in achieving high or low levels of environmental management using fuzzy-set qualitative comparative analysis (fsQCA) (*Chapter 4*). This method complements the

existing literature by taking an asymmetrical point of view where different combinations of predictor variables can produce the same outcome (Gast et al., 2018). In the context of this study, three external pressures namely social relationship, global environmental awareness and technological dynamic were considered as moderating variables. Firms need to align pressure from external sources with their internal structure to achieve competitive advantage (Zailani et al., 2012). Hence, the study argued that the existence of external influences will impact the relationship between a firm's decentralisation level and strength of environmental management practices.

Next, I explored the outcome of environmental management (*Chapter 5*). I noted the increase in attention to innovation activities as a result of environmental practices in firms. Hence, it raised questions about the outcomes of environmental and type of product innovation strategy firms engage most. The concept of exploration and exploitation in academic thinking has been related to the innovation process of an organisation (Wilden et al., 2018). In this study, the concept of the two types of innovation activities are examined. A firm's ability to compete lies in the ability to build on its existing competences, while developing new ones (Molina-Castillo et al., 2011). Hence, the concepts of product exploration and product exploitation are introduced in this study as the outcome of environmental management. In addition, this research also focuses on the role of dynamic capability (absorptive capability and transformative capability) in moderating the relationship between environmental management and product innovation. I ended the thesis with the conclusion section which summarised the contribution and limitation of the whole study (*Chapter 6*).

This dissertation focuses on different approaches using four studies (summary in Table 1.1; framework in Figure 1.1);

Study 1: The main purpose of this study is to explore the existing antecedents of environmental management available in the management literature. This study carries out a literature review of quantitative studies that focuses on the influence of organisational traits on environmental management. A literature search was conducted and a total of 24 studies from top-tier management journals were retrieved and analysed. The study finds that antecedents of environmental management was determined by five organisational traits including executives' perception, strategic experience, motivations, firm size, proactiveness and attitude to innovativeness. Three different types of

environmental management were found, namely, reactive, proactive and hybrid. Mixed results were also obtained but most studies were able to find positive relationships between organisational traits and environmental management.

This study has been submitted to the *Journal of Environmental Management* and is currently under review. It has also been presented at the research workshop, organised by Professor Eero Vaara at Lancaster University Management School and received much helpful feedback for improvements.

Study 2: This study explores the antecedent of environmental management using the method of regression. Specifically, it explores the role of organisational flexibility (decentralised structure) and external pressure (social relationship, global awareness and technological dynamic) in determining the practice of environmental management. Since the process of implementing environmental management is complex, firms need to align external influence with their internal structure to assist the adaptation (Ormazabal and Sarriegi, 2014). In this study, samples were collected from a total of 106 manufacturing firms in the UK where each one was represented by a single respondent. The results prove that a decentralised structure strengthens a firm's environmental management practice. Moreover, the finding also shows that the impact of a decentralised structure on environmental management is strengthened in the presence of a strong technological dynamic. However, a unique finding from this study argues that external pressure from global awareness on the environment weakens the environmental management in decentralised firms.

This study has been submitted to the *Journal of General Management* and has been accepted subject to major corrections. Currently, the article is under its second-round review. The study was also presented at the 3rd CHREST International Conference 2018, Terengganu, Malaysia and received a very positive response.

Study 3: This study focuses on the antecedent of environmental management using fsQCA of 107 manufacturing firms from Malaysia. As an effort to support different approaches, this method was adopted to analyse environmental management from a different perspective. This approach opposes the symmetric inter-relationship assumption of regression, while supporting the asymmetric relationship where similar outcomes can be obtained through different combinations of predictor variables (Gast

et al., 2018). The study explores the configuration of four internal resources (absorptive capability, decentralisation, firm size and social ties with customers) and one external involvement factor (global environmental awareness) influencing the level of environmental management among manufacturing firms. Findings show that a firm's internal resource integration and external involvement factors are important antecedents for high environmental management practices. Furthermore, external involvement (environmental awareness) plays the most important role in ensuring high environmental management in firms. Uniquely, the study also finds that a decentralised structure and absence of other internal or external influences produces a decline in environmental practices among firms. Though the findings were against the predicted outcome, it supports the characteristic of a decentralised structured firm where they tend to respond rationally to rapid and inconsistent changes (Hage and Aiken, 1967). Thus, the absence in pressure to practice environmental management may lead lower the engagement of decentralised firms to implement environmental practices.

This study has been submitted to *Organization & Environment* and is currently under review.

Study 4: The main objective of this study is to explore the outcome of environmental management practices among firms with regard to product innovation. Previous studies on environmental management have explored the outcome of product development but did not specify the type of development. Hence, in this study, the focus was to examine the moderating effect of transformative capability and absorptive capability on the relationship between environmental management and product exploration and exploitation. A total of 106 samples were gathered from manufacturing firms in the UK. This study finds a positive relationship between environmental management practices among firms and product exploration/exploitation. Furthermore, it shows that transformative capability can positively moderate the relationship between environmental management and product exploration. On the other hand, absorptive capability was found to negatively moderate the relationship between environmental management and product exploitation.

This study is published in the *Journal of Cleaner Production*. It was presented at the 3rd CHREST International Conference 2018, Terengganu, Malaysia and received best paper award.

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Table 1.1 Summary of studies involved

Study	Title	Type of paper	Country of sample	Number of samples
1	Organisational Traits and Environmental Management Practices: A Literature Review	Literature review	N/A	24 research articles
2	Small to medium manufacturing firms and environmental management: A contingency perspective of firms' organisational flexibility and external pressure	Empirical (antecedent)	UK	106 manufacturing firms
3	Organisational capabilities and global environmental awareness: A study of environmental management practice in Malaysian manufacturing firms	Empirical (antecedent)	Malaysia	107 manufacturing firms
4	Environmental management and product innovation: The moderating role of the dynamic capability of small to medium manufacturing firms	Empirical (outcome)	UK	106 manufacturing firms

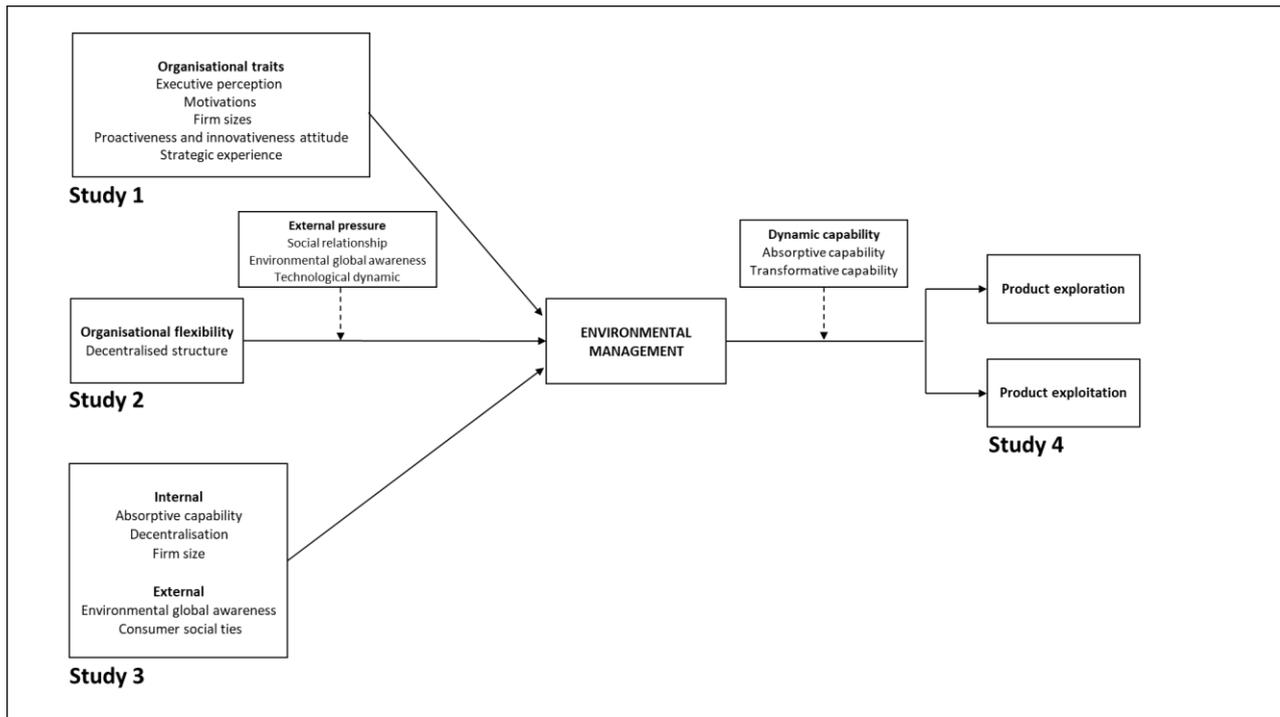


Figure 1.1 Framework of studies involved

1.6 Structure of the Dissertation

The dissertation is structured as follows:

This dissertation starts off with the introduction chapter. Included in this chapter is the *research problem, background, overview of the study and the methodology, and studies produced*. The *research problem* describes general issues of the research topic on environmental management. Next, the *background* tells about the author’s life experience and interest leading to the research domain of environmental management. The *overview of the study and the methodology* present the four studies and also the methodology adopted in the study. The *studies produced* explains the overview of constructs used in the studies and also the summary of each study.

Chapter 2 presents *study 1* titled “Organisational Traits and Environmental Management Practices: A Literature Review”.

Chapter 3 presents *study 2* titled “Small to medium manufacturing firms and environmental management: A contingency perspective of firms’ organisational flexibility and external pressure”.

Chapter 4 presents *study 3* titled “Organisational capabilities and global environmental awareness: A study of environmental management practice in Malaysian manufacturing firms”.

Chapter 5 presents *study 4* titled “Environmental management and product innovation: The moderating role of the dynamic capability of small to medium manufacturing firms”.

Finally, **Chapter 6** contains the discussion chapter. The chapter starts with a discussion of the literature review on antecedents and outcomes of environmental management. Then the findings were elaborated, and this was followed by the limitations and suggestions for future studies.

CHAPTER 2: STUDY 1 - ORGANISATIONAL TRAITS AND ENVIRONMENTAL MANAGEMENT PRACTICES: A LITERATURE REVIEW

Authors

Muaz Mahmud, Danny Soetanto, Sarah Jack

Abstract

The purpose of this paper is to carry out a literature review of quantitative studies from leading management journals that have analysed the impact of organisational traits on environmental management. A total of 24 studies were identified examining the organisational variables used, the environmental management variables, the statistical analyses and main findings obtained by these papers. The results were mixed, but the papers that found a positive relationship between organisational trait(s) and environmental management are predominant. Our review shows that the distribution of types of industry and country were diverse. The firm's environmental management implementation could be divided into three levels: proactive, reactive and hybrid. Environmental managers seeking insights on environmental management implementation through company features can benefit from the combined review instead of having to gather information from different sources.

2.1 Introduction

For nearly 30 years, we have seen a growth in the level of environmental awareness in various sectors (Melnik et al., 2002), which has led to the desire of firms for “sustainable development” (González-Benito, 2008). Environmental concerns are unavoidably becoming part of companies’ strategic planning, and environmental management is, therefore, crucial for the competitiveness of the business. The sense of awareness and responsibility towards protection of the environment is among the milestones achieved during the neo-industrial revolution. It was not till the 1990s that environmental management approaches started, where businesses anticipated the ecological effects from their operations, took initiatives to reduce waste and pollution in advance of regulations, and started to use environmental management as an effective means for business opportunities (Berry and Rondinelli, 1998). Though the term has been around for almost three decades, there has been no consistency in what constitutes environmental management. To achieve the establishment of environmental management, it is of the utmost importance to determine uniformity of such terms.

The development of environmental management among firms is contingent upon a wide range of aspects of company features, such as top-management team’s perception (Pinzone, Lettieri and Masella, 2015; Roxas and Coetzer, 2012; Delmas, 2001), firms’ proactiveness and innovativeness (López-Gamero et al., 2016; Aragon-Correa, 1998), motivations (Singh, Jain and Sharma, 2015; Gonzalez-Benito and Gonzalez-Benito, 2005) and strategic experiences (Darnall and Edwards, 2006; Bansal and Hunter, 2003). The domain of environmental management has attracted many researchers (Lucas and Noordewier, 2016; Menguc, Auh and Ozanne, 2010; Martin-Tapia, Aragon-Correa and Senise-Barrio, 2008). Such internal factors are known to be important for the development of sustainable practices (Delgado-Ceballos et al., 2012). As studies focusing on firms’ internal factors bring more findings, without any moderation, disputes will be the field of study. For example, the issues of firm size effect on environmental proactivity - whether large or small firms are more influenced to practice ecological solutions - have been debated for two decades (Nakamura et al., 2001). Additionally, size may play an ambivalent role, either promoting or hampering environmental efforts (Lefebvre et al., 2003) and the different context of research explains such diversity (Boiral et al., 2018). On the other hand, reviews on determinant

factors of environmental management at firm level are still limited in quantity with no major reviews in this field ever published.

A question then arises: What types of environmental management are firms applying to their business? And how do internal organisational traits influence the adoption of environmental management? Several authors have approached these questions and studied various traits of firms (González-Benito and González-Benito, 2006) but the results have never been consolidated. The purpose of this paper is to review and consolidate the works of literature from top leading management journals to provide a preliminary scheme of the organisational trait factors that feature as main predictors of environmental practices.

As a step to advance organisational traits in environmental management theory and research, we sought to identify those empirical and theoretical studies that have investigated organisational traits in this context. This is the first paper to do so, with a focus towards the role of organisational traits within the environmental management context. The review mainly focuses on empirical studies and the theoretical stances of each paper. However, we closely analyse the methodological approach practiced by the papers to bring coherence to the area least explored.

Generally, this review calls attention to the weaknesses of environmental management research and further emphasises the need to strengthen the environmental management area of research. Specifically, we focus on organisational traits and influence of environmental management at firm level. The homogeneity of the context helps to grasp a better understanding of a specific factor from a management perspective. The primary objective is to outline the findings of the review based on quantitative papers exploring the relationship between organisational traits and environmental management.

We used established databases and conducted the literature search from September 2016 until November 2016 to collect and analyse the relevant articles within this domain of sustainable literature. The paper offers exciting implications for firm owners, and identifies the interesting role played by various internal traits. This article also seeks to contribute to the continuing debate on reasons to implement environmental management from an organisational trait perspective. In our opinion, this is important

since coordinating business with internal capabilities could provide significant positive impacts on the environment as well as the company. The theoretical contribution of this paper is a comprehensive review and analysis of peer-reviewed articles from top-ranked journals, adding to the existing literature on environment. To be more specific, we advance the existing works by focusing on the influence of internal organisational traits on environmental management practices. This effort is an extension of recent calls to analyse the complete picture regarding the reasons for environmental proactivity (e.g. Delgado-Ceballos et al., 2012).

2.2 Methodology

While there is substantial literature linking between environmental management implementation and institutional drivers (e.g. Ateş et al., 2012; Nair and Prajogo, 2009; Bansal and Roth, 2000) and external influences (e.g. Tang and Tang, 2012; Buysse and Verbeke, 2003; Delmas, 2001), it is not the focus of this review. The links between different types of organisational traits and environmental management implementation is less well-established, although some authors have associated them with previous strategic experience (Hajmohammad et al., 2013; Darnall and Edwards, 2006) and/or owners' insight (González-Benito and González-Benito, 2006; Delmas, 2001).

Given that we were concerned with circumstances where organisational traits are influencers, we chose to explore these traits across the extant literature. We noticed, however, that the notion of these traits may not be straightforward. The question arises over which traits have consistent findings across different papers, since the notion of choices among traits are varied and produce mixed findings for certain traits. For example, Quazi et al. (2001) found finds that top management's concern towards the natural environment will enhance their willingness to adopt and follow environmental standards, whereas Uhlaner et al. (2012) find no relationship between directors' environmental concerns and their environmental practice. At this moment, no studies have compared these contrary findings.

2.2.1 Selection of Papers

In selecting the cases, we focused on specific related keywords that were browsed through the two databases, the ABI/INFORM and EBSCO Business Source Complete.

Searches in multiple research databases¹ revealed that these two contained the largest number of relevant hits, due to their coverage of environmental management-based publications.

A literature search in databases using the keywords search method was conducted for studies from peer reviewed journal articles published between 1997 and 2018. The search was divided into two categories: keywords associated with environmental management and those associated with organisational traits. Environmental management was related to terms such as “sustainable development”, “proactive environmental strategy”, “ISO 14001”, “environmental management systems” and “voluntary environmental practices”. Terms such as “internal factors”, “internal capabilities” and “organisational capabilities” were often cited in literature on organisational traits. These keyword searches involved the process of combining keywords (e.g. proactive environmental management and internal capabilities) as well as testing them independently. After finalising the selection of the relevant articles, the abstracts were analysed. Since this study focuses only on quantitative research, we removed articles which mentioned adopting other methods in the abstract. As this research had never been explored, we decided only to include studies having results that were derived from untargeted sampling (e.g. Tuzek et al., 2018). Compared to qualitative studies, quantitative methods promote randomised and higher sample sizes. The data spectrum also allows the results to explain a generalised point of view. We believe that early approaches to this type of study should be focused on previous literature that answers specific questions to a particular hypothesis. As the context extends, future studies could then consider the meaning behind social phenomena through gathering data from qualitative studies. This process narrowed the pool of articles to only 78 research papers.

The remaining articles were skimmed through and checked for whether the constructs (i.e. organisational traits and environmental management) used were suitable for this study. Certain articles were considered to be outside the scope of this study and were discarded. For example, some articles used the term of environmental management but were focusing only on certain functional departments of an organisation, such as

¹ List of research databases - ABI/INFORM, EBSCO Business Source Complete, Academic Search Premier, ScienceDirect, Web of Science Citation Databases, Oxford Scholarship Online, JSTOR, Google Scholar and Econlit

accounting, and excluded other functional units (e.g. Qian et al., 2018). After a final count, 24 studies were analysed for this study (

Figure 2.1).

Our study only includes quantitative studies from either primary and/or secondary sources. Half of the studies were published over the past six years whereas the other half were published between 1998 and 2009 (12 years) (see Table 2.1). This shows that the focus on organisational traits within the environmental management context is more recent.

Through reviewing previous studies, we were able to classify organisational traits into five categories: leaders' perception on environmental management, organisational proactiveness towards environmental management, various motivations on environmental management, firm size and organisational strategic experience.

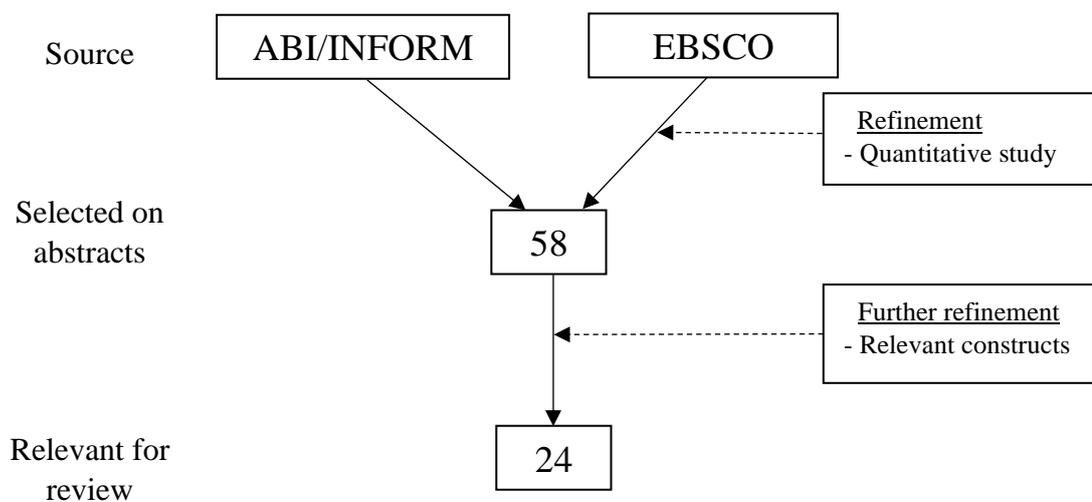


Figure 2.1 Research criteria for selecting literature for review

Table 2.1 Distribution of papers by year of publication, journal list and organisational traits

Details	Papers
<i>Distribution of papers by year of publication</i>	
2000	1
2001	1
2003	1
2007	1
2008	1
2009	1
2010	4
2011	1
2012	4
2013	3
2014	1
2015	1
2016	3
2018	2
<i>Distribution of papers by journal list</i>	
<i>Environmental management journals</i>	
Business Strategy and the Environment	2
Corporate Social Responsibility and Environmental Management	1
Environmental Quality Management	1
Ecological Economics	1
Journal of Cleaner Production	2
<i>General Management journals</i>	
Academy of Management Journal	1
Journal of Management Studies	1
<i>Ethics and policy journals</i>	
The Policy Studies Journal	1
Journal of Policy Analysis and Management	1
Journal of Business Ethics	7
Long Range Planning	1

Details	Papers
<i>Human resources journal</i>	
Human Resource Management	1
<i>Others</i>	
Journal of Computer Information Systems	1
Research & Development (R&D) Management	1
International Journal of Production Economics	1
Journal of Operations Management	1
<i>Distribution of papers by organisational traits</i>	
Executive perception	10
Motivation	3
Firm size	7
Proactiveness	5
Strategic intent	4

2.2.2 Analysis of Data

The data analysis conducted in this study were focused on three parts: establishing the different types of environmental management; exploring organisational traits that influences firm's environmental management; and exploring the relationship of organisational traits in different types of environmental management.

The terminology of environmental management is unclearly defined in previous literature (Jiang et al., 2018). We tried to gather the different understandings and definitions of environmental management across the selection of chosen articles and divided them based on the theme, namely reactive, proactive and hybrid. The reactive and proactive type of environmental management has been discussed in the extant literature, and Dixon-Fowler et al. (2013) confirm that certain firms do both strategies simultaneously. The hybrid approach is newly discovered. In order to validate the division (i.e. proactive, reactive and hybrid) of environmental management, we took further verification measures. First, all the authors of this paper have discussed and agreed to the categorisation of each environmental management definition. Second,

eight researchers (PhD students) were chosen and asked to match the definition with the type of environmental management. A briefing was given to explain about the study and the differences between each type of environmental management. Out of eight PhD students, two had results that differed from what we have proposed for this study. This was due to confusion and misinterpretation of certain statements, since both students did not come from a social science background, and not likely to be familiar with certain terminology and jargon used in this field. After clarification from the research assistants, they had a better understanding, thus agreed with the way types of environmental management had been defined by this study.

The next analysis focuses on the gathered articles, where they were divided based on the type of organisational traits tested in each study. We found five types of organisational traits that influence a firm's environmental management. Later, the traits were organised based on different types of environmental management. The findings of each selected article were then summarised, forming a review comparing the organisational traits across different types of environmental management.

2.3 Defining Environmental Management Practices

Implementing environmental management practices is the appropriate way for companies that wish to have a more environmental-aware position (Gonzalez-Benito and Gonzalez-Benito, 2005). That is, when such businesses are crafting strategies, they undoubtedly attach environmental aspects to their plan and these remain as the main focus.

A broad and mixed understanding of environmental management has led studies to fail in specifying clear definitions of environmental management. In this matter, previous studies have addressed the need for future studies to meet a common definition that exactly explains what it meant by environmental management (Gilley et al., 2000). Moreover, the published work on environmental management has produced a fragmented, disjointed body of literature. The debates in the green business literature have captured issues on different environmental approaches firms have chosen, since an important dilemma is the strategic options they would want to implement when it comes to environmental issues (Banerjee, 2001). They could choose to comply with existing rules and regulations as imposed by the government or local authority, and react

towards ecological matters whenever needed, or opt for a voluntary proactive strategy to create competitive advantages using environmental practices (Ateş et al., 2012). Though this issue has been previously discussed, it has not been reflected consistently within the definition of environmental management. In other words, some studies could use proactive terminology for environmental management but fail to justify the proactivity based on how the study defines environmental management.

Part of environmental management is the environmental management system (EMS) which is a regulatory structure that is established from within the firm (Coglianese and Nash, 2001). ISO 14001 is the most well-established EMS recognised internationally throughout the whole world (Johnstone and Labonne, 2009). Similar to total quality management (TQM), the purpose of ISO 14001 was to establish guidelines to orientate the progress of firms on voluntary environmental practices, and to distinguish those practicing appropriately, from others (Gonzalez-Benito and Gonzalez-Benito, 2005). ISO 14001 acts as a self-evaluation tool that allows a firm to develop the goals based on the specific requirements (Kitazawa and Sarkis, 2000). It is a voluntary, consensus-based, and market-driven standard (Kloepfer, 1997). Due to the audit processes that a firm must go through in order to be certified with ISO 14001, this standard has become legitimised and recognised by external stakeholders (Bansal and Hunter, 2003).

Based on the compilation of 24 studies, we find that environmental management is expressed as: environmental management practices, proactive environmental strategy, proactive environmental practices and environmentally sustainable orientation; these meanings belonging exclusively to each study. **Error! Not a valid bookmark self-reference.** displays how the various definitions can be clearly classified into different themes and the aforementioned types of environmental management: (1) reactive; (2) proactive; and (3) hybrid.

Reactive organisations relate to a defensive or end-of-pipe approach when facing environmental issues (Buysse and Verbeke, 2003). Such firms' focus is more narrow, and involves abiding by environmental regulations and taking a compliance-driven stand (Delgado-Ceballos et al., 2012). While this approach has received much criticism, some firms have chosen this approach to keep customers and suppliers at arms-length, as basic operational activities such as recycling, waste management and

packaging substitution are quick-fix solutions to meet with environmental regulation requirements and minimise short term risks (Nath and Ramanathan, 2016). This approach also minimises the cost of making structural changes but at the same time could portray the firm's principal focus on environmental management.

Unlike government laws and regulation, which impose compulsory requirements, the concept of environmental management has resulted from elements of voluntary orientation and produced incremental development in the evolution of environmental management (Tatoglu et al., 2014; González-Benito, 2008). In opposition to reactive organisations, proactive firms rely heavily on environmental planning and align their corporate strategy with environmental performance targets (Nath and Ramanathan, 2016). At this proactive level, firms are driven by new opportunities, addressing issues beyond public concerns, applying voluntary approaches and integrating issues across functions (Klassen and Angell, 1998), all for the sake of reducing the negative impact on the natural environment (Roxas and Coetzer, 2012). They accept regulations as a baseline and always address approaches that go beyond what is legally required (Ateş et al., 2012). Implementing a proactive approach is vital nowadays in a business environment that is competitive and demands firm to strategize to attain competitive advantages over their rivals. There has been theoretical (Hart, 1995) and empirical support (Christmann, 2000; Sharma and Vredenburg, 1998) that environmental management has a strong influence on the competitive advantage of a firm in general.

In certain cases, firms adopt both proactive and reactive strategies. The classic definition of environmental strategy as a pattern in action over time (Mintzberg, 1989) does not discriminate any efforts towards environmental preservation. This ranges from conforming with regulations and adopting standard practices, to a voluntary approach of having a consistent practice of actions to reduce environmental impacts of operations beyond fulfilling the environmental regulations and following any standard industrial practices (Sharma, 2000b). There are also studies which were ambiguous and unclear from the standpoint of whether firms are applying proactive or reactive approaches, based on their understanding of environmental management (e.g. Uhlaner et al., 2012). In this case, we assumed firms had a hybrid approach.

These three categories of environmental management are clearly distinct. However, no consistency was found between the terminology and definition of environmental management across the studies.

Table 2.2 Types of environmental management (EM)

Source	Definition of environmental management based on gathered studies	Themes	Type of EM
Benitez-Amado et al., 2010	“Firm’s abilities to implement voluntarily green management practices that go beyond environmental laws in order to reduce or minimize environmental impacts and ultimately to obtain business benefits”	Voluntary practice over and above the constitutional laws	Proactive
Dias-Sardinha and Antunes, 2007	“Planning and organizing the ways in which the company approaches environmental concerns, all with the objective of achieving specific environmental goals”	Environmental objective as an important element in company planning	Proactive
Darnall et al., 2010	“Intangible managerial innovations and routines that require organizational commitments towards improving the natural environment and which are not required by law”	Own initiative to reduce environmental impact	Proactive
Kumar and Shetty, 2018	“Encouraged by the regulators to supplement the traditional command-and-control regulation to create incentives for the corporates to embrace flexible, self-regulated programs that are cost effective and easier to implement”	Self-initiative environmental approaches for firm gains	Proactive
Lefebvre et al., 2003	“The extent to which a firm has taken explicit initiatives to integrate environmental issues into its products using some life-cycle-based management approaches”	Selective resource with a selective focus	Proactive
Lin and Ho, 2011	“Implementing new or modified processes, techniques, and systems to reduce environmental harms and can be regarded as a technical innovation process”	Progressive movement on environmental approaches	Proactive
López-Gamero et al., 2008	“More comprehensive and socially complex process than compliance, necessitating significant employee involvement, cross-disciplinary coordination and interpretation, and a forward-thinking managerial style”	Forward thinking and vigorous towards environmental initiatives	Proactive
De Burgos-Jiménez et al., 2013	“Systematic patterns of voluntary practices that go beyond regulatory requirements, for example, in terms of	Voluntary practice over and above the constitutional laws	Proactive

Source	Definition of environmental management based on gathered studies	Themes	Type of EM
	waste reduction and prevention of pollution at source”		
Pinzone et al., 2015	“Consistent pattern of environmental practices, across all dimensions relevant to their range of activities, not required to be undertaken in fulfilment of environmental regulations or in response to isomorphic pressures within the industry as standard business practices”	Voluntary practice over and above the constitutional laws	Proactive
Reyes-Rodríguez et al., 2016	“Formalisation of green issues, provided by the structuration of new routine procedures for planning, goal setting, assignment of responsibilities, measurement, evaluation and reporting”	Planned activities to embrace environmental approaches	Proactive
Roxas and Coetzer, 2012	“Overall proactive strategic stance of firms towards the integration of environmental concerns and practices into their strategic, tactical and operational activities”	Strong motivation to protect environment	Proactive
Vidal-Salazar et al., 2012	“Systematic environmental approaches that companies develop voluntarily that go beyond what is legally required”	Voluntary practice over and above the constitutional laws	Proactive
Khanna et al., 2007	“Establishment of internal standards, goals, and policies for environmental performance improvements, use of environmental cost accounting methods, and training and compensating employees to improve environmental performance”	Selective focus on environmental management	Reactive
Prajogo et al., 2014	“Ensures that operational processes such as product design, procurement, managing inventory, quality control, selecting appropriate technology, scheduling, maintenance, production, and packaging have no negative effects on natural resources and stakeholders (e.g., consumers, employees, communities) throughout the product's lifetime”	Selective focus on environmental management	Reactive
Cordano et al., 2010	“Rudimentary elements: goals, training, budgets, supplier criteria, and formalized responsibilities”	Basic environmental approaches	Reactive
Hajmohammad et al., 2013	“Level of resources invested in activities and know-how development that lead to pollution reduction at the source”	Selective resource with a selective focus	Reactive
Hofer et al., 2012	“Activities to monitor and control the impact of their operations on the natural environment”	Generalised plan to protect environment	Reactive

Source	Definition of environmental management based on gathered studies	Themes	Type of EM
Madsen and Uihøi, 2016	“Eliminate or reduce the consequences of business activities for the natural environment and society at large”	Generalised plan to protect environment	Reactive
Walker et al., 2014	“Environmental operational improvements (e.g., waste reduction, closed-loop systems, life-cycle analysis, employee training) and environmental reporting (e.g., internal and external accounting procedures, environmental indicators and goals, sustainability reports)”	Selective focus on environmental management	Reactive
Winter and May, 2001	“Regulatory problem not as one of enforcement but as one of compliance for which deterrent features are but one means”	Change in perception	Reactive
Wu et al., 2007	“Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS)”	Restricted areas of focus towards environmental initiatives	Reactive
Ervin et al., 2013	“Opportunity not simply to minimize regulatory compliance costs, but also to control risks, lower operating costs, respond to stakeholders, enhance revenues and improve competitive advantage”	Two-fold compliance	Hybrid
Sharma, 2000	“Outcomes in the form of actions firms take for regulatory compliance and to those they take voluntarily to further reduce the environmental impacts of operations (even though the actual impacts of these actions on the natural environment are not measured in this study)”	Two-fold compliance	Hybrid
Uhlauer et al., 2012	“Actions undertaken by a business to reduce the environmental impact of their operations”	Unclear spectrum of environmental activities undertaken	Hybrid

2.4 Analysis: Influence of Organisational Traits Towards Environmental Management

In this section, we put forward a series of explanations on how organisations’ internal traits are related to the development and/or adoption of an environmental management approach, based on the research articles that we have gathered. Unlike imposed regulations by lawmakers, environmental management is not compulsory but rather a

voluntary approach led by firms to reduce negative impacts on the environment. Although various factors related to organisational traits have been found, based on the extensive literature review on organisational traits, we found that these traits could be divided into five main groups. We examine the organisational antecedents using five factors: leaders' perception on environmental management, organisational proactiveness towards environmental management, various motivations on environmental management, firm size and organisational strategic experience. We acknowledge that there are other related factors not included but the latter were based on the articles selected for this study. Figure 2.2 exhibits the proposed model that represents the internal organisational factors and their influence towards environmental management adoption.

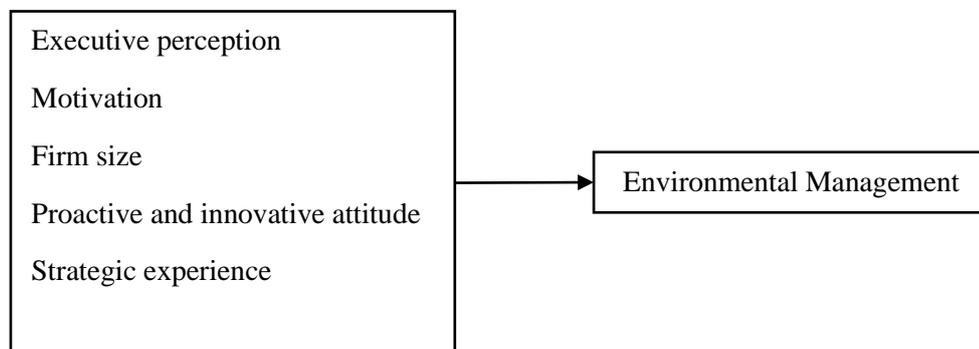


Figure 2.2 Determinant factors reviewed in the paper

2.4.1 Executive Perception

Organisational outcomes such as strategic direction and behaviour are reflected by the leaders or the upper echelons within an organisation (Hambrick, 2007). This is true in situations of small firms where leaders have full rights and control over their organisation's tactical and operational activities (Roxas and Coetzer, 2012). According to the results of a study conducted by Gupta (1995), 92% of 400 CEOs and top executives surveyed agreed that environmental challenge is one of the central issues in the 21st century. Potentially, an organisational leader's perception offers good insights of a firm's environmental management direction. A firm's choice to implement environmental management is mostly influenced by their previous support and enthusiasm towards such issues. As more research is being conducted, the connections between human behaviour and natural environmental effects are clearer, with more evidence being brought forward (Paillé et al., 2014; Schultz et al., 2004).

We build on Gardner and Stern's (2002) work on community management intervention, which involves the formation of firm-level rules and expectations that could drive firms' environmental behaviour. They expect that when most people are applying to what seems to be a community norm, people will feel less coerced, which minimises a firm's internal policy. Among small firms such as small and medium enterprises (SMEs), characteristics of managerial level employees/owners (e.g., norms, beliefs, values, and attitudes) are important in determining a firm's strategic direction and consequently its organisational behaviour (Banerjee, 2002).

Organisational leader involvement in firm agendas is vital. Among the internal barrier that prohibits or delays the adoption of proactive environmental strategies is lack of commitment from the top management team (Murillo-Luna et al., 2007). Kahneman and Tversky (1979) explained that through a manager's interpretation and views, a firm would weigh the risks of introducing new technology and possibilities of threats to its operation, to ensure that precautionary acts would be implemented to oppose any risks when proceeding with the latest technology. Similarly, Del Brío et al. (2001) argues that commitment and awareness of managers of the advantage and disadvantage of environmental management define the level of importance they give to these issues within the firm. Their perceptions have profound effects that will set the firms next steps. Thus, how they define the firm's environmental approach faced will drive the development of environmental behaviour. In developing countries, the influence of owner-managers is essential in determining firm's strategic determination including propensity towards environmental strategy. Roxas and Coetzer (2012) justified the role of the owner-manager in this regard for two major reasons: First, commonly these levels of hierarchy make them eligible to control firm resources, determining where the resources are deployed including allocation for environmental management purposes. Second, they act as the linking pin that coordinates the environmental management practice throughout the whole firm. When leaders work well, by displaying commitment, the self-imposed rule turns into shared social norms which other stakeholders or employees will adhere to, in the belief that what they are doing is correct or for the sake of keeping the system working (Gardner and Stern, 2002).

Although there has been much research on managerial intervention in the environment, some studies have identified more than just a straightforward and direct

link between managerial level involvement and environmental management. For instance, small firms may have the intention and willingness to practice a greener approach, but without having necessary knowledge and skills; the situation prohibits them to fully integrate greener approaches into the existing practice (Tilley, 1999).

In the health industry, committing to environmental issues is more prominent compared to industrial firms, where physicians are the main decision-makers in clinical as well as the administration department (Battilana, 2011), making the healthcare managers less reliant on top-down strategies to ignite changes and instead focus on support from the professionals (i.e. physicians) to implement new programs and activities (Pinzone, Lettieri and Masella, 2015; Best et al., 2012; Ferlie et al., 2005). Delmas (2001) finds that senior managers and corporate representatives are insufficient to induce competitive advantage from the dominating EMS, ISO 14001, and thus rely much on external stakeholders' involvement to transform the certification into an organisation's capability. However, she finds that environmental managers wield the influence to implement ISO 14001. This EMS applied by the firm acts as a leverage tool that supplements their (environmental managers) control inside the organisation. It shows that in certain situations, other factors act as a moderator and mediator in the manager- environmental management relationship. Therefore, it is essential to view this relationship from a broader point of view.

The role played by managerial level employees is crucial for the positive development and performance of environmental management (Sharma, 2000a). Without consent and support from the top management, Flynn, Schroeder and Sakakibara (1995) argued that core practices of the firm will be ineffective. In a review article, Berry and Rondinelli (1998) identified top management support as one of the six critical elements that a proactive company should have to create effective environmental management. If the managers recognise issues as opportunities against threats, it will help reduce the ambiguity towards environmental technologies and information as well as assist with the firm's current "dominant coalition" (Hambrick and Mason, 1984), thus influencing others in the organisation.

In different types and sizes of industries, leaders of the firms have a distinct influence over the environmental strategy. Therefore, having superior managerial skills and endorsement by the leader of firms will ease the implementation of such plans.

González-Benito and González-Benito (2006) justify the importance of support and commitment of firm leaders in two ways. First, the release of resources to implement environmental management will become more readily available. Second, this type of strategy requires collaboration between different departments and divisions that can be managed easier through the support from the top.

2.4.2 Proactiveness and Innovativeness Attitude

Among the questions that are critically discussed within the domain of environmental management is, how do strategically proactive firms differ from other firms in their approaches to the natural environment? (Aragon-Correa, 1998). The business world demonstrates a challenging and complex path and requires high motivation within the firm to remain competitive to ensure firms' survival. In order for firms to survive in the long run, they must remain proactive. Proactiveness is a forward looking, opportunity seeking perspective (Ahuja and Lampert, 2001; Rauch et al., 2009). Scholars have argued that advanced approaches to the natural environment can be enhanced through proactive business strategies (López-Gamero and Molina-Azorín, 2016; Wagner, 2005). The traditional way of solving problems (with end-of-pipe solutions) is attempted when the problem arises, whereas, the modern method (proactive) is to prevent the occurrence through dealing with their sources. Aragon-Correa (1998) defines strategic proactivity as "a firm's tendency to initiate changes in its various strategic policies rather than to react to events". Firstly, proactive firms are ready to invest heavily to gain competitive advantage (Dvir et al., 1993) and secondly, they correspond faster to changes compared to less proactive firms (Miles and Snow, 1978).

In times of uncertainty and significant changes happening in today's business scenario, innovation helps knowledge generation and knowledge transmission (Vidal-Salazar et al., 2012). Proactiveness and innovativeness have been associated in previous studies (e.g. Jalali, 2012; Kreiser et al., 2010). A firm is considered as having strong innovativeness if an organisational culture is nurtured that encourages the employees to innovate and apply new ideas (Hurley and Hult, 1998). To ensure this, being proactive as well as exploring new opportunities is crucial, compared to just exploiting current strengths (Menguc and Auh, 2006). Vidal-Salazar, Cordón-Pozo and Ferrón-Vilchez (2012) find that innovativeness plays an important role for firms to implement environmental management through knowledge generation and knowledge

transmission. They further recommend environmentally conscious executives to focus on developing innovativeness within the firm to inspire the development of learning pathways for a proactive environmental strategy. Aragon-Correa (1998) also confirms that greater strategic proactivity will result in greater environmental proactivity. However, firms should manage their approaches through a careful but not defensive manner to stay competitive. According to Benitez-Amado et al. (2010), firms' level of innovativeness is a key predictor to the development of environmental management: environmental management strategies are easier implemented if firms are innovative, and prior research suggests firm innovativeness is a source of competitive advantage.

Based on previous literature on business strategies and the natural environment, the role of specific environmental management activities are emphasized. For example, in the area of pollution prevention technologies, a firm's innovation skills are important (Christmann, 2000). In a similar way, Khanna et al. (2007) finds R&D departments within firms can help stimulate environmental management practices. Thus, firms having the ability to develop innovation capabilities will achieve competitive advantages from an environmental management perspective more easily.

2.4.3 Motivations

Firms are continually challenged to determine what drives them towards their strategic goal. However, firms' success is determined by how these drivers are managed and focused. The diverse literature on sustainability has suggested that firms practice environmental management due to various motivational factors. Internal motivations were found to be an interesting factor influencing firms' strategic decisions. Understanding which internal motivation fits best with the company's objective could help to re-align the strategic focus of the company.

Ruddell and Stevens (1998) investigate motivations for firms to be involved with voluntary environmental programs such as ISO 14001, where the strongest motivations were to avoid negative impacts on the environment, improvement of employee's environmental awareness and response towards customer demands. Besides that, customers were also motivated by the improvement of the corporate image through this EMS certification. Morrow and Rondinelli (2002) extended the list by including other potential motivational factors such as improvement of environmental outcomes,

complying with regulations, cost saving and efficiency improvement. The list stretched, as more researchers looked into other motivational factors of EMS adoption (Del Brío et al., 2001; Quazi et al., 2001). We identified three articles that provided five different types of motivations, i.e., relational motivation, innovational motivation, operational motivation, ethical motivation and competitive motivation.

Among the motivation for ecological responsiveness is to gain legitimisation (Bansal and Roth, 2000) by establishing a relationship with a firm's primary stakeholders (Gonzalez-Benito and Gonzalez-Benito, 2005). The key aspect of the motivation is worry and concern for the social good by addressing ecological obligation instead of focusing only on being pragmatic. Firms are not only contributing to the social well-being of the environment but also potentially establishing a healthier relationship with external stakeholders through the company's interest in solving environmental problems (Singh et al., 2015). Boiral and Sala (1998) also claimed that firms with ISO 14001 certification may improve their relationships with banks, governments and insurance companies. The effort to protect the environment portrays firms' image as being socially responsible, thus gain the confidence of external stakeholders (Gonzalez-Benito and Gonzalez-Benito, 2005). However, in the context of ISO 14001, Gonzalez-Benito and Gonzalez-Benito, (2005) found through their empirical work that firms' relational motivation is not related to the adoption of the standard. Nevertheless, the result may be specific to certain demographic and geographic features and therefore, could not be generalised. Besides that, the findings may only relate to the adoption of ISO 14001 and not environmental management, as a whole.

At the forefront of environmental management is efficient energy and waste management through new advanced technologies. Effects of undertaking innovational acts and allocating resources for innovation are important for developing organisational capabilities that are related to EMS's for eco-innovation (Kesidou and Demirel, 2012). The need for policies that support low-carbon and high-efficient technology are essential due to severe environmental threats around the world. Through these new clean technologies, reduction of wastage and emissions leads to lower cost of production and better profit margins, thus delivers better competitive positions for organisations in the market (Hart, 1995). With firms taking environmental actions, the

main goal to maximise profit remains the same, but this could still be possible through minimising operational costs.

According to Shrivastava (1995), organisations' commitment to ecological and environmental standards are reflected by the level of a company's ethical behaviour. This signals that firms are therefore not only complying with environmental commitment for firm benefits but also have a social obligation to do the right thing from an ethical standpoint. Commonly, the influence of the motivation is driven by individuals with authority to determine firms' direction concerning ecological responses (Bansal and Roth, 2000). Without such motivations, leaders of firms would "cut-corners" when they are unable to achieve any financial advantage as a result of practicing environmental approaches (Walker et al., 2014). Such behaviour results from an organisational perspective that does not recognize and appreciate ecological responsibility. On the contrary, it is reasonable to expect that firms driven by ethical motivations will have a stronger environmental management approach (Walker, Ni and Huo, 2014; Gonzalez-Benito and Gonzalez-Benito, 2005).

Thriving firms sustain a consistently high level of performance by staying competitive with their rivals in their respected industry. A firm will be competitive if it can create or maintain advantage(s) to attain a position better than their competitors (Porter, 1985). This status can be achieved through benchmarking their performance with the best players in their industry to improve their performance (Singh et al., 2015). Besides, Singh, Jain and Sharma (2015) found firms are motivated to implement EMS as an approach to remain competitive by adopting similar environmental standards as their competitors in the market. Studies have shown that environmental proactivity among firms can help to improve legitimacy and firm reputation (Bansal and Clelland, 2004; Miles and Covin, 2000). It also leads to new product development opportunities and product differentiation (Ambec and Lanoie, 2008). Through setting themselves apart by exhibiting high performance in environmental approaches, they will portray a positive image and capture the attention of external stakeholders. Both Gonzalez-Benito and Gonzalez-Benito (2005) and Walker, Ni and Huo (2014) found that firms that desire a more significant competitive position will also be more environmentally proactive.

2.4.4 Firm Size

Firm size is found to be an important factor contributing towards firms' competitive behaviour (Schumpeter, 1942). For example, the size of a firm can determine the extent of resource to be invested in myriad actions. This assumption negates the 'one-size-fits-all' strategy (Madsen and Uihøi, 2016). However, there has been a vast amount of empirical work showing mixed findings relating firm size and competitive behaviour.

Extant literature has also seen firm size as an indicator for environmental responsiveness. One viewpoint suggests that large firm size is associated with greater environmental proactiveness (Etzion, 2007; Bowen, 2000). The rationale for such a relationship is because larger firms have greater societal visibility (Darnall et al., 2010) and therefore would more likely respond to institutional pressures (Jiang and Bansal, 2003). Arora and Cason (1996) suggested that larger firms are more likely to participate in voluntary environmental programs due to the potential benefit from a large number of customers/consumers. From another perspective, size was seen as a barrier since an increase in operational size may require establishments of standard practices that could "impede local ingenuity and local performance" (King and Shaver, 2001). In general, Darnall, Henriques and Sadorsky (2010) finds larger firm adopt more proactive environmental approaches compared to small firms. However, building on three factors (i.e. resource constraint, less bureaucracy and innovative motivation) that characterize small firms, they are more acutely influenced by stakeholder pressure, which encourages them to respond more vigorously.

Table 2.3 Large vs small firms on factors that influence environmental practice adoption

Author (date)	Large Firms	Small Firms
Darnall, Henriques and Sadorsky (2010)	- Strong societal visibility	- Weak societal visibility
Gonzalez-Benito and Gonzalez-Benito (2005)	- Flexibility of resource allocation - Acknowledged with a positive image by higher number of clients/customers - Receives more pressure from stakeholders with ecological concerns	- Limited resources - Acknowledged with a positive image by smaller number of clients/customers - Limited number of stakeholders that would pressure firm to practice environmental initiatives

Author (date)	Large Firms	Small Firms
Nakamura, Takahashi and Vertinsky (2001)	<ul style="list-style-type: none"> - Less significant towards cost of implementation - Have existing skills that could facilitate the implementation of environmental practices 	<ul style="list-style-type: none"> - Highly significant effect for implementation - Lack of knowledge and skills about environmental practices
Nishitani (2009)	<ul style="list-style-type: none"> - Experience more pressure from stakeholders regarding environmental practices - Less significant towards cost of implementation 	<ul style="list-style-type: none"> - Experience less pressure from stakeholders regarding environmental practices - Highly significant effect for implementation

Based on four articles, we identified the traits associated with a large and small firm that could potentially influence them to practice environmental management (see Firm size is found to be an important factor contributing towards firms' competitive behaviour (Schumpeter, 1942). For example, the size of a firm can determine the extent of resource to be invested in myriad actions. This assumption negates the 'one-size-fits-all' strategy (Madsen and Ulhøi, 2016). However, there has been a vast amount of empirical work showing mixed findings relating firm size and competitive behaviour.

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Table 2.3). The table shows that large firms have more potential to increase environmental management practices since they have more resources and experience

more pressure from stakeholders. Based on a quantitative study conducted by Nishitani (2009), larger firms are more prone to adopt ISO 14001 compared to small firms based on two assumptions, they experience more pressure from stakeholders to practice environmental initiatives and they can afford the high cost to adopt ISO 14001. The financial pressure to subscribe to ISO 14001 would put a burden on smaller firms. A case study by Nakamura, Takahashi and Vertinsky (2001) also finds a similar result, ISO 14001 certification is related to the size of the firm, where larger firms may have existing skills that facilitate its adoption as compared to smaller firms. Thus, size may also be important for organisational support for environmental management practices in firms.

2.4.5 Strategic Experience

Another dimension relevant to the choice of environmental strategies is related to firms' previous strategic experience. Based on previous studies, two main strengths were identified: utilisation of fewer resources and the benefit of continuous effort.

According to Darnall and Edwards (2006), fewer resources are required for EMS adoption if a firm has complementary capabilities such as previous experience with quality-based management systems. These types of capabilities are considered complementary if they assist the implementation process of EMS adoption. Similarly, both for EMS and quality-based management systems, adopters develop long term plans and focus on them to achieve the desired outcome (Kitazawa and Sarkis, 2000). Like EMS, quality-based management systems also focus on optimisation of stock materials and reduction of unnecessary inputs throughout the production process, compared to the outcome of product/process quality. The experience from the previous system provides opportunities for firms to reduce adoption costs of EMS implementation due to the parallels of both systems.

The lean production system which usually encompasses just-in-time (JIT) practice is used to improve quality and delivery time (Hajmohammad et al., 2013). In the concept of lean manufacturing, waste minimisation systems are implemented without jeopardising productivity. Scholars have also suggested that this practice improves customers' lead time, cycle timeframe of the manufacturing process, reduction in manufacturing costs and improvement in labour productivity and quality

(De Treville and Antonakis, 2006; Hopp and Spearman, 2004). Since environmental management is critically related to operational activities involving product design and process technologies, the perpetual pursuit of waste minimisation found in practicing lean management provides a continued effort to reach the objective of firms' environmental practice of reducing negative impacts on the environment. According to King and Lenox (2001), the lower level of inventory utilisation is positively correlated with lower waste generation and emissions. However, not all studies found a statistical link for such a relationship (Rothenberg et al., 2001). This particularly shows that not all firms participating in lean management benefit from this practice.

The adaptation of processes to implement environmental practice could be more efficient if firms had existing capabilities. According to Hart (1995) and Shrivastava (1995) EMS was built based on the values of TQM. The principles of TQM are similar to EMS, where continuous improvements are advocated, and functionality focus takes a systematic approach (Bansal and Hunter, 2003). These advanced manufacturing practices such as JIT and TQM provide firms to culture innovativeness and continuous improvement (King and Shaver, 2001) towards product and processes and fit well with the implementation of sustainability practice. The norms of volunteering associated with the features of previous practices (i.e. JIT and TQM) makes it easier for firms to attract commitment from employees. Previous experience with ISO 9000, i.e. a standard which applies the principle of TQM which precedes the launch of ISO 14001, may require less information search, and fewer learning costs are involved during the application of ISO 14001 due to similarities in terms of the foundation of both standards which embrace systematic processes to improve the existing system (Nakamura et al., 2001). Given the similarities, integrating the former with the latter may lead to definite advantages (Roome, 1992). Resource wise, Darnall and Edwards (2006) find the existence of complementary capabilities such as TQM provides a means for reduction of EMS adoptions costs.

Previous strategic experience could also encourage cost reduction in environmental practices. Inventory control management focuses on the reduction of stock materials and additional inputs throughout the process of production (Rosenberg and Campbell, 1985). Similar to TQM, this practice helps to ensure the success of environmental management adoption due to the focus on minimisation of inputs used

during production, therefore helps reduce negative impacts on the environment. Firms abiding by this practice cultivate a practice of continuous internal evaluations that assists firms with better organisational efficiency as an important aspect of environmental improvement. In a study using a US database from the National Database of Environmental Management Systems (NDEMS), Darnall and Edwards (2006) find that inventory control management systems experience reduces the cost of EMS implementation. This can be supported by the concept of input minimisation that technically should help reduce costs due to the number of inputs saved.

Though TQM is based on similar processes to EMS and shares the same ideas of system improvement, Bansal and Hunter (2003) found that quality initiatives do not support early adoption of ISO 14001 certification. In addition, they predict that the cause may be due to the insignificant incremental benefit from the certification and that firm's strategic direction could be achieved through other means. Nevertheless, numerous studies have found strategic experience has benefited adoption of environmental management practices (Yang et al., 2010; Darnall and Edwards, 2006; Nakamura, Takahashi and Vertinsky, 2001).

2.5 Analysis: Organisational Traits Based on Type of Environmental Management

Overall, this review highlights how environmental management among businesses is being researched and tested in a variety of organisational context areas. Our sample included 24 quantitative papers assessing influence of certain organisational traits on environmental management, as in Previous experience with practices such as lean management and quality management were found to positively affect firms' implementation of environmental management regardless of whether they are environmental management proactive or reactive. Though only three studies tested the strategic experience effect on environmental management implementation, all acknowledged the relationship between these two constructs.

Most literature finds that environmental management practices among firms can be aided through learning experience with total quality management (TQM) (Idris, 2011), JIT (Zhu and Sarkis, 2004) and lean management activities (Hajmohammad et al., 2013). First, this may be due to the values gained from these practices, for example,

lean management practices are associated with waste minimisation (Womack and Jones, 1997), thus directly contributing towards firms' efforts on environmental management. Second, the well-organised and effective system of the previous strategic practices ensures such behaviour that leads firms to be increasingly likely to practice environmental management in a more responsible way (Campbell, 2007).

Nevertheless, there are studies finding opposite results of previous strategic experiences. Melnyk, Sroufe and Calantone (2003) find that poor experience of previous certification of ISO 9000 experience can lead firms to be less likely to pursue ISO 14001. In other situations, EMSs are irrelevant if ISO 9001 has been implemented as they have the same requirements. In these types of environmental management implementation, financial implications need to be considered, which may limit firms' actions, especially if no financial benefits are attained.

From the findings from the papers reviewed in this study, firms with previous strategic experience are more prone to practice higher levels of environmental management regardless of whether they are proactive or reactive, but if financial implications are involved, the effect may be reversed.

Table 2.4. We analysed the findings of organisational trait influence across different levels of environmental management implementation: (1) proactive firms (2) reactive firms and (3) hybrid firms.

2.5.1 Executive Perception- Environmental Management

Based on our analysis, we find that most studies argue that involvement of owners or top-level management support for environmental management is crucial, regardless of the type of environmental management implementation. From 10 studies, 50% involved proactive firms, 20% reactive firms and 30% hybrid firms.

Though articles involving proactive firms were mostly to be found tested against executive perceptions, not every study agreed to a single conclusion. While four articles found a positive relationship between executive perception and firms' level of environmental management, one study found the opposite. In most cases, leaders' involvement determines the strategic direction of a particular business, but in the case of Reyes-Rodríguez and Ulhøi and Madsen (2016), only partial support was found for

such a relationship. This contradicts the traditional assumption of owner-managers' attitude in SME's management (Cassells and Lewis, 2011). Nevertheless, at this point, it can be suggested that there are still gaps between owner-managers attitudes and their real actions (Reyes-Rodríguez, Ulhøi and Madsen, 2016) among firms that are proactive in environmental management.

On the other hand, among the studies involving firms practicing environmental management in a hybrid manner, Uhlaner et al. (2012) is the only study that agrees partially on the positive relationship between executive involvement and firms' level of environmental management implementation. This study finds that within firms with fewer than three owners, there is no relation between family influence and the level of engagement in environmental management practices. Although only one of the three studies involving environmental management hybrid firms had such findings, it notes that the number of owners may determine the level of influence on environmental management practices. As predicted, positive social pressure on firms is displayed for engaging with environmental practices, just like other studies (i.e. Ervin et al., 2013), but only begins with a threshold of three owners and above.

From what has been observed, across all three types of environmental management practice, there is agreement that an organisational leader's perception is bound to positively influence the level of environmental management implementation. This finding is in-line with our previous discussion (refer to 2.4.1) which argues that positive attitude and support by leaders will encourage firms to practice environmental management. The role of these executives has been discussed widely in the literature. Flynn, Schroeder and Sakakibara (1995) argued that efficiency of core firm practices requires strong support from the top management team of the firm. Environmental issues are legitimated as an integrated segment of the corporate identity in terms of economic emphasis or firms' environmental responsiveness (Sharma et al., 1999). If the issues of environmental practices by firms enhance their corporate image, managerial level involvement is crucial (Sharma, 2000a).

There were only two studies (Reyes-Rodríguez, Ulhøi and Madsen, 2016; Uhlaner et al., 2012) that only found partial support for their hypothesis. Nevertheless, in terms of count, studies involving environmental management, proactive firms dominate the study with half the number of total papers looking into the relationship

between executive perceptions and firms' level of environmental management implementation, revealing the importance of this factor.

2.5.2 Proactiveness and Innovativeness Attitudes - Environmental Management

Six studies were found to test the effect of a firm's level of proactiveness and innovativeness towards environmental management implementation. The studies related to this factor are limited in the context of environmental management. This was proven during the keyword search. For example, if we use the EBSCO database and pair "environmental management" with "proactiveness" in the keyword search, only 27 results were produced. However, 100% of the findings support a positive relationship between firm proactiveness/innovativeness and environmental management. In addition, all studies for this factor were from proactive environmental management firms. In certain studies, the level of proactiveness and innovativeness is displayed through the presence of R&D facilities (Khanna et al., 2007). Interestingly, having R&D facilities encourages firms to practice environmental management voluntarily without hoping for any payoffs from public recognition.

The inefficient utilisation of resources and pollution increases firms' operating costs, however, technological innovation and development of management practices could result in a more efficient operation that helps reduce such costs (Morad, 2007). In many cases, firms are able to compete with their rivals as a result of proactivity, this helps situate them to benefit from future opportunities (Kreiser et al., 2010). As such, we were able to support the earlier previous discussion (refer to 2.4.2) that firms which are proactive and innovative are associated with higher levels of environmental management. Similar to previous factors, the findings were context specific, and applied to proactive firms only.

2.5.3 Motivations - Environmental Management

Based on the summarised results, only studies (Walker, Ni and Huo, 2014; Winter and May, 2001) involving reactive firms tested the relationship between various firm motivations when implementing environmental management. This condition might be possible due to proactive and hybrid firms focusing on implementing environmental management at an optimum level, driven to achieve the single focus of a sustainable environment without having to be motivated by other factors. According to Nath and

Ramanathan (2016), firms with a proactive level of environmental management are more long-term driven towards protecting the environment while reactive firms are more influenced by firm benefits such as cost saving. Based on the positive findings of ethical and social motivations towards environmental management implementation, from Walker, Ni and Huo (2014), it also proves that for reactive firms to promote environmental management, they must make a standpoint for ethical and morality responsibility towards the natural environment.

The empirical findings linking the level of executive perception to environmental management implementation among reactive firms suggest some mixed findings between the constructs. Different types of motivations produced different results. Among the motivations that did not support a positive influence towards environmental management were motivations such as detection of compliancy and fines (Winter and May, 2001). In other studies, some firms were found not to be motivated to practice environmental management as a result of cost saving (Singh, Jain and Sharma, 2015; Winter and May, 2001). One of the reasons was that firms initiate environmental management to satisfy customer and societal requirements but increase the investment for factors such as cost savings (Kesidou and Demirel, 2012). Since the types of motivations widely vary and offer mixed findings, we could not generalise any single conclusion to represent motivational effects on firms' environmental management approaches. For instance, Winter and May, (2001) also found normative and social motivations to enhance firms practices of environmental regulations despite finding other motivations to be unrelated to the level of firms' environmental management practice.

2.5.4 Firm Sizes - Environmental Management

Based on all organisational traits examined, firm size is the second factor with the greatest number of studies (n=8). In terms of dispute, this factor has the greatest dispute among all other factors, where 50% of the studies agreed to the positive relationship between firm size and environmental management implementation level, while the remaining 50% rejected the previous assumption.

Interestingly, two out of three studies involving reactive firms rejected our previous discussion (refer to 2.4.4) and agreed that smaller firms are in a better position

to implement stronger environmental practices compared to larger firms. Though extant literature has discussed the capacity of large firms to invest in company strategies, Darnall et al. (2010) finds that smaller firms respond better towards environmental initiatives under the pressure of stakeholders. This is no surprise as, though smaller firms are associated with limited resources, they are less likely to invest in political resistance and would rather invest in initiatives that address environmental issues. Smaller firms are also advantaged in terms of response towards any strategic decision, due to the likeliness that managers and employees can easily interact with the owners (Madsen and Ulhøi, 2016).

On the other hand, the results for environmental management proactive and hybrid firms seem to agree with our previous discussion (refer to 2.4.4). The early literature on environmental protection mentioned the downside of small firms. Among them were low environmental awareness, economic barriers and limited business support (Tilley, 1999). Brammer, Hojmoser and Marchant (2012) also found small firms lagging behind in environmental management implementation. Contrary to Darnall et al. (2010), González-Benito and González-Benito (2006) found that larger firms, on the other hand, were often required to practice environmental activities due to higher pressure from their stakeholders.

Based on the findings from this study, among firms with proactive environmental approaches (including hybrid firms), larger firms are possibly implementing higher levels of environmental management practices. However, reactive smaller sized firms are more able to implement a higher level of environmental practices. These varying results may be due to the different types of environmental management and the context specific nature of their implementation. This is in line with other findings from previous studies, e.g. Lefebvre, Lefebvre and Talbot (2003) which identify environmental management as an industry specific variable.

2.5.5 Strategic Experience - Environmental Management

Previous experience with practices such as lean management and quality management were found to positively affect firms' implementation of environmental management regardless of whether they are environmental management proactive or reactive. Though only three studies tested the strategic experience effect on environmental

management implementation, all acknowledged the relationship between these two constructs.

Most literature finds that environmental management practices among firms can be aided through learning experience with total quality management (TQM) (Idris, 2011), JIT (Zhu and Sarkis, 2004) and lean management activities (Hajmohammad et al., 2013). First, this may be due to the values gained from these practices, for example, lean management practices are associated with waste minimisation (Womack and Jones, 1997), thus directly contributing towards firms' efforts on environmental management. Second, the well-organised and effective system of the previous strategic practices ensures such behaviour that leads firms to be increasingly likely to practice environmental management in a more responsible way (Campbell, 2007).

Nevertheless, there are studies finding opposite results of previous strategic experiences. Melnyk, Sroufe and Calantone (2003) find that poor experience of previous certification of ISO 9000 experience can lead firms to be less likely to pursue ISO 14001. In other situations, EMSs are irrelevant if ISO 9001 has been implemented as they have the same requirements. In these types of environmental management implementation, financial implications need to be considered, which may limit firms' actions, especially if no financial benefits are attained.

From the findings from the papers reviewed in this study, firms with previous strategic experience are more prone to practice higher levels of environmental management regardless of whether they are proactive or reactive, but if financial implications are involved, the effect may be reversed.

Table 2.4 Organisational traits and type of environmental management

Organisational trait	Proactive	Reactive	Hybrid
Executive perception	<ul style="list-style-type: none"> - There is a positive influence between organisational support and green practice adoption for companies (Lin and Ho, 2011) - Managers perceive environmental 	<ul style="list-style-type: none"> - Management support positively influences sustainable manufacturing practices (Aboelmaged and Hashem, 2019) 	<ul style="list-style-type: none"> - Management attitude towards environmental stewardship positively affect a facility's environmental practices and pollution prevention

Organisational trait	Proactive	Reactive	Hybrid
	<p>management as a competitive opportunity (López-Gamero et al., 2008)</p> <ul style="list-style-type: none"> - Organisational commitment to environmental issues is prominent (Pinzone et al., 2015) - There is only partial support relating managerial attitudes to the adoption of environmental initiatives (Reyes-Rodríguez et al., 2016) - Attitude of owner-managers towards natural environment does not directly impact actual environmental behaviour but influences overall strategic proclivity or orientation of firm (Roxas and Coetzer, 2012) 	<ul style="list-style-type: none"> - Manager's positive attitudes influences establishment of environmental management programs (Cordano et al., 2010) 	<p>activities (Ervin et al., 2013)</p> <ul style="list-style-type: none"> - Managerial interpretation of environmental issues are related to voluntary actions for environmental preservation (Sharma, 2000b) - Among SME's, family influences do not influence the business to engage in environmental management practices (Uhlener et al., 2012a)
Motivation		<ul style="list-style-type: none"> - A stronger ethical and competitive motivation will positively influence environmental proactivity (Walker et al., 2014) - Normative and social motivations enhance firms practices of environmental regulations. However, detection of compliancy and 	

Organisational trait	Proactive	Reactive	Hybrid
		<p>finances do not enhance firms practice of environmental regulations (Winter and May, 2001)</p>	
Firm size	<ul style="list-style-type: none"> - The bigger the firm size, the more voluntary environmental program's will be undertaken by the firm (Kumar and Shetty, 2018) - There is no relationship between firm size and their environmental performance (Lefebvre et al., 2003) - There is a positive relationship between company size and green practice adoption (Lin and Ho, 2011) - Larger firms are more likely to participate in voluntary environmental programs compared to SMEs (Khanna et al., 2007) 	<ul style="list-style-type: none"> - Smaller firms are more efficient in responding to adoption of proactive environmental practices (Darnall et al., 2010) - The larger the firm, the greater its environmental management activity (Hofer et al., 2012) - There is slight proof that smaller companies are able to achieve better results in environmental initiatives compared to medium-sized companies (Madsen and Uthøi, 2016) 	<ul style="list-style-type: none"> - Among SME's, larger sized firms positively influences the business to engage in environmental management practices (Uhlener et al., 2012a)
Proactiveness	<ul style="list-style-type: none"> - IT innovative capacity impacts green management capabilities (Benitez-Amado et al., 2010) - Presence of R&D unit stimulates the adoption of environmental management 		<p>Among SME's, greater innovation orientation positively influences the business to engage in environmental management practices (Uhlener et al., 2012a)</p>

Organisational trait	Proactive	Reactive	Hybrid
	<p>practices (Khanna et al., 2007)</p> <ul style="list-style-type: none"> - Greater internal resources creates the likelihood of a firm developing a proactive approach to environmental management (López-Gamero et al., 2016) - Strategic intent stimulates the adoption of environmental initiatives over time (Reyes-Rodríguez et al., 2016) - Innovativeness is a decisive factor for proactive environmental strategies (Vidal-Salazar et al., 2012) 		
Strategic Intent	<ul style="list-style-type: none"> - The contribution from previous quality management experience are fundamental to achieving environmental excellence (Jabbour, 2009) 	<ul style="list-style-type: none"> - Supply management and lean management provide means by which resources can be invested in environmental practices (Hajmohammad et al., 2013) - Advanced manufacturing practices such as supply chain practices and continuous improvement (e.g. JIT) increases firms environmental management (Yang et al., 2010) 	

2.6 Recommendation and Conclusion

In recent decades, we have seen a considerable amount of literature raising concerns on issues about the sustainability of the environment. Environmental management can be seen as the forefront for organisations' contribution towards protecting the natural environment. Numerous studies have started contributing towards the understanding of factors that may influence the development of environmental management among firms (Aragón-Correa and Sharma, 2003). However, there has been a lack of focus towards organisational traits as a predictor of ecological initiatives. Practically, corporate practitioners get confused by the disputes and diversity in existing literature, thus, have difficulties with adopting the correct practice to optimise their firms' strategy. Theoretically, the body of research remains unclear due to an absence of consolidated work to integrate existing research.

As expected, our literature review results suggest firms' level of environmental management implementation can be divided into three categories namely, proactive, reactive and hybrid. Though seemingly diverged, there is no hierarchical structure that displays superiority of one approach over another, from a strategic practice. Rather, the chosen type of environmental management implementation depends highly on the strategic direction of the firm. If firms choose to adopt a reactive environmental management approach, it does not suggest that they are roving bands of tyrannical industrial players that purposefully go against environmental protection.

Besides that, the results suggest a significant positive relationship between general organisational traits and firms' environmental management, which is consistent with previous researchers (Aragón-Correa and Sharma, 2003). However, the link is not linear and straightforward in all cases. Together with the key findings described above, a few issues may be highlighted. First, in certain businesses, top-down strategies are less reliant to stimulate change. For example, in the healthcare industry, physicians are decision-makers both for clinical and administrative purposes compared to the top-management team (Battilana, 2011). An important aspect is that the dominance of firm leaders is impractical in certain conditions, due to the level of understanding of specific issues at certain times. In the context of environmental management, implementing these approaches needs to be dominated by people with knowledge in sustainable matters who could decide on what is most ideal for the firm. Second, while previous

experience with quality initiatives was found to support environmental management practices (Nakamura et al., 2001), firms do not rush for an early environmental management certification (e.g. ISO 14001) (Bansal and Hunter, 2003). Part of the advantage of environmental management implementation with certification is the ability to comply with customers' needs that require suppliers to be certified (Christmann and Taylor, 2001). For firms with previous certifications such as ISO 9001, they are aware of recognition advantages through similar certifications, which motivates their willingness to certify with ISO 14001. Nevertheless, the certification may be deferred based on the requirement. As organisations may only need it for legitimacy purposes (Aravind and Christmann, 2011), they will act to engage with the accreditation whenever required. Due to this, many firms with symbolic profiles are interested in the certification to indicate their sustainable responsibility, but do not necessarily achieve significant improvements in sustainability performance. The consequences of symbolically certifying to ISO 14001 results in confidence loss of confidence in this certification (Ferrón, 2017). Third, the descriptive analysis from the papers involved reveal increased attention within the field of organisational traits. We find a slight increase in the number of articles published in this field recently (since 2010). Despite the rise, much attention still needs to be given to studies on the roles of internal organisational traits.

Our results contribute to the ongoing discussion within the domain of environmental management and sustainable development. This study brings together articles from leading management journals that are researching the relationship between the two. Previous studies have focused on antecedents of environmental management (e.g. González-Benito and González-Benito, 2006) without focusing on any specific factor. We contribute by integrating literature from management journals that explore the organisational trait-environmental management relationship. While the concept of environmental management has been in the literature for more than 20 years (Berry and Rondinelli, 1998), there has never been a specific term to be agreed upon or dimensions that reflects environmental management. From this perspective, the different definitions may confuse if not mislead the understanding of the issue and if we do not have “a common definition and measure of environmental performance, our understanding of its antecedents and consequences will be hindered” (Gilley et al., 2000). Though we were not able to gather all works of literature on environmental

management, we were able to identify a similar theme for the definitions from our list. Two of the key components of environmental management are that it is voluntary and proactive. Few studies have found both elements to be related where firms need to demonstrate voluntary actions consistently, to be considered as proactive (Martin-Tapia, Aragon-Correa and Senise-Barrio, 2008; Sharma and Vredenburg, 1998). Vidal-Salazar, Cordón-Pozo and Ferrón-Vilchez (2012) also supported the relationship where development of a proactive environmental strategy is required to apply voluntary actions that go beyond existing regulations. Our results also show the importance of innovating and being proactive to develop aspects of organisational culture such as environmental management. Three of the papers that we reviewed (e.g. Vidal-Salazar, Cordón-Pozo and Ferrón-Vilchez, 2012; Menguc, Auh and Ozanne, 2010; Aragon-Correa, 1998), agreed that environmental management is characterised by considerable risk (Aragón-Correa and Sharma, 2003) and require firms to establish a proactive and innovative posture. Persistence is needed if the firms desire a long-term survival (Trott, 1998). This is consistent with the findings from our review that firms are not motivated to adopt EMS due to the perception that it can promote innovation to develop new technology and products (Singh et al., 2015). Among the ways to stimulate environmental management is through the receptiveness to employees' ideas (Yami and Roy, 2007). Thus, it is crucial for firms to recognise the potential of their employees.

While this study, in general, provide guidelines for practitioners and explicitly benefits environmental managers. In reality, before firms engage with any environmental management practice, they should align their ecological plans with their general business plans. Integrating environmental initiatives into a firm's existing strategy can increase complexity of production and processes (Russo and Fouts, 1997) and risk the company's future. Furthermore, implementing environmental management requires firms to scrutinize the situation instead of relying on a universalistic approach. In this study, we provide the platform for readers to analyse environmental management according to a broad view of its antecedents (i.e. organisational traits) instead of reading many reviews on the subject. The question of whether firms have to "pay to be green?" would remain unanswered (Alt et al., 2015) if such studies were not conducted.

The research on the effects of organisational context on environmental management is still new and underdeveloped as compared to other matured domains.

Although fruitful, there are still plenty of organisational-related dimensions that must be accounted for. Company features play a relevant role to ensure support for the appropriate strategy to use. To allow environmental values to prosper among small firms, introducing a new managerial perspective to the firm would be ideal (Tilley, 1999). For example, the importance of decision-making authority has been well-debated in the literature and presented as an important aspect of a firm's innovation prospect. Decisions made by firms at different hierarchical levels during periods of uncertainty will determine their success or failure. According to Gardner and Stern (2002), "education to change attitudes and provide information" are important intervening factors that may affect individuals' approach to significant environmental behaviour. The expression of such, however, cannot be committed to unless authorisation is provided. This situation builds on the importance of decision-making authority towards a firm's environmental commitment. Despite this matter, this area of research remains scarce. A literature review conducted by Aragon-Correa (1998) about the environmental uncertainties that firms are experiencing in their industry revealed about how decision-making processes on the interface between business and the natural environment are implemented at a decentralised level among proactive firms. Nevertheless, no empirical evidence was addressed in this study. Thus, future research could, therefore, explore how different levels of decision making during environmental uncertainties will help firms to implement environmental management.

Recently, scholars have begun to venture into different types of motivational drivers influencing environmental management adoption (e.g. Bansal and Roth, 2000). We distinguished between relational motivation, innovational motivation, operational motivation, ethical motivation and competitive motivation. We find that operational and innovational motivation remain scarce and underdeveloped. Interestingly, Singh, Jain and Sharma (2015) find that both these types of motivation fail to influence firms to adopt EMS practice. This conclusion is limited to the context of EMS and not environmental management practices, as a whole, thus, future research could consider looking into these motivations from different aspects of environmental management.

**CHAPTER 3: STUDY 2 - SMALL TO MEDIUM
MANUFACTURING FIRMS AND ENVIRONMENTAL
MANAGEMENT: A CONTINGENCY PERSPECTIVE OF
FIRMS' ORGANISATIONAL FLEXIBILITY AND
EXTERNAL PRESSURE**

Authors

Muaz Mahmud, Danny Soetanto, Sarah Jack

Abstract

This paper examines the interaction between organisational flexibility and external pressure in determining the practice of environmental management in the context of small to medium manufacturing firms. Using contingency theory, this study argues that having a decentralised structure, small to medium manufacturing firms are able to adapt to external pressure while strengthening the implementation of environmental management. The data were drawn from 106 small to medium manufacturing firms in the United Kingdom (UK). The study found that a decentralised structure is positively associated with environmental management. Moreover, the finding also reveals that the impact of decentralised structure on environmental management is strengthened in the context of high level of technological dynamic. Surprisingly, external pressure from global awareness and social relationships have less impact on small to medium manufacturing firms' environmental management. Overall, the study has provided some recommendations to theory and practice of environmental management especially how small to medium manufacturing firms should develop their organisational structure and respond to external pressure.

3.1 Introduction

The aim of this paper is to examine the interaction between organisational flexibility and external pressure in determining the implementation of environmental management. More specifically, this study focusses on small to medium manufacturing firms, firms which are actively involved in exploring, evaluating and exploiting opportunities (Shane and Venkataraman, 2000). Small to medium manufacturing firms are normally small and medium sized firms aiming to bring products or services to the market. Innovation is often considered as a nexus for these small to medium manufacturing firms as it creates opportunities that potentially come from knowledge-based, technology, or research-driven origins (Acs et al., 2009; Shane, 2003). This study focused on small to medium manufacturing firms based on the following reasons. First, it is driven by the emerging pressure facing many firms including small to medium manufacturing firms where the increases of environmental degradation, such as depletion of natural resources and climate change, has led to the efforts to preserve the environment (Ateş et al., 2012; Feng et al., 2014; Graham and Potter, 2015). As a result, a new way of measuring firms' competitive advantage has arisen where environmental management should be considered as a part of their strategy (Gualandris and Kalchschmidt, 2016). Accordingly, small to medium manufacturing firms are considered to be less competitive unless they meet and follow trends in sustaining and maintaining the environment (Llach et al., 2015). Second, this study investigates the role of organisational flexibility in supporting the implementation of environmental management (Darnall et al., 2008). One of the main issues highlighted in the organisational study literature is related to how flexible an organisation with a hierarchal decision-making system is in driving firms to engage in new activities (Frondel et al., 2007; Gallear et al., 2015; Lichtenstein et al., 2017; Martin et al., 2016). Despite being important, few studies have focused on the level of organisational flexibility, such as a decentralised structure, that allows small to medium manufacturing firms to deal with change, especially in implementing environmental management. Since environmental management requires a collective effort of the whole organisation across different functional areas, firms with such flexibility will be at an advantage to manage the implementation. Third, small to medium manufacturing firms may have limited resources, which may provide a challenge for their environmental management. Although some studies argue that small to medium manufacturing firms develop a

structure that is flexible enough to deal with adaptation and external threat (Tamayo-Torres et al., 2011), their experience with limited resources may constrain their ability to manoeuvre existing resources (Baumgärtner et al., 2015). Their objective focuses mainly on bringing products or services to market, which may hinder the effort to consider environmental management as part of the operational process. At the same time, small to medium manufacturing firms are vulnerable in facing external pressure, such as change in demand and regulation, due to the increased interest in environmental management. Thus, the alignment between firms' organisational flexibility and external pressure is critical for not only successful business performance but also the implementation of environmental management.

Using data from 106 firms in the UK, this study contributes to the development of knowledge in the field in two ways. First, this study investigates the role of organisational flexibility as an enabler for implementing environmental management in the context of small to medium manufacturing firms. It highlights the relevance of organisational flexibility that has often been overlooked in studying small firms' environmental activities (López-Gamero et al., 2016). Although previous studies have been advocating the benefits and values of implementing environmental management, the understanding on the factors that support it in the context of small to medium manufacturing firms is still limited (Kunapatarawong and Martínez-ros, 2016; Mitra and Datta, 2014). Second, as few studies have been devoted to investigating the alignment between organisational flexibility and external pressure, this study further advances the application of contingency theory by moving beyond management and organisational studies (Linnenluecke and Griffiths, 2010; Vroom and Philip, 1973; Weber et al., 2009) to environmental management and entrepreneurship studies. As contingency theory argues that the best way to organise is to depend on the nature of the environment to which the organisation is related (Cui et al., 2014; Karim et al., 2016), the implementation of environmental management can be conceived as a product of the fit between organisational flexibility and a set of contingency factors such as external pressure. Lastly, the study aims to assist both managers and policy makers to understand more about how better policies can be designed to support the implementation of environmental policies, especially in the context of small to medium manufacturing firms (Johnstone and Labonne, 2009; Klassen and Angell, 1998).

3.2 Environmental Management: An Alignment Between Organisational Flexibility and External Factors

This study defines environmental management as organisation's voluntary mechanism of techniques and policies to tackle environmental issues (Montabon et al., 2007; Wang, 2017). Using Porter's value chain as a framework, this study measured the practice of environmental management in organisations' activities, including operations, inbound logistics, outbound logistics, services and sales and marketing (Pal and Altay, 2019). This includes formal standards or informal practice to reduce the negative impact on the natural environment. The term 'environmental management' was first introduced by Tatoglu et al. (2014) but the analogy started in the 1990s when businesses shifted from a reactive mode (1980s) to a proactive sustainable business mode, focusing on prevention of negative impacts on the environment as well as the development of new approaches, such as environmental accounting and environmental employee training (Berry and Rondinelli, 1998). Unlike regulations and rules imposed through the government, environmental management is voluntarily driven; firms are not obliged to follow guidelines but are self-motivated (González-Benito, 2008). While firms implement environmental management as their intention to preserve the environment (Brammer et al., 2012), the benefits are not limited to only fostering social legitimacy but rather provides advantages due to an increase in efficiency, enhanced innovativeness and firms' attractiveness to the public eye (King and Lenox, 2002).

As implementing environmental management is a complex process, small to medium manufacturing firms need to align the pressure from external source with their internal structure (Dahlmann et al., 2008; Ormazabal and Sarriegi, 2014). Threats from competitors and global trends influence small to medium manufacturing firms in their decisions to consider the implementation of environmental management. Additionally, customers or buyers have become critical regarding the source and process of production (Wong et al., 2020). Hence, small to medium manufacturing firms should be able to absorb external pressure while allowing adaptation and changes. Extant literature has been advocating the importance of organisational flexibility, which is often seen as a source of competitive advantage for small to medium manufacturing firms when operating in difficult environments (Luo and Rui, 2009; Martin et al., 2016). The logic is that external pressure might have a positive impact on firms if they are

supported by organisational flexibility (Brettel et al., 2015; Martin et al., 2016). By leveraging flexibility, small to medium manufacturing firms will be able absorb external pressure as a driver that eventually facilitates the diffusion of environmental management into all aspects of the organisation.

Figure 3.1 illustrates the framework of this study. The hypothesis were constructed to examine the impact of organisational flexibility in the form of a hierarchical decision-making structure. In this case, the study considered that small to medium manufacturing firms with a decentralised structure are more receptive to the change due to their high degree of flexibility and freedom in making decisions while their less decentralised structure offers a limited autonomy (King et al., 2005). In measuring the external pressure, this study considers social relationship, global environmental awareness and technological dynamics will either enhance or limit environmental management practices. Moreover, this study also tests the interaction between the decentralised structure of small to medium manufacturing firms and external pressure as it argues that organisational flexibility should be constructed to allow small to medium manufacturing firms to transform external pressure into a positive motivation for internal change (Perez-Valls et al., 2016). This thinking is in line with contingency theory, which explains how external conditions correlate with organisations' structure to form an organisational fit that determines their effectiveness (Burns and Stalker, 1961; Tangpong et al., 2019). The origins of this theory can be traced back to the works of prominent scholars (e.g. Donaldson, 1987; Drazin and de Ven, 1985; Thompson, 1967; Venkatraman, 1989; Venkatraman and Camillus, 1984). Contingency theory upholds the belief that there is 'no one best way' of managing or organising but it depends on the 'fit' between the organisation and the environment (Galbraith, 1973; Lawrence and Lorsch, 1967; Schoonhoven, 1981; Venkatraman, 1989). In the context of this study, external pressures correlate with a decentralised structure to form the organisational fit that determines the effectiveness of environmental management (Aragón-Correa et al., 2008; McAdam et al., 2019).

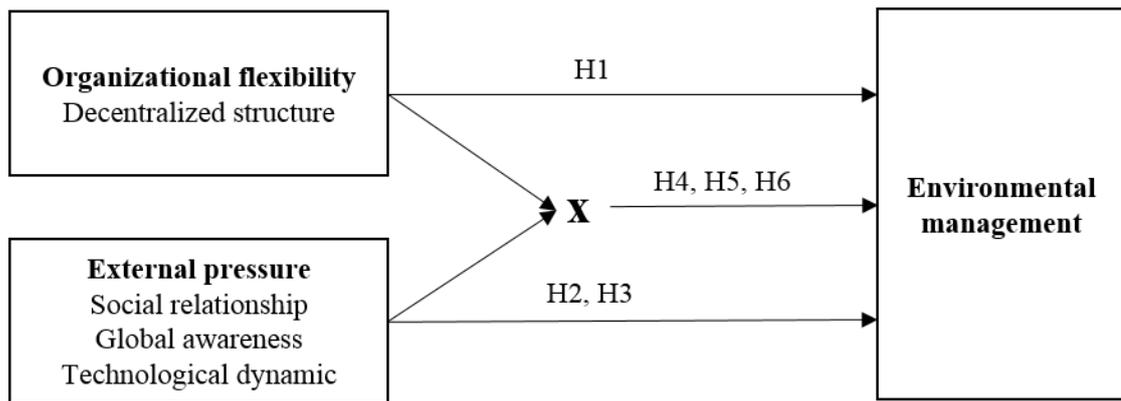


Figure 3.1 Research framework

3.2.1 The Construction of Hypothesis

Research on organisational flexibility highlights the critical role of the organisational decision-making process in enabling organisations to respond quickly to external pressure and to greater uncertainty and competition (Csaszar, 2013). As external pressures may create uncertainty and reduce profit, there is still considerable confusion as to how organisations should respond to them (Zailani et al., 2012). Within the context of the environmental management domain, the literature on organisational flexibility of decision-making authority is scarce. The latest industry practices have suggested that configuring firms' organisational structure is important to achieve environmental and economic goals (Rodríguez et al., 2016). The literature has been discussing two types of organisational structure. First, firms create flexibility by developing a decentralised structure or bottom-up approach which encourages more involvement in the decision-making arrangement (Martin et al., 2016). Second, a top-down approach attempts to drive down cost to ease external factors through a more centralised form of organisational structure (Joseph et al., 2016). Since the implementation of environmental management involves a complex process and requires participation from workers at all levels in the firm, organisations will not be able to adapt with a less decentralised structure unless the management has flexibility (López-Gamero et al., 2016). This is because in a less flexible organisational structure, organisations limit the involvement of lower level staff to participate in the decision-making process, while narrowing communication channels and creating a high level of authority (Cardinal, 2001).

In contrast, a decentralised structure allows organisation to implement new approaches within their traditional or normal routines. A decentralised firm by default will motivate employees to concentrate their efforts and warranted freedom to express their ideas without having to be distracted by bureaucratic hierarchy to achieve environmental performance (Hart, 1995). As the firm structure becomes more decentralised, the elements of autonomy emerge whereby lower-level staff are more regularly involved throughout the decision-making process. The less formal communication will encourage new idea developments (Narayanan et al., 2011) and expression of such an approach could lead to positive outcomes for the firm such as sustainable awareness.

Moreover, to gain employees' support, top level management needs to provide discretion to encourage contextual experimentation within the organisation. Environmentally proactive firms would alter the pattern of authority, responsibility and control to allow operating managers to tap into the budgeted funds (López-Gamero et al., 2016). This provides space for them to reconfigure while exploring the whole new routine as a result of applying environmental management. In that case, besides improvement of environmental impact, the cost benefits and innovation will potentially be realised too (Sharma et al., 1999). In this respect, studies (Russo and Fouts, 1997) finds that firms displaying environmental behaviour are characterised, among other things, as decentralised and involving higher participatory decision-making structure. Organisational commitment to the environment involves employees at various levels (López-Gamero et al., 2016), hence they are required to have decision-making authority in order to increase environmental productivity (Sweet et al., 2003). Thus, organisations such as small to medium manufacturing firms embracing a decentralised approach are expected to contribute to environmental strategy as stated in the following hypothesis.

H1: A decentralised structure encourages small to medium manufacturing firms to implement environmental management.

Another factor that encourages small to medium manufacturing firms to implement environmental management is pressure from external social network. Environmental sociologists have emphasised the importance of social network ties in shaping environmental practices (Hargreaves, 2016). Small to medium manufacturing firms learn from and are influenced by other firms in their geographical and social

capital (McHugh and Perrault, 2018). As argued by Cantor et al. (2015), the process of engagement with environmental behaviors at firm level needs to be done collectively. Having another organisation within their networks that implements environmental activities will put pressure on firms to follow the practices. The pressure networks also apply at the individual level (Reichhart and Holweg, 2008). Among employees of firms, it is common for shared knowledge and information to happen among socially close individuals, especially interactions with those that meet on a frequent basis, such as customers, rivals and suppliers. The pandemic of environmental awareness has been proven through an increase in interest towards the environment from various groups of scholars, firms and consumers (Cho, 2014). Social networks are responsible for the spread in awareness (Baumgärtner et al., 2015). Without the establishment of a social connection, small to medium manufacturing firms may not be exposed to diverse knowledge and thus may be less motivated to pursue any environmental management strategy. Overall, it can be argued that pressure from social networks has a positive effect on the implementation of environmental management. Small to medium manufacturing firms are likely to feel left behind if other players in their business ecosystem are following the market trend of sustainable practice.

Through early anticipation, small to medium manufacturing firms could act promptly by adapting certain environmental measures to ease the pressure from their network contacts. As a result, environmental management is becoming more of a strategy, which, other than helping to preserve the natural environment, also acts as a tool to achieve competitive advantage and stay ahead of other businesses (Leonidou et al., 2015). The effect of firms' and individuals' networks on the practice of environmental management yields the following hypothesis:

H2: Social relationships with partners who are implementing environmental management encourage small to medium manufacturing firms to implement environmental management practice.

In recent years, global environmental awareness has changed the industrial competition patterns for firms around the world (Chang and Chen, 2012). Various groups, such as political stakeholders (e.g. government), economic entities (e.g. consumers), pressure groups (e.g. non-profit bodies) and members of the community

(Bansal and Hunter, 2003; Leonidou et al., 2015), are becoming interested in ensuring the sustainability of the environment. Thus, small to medium manufacturing firms are becoming more concerned to focus on environmental issues as a result of rising environmentalism (Keogh et al., 2006). Among the reasons to implement environmental management include the desire: (1) to exhibit socially responsible behaviour to influential entities such as governmental authorities and consumers; (2) to present a corporate image that is concerned about environmental issues; and (3) avoid negative consequences such as penalties and consumer boycotts (Banerjee et al., 2003). Hence, experiencing high pressure to become sustainable, firms have no choice but to adapt to the situation (Walker et al., 2014). Flammer (2013) argued that as environmental issues become institutionalised as a norm, the stronger the effect of negative perceptions of a firm, and firms who are not following the norms will be punished.

The rise in global environmental awareness has also changed consumer behaviour rapidly (Wang et al., 2014). Follows and Jobber (2002) reported that initially, very few environmentally responsible products were available in the market. However, the existence of such products in the market are signs that consumers are more aware of the sustainable issues and want to be part of the solution to the problem. Previous studies (e.g. Purhoit, 2012; Zhang et al., 2015) found that the majority of North American consumers have environmental concerns over the products that they buy. This increase in demand towards environmentally responsible products and processes has resulted in firms pressured into employing environmental management in their operational routines (Cho, 2014). Consumers have acknowledged the importance of environmental issues and therefore tend to boycott companies conducting unethical environmental activities (Chang and Chen, 2013). As a result, global environmental awareness can be considered as an influencer for firms to implement environmental activities (Pacheco and Dean, 2015). Thus, the study posits the following:

H3: Global environmental awareness encourages small to medium manufacturing firms to implement environmental management.

Over time, industrialisation has compromised living conditions through uncontrolled pollution (noise, water and air) and unsafe machinery (Wong et al., 2012). However, over the last few decades, efforts were being made to avoid more environmental destruction of the natural environment. Technology is also another factor

that may help small to medium manufacturing firms to implement environmental management. Through rapid technological innovation, environmentally friendly products can be produced. Not only does technological advancement create sustainable products, but firms also undergo a whole new process of operation that considers how to avoid negative impacts towards the environment (Ogbeibu et al., 2019). In this case, technological dynamism might have a positive impact on firms' environmental management. For example, in markets for high-tech products namely semiconductors and mobile telecommunications, the underlying technology is evolving rapidly (Chang and Chen, 2013), which encourages the usage of advanced technology with sustainable features such as energy saving and reduced pollution effects. Moreover, the latest innovation practices are now more sensitive towards issues of environmental protection such as energy saving and wastage. In contrast, firms with less focus on innovation and technological dynamism will potentially suffer from obsolescence of existing products due to the rapid and constant redefinition of consumers' preference structure (Suarez and Lanzolla, 2005).

The fast changing technological development could also affect operations in general through advanced machinery with environmentally friendly traits, which can help to support firms' ethical stance towards environmental initiatives (Ogbeibu et al., 2019). Based on the need to remain competitive, innovation can be an option for firms to survive and grow. It determines whether the firm will grow through applying the updated technology or decline due to obsolescence of existing technologies. Rapid innovation cycles also create more opportunities to build machinery involving processes of transforming inputs into outputs with environmental friendly features (Chen et al., 2015). While many research studies have investigated the role of technology towards improving environmental issues, not much attention has been given to investigating how technological dynamics can help small to medium manufacturing firms to conduct environmental management. Therefore, the following hypothesis is constructed:

H4: Technological dynamics encourage small to medium manufacturing firms to implement environmental management.

The theoretical position underlying this study is that coalignment between organisational flexibility and external pressure is a desirable property that has implications for performance (Olson et al., 2005; Venkatraman, 1990; Vorhies and

Morgan, 2003). The expectation is that small to medium manufacturing firms should reconcile these competing forces to effectively implement strategy. Environmental context in this study includes social relationship, strong global awareness on environmental management and technological dynamics that should encourage firms to invest in building critical capability to deploy effective combinations for generating competitive outcomes (Zhao et al., 2018). In implementing environmental management, the strategy is to find a configuration of organisational level of hierarchical decision-making process that co-aligns with those environmental contexts.

The next hypothesis argues that the implementation of environmental management is strengthened by alignment between a decentralised structure and external pressure from social relationships. As network partners share their unique ways of practicing environmental initiatives, the diffusion of environmental management practices increases. In the context of small to medium manufacturing firms with decentralised organisational structures, firms authorise lower employee levels to make their own decisions. This enhances employees' awareness about environmental management, and they can potentially gather information as a result of their social relationship with other business actors who practice environmental management (e.g. customers, suppliers and competitors). The continuous interaction between the actors can catalyse the development of cooperative norms which therefore support the environmental management practices (Bercovitz et al., 2006). In contrast, in less decentralised firms, a firm's perspective is narrowed to a few top decision makers and limits alternative perspectives (Martin et al., 2016). As the ideas about environmental solutions for the firm must be endorsed by the higher level of authority before the implementation, a less flexible organisational structure may weaken the implementation of environmental management. Based on the argument, this study assumes the interaction between social relationships and a decentralised structure will encourage the practice of environmental management. Thus, the hypothesis is constructed:

H5. Social relationships with partners who are practicing environmental management strengthens the impact of having a decentralised structure on the implementation of environmental management.

In order to respond effectively to external pressure, the structure of a firm must be considered (López-Gamero et al., 2016). For firms with a less flexible organisational structure, the implementation of environmental management would be weak even in conditions of strong global awareness on environmental responsiveness due to their existing decision-making structure which promotes stringent decision-making authority, limited to higher ranked executives. Due to the unpredictable environmental awareness in the market, as well government pressure for businesses to operate with lower impacts on the natural environment, adapting to market demands and trends may be delayed due to the communication and agreement that needs to be transmitted across certain functional levels before actions are executed (Joseph et al., 2016). In this matter, the longer the time it takes for the firm to execute environmental practices, the higher the chance that they will lose their competitive advantage. In contrast, a decentralised structure will allow small to medium manufacturing firms to react quickly and flexibly enough to deal with global awareness on the environment and environmental issues (Agrawal, 2014). Global environmental awareness has forced small to medium manufacturing firms to explore the possibility of embedding sustainable elements in their business practices while adjusting their strategic planning accordingly (Buysse and Verbeke, 2003). With the exponential growth of concern for the natural environment globally, firms that practice environmental management are more likely to portray their business as supporting global sustainable agendas (Gadenne et al., 2009). Such a strategy is prevalent since a positive image could encourage business growth in the environmental era (Chang and Chen, 2013). Therefore, the following hypothesis was proposed:

H6. Global environmental awareness strengthens the impact of having a decentralised structure on the implementation of environmental management.

The next hypothesis focuses on the existence of external pressure such as the development of technology as a moderator on the relationship between the decentralised structure of small to medium manufacturing firms and environmental management. A fast-changing technological development offers new opportunities for small to medium manufacturing firms to implement environmental management. However, they have to react quickly. As the accelerated pace of technological changes has encouraged the

innovation of environmentally friendly products (e.g. solar powered electrical equipment and electric cars) and environmental operation (e.g. less wastage, less pollution, proper waste treatment), a decentralised structure provides flexibility to develop competitiveness through innovation (Hall and Rosson, 2006). Several studies (e.g. Kim et al., 2019; Ogbeibu et al., 2019) have found that firms met environmental target outcomes due to technological dynamics. This external pressure strengthens the ability of structurally decentralised small to medium manufacturing firms to implement environmental management. In a decentralised structure, firms react faster (Davis-Sramek et al., 2015), thus, they are more effective in the practice of environmental management. Hence, the following hypothesis is constructed:

H7. Technological dynamics strengthen the impact of having a decentralised structure on the implementation of environmental management.

3.3 Research Method

3.3.1 Sample and Measurements

This study chose small to medium manufacturing firms as the target sample since their operational activities have been associated with negative environmental impacts, thus, they are increasingly pressured to act ethically by paying attention towards the environment (Delgado-Ceballos et al., 2012). The focus of the paper is small to medium manufacturing firms with annual turnovers of less than £25 million and/or employing fewer than 250 people, coming from a broad sweep of manufacturers in terms of the sector. This sample selection fits the criteria for the majority of business entities in the UK. For these types of firms, internal drivers such as decentralisation level of decision making are important for driving environmental management (Deutz et al., 2013).

Due to it being suitable to achieve the objectives of this study, a quantitative approach was adopted. Secondary datasets that could represent the constructs involved were also unavailable, making primary data the best source for this study. A questionnaire was designed to test the hypothesis in the UK manufacturing industry. The items in the questionnaire were constructed by referring to prior literature. Prior to the main data collection, a pilot survey with a sample of manufacturing firms was conducted. Those respondent firms came from various sectors of manufacturing. Before

the interview, the complete questionnaire was sent via email. During the process of answering the questionnaire, at least one researcher was present to capture all comments and recommendations. Based on the feedback, some parts of the questionnaire had to be paraphrased to suit the background of respondents who were not familiar with research jargon. At the same time, a panel study involving academics, such as PhD students and researchers from the field of management, was conducted to evaluate the questionnaire. After receiving feedback from the pilot survey and the panel study, some questionnaire items were adjusted to increase clarity.

The sample of this study were derived from the FAME (Financial Analysis Made Easy) database. To increase the effective response rate of the conducted survey, research assistants were employed to contact each selected company, explain the research objective and content of the survey. Furthermore, they were required to gather the details of the most suitable personnel from the firm to answer the questionnaire. For each firm, only a single representative was required. The survey was sent to capture the perceptions of respondents who would be among the top management level or managers in charge of environmental strategy and conducted online after the potential respondents had received an invitation via email. We asked the respondents to answer the online survey within one week. In total, we contacted 2,767 small to medium sized manufacturing firms; but only 1,887 invitations were sent as certain firms contacted were not interested in participating in the survey. After two follow-up contacts with nonrespondents, 106 complete and valid responses were collected. The effective response rate was 5.6% which is similar to Yu and Ramanathan (2015) who also conducted a survey-based environmental management study. Moreover, the sample size of this study is also comparable with the sample size from other recent research on this topic (e.g. Peng and Lin, 2008; Singh et al., 2015)

Considering that the data of this study was collected based on self-reporting, the results could be vulnerable to non-response bias and common method bias (Podsakoff and Organ, 1986). To reduce the risk, the study implemented a rigorous statistical approach to verify the reliability and validity of the study. Non-response bias was diagnosed using independent sample t-tests where analysis was performed by comparing 31 firms that responded and 31 firms that did not finish completing the survey. The data for non-responding firms was collected via Qualtrics software (online

questionnaire software) which stores records of respondents that have fully responded as well as those that partially responded. The T-statistics were insignificant, concluding that non-response bias was not a major issue.

In order to check whether the survey could lead to common method bias, a few steps were taken. First, the measurements for each construct were drawn from the extant literature, carefully designed and refined through several refinement processes. Second, anonymous responses were required in this study. The respondents were informed through a phone call, email, and questionnaire. Third, the layout of the questionnaire was not designed based on the themes, such as performance, organisational decision-making structure, etc. so that it was nearly impossible for the respondents to determine the relationship between predictor and outcome variable. Fourth, Harman's single test was performed to establish whether one single factor to account for most of the variance in the data could be identified (Podsakoff and Organ, 1986). The outcome of the test showed that there were four factors with an eigenvalue of more than one which accounted for 75.62% of the total variance. There was no single factor that could account for the majority of the covariance in the model. Overall, common method bias would not be a threat to this study.

Table 3.1 The variables and measurements of this study

Variable's name	Questionnaire items	Variable	Description
Environmental management (EM)	<p>To what extent has your firm engaged in voluntary environmental activities with:</p> <ul style="list-style-type: none"> - Inbound logistics - Operations - Outbound logistics - Marketing and sales - Services 	7-point Likert scale	The variable like other studies in different fields (e.g. Anandarajan et al., 1998; Prajogo et al., 2016) was constructed based on Porter's value chain framework that covers firms' primary activities. This variable was created by formative indicator constructs. Studies in EM have mostly used activity-based measures to quantify environmental strategy such as proactive environmental strategy and environmental management practices (Ateş et al., 2012; Montabon et al., 2007).
Organisational flexibility (Org_Flex)	<ul style="list-style-type: none"> - Little action could be taken here until a supervisor approved a decision - Even small matters had to be referred to someone higher up for a final answer - Employees had to ask their boss before they did almost anything - Any person who wanted to make their own decisions was quickly discouraged here 	7-point Likert scale	The variable was modelled as a reflective construct and measured by the degree of centralisation-decentralisation in the decision-making structure. The construct was assessed by four items developed by Hage and Aiken (1967) and adapted by Baumgärtner et al. (2015). Originally, there were five items for the construct but due to a low loading score of less than 0.3 for one of the items, this study had to remove that specific item.
External pressure from technological dynamics (Ext_Tech)	<ul style="list-style-type: none"> - The technology in our industry was changing rapidly - Technological changes provided big opportunities in our industry - It was very difficult to forecast where the technology in our industry would be in the next 2-3 years - A large number of new product ideas were made possible through technological breakthroughs in our industry 	7-point Likert scale	The variable was developed using measures adapted from Jaworski and Kohli (1993). Technological dynamic items measure the extent to which technology in an industry is changing. We adopt a four-point reflective scale for all the items.

Variable's name	Questionnaire items	Variable	Description
External pressure from global environmental awareness (Ext_Trend)	<ul style="list-style-type: none"> - There were intense changes in environmental awareness in our local market - Our clients were gradually asking for more eco-products/eco-services - Consumers were increasingly willing to pay for eco-products/eco-services even at an additional cost - Each year, more and more eco-products/eco-services were offered in our market 	7-point Likert scale	This reflective variable was constructed to measure the extent of global environmental awareness in the market as perceived by the firm.
External pressure from social relationships (Ext_Social)	<ul style="list-style-type: none"> - We shared close social relations with them - Our relationship with them could have been defined as "mutually gratifying" - We expected to maintain close relationships with them far into the future 	7-point Likert scale	This variable was constructed using a measurement developed by Rindfleisch and Moorman (2001). This construct was tested on 4 different groups namely customers, suppliers, rivals and other firms nearby. Each group were given the same items to be answered. Both first-order and second-order constructs were using reflective indicators.
Firm size	<ul style="list-style-type: none"> - Firm's number of employees 	Continuous variable	This count variable was measured by taking the logarithm of the number of employees to alleviate univariate non-normalities and account for non-linear effects (Feng et al., 2014).

Note: The Likert scale covers measurement from 1: 'strongly disagree' to 7: 'strongly disagree'.

3.3.2 Validation of Constructs

In this study, the constructs used undergo a methodologically rigorous and comprehensive examination as a fundamental for meaningful and reliable research (Trumpp et al., 2013). The first analysis was exploratory factor analysis (EFA) using principle component analysis with varimax rotation in order to examine whether the items fit with the constructs. The Kaiser-Meyer-Olkin (KMO) test for sampling adequacy was 0.76, indicating reliability towards the constructs. The list of items was reduced to 5 factors, each with an eigenvalue of more than 1 and explains 75.62% of the total variance. Internal consistency (reliability) of the model was established through the Cronbach alpha value of more than 0.7 for each factor (Nunnally and Bernstein, 1994). Table 3.2 shows the indicated measures' item loadings, scale composite reliability (SCR) and average variance extracted (AVE).

Table 3.2 Summary of measurement scales

Items	Mean	SD	Item loading	Composite Reliability	AVE
Org_Flex					
C1	3.61	1.88	0.89	0.93	0.77
C2	3.48	1.88	0.94		
C3	3.19	1.95	0.90		
C4	3.59	1.90	0.89		
Ext_Tech					
T1	4.12	1.68	0.89	0.85	0.59
T2	4.62	1.64	0.82		
T3	3.71	1.48	0.59		
T4	3.75	1.64	0.90		
Ext_Trend					
G1	4.20	1.59	0.79	0.89	0.68
G2	4.28	1.55	0.88		
G3	3.77	1.66	0.86		
G4	3.54	1.67	0.90		
Ext_Social					
R1	3.86	1.69	0.75	0.81	0.60
R2	4.72	1.64	0.86		
R3	4.80	1.67	0.88		

Note: SD, standard deviation

Second, confirmatory factor analysis (CFA) to examine the reliability and validity of the measures was conducted. Table 3.1 shows SCR and AVE values meet the criterions (SCR > 0.7; AVE>0.5) that suggested the theoretical framework had

established convergent validity and therefore, a reliable model. Moreover, an inter-construct correlation was calculated (Fornell and Larcker, 1981). The square root of AVE for each construct was found to be greater than the inter-construct correlations proving possession of discriminant validity. Based on the measurement fit indices used to assess the goodness-of-fit of models, it was confirmed as a good overall model fit ($\chi^2= 106.97$, GFI= .89, AGFI= .84, CFI= .98, and RMSEA= .05).

3.4 Findings

This study adopts the procedures of negative binomial regression (NBR). Since the dependent variable (environmental management) was a continuous variable, employing the ordinary least squares (OLS) was not appropriate for two reasons (Gardner et al., 1995). First, the nature of the data would produce nonsensical, negative predicted value. Second, it is unlikely for count data to meet the assumptions on variance of scores. The data was not rescaled into sub-groups to avoid dilution in statistical power. Since data for the dependent variable was over dispersed and not able to meet the restriction assumptions of Poisson regression (i.e. mean=variance), negative binomial regression was employed (Hausman et al., 1984). This regression embeds a random term to reflect the unexplained between subject disputes (Gardner et al., 1995).

Table 3.3 depicts the means, standard deviation and correlation among the variables assessed in this study. Computation of correlation indicated multicollinearity is not a concern where the highest correlation coefficient is 0.32 (between external environmental awareness and number of employees). Since the values are below the usual threshold, it implies that no serious multicollinearity problems were in existence (Hair et al., 1998). For robustness purposes, eight models were used to address all hypothesis challenged in this study (Table 3.3). Model 1 contains the control variable and main effects. The moderating variables were added into model 2. Models 3-8 were employed to test individual interactions with the control variable and main effects.

Table 3.4 shows the results of the regression analysis. The independent variable and moderating variables were mean-centered prior to running the regression analysis to minimise potential multicollinearity problems (Aiken et al., 1991). Based on the results, the control variables (firm size) were found not to have any significant effect on firms' environmental management implementation level. Organisational flexibility

(decentralisation) is found positively related to environmental management ($P < 0.01$) in all models. This further suggests that the baseline for this study ($H1$) is confirmed. Prior to testing the moderation hypothesis, Hypothesis 2, 3 and 4 were tested. The results from Table 3.4 show that all three-hypothesis failed to establish a significant relationship, thus $H2$, $H3$ and $H4$ were rejected. Results indicated that the interaction between social network and a firm's decentralisation level on environmental management was not significant ($p > 0.05$), confirming the rejection of $H5$. The interaction term between global awareness of the environment and a firm's decentralisation level on environmental management is significant ($p < 0.05$) but showing the opposite magnitude of what had been proposed, thus rejecting $H6$. However, in support of $H7$, the study confirms the positive moderating effect of external pressure from technological dynamics on the relationship between firms with a decentralised structure and environmental management is significant ($p < 0.05$). Summary of findings are presented in Table 3.5.

Table 3.3 Descriptive statistics and correlation coefficients

Variables	Mean	SD	1	2	3	4	5	6
1. EM	20.12	7.61	1					
2. Firm size	96.09	86.91	.28**	1				
3. Org_Flex	3.47	1.73	-0.28	0.05	1			
4. Ext_Tech	4.12	1.44	.23*	0.02	-.20*	1		
5. Ext_Trend	3.75	1.35	0.17	.32**	0.11	0.14	1	
6. Ext_Social	4.46	1.40	0.18	0.04	-0.08	0.12	0.18	1

N= 106

* $p < 0.05$; $p < 0.01$

Table 3.4 Results of negative binomial regression analysis for environmental management

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
<i>Main effects</i>								
Org_Flex	-0.228**	-0.225**	-0.218**	-0.229**	-0.231**	-0.236**	-0.266***	-0.23**
Ext_Social	0.131	0.156	0.119	0.14	0.153	0.148		
Ext_Trend	0.076	0.095	0.081	0.07	0.094		0.125	
Ext_Tech	0.155	0.117	0.152	0.144	0.134			0.166 ⁺
<i>Interaction effects</i>								
Org_Flex x Ext_Social		0.024	0.035			0.035		
Org_Flex x Ext_Trend		0.115*		0.111*			0.113*	
Org_Flex x Ext_Tech		-0.136*			-0.121*			-0.103*
<i>Control</i>								
Firm size	0.005**	0.004**	0.005**	0.005**	0.004**	0.005**	0.005**	0.005**
Constant	4.025***	3.935***	4.032***	3.997***	3.966***	4.032***	3.997***	3.974***
Pseudo log-likelihood	-426.27	-424.85	-424.07	-424.57	-424.52	-424.74	-424.73	-424.53

N = 106.

*p<0.05; **p<0.01; ***p<0.001

3.5 Discussion

The findings confirm the link between *decentralisation* and *environmental management* (*H1*). The result further verifies the importance of having a flexible organisation in term of a decentralised decision-making structure for firms' performance (Olson et al., 2005; Theodosiou and Katsikea 2013). The fact that small to medium manufacturing firms have a dispersed decision-making process, deciding and implementing a decision would require a shorter time. According to Perez-Valls et al. (2016), applying a flexible organisation structure in dynamic environments would produce "above-average" returns for developing environmental management. This study further tested the direct effect of external pressure from social relationships on environmental management. No evidence was found that showed a significant relationship between *social relationship* and *environmental management*. Thus, the results showed no support for *H2*. While the hypothesis is strongly supported in terms of the role of social network in influencing behaviour and facilitating the sharing of information and knowledge, it might not be generalised for environmental management. Hence, more extensive research is needed to determine the other underlying factors that can help the diffusion of environmental management through social relationships.

Surprisingly, results showed no relationship between *global environmental awareness* and *environmental management* which rejects the proposition of *H3*. Historically, environmentally friendly products have been associated with low quality products (Bourn and Prescott, 2002). While there is also a concern about brainwashing on environmental issues (De Jong et al., 2018), small to medium manufacturing firms may not be interested in applying environmental management. Furthermore, environmental management can be easily overstated as Aragón-Correa and Rubio-López (2007) illustrated that while sales of organic food have increased by a very high percentage, it still holds a small share compared to the increase in the total food industry growth. These factors potentially drive firms away from the implementation of environmental practices. The relationship between *technological dynamics* and *environmental management* was also proven to be statistically not significant. Thus, *H4* was rejected. During periods of high technological dynamics, most firms are pressured to follow the latest technology. However, certain firms do not benefit, especially for products that have been available in the market for a long period of time (Chang and

Park, 2013). Besides that, technological advancement is not always prone to side with cleaner carbon trait but sometimes contributes to environmental pollution from the waste outputs.

The results reveal that *social relationship* does not moderate the relationship between *decentralisation* and *environmental management* (*H5*). One explanation could be that adoption of environmental strategies are more institutionally driven compared to inter-firm influences. Such actions are influenced by the need to comply with regulatory control of the institutional environment (Cummings, 2008). In any business entity, the sources of information and knowledge are carefully verified. Social networks may not be the best source for advice or knowledge on matters concerning the environmental strategy of a firm.

H6, which states that external pressure from *global environmental awareness* has a positive moderating effect on the relationship between *decentralisation* and *environmental management*, is not supported but resulted in a significant opposite finding ($P < 0.05$). This intriguing and somewhat counter intuitive result provides a new view on how firms should react during uncertainty. The idea of critical strategic thinking, and not focusing on where the trend sits (industrial players heavily and explicitly implementing their environmental strategy), is crucially important to why a focus on strategic renewal should be considered by firms. Due to the influx of key players focusing on sustainable approaches, it no longer provides a competitive advantage platform in the long run. The contemporary global trend which is paying more attention towards environmental awareness can sometimes be tough due to the establishment of new regulations (Zhang et al., 2019) and standards, which could burden businesses that wish to venture into environmental management. For example, environmental standards, such as ISO 14001, are recognised world-wide, could improve corporate reputation (Jiang and Bansal, 2003). However, the adoption of such a standard is related to excessive bureaucratisation required by the system (Ferrón, 2017).

H7 predicted a positive moderating effect of *technological dynamics* on the relationship between *flexible structured firms (decentralisation)* and *environmental management*. The results indicate that this two-way interaction is significant ($p < 0.05$) as shown in models 2, 5 and 8, and hence, *H7* is supported. In flexible firms, autonomy encourages quick decision making based on local information or knowledge to deal with

challenges of fast changing technologies (Chen et al., 2015). The result suggests that firms' organisational structure is needed to match contingency to ensure firms' effectiveness, where non-flexible firms (those with a centralised structure) are more effective in influencing environmental practices when the technological dynamics are minimal, while strong industrial technological dynamics would match flexible firms (those with a decentralised structure) to ensure they strongly implement environmental practices.

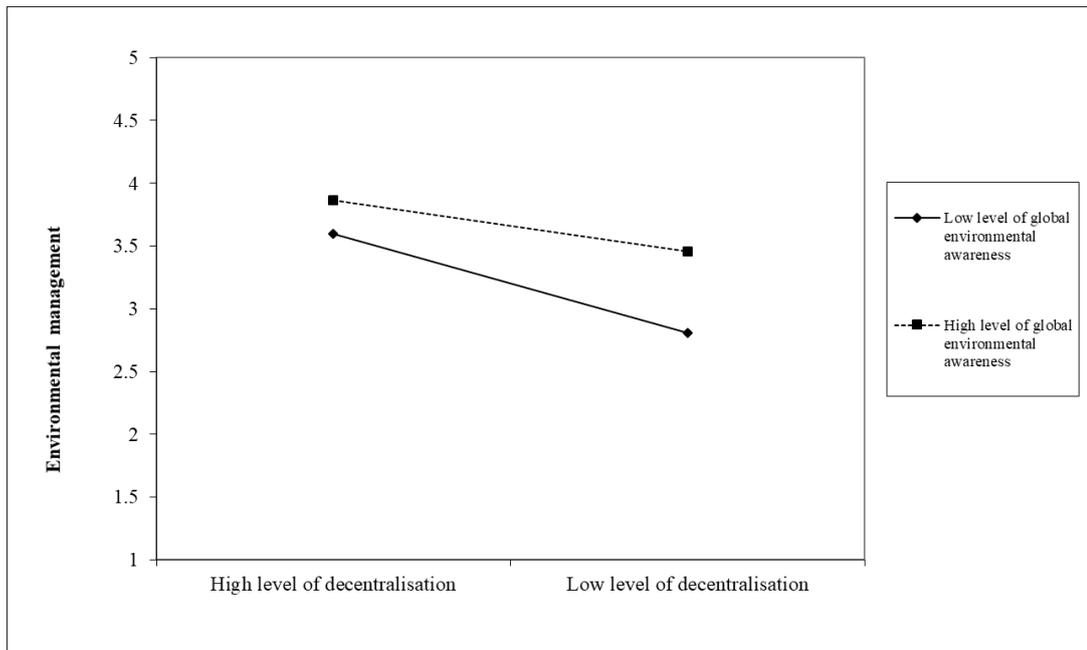
To gain further insight into the nature of the two-way interaction, the interaction effect of two of the significant hypothesis, 6 and 7, were illustrated (Boschma, 2005; Dawson, 2014). When testing for hypothesis 6, both plots are sloping downwards, revealing that firms without a flexible structure have a negative effect on environmental management despite the presence of global awareness (Refer to Figure 3.2 - Panel A). However, low global awareness shows a stronger negative effect on the relationship (decentralisation-environmental management) compared to high global awareness on the environment.

For H7, the predicted values of environmental management were calculated under different conditions (high and low values of decentralisation, and high and low values of technological development). Based on Figure 3.2 (Panel B), the positive effect of decentralisation on environmental management is stronger in firms with a high level of technological development in the industry compared to a lower level.

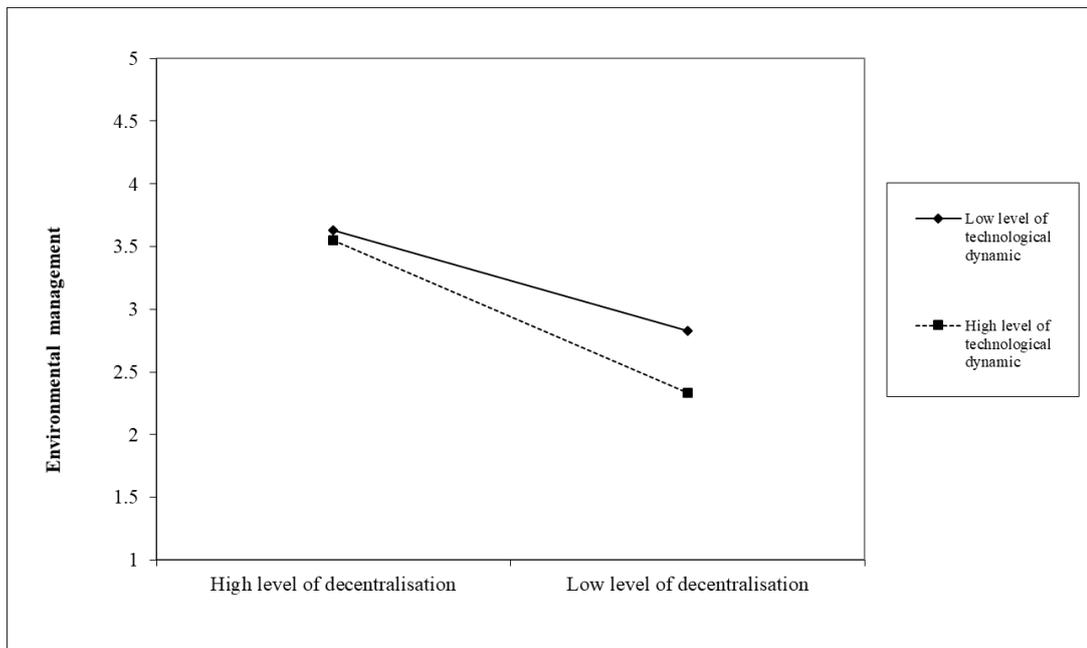
Table 3.5 Summary of findings

Hypothesis	Proposed Effects	Hypothesis Supported?
H1: Organisational flexibility (Decentralisation) → EM	+	Yes**
H2: External pressure from social relationship → EM	+	No
H3: External pressure from global awareness on environment → EM	+	No
H4: External pressure from technological dynamics → EM	+	No
H5: Organisational flexibility (Decentralisation) * External pressure from social relationship → EM	+	No
H6: Organisational flexibility (Decentralisation * External pressure from global awareness on environment → EM	+	No*
H7: Organisational flexibility (Decentralisation * External pressure from technological dynamics → EM	+	Yes*

*p<0.05; **p<0.01



Panel A: Global environmental awareness as a moderator of the relationship between decentralisation and environmental management



Panel B: Technological dynamics as a moderator of the relationship between decentralisation and environmental management

Figure 3.2 Moderating effects of technological dynamics and environmental awareness

3.5.1 Contribution to Theory

This study aims to examine how firms with a flexible structure are more likely to affect environmental management in situations of high external pressure in technological development and low global awareness on the environment. Being aware of external contingencies will help small to medium manufacturing firms more closely align their environmental strategy to the specified organisational structure. This study makes a number of contributions to theory. First, the role of organisational variables such as decentralisation have been adapted widely within the management research generally (Karim et al., 2016) but has received little insight within the specific context of environmental management (López-Gamero et al., 2016). Integrating the perspective of contingency theory and related environmental literature, this study developed a new model for this relationship, which was further tested empirically. From the findings, the baseline relationship between decentralisation and environmental management was confirmed (Table 3.5), thus, verifying previous research that found flexibly structured firms (with decentralised decision making) impact on innovativeness (Boso et al., 2013). The results coincide with the study conducted by López-Gamero et al. (2016), which found a non-significant positive relationship between hotels in Spain with a decentralised structure and environmental proactivity. This finding helps expand the understanding of the beneficial consequences of having a flexible organisation and empowerment for firms' environmental strategy. A key lesson from the finding may be that an individual employee's role at all levels to support an organisation's agenda is important. Thus, as Quirin and Bower (2006) suggest, impetus for a firm's new ventures usually begins from the lower levels in the firm, which reflects the importance of autonomy. On the other hand, it also shows that non-owners (e.g. employees) have concern over protecting the natural environment though not necessarily as part of the company's main objective. At this level of finding, it can be suggested that there is a possibility that environmental strategies are motivated and self-driven at any level of the command chain.

Second, by focusing exclusively on a firm's primary activities (inbound logistic, operation, outbound logistic, sales and marketing and services) adapted from Porter's value chain (Porter, 1985), the environmental management measure has a better chance of receiving the most accurate information. Previously, most studies used activity-based

measures (i.e. Delgado-Ceballos et al. 2012; Gallear et al. 2015) to benchmark environmental management. The items included may be insufficient and deprive certain aspects of environmental management that were implemented specifically by firms. From another perspective, there is no consistency in terms of the items used to measure environmental management. Using Porter's value chain promotes consistency through the standardised activities covering all elements of environmental management practices throughout business facilities.

Third, the determinants of environmental management as a result of interaction between a firm's decentralisation level and global awareness on the environment produced an extremely interesting finding. Going against the predicted outcome, the results showed an unusual and distinct positive tendency. This evidence provides a stronger basis that business entities tend to weigh-in the risks and potential before committing to any "trending" strategies. In stable environments, firms with a tight hierarchical structure with communication and control following hierarchical routes will deliver maximum efficiency (Burns and Stalker, 1994). This concept is however opposite in cases of environmental awareness at a global level. High environmental awareness in an industry does not always influence firms to be environmentally proactive, since other industrial players will follow the same strategy as well as issues with uncertain benefits to the firm after engaging with environmental management practices (Ferrón, 2017). In this study, firms with higher flexibility were found to perform less environmental management in a market with high environmental awareness compared to when the market is stable. In this situation, firms should act quickly and shift towards other strategies that are less focused, to gain competitive advantage.

Fourth, this study contributes to the environmental management literature by proposing a cross-level framework that bridges the organisation-level variable (environmental management practices), and the external-level variables of external pressure for technological development and environmental awareness. Most of the previous research applies a single-level approach to environmental management studies (Chen et al., 2015). However, due to the dynamic situation of sustainability issues which has a global effect, more research should emphasise different levels compared to single-level research (Rousseau, 1985).

3.5.2 Managerial Implications

Practically, the research outcomes provide beneficial implications that could lead to valuable insights for small to medium manufacturing firms. Through implementing this empirical study, proof beyond the anecdotal was provided, that organisations communicating their structure through an organic (flexible) orientation can benefit in the form of improved environmental performance. Flexibly structured firms also corresponded in a more agile way during uncertainties.

First, firms may often be in dilemma as to which flexibility structure (centralised or decentralised) they need to adopt to improve their environmental management. This study examines the fundamental issue addressing the organisational “fit”. The framework of this study delivers some direction to managers, especially environmental managers, on how having a flexible organisational structure orientation may translate into specific environmental proactivity within the context of small to medium manufacturing firms in the UK. Since there is a complex decentralisation-environmental management relationship linked to exogenous uncertainties, managers can therefore make informed decisions about their environmental strategy (López-Gamero et al., 2016). Unlike other strategies, firm-level environmental management initiatives are complex (Lucas and Noordewier, 2016), needing firms to consider organisational design such as organisational flexibility (decentralisation). As such, firms are warranted to align their level of flexibility in decision making in order to ensure that they can produce the specific outcome from their practice of environmental management.

Second, firms usually face difficulties in determining to what extent they should be committing to environmental practices to gain market position. This study shows that even when there is high external pressure for firms to engage with sustainable practices, those that are flexible are better-off not to focus intensively on environmental management. Many studies have found negative relationships between corporate environmental management practices and financial performance (Aragón-Correa and Rubio-López, 2007). The general overclaims that encourage firms to practice environmental management for financial gains have increased confusion around this topic and in some cases, might lead towards disappointment which drives firms away from having an interest in practicing environmental management within their business.

Furthermore, there are findings that the environmental statements and claims made by companies are not always trusted by stakeholders (Aragón-Correa and Rubio-López, 2007). On the consumers' side, not all citizens have equal interest in every aspect of environmental preservation. This makes it riskier for firms implementing environmental practices that may have the least interest for their target market. Strategically, firms must analyse and conduct their due diligence before deciding on any environmental management decisions.

Third, in cases of high pressure from technological development from the market, firms with a flexible structure tend to have a better interest in committing to environmental management practices compared to those that are not flexible in terms of decision-making. Extant literature suggests advanced manufacturing technology is an important component of environmental management (Nath and Ramanathan, 2016). Since technological advancement can only be managed by firms that are alert and can respond faster, a flexibly structured firm would best fit this description. In a flexible firm, decision-making is made by those holding the relevant information (Davis-Sramek et al., 2015) while the decision making in less flexible firms is usually in the hands of a few founding members (Martin et al., 2016). Hence, firms that are able to respond faster in an environment of high technological pressure will have strong complementary capability that helps their practices towards a more aggressive environmental goal (López-Gamero et al., 2008).

3.5.3 Limitations and Directions for Future Research

Notwithstanding its contribution, this study has some limitations. First, it focuses solely on small to medium manufacturing firms. Though negative environmental outcomes usually relate to organisations involving production lines, other types of industry such as services were neglected. Since both industries have different operational settings, which could affect the natural environment in different ways, there would be a generalisation problem if the study is based on a single industry. Future studies could look into the different industries, adapting the existing framework from this study to complement the results, hence generalising the findings.

Second, in the extant literature, organisational structure is usually measured by three major structural variables, namely formalisation, decentralisation and

standardisation. While seemingly, they are supposed to form a unitary conception characterised by a highly positive relationship, there were studies that found otherwise (Child, 1972). In this study, only a single element of organisational structure was focused on, which is the degree of decentralisation. Future research could therefore involve all aspects of organisational structure.

**CHAPTER 4: STUDY 3 - EXAMINING THE INFLUENCE
OF FIRM'S INTERNAL RESOURCE INTEGRATION
AND EXTERNAL INVOLVEMENT FOR HIGH
ENVIRONMENTAL MANAGEMENT PRACTICES:
FINDINGS FROM fsQCA**

Authors

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Abstract

The driver of firm's environmental management practices has spawned considerable research interest. The literature acknowledges firm's internal resources and external involvement towards environmental management practices. However, in most cases, researchers have relied on set of independent explanatory factors using linear analysis. This type of analysis is limited and condones the concept of equifinality. As a treatment, this research proposes a configuration approach to firm's environmental management that accounts for complex interdependencies among internal resources and external involvement. This study critically examines the sample of 107 manufacturing firms from Malaysia using the fuzzy-set qualitative comparative analysis (fsQCA). The findings reveal that firm's internal resources always have to be complemented by presence of external involvement. There are different equifinal configurations of firm's internal resources and external involvement leading to successful (high) environmental management. On the other hand, configurations characterized by absence of these two factors are related to weak environmental management practices. This study extends literature on antecedents in environmental management literature. It also bridges

together apparently contradictory research on the relationship of firm's internal resources and external involvement towards environmental management practices. Finally, the study demonstrates that internal resources and external involvement have different roles in reaching high and low environmental management.

4.1 Introduction

Contemporary firms can take advantage from firms internal resource integration as well as external involvement to determine their level of environmental management (Melander, 2018; Delgado-Ceballos et al., 2012; Zailani et al., 2012). On one hand, firm's environmental management were found to be enhanced through external conditions such as changes in worldwide environmental trends and customer's pressure. It is known that external constituents including governments, legislators, regulatory forces, non-profit organisation, policy makers, environmental activist organisations and local communities have responded to environmental issues through pressure onto businesses. On the hand, some studies consider internal resource integration as the key aspect to firms level environmental management engagement (Inoue et al., 2013). Environmental management has also been predominantly viewed from an internal driven perspective (Menguc et al., 2010). Firms implementing environmental management are usually associated with internal resources originated from within the organisation including firm size, financial resources and organisational practices (Delgado-Ceballos et al., 2012).

Nevertheless, in most previous studies, these organisational factors were mainly tested using the regression logic which does not suggest on how the factors combined together can form sufficient conditions of high and low environmental management. This study argues that internal resource integration and external involvement factors cannot be only viewed from a symmetrical point of view (usually related to regression). Reality is, however, often characterised by asymmetrical among the observations (Schmitt et al., 2017). This is proven by the inconsistent and indefinite findings in the current literatures. For example, the debates on firm size effect as a factor that influence firms to practice environmental management has been inconclusive with one viewpoint arguing that large firms have better chances of high environmental management practices (e.g. Suryanto et al., 2018) while some scholars opposes this view (e.g. Darnall et al., 2010).

Responding to this, this study employs the fuzzy set qualitative comparative analysis (fsQCA) to resolve the issue of ambiguity by examining closely how configurations of internal resource integration and external involvement firm factors contribute to the high and low practice of environmental management. Furthermore, this study respond to the calls for research on combined effects of internally and externally driven factors (e.g. Melander, 2018; Menguc et al., 2010 and Oliver, 1991). Hence, this study seeks to focus on the combined effect of internal resource integration and external involvement factors towards various outcome level of environmental management practices. While conducting a systematic review on sustainable practices, De Medeiros et al. (2014) concludes that integration of internal and external factors are most important for enabling organisation's environmental competencies. This method has proven to help find the missing association (as a result of using traditional techniques) of subset entities between the independent and dependent conditions (Oyemomi et al., 2016; Eng and Woodside, 2012). Compared to the traditional methods, fsQCA does not assess the independent influence of factors on a particular outcome but rather analyses the pattern of the factors associated with the outcome. This means that a specific outcome can be produced through diverse ways (Kraus et al., 2018). In the context of environmental management, internal organisational factors and external involvement were mostly tested independently and mutually exclusive, hence, a better understanding of the determinants of both organisational factors together is needed (Gleim et al., 2019). Hence, our study aims to answer the following research question on how does configurations of organisational internal resource integration and external involvement factors affect levels of environmental management practices?

In this article, a model that links organisational factors was tested through different forms of causal configurations. This study builds on López-Gamero and Molina-Azorín, (2016) to argue that the unique characteristic of firm internal competencies and external pressures are important for determining the influence towards level of environmental management practices. Recent studies report the phenomena of environmental management among businesses (Tatoglu et al., 2014), but theory still fails to explain why and under which conditions do firms are being motivated to apply environmental management practices. From the early arguments, involvement of external involvement factors was known to be associated with firm's environmental management performance. However, little do we know about how these

factors configure with other organisational factors to influence firm environmental management practices (Cao and Chen, 2019).

The external variables grouped in our study focuses on global awareness on environmental issues and customer pressure whereas internal variable consist of size, centralisation and absorptive capability as critical antecedents to environmental management practice by firms. The fsQCA on a sample of 107 Malaysian manufacturing firms is used to identify distinct sets of causal configurations which are observed across cases.

This study provides contribution in many ways. First, the study offers a further empirical contribution by extending the fsQCA method into the sustainable management literature. Comparing to regression methodology which assumes symmetric inter-relationships, fsQCA's assumptions are based on asymmetric relationships where different combination of independent variables can reach the same outcome (Gast et al., 2018). This study advances the existing work on environmental management practice in manufacturing firms by offering a system that can reach the final state using different alternative paths (known as equifinality).

Second, the study provides new data on specific configurations of internal strengths and external conditions as causal conditions that yield high performance for environmental management practices among manufacturing firms. While previous studies have explored this domain, the simplistic narrative of linear relations between the internal/external factors and environment management has dominated the literature. Whereas, the causality in the research phenomenon can reach an outcome based on more than one cause (Kraus et al., 2018). Certain conditions are shown to be sufficient but does not necessarily causes an outcome (Woodside, 2011). Hence, this study provides the opportunity to detect relevant configurations of internal resource integration and external involvement factors that guarantees a high or low performance in the outcome condition (Henik, 2015). Furthermore, a new perspective brought in this study displays how different forms of internal and external factor configurations can reach the same final state.

Third, this study uses configuration theory and draw together expectations from the environmental management domain to set out new propositions about the

configurations of internal resource integration and external involvement factors and how these might contribute to high or low level of environmental management. Our findings contribute to theory by proposing that presence of global environmental awareness as the most vital factor to assure high environmental management while the absence of other internal or external factor can still result in high environmental management. The decision to invest in greater environmental efforts are risky and having trade-offs (e.g. money, time effort). Thus, this result provides useful insights for manufacturers to review the corporate agenda and only venture into environmental management during the existence of global awareness towards the environment.

Fourth, this study challenges the notion regarding the role of decentralisation in influencing environmental management. While most literatures agree to the importance of having a decentralised organisational structure (e.g. Baumgärtner et al., 2015; Terziovski and Guerrero, 2014; Russo and Fouts, 1997), the results found that configurations involving decentralisation can produce different outcomes. This study contributes by exhibiting that a decentralised organisational structure must supported by other internal resource integration and external involvement factors in order to produce positive outcomes on firm's environmental management practices.

4.2 Literature Review

The interest towards studies on antecedents of a firms environmental management has increased over the past years (e.g . Alt et al., 2015; Ateş et al., 2012; Buffa et al., 2018; Xie et al., 2016b) where most of the studies have focused on internal and external factors. Empirical studies have displayed that both internal and external factors positively affect the development of environmental management (Gleim et al., 2019). However, the approach used have mainly been independent and mutually exclusive. In this study, both internal resource integration and external involvement factors were explored from a configurative perspective.

Firms internal resource are important at enhancing and processing competency of the business (Nair and Prajogo, 2009). In most studies, environmental management has been viewed from an internal driven perspective where firm's internal resources are utilised to improve the voluntary and innovative activities of environmental management (Pinzone et al., 2015, Wang, 2017; Zhu et al., 2016). Firms internal

resources can be described through assorted capabilities (Kesidou and Demirel, 2012), structure (López-Gamero et al., 2016) and characteristics (Suryanto et al., 2018). This study includes three established internal factors that has been vastly used in the management domain but scarce within the environmental management literature. *Firm size* has been recognized as an important contingency factor (Fang et al., 2016). Although studies usually treat firm size as a control variable, it is a good measure for organisational power (Darnall et al., 2010). For instance, Lin et al. (2019) finds small firms to have higher innovation investment returns compared to larger-sized firms. *Decentralisation* relates to the participation of decision making and hierarchy of authority (Baumgärtner et al., 2015), It is considered as an important organisational design characteristic related to the strategies of environmental responsiveness (López-Gamero et al., 2016). A critical decision that a firm has to make is related to balance of control against adaptation (Alonso et al., 2008). In the context of environmental management, the decision on the level of decentralisation is important. Simply relying on a single decision-making structure can be harmful since the practice of environmental management is a risky investment as it is complex and long term (De Burgos-Jiménez et al., 2013; Hillary, 2004; Laufer, 2003). *Absorptive capability* which relates to recognising external knowledge and transforming it to commercial ends (Zhang et al., 2018; Cohen and Levinthal, 1990), is a necessary tool for generating environmental innovations (Pacheco et al., 2018). In some studies, authors have highlighted the need to emphasize on knowledge to improve environmental management practices (Gluch et al., 2009; Hashim et al., 2015). As such, absorptive capability is a sensational tool to understand mechanism and the variables related to the complex process of environmental management (Pacheco et al., 2018).

It is commonly known that external involvement does exist and beyond the control of any business entities. Studies have shown that external involvement helps to collect accurate demand and supply information essential for environmental management (Leal-Millán et al., 2016). Among the important external drivers of environmental management are triggered by awareness of stakeholders towards environmental issues (Gadenne et al., 2009) and customers with their product selection rights. In this study, we choose two external factors which are the environmental global awareness and the firms social ties with customers. *Environmental global awareness* is related to the pressures from businesses to include environmental practices in their

operation and production as a result of environmental awareness among consumers, government, policy makers, suppliers, financial institution and other stakeholders. In the literature, it argues that as more types of stakeholder's pressure on businesses to implement environmental management, the company will tend to increase their effort on environmental management (Zhu et al., 2016). In the presence of constant pressure from various types of stakeholders, business entities usually have very limited options but to follow the demands coming from them. Hence, with today's environmental situation, the role of environmental global awareness can be a strong predictor for firms' environmental practices. *Social ties with customers* are vital to create trust that could be leveraged to permit better environmental performance (Gualandris and Kalchschmidt, 2016). Customers relationship with business actors (employees or employers) are important at determining company sales (Wong et al., 2020). This finding has also been established in studies on environmental management where customers are adjusting their buying behaviour towards favouring products that undergo through an environmental friendly process (Yadav and Pathak, 2017). Hence, with customers nowadays having more pro-environmental values, the needs to create an excellent relationship with customers are needed more than ever.

4.2.1 Internal Resource Involvement

Studies on sustainable management literature have made every effort to explore factors driving firms to adopt environmental management practices (Vidal-Salazar et al., 2012). However, little attention has been given to understanding the involvement of internal resources as a factor in the development of environmental management strategies (e.g. Delgado-Ceballos et al., 2012; Menguc et al., 2010). According to Van Hemel and Cramer (2002), the internal stimuli for environmental productivity is more important than external stimuli. This study focuses on the importance of firm size, centralisation level and absorptive capability of a firm that drives environmental management initiatives from a configurative perspective. Organisational size plays an important role in determining whether resources and capabilities related to different firm size helps them to practice environmental management (Zhu et al., 2008). Previous studies have also proven that what works and is applied in large organisations may not be applicable to smaller firms (Chen and Hambrick, 1995). On the other hand, the next important aspect of a firm is the responsiveness towards environmental issues. In challenging and

competitive markets, the response rate of firms towards certain issues are vital. One of the indicators is a firm's level of centralisation. The prior research has found far-reaching implications for firms, resulting from various degrees of decision making authority (Martin et al., 2016). Nevertheless, this construct (centralisation level) has rarely been addressed in terms of its impact on environmental management.

Another important aspect of firms' environmental management strategy is the ability to acquire the technical advancement needed to implement the strategy. Absorptive capability describes firms' ability to recognise the value of new external information, assimilate it and apply it to commercial ends (Ferrerias-Méndez et al., 2016). Prior literature has asserted that adoption of environmental practices requires firms' capability to acquire, disseminate and utilise external knowledge (Tseng et al., 2011). An organisation's environmental management implementation is complicated, due to the two-fold compliance of helping to protect the natural environment and achieving competitive advantage. Hence, the knowledge base needed may not be present within a firm. The presence of absorptive capability helps firms to gain the required skills and processes needed to achieve successful environmental management implementation (Aboelmaged, 2018).

4.2.1.1 Firm Size as An Organisational Character That Leads to Environmental Management

There has been on-going debates on whether size of a business are considered for analysis of strategic and development options including environmental management practices (Buffa et al., 2018). This driver of environmental management has been widely analysed from perspectives of social and environmental disclosure (Gray et al., 2001). However, the literature of environmental management studies has never witnessed an establishment of a consistent relationship. Under this approach, there are two (2) opposing views on the relationship of size and environmental management.

It is argued that large firms are more socially responsive that could lead to stronger environmental responsiveness (Suryanto et al., 2018). According to Uhlaner et al. (2012), there are 2 typical arguments for this view. First, larger firms usually are more stable in terms of resources (e.g. finances) and exploiting economies of scale which makes them more likely to engage in environmental management activities.

Hence, they are more motivated and have more resources to be invested as an effort to legitimise their activities compared to small-sized businesses. Second, larger firms are more publicly exposed. Ortas et al. (2015) supported this notion that large-sized businesses usually attract more attention from the public which leads the firms to deploy more extensive environmental management practices to avoid and solve all possible conflicts. Any irresponsible behaviour could result in jeopardise their reputation and survival (Lynch-Wood et al., 2009).

On the other hand, several literatures argues that small sized firms are prone to adopt better environmental management (e.g. Darnall et al., 2010) or suggests that smaller firms implement the same extent of environmental management as larger firms (e.g. Ferenhof et al., 2014; Mokhtar et al., 2016). However, this study stands with the notion that environmental management practices involves large resource commitment (e.g. Ortas et al., 2015) where large firms are potentially capable of having access to better resource facilities compared to smaller firms. While each practice of environmental management have different enabling conditions due to different terms of complexity, accessibility and cost-wise (Buffa et al., 2018), it is believed that larger sized firms have the resource advantage, hence having higher level of environmental management practice.

4.2.1.2 Firm's Decentralisation Level and the Impact Towards Environmental Management

The centralisation-decentralisation dimension refers to the degree to which decision-making autonomy is dispersed or concentrated (Perez-Valls et al., 2016). A highly centralised firms decision-making takes place at upper managerial levels, with a limited decision-making authority granted to lower level employees. A lower level of centralisation is referred as a decentralised organisational structure tends to promote decision making authority to lower levels of the organisation (Martin et al., 2016). In the literature of environmental studies, scholars have found that environmental management practices requires firms to be flexible in terms of the structure and non-formalised (e.g. Perez-Valls et al., 2016; Russo and Fouts, 1997)

Applying to our context of study, firm's decision-making structure potentially facilitates changes which supports environmental goals of the firm (Aragón-Correa and

Sharma, 2003). According to López-Gamero et al. (2016), managing environmental issues successfully requires firms to have appropriate organisation structure that has decision making authority across different functional units. This is primarily due to environmental responsiveness involves joint effort involving all employees and units across the whole organisation (Miller, 1987). For firms that are newly engage in environmental strategy, providing discretion to employees is essential so that they can experiment in product and process modifications (López-Gamero et al., 2016).

Since prevention of negative environmental impact requires a high comprehensive and is a socially complex process, it requires the involvement of workers at various level and a forward-thinking managerial style (Russo and Fouts, 1997). If the decision-making authority is centralised, there is a possibility that the decisions are limited to top-management level employees and potentially made by personnel's that does not possess the relevant knowledge (Davis-Sramek et al., 2015) regarding environmental management, thus, restricting firm's environmental responsiveness. Moreover, centralised decision-making firms tend to limit employees with authority. This would limit opportunities for action if direct supervisors have less autonomy. In today's fierce global competition among firms to practice green approaches as a response from customer demands, firm's with delayed actions due to needs of a higher decision-making authority would weaken firms effort to implement environmental management (Baumgärtner et al., 2015). Thus, this study argues that when firms implement collaborative decision-making across different employee levels (centralised organisational structure), faster response time can be hampered to produce greater disposition towards higher level practice of environmental management.

4.2.1.3 Information Gained from Firm's Absorptive Capability and Influence Towards Environmental Management

Absorptive capability is defined as the ability to recognize the value of new external information, and to assimilate and apply the information to commercial ends (Cohen and Levinthal, 1990). Absorptive capability is an important element for manufacturing firms to remain successful if they maintain their absorptive capability (Harrington and Guimaraes, 2005).

According to Xie et al. (2016), environmental management and absorptive capability are related. This is supported by prior literature that has asserted the adoption of environmental management practices in manufacturing industries with the firm's capability to acquire and disseminate external knowledge (Tseng et al., 2011). For example, having absorptive capability were found to enhance green supply chain collaborative innovation (Hong et al., 2019) and green innovation (Albort-Morant et al., 2018). They demonstrated that firms with strong environmental practices usually engage with external information regarding issues of pollution impact, waste management, clean energy and other environmental related outcomes which are related combined with existing internal knowledge to facilitate the integration green innovation practices into routine activities. During the process, the firm combines its distinctive skills with the competencies of other actors of the network (Carlsson, 2001) According to Ben Arfi et al. (2018), leaders skills and ability to gain access to both internal and external knowledge sources are the key success to environmental innovation. He further explained that having external knowledge can be an advantage through transformation into internal skills. These external knowledge can be acquired through variety of sources such as spill overs, contractual agreements, joint ventures and alliances (Dunlap et al., 2016).

On the other hand, the absence of early investment in acquiring absorptive capability often makes it more costly to explore future opportunities (Cohen and Levinthal, 1990). Due to lack in absorptive capability, firms may also not recognise the opportunities due to failure of inter-functional coordination role in assimilating and applying knowledge from the market and therefore not appreciate them (Najafi-Tavani et al., 2016). Compounding this effect, a low investment in absorptive capability also reduces the attractiveness to invest in environmental management. Hence, based on these arguments, this study believes that absorptive capability is part of internal organisational traits that contributes towards the increase in firm's environmental management activities.

4.2.2 Organisational External Involvement

Besides internal resources, involvement with external factors must be considered as antecedents driving environmental management activities (Gleim et al., 2019). When there are social and institutional pressures such as new government regulations (Dubey

et al., 2015) and consumer sensitivity (Zhang et al., 2019) towards environmental matters, firms will therefore be influenced to adopt environmental management to protect their social legitimacy and reputation. This study focuses on the external elements of global awareness on environment and sustainability issues and customer pressure as an impact on firms' influence to practice environmental management. Environmental concerns are usually triggered by external pressure. At the global level, corporations that do not practice environmental management are said to be less competitive in the global economy of the 21st century due to growing demand from stakeholders (Wong et al., 2012; Berry and Rondinelli, 1998). Customers are among stakeholders that are environmentally sensitive (Leonidou et al., 2015). Under the intensified competitive conditions, customers have the power to switch from one firm to another, if it is seen as being more environmentally friendly. Hence, customer satisfaction towards firms' environmental effort can be an important aspect to consider.

4.2.2.1 Role of Firm's Global Awareness on Environment and Sustainability Issues Towards Environmental Management

The last few decades have been marked by increase in environmental concern on sustainability issues globally (Delmas and Montes-Sancho, 2011). This has led organisations to realise the increasing amount of business risks due to environmental pressures (Hsu, 2013). Manufacturing operators are traditionally known to have a high negative impact on the natural environment (López-Gamero et al., 2016). Since business operations are among the leading causes of negative environmental impacts, firms are pressured by several parties of stakeholders, policymakers and government institutions to address environmental issues (Aravind and Christmann, 2011). Coercive and mandatory regulations were able to motivate firms into environmental efforts due to heavy fines, penalties or taxes being imposed for businesses that fail to comply (Zhu et al., 2016). This is supported by Delmas and Montes-Sancho (2011) that finds the government as the driving force for environmental management initiatives. Furthermore, Wan et al. (2018) finds that high policy intensity is a cause for the spread of green behaviours. Dubey et al., (2015) and Oliver (1991) states that external influence coming from institutional pressures are drivers factored into company's decision. In the case of environmental management, these institutional pressures would force firm's to adjust their environmental strategic planning by reallocating their

resources (Chang and Chen, 2013; Sharma et al., 1999). Though, it is not necessary for firms to undertake environmental practices, it is important for businesses to take advantage of green opportunities in this environmental era (Chang and Chen, 2012). For example, Body Shop are among the leading brands that took advantage of the changing demands in environmental consumerism since few decades ago by integrating green processes as part of the strategic planning helping companies to seize environmental opportunities.

On the other hand, different business entities tend to be aware of environmental and sustainable issues at different level, and thus implement environmental management practices differently (Zhu et al., 2017). With less strictness and less concern among certain firms about sustainable development, they are less likely to be engaged heavily with environmental management activities (Lau and Wang, 2009). Firms that lack awareness to engage with sustainable practices is usually due to having the thoughts that environmental consequences are less relevant as compared to other strategic approaches. Hence, it is believed that the global awareness has resulted in government agencies, non-profit organisations and business stakeholders to pressure firms to implement sustainable practices.

4.2.2.2 Social Ties of Firm Actors with Customers and the Impact on Environmental Management

Understanding customers has been the main issue of numerous studies over the last few decades (Taufique and Vaithianathan, 2018). Customers are known as the most powerful stakeholder for a business and in the market mechanism that has one of the closest relationship with management, operational and production of enterprises where their concern for environmental protection are among the main sources of market pressure (Cao and Chen, 2019). This is due to customers behaviour on products or services from perception and awareness will directly impact company sales (Wong et al., 2020). Customers that are close to firms employees will entail social closeness that is bonded through trust (Presutti et al., 2019). With the issues on green consumerism being resurfaced (Chekima et al., 2016), it has attracted customers to pressure actors of business entities (e.g. employees) to offer products that are produced with less negative impact towards the natural environment. Customers attitude has been influenced towards environmentally friendly approaches where increasing demands have been

seen towards organic food produces (Basha and Lal, 2019), products with environmentally friendly characters (Zhang et al., 2019), eco-labelled products (Vanclay et al., 2011) and carbon-labelled/low carbon emission products (Wong et al., 2020).

The extant literature has confirmed that social ties are related to benefits of both parties. For example, Engelberg et al. (2012) demonstrated that firms' close relationship with suppliers have led to favourable lending terms and increase in credit ratings. Customers seek social ties with business owners or workers creating knowledge spillovers between both parties (Bönte, 2008). As a customer to a business, they will take advantage of expressing their demands and concerns towards certain needs. The closer they are to the employee or employer of the business, the higher tendency of sharing and exchanging information. In this context, being a business entity, the growing concerns among customers towards environmental friendly products and services must be addressed and cannot be underestimated (Clement et al., 2017).

Researchers have documented the tendency for businesses to react based on relationship with their stakeholders (e.g. Ozer and Zhang, 2015). According to the hierarchy of the effect model, customers attitude towards a product will influence their decision to purchase (Lavidge and Steiner, 1961). In most cases, customers tend to reflect themselves and respond to their surrounding created by their cultural context that they experience (Chekima et al., 2016). If the man-nature orientation among customers is associated with more concern towards environmental values, they are most likely to purchase products with sustainable features (product and/or process) and communicate with business owners or employees whom they are most socially close with, leading businesses to be more pressured to engage in sustainable activities.

In contrast, if customers have a weak relationship with business owners or employees, less communication are expected. Hence, knowledge sharing activities are unlikely to take place. Less favourable attitude towards environmentally conscious consumption decisions among customers will lead business entities to unlikely justify the relevance of environmental management practices (Biswas and Roy, 2015). Even in customers with high environmental concerns, the message will not convey if no communications take place between them and business owners or employees. Thus, this

study predicts that strong social ties between firm actors and customers can lead to high environmental management practices.

4.3 Methodology

4.3.1 Sample and Data Collection

The sampling process was conducted among small to medium size manufacturers in Malaysia. Since the funding for this study was from the Malaysian's Ministry of Higher Education, they have requested the sampling to be conducted in Malaysia. The selection of Malaysia as the country of study is due to the manufacturing organisations in this developing country is in the phase of growth where environmental management trends have evolved over the recent years (Ogbeibu et al., 2019). Furthermore, this chosen location suits with the context of the study since manufacturing firms in Malaysia have started to change their activities by implementing environmental management (Ogbeibu et al., 2019). A quantitative approach was adopted in order to address the objective of this study. A questionnaire on organisational traits and environmental management yielded the data for this study. Participants responded via online questionnaire which was sent to the email of the participant. The full list of respondents came from a database (Federation of Malaysian Manufacturers) containing contact details for all manufacturing companies registered in Malaysia. In general belief, environmental problems are related to the poorly regulated of manufacturing activities (Chandra Shukla et al., 2009).

Prior to the survey, a pilot test was conducted where the questionnaire was sent to three manufacturers in Malaysia. The questionnaire was amended and later sent to two other manufacturers. They had no difficulty answering any other survey items; hence the questionnaire was proceeded for the census survey. The full survey was conducted in Malaysia from August 2016 and December 2016. Information was available for 2,700 manufacturing companies in Malaysia from the directory of Federation of Malaysian Manufacturers. The companies were contacted through phone before sending the questionnaire upon agreement of the respondent. Two trained interviewers were recruited to handle with the phone calls in order to ensure that the respondents have clarity on how to respond to the questionnaire. This included explaining the research objective, the content of the online questionnaire and

confirming the names and position of the potential respondent. Besides that, certain details about the company were asked including number of workers, annual revenue and years of operation. To obtain better response rate, follow-up steps were taken. Of these 2,700, only 107 responded to the questionnaire, representing a 3.96% response rate.

To reduce sampling bias, this study took certain measures. Non-response bias issues were tested by comparing non-completed questionnaires with completed questionnaires to check for mean differences. Based on the results of the paired sample t-test, there were no significant difference between both data thus showing that there are no issues with non-response bias. Two steps were also taken to avoid common method bias. First, the data was gathered from more than one information source. Second, respondents are notified about a guaranteed anonymity towards their responses.

4.3.2 Measures

This study developed multi-item reflective measures using constructs adapted in previous studies and modified the items to fit in with our context. Only the variable of environmental management is newly developed and never used in any other previous studies. All variables were measured on a 7-point Likert-type scale from 1 (strongly disagree) to 7 (strongly agree).

The measure of *environmental management* in the current study uses the firm primary activities from Porter's value chain. Instead of the using specific activities as items to measure environmental management (e.g. Chan and Ma, 2016; Trumpp et al., 2013), this study uses a cross-functional activity scale. This ensures that all aspects of the firm activities are covered. Respondents were to rate the practice of environmental management in the activities of inbound logistics, operations, outbound logistics, marketing and sales and services.

The internal resources consist of three factors. *Absorptive capability* was measured using a four items which were adapted from García-Morales et al. (2008). This factor measures the firm's ability to recognise new external opportunities and knowledge to undertake internal transformation. Since external knowledge is an important element to guide firms towards strategic directions, absorptive capability has the potential to gather external knowledge in establishing organisational practices that

respects environmental interests (Pacheco et al., 2018). *Decentralisation* was measured by the extent to which employees had control of decision-making authority. The centralisation dimension is the measured at firm levels relating the right of decision-making in organisations (Shafiee et al., 2016). This five-item was originally developed by Hage and Aiken (1967) and later on adapted by Baumgärtner et al. (2015). Researchers have suggested that firms looking for better distribution of firm performance must pay attention to the centralisation system of a firm (Martin et al., 2016; Caruana et al., 2002). *Firm size* was measured by the firm's number of full time and part-time employees. Numerous studies involving antecedents of environmental management has included firm size as one of the determinants (e.g. Bowen, 2002; Darnall et al., 2010). Compared to other studies which groups the number of employees (e.g. Reyes-Rodríguez et al., 2016), this studies chooses to remain the number of employees as a count variable. Hence, natural logarithm of employees had to be used due to the potential skewed distribution (Darnall et al., 2010).

This study considered two constructs to represent firm's external involvement. *customers social ties* was adapted from Rindfleisch and Moorman, (2001). This three-item scale captures the extent to which firm workers or owner have good connection with various customer. This measure was used to replace the traditional method of "frequency of contact" to measure the strength of social ties which only reflects opportunities compared to the rather motivation. In our context of study, the adapted to our context of study which focuses more towards the social relationship between customers and the business actors (employees or employers). *Environmental global awareness* measures the extent to which the global market responds to environmental awareness issues. Since this construct proposes a new concept of environmental awareness, there were no existing scales that could be adopted. This 4-item scale was adapted from Jansen et al. (2006) and rephrased to suit with our context.

4.3.3 The fsQCA Method

This study adopted a configurational approach using fsQCA. This method has gained substantial attention from scholars in management, innovation, and entrepreneurship (Seny Kan et al., 2016; Kraus et al., 2018; Douglas et al., 2020). It is based on a set-theoretical approach where each case is conceptualised as a set consisting of different combinations of conditions (Rihoux et al., 2012; Ragin, 2008). In contrast to traditional

inferential statistics that assess the extent of relationship (e.g., the net effects) between two variables, the fsQCA method is designed to reveal the configurations or combinations of conditions that lead to the occurrence of an outcome (Schneider and Wagemann, 2012). That is, the fsQCA method examines the individual conditions holistically, whereas traditional inferential statistics tend to examine the individual variables in isolation.

The fsQCA method is ideal to address our research questions because it can deal with potential causal complexity concerning causal conjunction, equifinality, and asymmetry (Rihoux et al., 2012; Ragin, 2008). First, fsQCA can uncover potential causal conjunction, meaning the outcome is resulted from a combination of different conditions work together. It can shed light on whether the different internal and external organisational factors might work together to influence firms' extent of environmental management. To illustrate, firms might need to complement the environmental global awareness with resource availability, which is captured through the proxy of firm size, to implement environmental management.

Second, the fsQCA method can capture potential causal equifinality, meaning the same outcome might be produced in different ways (Ragin, 2008; Schneider and Wagemann, 2012). Firms tend to differ in their capabilities, structure, and resources, among others, implying different initial conditions. The fsQCA method can provide insights on how firms from the different initial conditions may reach the same outcome (e.g., environmental management) through distinct paths (Schneider and Wagemann, 2012). Third, it can also reveal potential causal asymmetry, meaning conditions leading to an outcome (e.g., environmental management) in one configuration might not be inversely related to another configuration that lead to the absence of the same outcome. For example, while absorptive capability might contribute to environmental management, it is likely that the lack of such capability might not necessarily lead to the absence of environmental management

4.4 Analyses and Results

The first step in fsQCA is to calibrate the data for the different variables into fuzzy-set membership scores. A fuzzy-set membership score of 0 implies full non-membership or fully out, a score of 0.5 represents the cross-over point, and a score of 1 indicates full

membership or fully in (Ragin, 2008). Following best practice in fsQCA research (Hudson and Kühner, 2013, the mean value of all variables were set except for firm size as the cross-over point, a value with one standard deviation below the mean as full non-membership, and a value with one standard deviation above the mean as full membership. Based on these three anchoring points, this study used the direct calibration method using fsQCA 3.0 software for data calibration. For firm size, the anchoring points of 49 and 250 were used to represent full non-membership and full membership, and the middle point between them (i.e., 150) to represent the cross-over point. It should be noted that the software excludes cases with a fuzzy-set membership score of 0.5. In line previous fsQCA research (Fiss, 2011), 0.001 was added to cases with a membership score of 0.5 to ensure all cases are included in the data analysis. The data calibration thresholds and correlations of the conditions are shown in Table 4.1.

Table 4.1 Calibration thresholds and correlations of the conditions

	Conditions	Fully out	Cross-over point	Fully in	1	2	3	4	5	6
1	Absorptive capability	4.01	5.20	6.38	1					
2	Decentralisation	1.14	2.40	3.66	0.09	1				
3	Firm size	49.00	150.00	250.00	0.08	0.11	1			
4	Consumer social ties	4.24	5.31	6.39	.31**	-0.07	0.07	1		
5	Environmental global awareness	3.34	4.54	5.75	.50**	0.16	.25**	.38*	1	
6	Environmental management	1.60	3.69	5.79	.20*	0.15	0.15	.19*	.38**	1

Number = 107, * p < 0.05 ** p < 0.01 (2-tailed)

4.4.1 Analysis of Necessity

After the data calibration, analysis of necessity was conducted to assess whether any of the individual causal conditions (i.e., absorptive capacity, decentralisation, firm size, consumer social tie, and environmental global awareness) is a necessary condition for the presence of high environmental management, Table 4.2 shows the results from necessity analysis including both the presence and absence (~) of all individual

conditions. Previous research suggests a consistency threshold of equal or above 0.8 to establish the causal necessity of a condition (Ragin, 2008). As shown in the table, all consistency scores for the presence or absence of individual conditions were below the threshold of 0.8. As such, none of the causal condition is a necessary condition for the presence of high environmental management.

Table 4.2 Analysis of necessary conditions for high environmental management

Conditions	Consistency	Coverage
Absorptive capacity	0.65	0.66
~Absorptive capacity	0.48	0.55
Decentralisation	0.57	0.65
~Decentralisation	0.54	0.55
Firm size	0.53	0.66
~Firm size	0.60	0.57
Consumer social tie	0.68	0.67
~Consumer social tie	0.45	0.52
Environmental global awareness	0.70	0.71
~ Environmental global awareness	0.43	0.49

Note: ~ indicates the absence of the condition

4.4.2 Analysis of Sufficiency

The analysis of sufficiency was conducted to identify the combinations or configurations of causal conditions that are sufficient to produce the presence or absence of high environmental management. The sufficiency analysis was performed using a truth table consisting of 32 possible configurations, calculated as 2^5 where 5 equals to the number of causal conditions included in the study. This study applied a frequency threshold of 2.0. The frequency threshold leads to 95% of cases in the sample are used in the analysis. The proportion of cases retained is much higher than the 80% recommended by Ragin (2008). In the next step, a consistency threshold of equal or above 0.8 was applied to identify the configurations that are sufficient to produce the outcome, namely the presence or absence of environmental management (Ragin, 2008; Greckhamer, 2016; Afonso et al., 2018). The fsQCA software then derives three solutions: intermediate, parsimonious, and complex solution based on how configurations with no empirical cases (logical remainders) are dealt with in the analysis

(Ragin, 2008). The results were reported based on complex solution because logical remainders are not included in the analysis.

Table 4.3 shows the results from sufficiency analysis for configurations that are sufficient to produce the presence or absence of high environmental management. The results uncover four configurations (A1 to A4) for the presence of high environmental management. The overall solution consistency, refers to the extent to which the configurations are consistent in leading to the outcome, is 0.81, above the threshold of 0.75 (Ragin, 2008). The overall solution coverage is 0.45, indicating substantial proportion of the outcome are explained by the four configurations (Schneider and Wagemann, 2012). Furthermore, the results show four configurations (B1 to B4) that are sufficient for the absence of high environmental management. The overall solution consistency is also above the threshold of 0.75 with an overall solution coverage of 0.55. The configurations A1 to A4 are all distinct from configurations B1 to B4, suggesting no contradictory findings in our results (Ragin, 2008).

Table 4.3 Configurations for presence/absence of high environmental management

Causal Conditions	Presence of high environmental management				Absence of high environmental management			
	A1	A2	A3	A4	B1	B2	B3	B4
<i>Internal factor</i>								
- Absorptive capability	○	●	○	●		○	○	○
- Decentralisation	●		○	●		○	○	●
- Firm size	○	○	●	●	○	○	○	
<i>External factor</i>								
- Consumer social ties		●	●	○	○		○	○
- Environmental global awareness	●	●	●	●	○	○		○
Consistency	0.79	0.82	0.81	0.86	0.80	0.86	0.86	0.78
Raw coverage	0.18	0.28	0.10	0.15	0.42	0.35	0.31	0.22
Unique coverage	0.06	0.15	0.03	0.06	0.08	0.06	0.02	0.05
Overall solution consistency	0.81				0.78			
Overall solution coverage	0.45				0.55			

Note: ● (○) represents the presence (absence) of the condition

4.5 Discussion

This study empirically tests the contribution of internal and external organisational traits on environmental management. With the accelerated environmental deterioration worldwide and the increasing awareness of environmental issues in the society, environmental management is becoming increasingly important for individual organisations across the globe (Hong et al., 2019). However, previous research has explored the antecedents of environmental management (e.g. Buffa et al., 2018; Perez-Valls et al., 2016; Xie et al., 2016a), but rarely studies these connection from a configural perspective. This research employs a reliable analysis tool of fsQCA which uses combinations of conditions that explains occurrence of a certain outcome (Schneider and Wagemann, 2012).

For configurations that are sufficient to produce the presence of high environmental management, configuration A1 implies that a decentralisation structure in combination with environmental global awareness is sufficient for high environmental management when absorptive capability and firm size are absent; consumer social ties is irrelevant in this configuration. Configuration A2 suggests that the joint presence of absorptive capability, consumer social ties, and environmental global awareness can produce high environmental management when firm size is absent; the decentralisation structure is irrelevant in this configuration. Configuration A3 indicates that the presence of firm size, consumer social ties, and environmental global awareness are sufficient for high environmental management when both absorptive capability and decentralisation structure are absent. Finally, configuration A4 demonstrates that the joint presence of all conditions except for absent consumer social times can lead to high environmental management.

For configurations that are sufficient to produce the absence of high environmental management, configuration B1 suggests that the joint absence of firm size, consumer social ties, and environmental global awareness can lead to the absence of high environmental management, where absorptive capability and decentralisation structure are irrelevant in this configuration. Configuration B2 implies that the joint absence of all conditions, except for consumer social ties, can lead to the same outcome. Configuration B3 indicates that the joint absence of all conditions, except for environmental global awareness, can produce the same result. Finally, configuration B4

implies that the presence of decentralisation structure combined with absent absorptive capability, consumer social ties, and environmental global awareness can lead to the absence of high environmental management, where firm size is irrelevant in this configuration.

Furthermore, various findings were found in this study. First, the dominant factor that appeared is global awareness towards the environment where any configurations of high environmental management requires the presence of this specific antecedent (Configuration A1, A2, A3, A4). A reason for that might be the fact that without the noticeable phenomena and growing concerns of environmental issues around the world, business entities would not be aware about the needs to practice environmental management in their daily operation (Sivamoorthy et al., 2013). According to Ajzen and Fishbein (1980), planned behaviour is influenced by the beliefs and attitude. Worldwide, the issue of environmental disruption is a global interest, hence customers and clients are expecting for businesses to respond through conduct of operations with consideration towards the impact on natural environment. This finding indirectly highlights involvement of external pressure is a vital component to ensure the practice of high environmental management.

Second, analysis of other necessary conditions (Configuration A4) shows that weak customers social ties may provide a significant negative impact and needs to be supported by strong internal resources of absorptive capability, decentralisation and firm size in order to achieve high practice of environmental management. Powerful ties with customers are essential to business success. According to Biswas and Roy, (2015), customers price and knowledge perceptions are important factors motivating them to purchase environmental related products or services. Hence, the importance of maintaining a close relationship between business actors and customers can be proposed. In our context of study, customers are important sources of information about type of strategy that needs to be implemented and also the method to deliver the strategy in an effective manner.

Third, each internal resource can be equally important. The extant literature has endorsed the importance of internally driver perspective of environmental management (Menguc et al., 2010). Referring to configuration A1, A2 and A3 from Table 4.3 each factor is independent and does not rely on each other to support external involvement

in ensuring configuration of high environmental practices. All these three internal resources (Absorptive capability, decentralisation and firm size) have been tested in previous research and shown that they have positive direct influences towards environmental management (e.g. López-Gamero et al., 2016; Uhlener et al., 2012; Aboelmaged and Hashem, 2019). Nevertheless., the integration of these three internal resources can also produce high environmental management (configuration A4). Hence, our results prove that the existence of these resources produce benefit towards firms' environmental practices and the absence of them will bring prevent the firms from achieving strong environmental practices in the firm. The results also show that each of strong environmental management are configured by presence of both internal resources and external involvement.

4.5.1 Contributions and Limitations

This study empirically tests the contribution of internal resource integration and external involvement factors on environmental management through the application of a research method uncommon (fsQCA) for this domain. Overall, we believe that fsQCA offers more than just a “fancy” methodology (Kraus et al., 2018). This approach helps in decision-making logic providing fresh insights in this domain of environmental management. Although early empirical studies have been utilising multiple regression analysis, it might not be the best method in investigating decision-making logics because it only proves the presence of monotonically increasing and decreasing relationships between two constructs (Stroe et al., 2018). The method of fsQCA is convenient for analysing small samples, making it a reliable analysis tool for this study (107 cases). The use of this method provides a more holistic approach of the understanding the phenomena under the analysis as well as complementing findings of Menguc et al. (2010). Specifically, the result in configuration A4 (Table 4.3) confirms the findings of López-Gamero and Molina-Azorín (2016) in identifying a positive relation between organisational factors internal and external towards environmental management. This result along with configuration B1-B4 concludes that presence firm's internal resource integration and external involvement factors are important predictors of environmental management level.

Second, the findings also add to the growing literature on environmental management. It responds to calls in the management journals for additional research

using configurational methods rather than net effect methods (Aragón-Correa and Sharma, 2003; Bansal and Corley, 2011; Schmitt et al., 2017). The social science problems can be related to certain cases where causal statements are not necessarily sufficient to explain the occurrence of a dependent variable (Hughes et al., 2018). Furthermore, regression methods are limited to the presence of “monotonically increasing and decreasing relationships between two variables” which does not capture all features of the reality (Stroe et al., 2018). To end this, fsQCA establishes configuration sets of causal condition and an outcome. Instead of focusing on a single condition for explaining factors that lead to a particular outcome, fsQCA focuses on several combinations of conditions (Bell et al., 2014). Thus, these findings offer evidence and potential causes for inconsistent level of environmental management practiced by firms using a method that connects a qualitative and quantitative approach.

Third, at a surface examination, the result in configuration B4 (Table 4.3) may seem paradoxical. In configurations for presence of high environmental management, a decentralisation organisational structures are seen to be an important contributing factor. In contrast, having a decentralised structure alone without other support from internal or external factors can lead to the decline in practice of environmental management. However, the underlying rationale of the finding is related to the characteristic of a decentralised decision-making structure where decisions are made “locally” at functional level. This leads to the risk of unintended consequences due to the decisions which are made based on interest of each functional group and may not have awareness between these groups (Davis-Sramek et al., 2015). Naturally, decentralised firms fit for having rational response to rapid and inconsistent changes (Hage and Aiken, 1967). Hence, in absence of strong external pressure to practice environmental management, firms with decentralised structures are most likely to focus on other strategies and provide less focus on any strategies related to environmental management.

This paper also offers insights from a practical perspective. First, this study showcases that firms with high environmental management is supported by strong firm’s internal resource integration and external involvement factors. While external involvement apparently outweighs the importance of internal resources, the presence of each internal factor (absorptive capability, decentralisation and firm size) hold equal

importance to ensure high environmental management in firms. Previous literature confirms these findings where Gonzalez-Benito and Gonzalez-Benito (2005) associates large firms with flexibility of resource allocation, thus motivating firms to practice higher environmental management. Furthermore, since environmental responsiveness requires joint effort involving all employees and units in a firm, distribution of power and the capacity of decision-making authority is an important mechanism to ensure improvement of environmental proactivity (Perez-Valls et al., 2016). Decentralised organisations are also associated with broad participation in decision-making thus providing greater predisposition towards high environmental management practice (López-Gamero et al., 2016). Aboelmaged and Hashem (2019) argued that existence of strong absorptive capability will complement firms existing knowledge to ensure success of environmental practices. In configuration A1, A2 and A3 (Table 4.3), it displays that each internal factor is independent in presence of external factors. Hence, in firms that wishes to practice high environmental management, having a strong presence of any internal resources can be sufficient.

Second, environmental global awareness is the most important factor in configurations to achieve high environmental management compared to other factors. Several companies such as 3M and Bodyshop have responded to environmental demands though integration of green concepts into their routine activities and had succeeded this corporate performance (Chang and Chen, 2013). Without the awareness of environmental issues, it would be meaningless if firms focused to invest heavily in applying environmental concepts to their business. In practice, strategic orientation requires a rigor process. Thus, it concludes that firm's strategic choice to practice environmental management has to be driven by strong external factors and demands.

This study has certain limitations. First, we have the issue of single respondents. However, we believe that the results were not affected by this issue since the respondents were chosen from managerial level personnel's who are knowledgeable about their organisation and their environmental management initiatives. Second, the sample consist of manufacturing firms in Malaysia. Further research is needed to replicate this study using different geographical and industry samples. Third, our study only includes certain internal and external factors. It would be interesting if future

research on antecedents of environmental management could explore other firm-level constructs that have not been used in this study.

4.5.2 Conclusion

Given scholars' and practitioners' widespread interest in environmental efforts in business entities, our aim was to study firm-level determinants of environmental management using a configurational method. This study builds on previous research that shows external and internal factors as contributing factors towards environmental management (López-Gamero and Molina-Azorín, 2016; Menguc et al., 2010; Dangelico et al., 2017).

This study further seeks on how configuration of firm's internal resource integration and external involvement factors influences environmental management. Our results suggest that, the most important factor to achieve high environmental management is the presence of environmental global awareness. Nevertheless, to achieve high environmental management, presence of other internal and external factors is also needed. This study also shows that absence of both firm's internal resource integration and external involvement factors prevents firms from having a high environmental management.

CHAPTER 5: STUDY 4 - ENVIRONMENTAL MANAGEMENT AND PRODUCT INNOVATION: THE MODERATING ROLE OF THE DYNAMIC CAPABILITY OF SMALL TO MEDIUM MANUFACTURING FIRMS

Authors

Muaz Mahmud, Danny Soetanto, Sarah Jack

Abstract

Given the overwhelming concerns on environmental issues, our study attempts to investigate the important role of environmental management practice in the context of product exploration and product exploitation. Additionally, we examine the moderating effect of transformative capability and absorptive capability on the relationship between environmental management and product exploration and exploitation. Based on a survey of 106 managerial-level employees from small to medium manufacturing firms in the United Kingdom (UK), this study found that environmental management practice has a positive direct effect on product exploitation and product exploration. The study also found that (1) transformative capability positively influences the relationship between environmental management and product exploration; (2) absorptive capability negatively influences the relationship between environmental management and product exploitation. From this study, we offer novel insights that extend the existing literature concerning the outcomes of environmental management within the context of product exploration and product exploitation.

5.1 Introduction

This study aims to extend the understanding about the relationship between environmental management and product innovation in the context of small to medium manufacturing firms. While there have been sporadic efforts to address these issues, environmental management and product innovation have their own research streams and the knowledge in both have been developed separately (De Medeiros et al., 2014). Though some studies (e.g. Maletič et al., 2016; 2018) have recently attempted to create a linkage between these two streams of research, studies have tended to remain at a conceptual level; hence the need for more empirical evidence to unify the current understanding from studies focusing on environmental management and product innovation.

As a response to the research gap on the role of environmental management, this study addresses the following research questions: How does environmental management impact on product innovation? And, what effect does dynamic capability have on the relationship between practising environmental management and product innovation? These research questions are derived from the inherent conundrum associated with the need to respond to the current awareness concerning sustainability, at the same time as overcoming a challenge to introduce environmental management as a part of the product development process (Aragón-Correa and Sharma, 2003; Triguero et al., 2013). More specifically, this study is a response to the recent call (e.g. Boiral et al., 2018; Maletič et al., 2016; 2018) for studying the practice of environmental management in a small firm context. The implementation of environmental management is a challenge for small firms as they have limited access to resources and are bounded to their local context (Bromiley and Rau, 2016). Considering the limitations on small firms, this study argues that the success of introducing environmental management into product innovation is contingent on the capability to dynamically integrate, build and reconfigure internal and external resources to address rapidly changing environments (Aboelmaged and Hashem, 2019; Ferreras-Méndez et al., 2016; Gebauer et al., 2012; Teece et al., 1997).

Using a survey conducted among 106 managerial-level employees from small to medium manufacturing firms in the UK, this study intends to make several contributions. *First*, it provides insights into the practice of environmental management

in the context of small to medium manufacturing firms. Small firms are important and considered to be the cornerstone of sustainable development (Blackman, 2006), representing around ninety-nine percent of all enterprises (Van Hoof and Lyon, 2013). While previous literature has investigated the practice of large firms, only a few have focused on small to medium manufacturing firms, creating a paucity in understanding about the interaction among environmental management, innovation and the dynamic capability of small firms. *Second*, following recent calls (e.g. Boiral et al., 2018; Maletič et al., 2016; 2018; Ogbeibu et al., 2019; Ambec and Lanoie, 2008), this study examines the impact of environmental management on small firms' innovation activities. To be more specific, we advance current and existing works by focusing on the role of dynamic capability in moderating the relationship between environmental management and product innovation. This effort is an extension of the emerging debate in the literature on environmental management and innovation initiated by several scholars such as Maletič et al. (2016; 2018) and Ogbeibu et al. (2019). *Third*, this study helps advance both practice and research. From a practice perspective, it provides insights for small firm managers about environmental management practice, producing competitive advantage, and developing environmentally friendly products. From a research perspective, it seeks to advance the theoretical linkages between environmental management and innovation management. The study also provides underpinnings for further exploration regarding the role of dynamic capability in supporting the efforts of small firms in addressing sustainability and environmental issues.

The paper is organised as follows. We start by discussing the definition and theoretical background. Next, we hypothesize about the impact of environmental management on product innovation and the role of dynamic capability in moderating the relationship between the two. The following section is concerned with methodological aspects of the empirical study, including data collection, measurement issues and method of analysis. Descriptive results and modelling results are presented and discussed next. The paper closes with a conclusion, implications and limitations.

5.2 Theoretical Background

5.2.1 Defining Environmental Management and Product Innovation

The cleaner production literature shows that environmental management is a structured and systematic approach for managing and measuring organisational environmental impacts (Xie, Zang, et al., 2016). In this study, environmental management practices are defined as actions taken by organisations, including formal standards and common practices, aimed at reducing the negative impact on the natural environment. The activities involve multiple functional units across the firm, namely logistics, operations, marketing and services. In the past, environmental management has naturally been applied during production processes (Prajogo et al., 2014; Albino et al., 2012), but it has been extended to other processes such as marketing and new product development. It involves the creation of new routines as well as re-alignment with existing operational routines aimed at reducing the impact on the natural environment (Diwekar and Shastri, 2010). The benefits from implementing environmental management have been discussed in previous studies and include new business opportunities (Montabon et al., 2007), an increase in financial performance (O'Donohue and Torugsa, 2016) and a decrease in negative environmental impacts (Ateş et al., 2012; Molina-Azorín et al., 2009).

Due to the rise in popularity of environmental management, more businesses are aware of environmental consequences during the product development process (Chen, 2011); consumers are more prone to purchase products that consider the environment and sustainability (Makower, 2009) and are more willing to pay a premium price in supporting sustainable efforts (Chen and Chang, 2012). While the common arguments suggest that firms need to create products with core attributes that satisfy customer's needs, there has been a rise in demand for products with eco-friendly benefits (Zhang et al., 2015) and especially those which have a less negative impact on the environment (Beylot et al., 2019). This situation has encouraged firms to integrate an environmental philosophy with product innovation, the aim being to prevent production waste while increasing efficiencies.

As there has been increased attention toward assimilating environmental management into innovation activity, especially during new product development, this

study responds to that call by examining two types of product innovation activities, namely *product exploration* and *product exploitation* (Chan et al., 2016; Severo et al., 2017; Voss et al., 2008). *Product exploration* is defined as the extent to which firms introduce new products to meet emerging customers' demand, meet new market potential or promote the introduction of new technology in products or services. In contrast *Product exploitation* is the extent to which firms emphasize incremental innovation of products and designs to meet the needs of existing customers (Jansen et al., 2006). The effort is to expand, refine or improve the existing offering. While early studies have argued that balancing these two activities is difficult, further studies have identified the existence of ambidextrous organisations that can perform both (Kammerlander et al., 2015). However, since the sustainability issues are becoming mainstream, it is important for firms to integrate environmental management practices with both innovation activities (Pujari et al., 2003).

5.2.2 Environmental Management, Product Innovation and Dynamic Capability

For many small to medium manufacturing firms, capability in linking existing skills and resources to meet external pressures, such as sustainability and environmental awareness, is a key success in supporting growth through innovation (Dunlap et al., 2016). Compared to large firms, small firms experience limited resources which may reduce their ability to introduce environmental management into innovation activities. However, such firms are known to be more flexible and agile in transforming and reconfiguring resources. As a result, small firms' capabilities are considered to be the catalyst for practising environmental management. This is in line with the contingency perspective that believes that small firms' actions or strategies need to fit within their context – whether it is the external environment, organisational structure, or precondition factors (Mokhtar et al., 2016). In this case, the implementation of environmental management into innovation activities should be aligned with small firms' capability in order to maximise the outcomes. The capability to dynamically integrate, build and reconfigure internal and external resources and skills to address a rapidly changing environment is critical (Winter, 2003; Eisenhardt and Martin, 2000; Teece et al., 1997). Given that applying environmental management and innovation involves a high degree of change and uncertainty, dynamic capabilities can be treated

as a moderator for ensuring the positive impact of environmental management on product innovation activities.

The notion of dynamic capabilities was first introduced by Teece et al. (1997) to describe competitive advantage in dynamically changing markets. It was initially defined as the capacity of an organisation to purposefully create, extend, or modify its resource base (Teece, 2007). In understanding the green entrepreneurial orientation, Jiang et al. (2018) described dynamic capability as a mechanism to exploit new ideas and encourage innovativeness. As discussed in Horbach et al. (2012) and Aldieri et al. (2019), innovation as a part of environmental management can be identified as: (a) market pull factors where the market demands a 'green' product and process, (b) technology push drivers where firms have explored new technology to make a product or process 'greener', and (c) regulation to meet certain requirements for environmental performance. All those factors require firms to dynamically develop their capability. This includes the capability to acquire, develop and reconfigure resources or knowledge from internal and external sources. In line with the above argument, this study considers that small firms' capability is referred to as transformative and absorptive. *Transformative capability* refers to the degree of a firm's ability to constantly redefine a portfolio of product or service opportunities based on knowledge endogenous to the firm. The term was initiated from Garud and Nayyar (1994) (as transformative capacity) while referring to the exploitation of knowledge generated within an organisation to create technological advances, new business opportunities, and increase competitive advantages. *Absorptive capability* refers to the degree of a firm's ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends (Cohen and Levinthal, 1990). It involves the assimilation process of new external knowledge with the firm's existing internal knowledge (Wang et al., 2015). In short, transformative capability is defined as a firm's capability to utilise internal resources and knowledge while absorptive capability is the capability of firms to absorb new external resources and knowledge. Figure 5.1 shows the hypothetical model of this study.

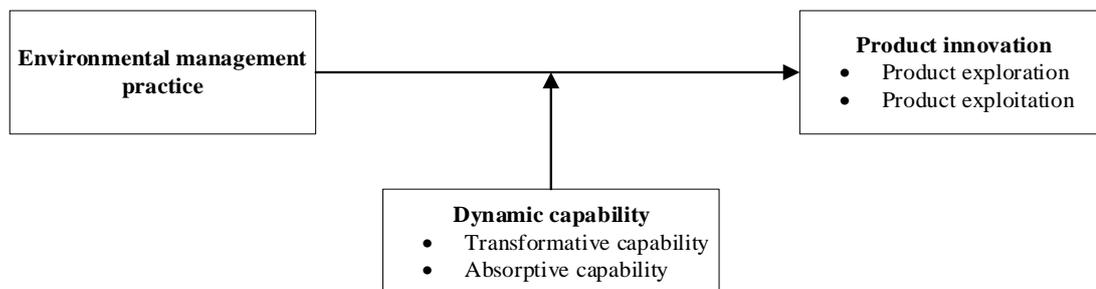


Figure 5.1 Research framework and hypothetical relationships

5.2.3 Hypothesis Development

5.2.3.1 *The Impact of Environmental Management Practice on Product Innovation*

The first hypothesis concerns the influence of environmental management on product exploration and product exploitation. Several studies (e.g. Maletič et al., 2018; Chen and Chang, 2013) have argued that environmental management practice supports product exploration. Recent findings have shown that performing exploration can be used as a predictor of innovation performance especially in competitive environments (Maletič et al., 2018). One of the reasons is that exploration is driven by desires to discover something new (Yalcinkaya et al., 2007); and exploration in environmental management has a long-term objective of producing new products that have the least negative impact on the environment (De Medeiros et al., 2014). Thus, environmental management drives small firms to realign their strategy to explore new products while at the same time focusing on emerging new customers and market needs (Molina-Castillo et al., 2011; Molina-Azorín et al., 2009). Another reason relates to the reduction of daily operating costs as a result of the implementation of environmental management. In addition, environmental management practices usually force firms to explore new areas of research and technology. This sustainability issue has attracted more firms to develop new products with “green” features as it is becoming a powerful competitive weapon in the market (Chen, 2011). For instance, many car manufacturers have advanced technology by producing car engines with cleaner combustions and better fuel economy. Based on these arguments, we posit as follows:

H1a. Environment management practice has a positive impact on product exploration activities.

Moreover, environmental management may encourage innovation through product exploitation activities. With product exploitation, firms perform innovation activities through incremental improvements such as the introduction of product variants featuring improvements and market repositioning (Levinthal and March, 1993; Stone, 2006) while trying to reduce usage in materials, water and energy use (Maletič et al., 2016). Performing exploitation does not only strengthen a small firm's position in the market but is also more likely to reduce the cost of operation so lower prices can be offered to consumers (Prajogo, 2016). As the objective is to consider the reduction of natural resources, water, energy, materials and other practices that minimises the negative impact on the environment (Potts, 2010), among the possible solutions are improved products that offer sustainable features such as having recycled components, less packaging, being manufactured in an energy-conserved way, and being less detrimental to human health (Ikram et al., 2019). When small firms implement environmental management, they potentially optimise the production process and therefore stimulate exploitation activities (Shin et al., 2008). Hence, product exploitation can be an option for small firms to achieve their environmental goals. In other words, small firms practising environmental management are more likely to perform incremental innovation and improve their existing product(s). Based on the above arguments, we suggest that a higher level of environmental management practices would result in more encouragement to perform product exploitation. Therefore, the hypothesis is constructed as follows:

H1b. Environmental management practice has a positive impact on product exploitation activities.

5.2.3.2 Transformative Capability and Its Moderating Role in Environmental Management and Product Innovation Practices

This hypothesis argues that transformative capability is critical for the implementation of environmental management on small firm product innovation. Small firms should develop transformative capability so they can adapt their business according to the market's need and expectation such as the increasing awareness of sustainability and the environment (Wang et al., 2015). Transformative capability is an extension of dynamic capability and it explains the process of utilising internal resources to meet external demand. The transforming aspect of dynamic capabilities is needed most

obviously for addressing new opportunities such as new products produced with stronger environmental awareness (Dangelico et al., 2017).

Transformative capability encourages the use of internal knowledge to trigger the development of new knowledge while trying to optimise existing knowledge (Pandza and Holt, 2007). A study from Nath and Ramanathan (2016) shows that the ability to integrate internal knowledge is critical to support environmental management practice and to produce strong environmental performance. Several studies (e.g. Albino et al., 2012; Dibrell et al., 2011) found a critical condition for transformative capability is the presence of commitment and strong collaboration among units within a firm. This is so due to time saving advantages, for example not needing to “break the ice”, and understanding of the social cognition of each unit. In the context of product exploration, those conditions will help firms to utilise internal resources and knowledge as a response to environmental changes. These activities often focus on exploring new opportunities such as the development of new technology or the opening of a new market as a result of new trends and perspectives to preserve the environment and increase sustainability. In line with the above arguments, we propose the hypothesis as stated below:

H2a. The interaction between transformative capability and environmental management practice produces a positive impact towards product exploration activities.

Similarly, transformative capability helps small firms in exploiting their current product or market. An example of a firm’s transformative capability is the integration of different functional units within an organisation which can produce internal knowledge integration that is important for firms engaging in green practices (Dibrell et al., 2011). One reason for this is that integration of different functional units brings a different composition and level of heterogeneity (Bercovitz and Feldman, 2011). During product exploitation, small firms perform activities to increase efficiency of the production process while introducing environmental management practices. During the process, the capability to reconfigure existing resources and knowledge is critical to deliver the innovation within environmental management practice. In summary, combining internal resources and knowledge with understanding of the current market means small firms will be able to respond to the increased awareness of environmental

performance through product exploitation. Thus, the following hypothesis is considered:

H2b. The interaction between transformative capability and environmental management practice produces a positive impact towards product exploitation activities.

5.2.3.3 Absorptive Capability and Its Moderation Role in environmental Management and Product Innovation Practices

This study argues that small firms' absorptive capability helps to strengthen the implementation of environmental management on innovation activities (Wang and Ahmed, 2007). Absorptive capability appears to be one of the important determinants of a firm's capability to absorb new external knowledge and to apply it to create commercial goals (Açikgöz et al., 2016). Studies have suggested that absorptive capability can assist businesses to capitalise on external sources of innovation (West and Bogers, 2014; Harrington and Guimaraes, 2005). In order to respond to the needs of the market, small firms respond by introducing new products or improvement (e.g. upgrade, update) to existing products that create less environmental damage (e.g. avoiding production wastage) (De Medeiros et al., 2014; O'Cass et al., 2014).

Firms with a high level of absorptive capability are potentially more likely to assist environmental management in succeeding with product exploration. With respect to green practices, as firms increase their effort to explore new products with sustainable features, they usually engage with new buyers and regulatory authorities, and gain new external knowledge which provides advantages to explore new product opportunities (Xie, Huo, et al., 2016). The essence of product exploration by "experimentation with new alternatives" is prone to be complex and involve uncertain returns (Zhang et al., 2015; March, 1991). Absorptive capability is known to enhance speed and frequency of innovation and knowledge that it produces (Lane et al., 2006). The resulting knowledge databases and unique competitive edges helps to serve the firm in exploring innovation in new product ventures that support environmental practices (Pacheco et al., 2018). This element is needed in the product exploration strategy since first-movers tend to have more opportunity. Using the advantage of early access to knowledge, firms can

plan their exploration strategy more efficiently. Thus, we posit the hypothesis as follows:

H3a. Interaction between absorptive capability and environmental management practice produces a positive impact on product exploration activities.

While the essence of product exploration is “experimentation with new alternatives” (Zhang et al., 2015; March, 1991), product exploitation aims to develop a more efficient use of organisational resources and reduce development time and costs (Jansen et al., 2006). For product exploitation, absorptive capacity provides knowledge about integrating environmental management practices into existing products or processes. Firms engaging in exploitation opportunities usually interact with outsiders (Foss et al., 2013) to obtain a more accurate and complete assessment of what the markets need to avoid unwanted and unimportant features (Carbonell et al., 2009). It provides the advantage of an expanded range of resources beyond a firm’s internal capacity to create solutions for customer needs (Salonen and Jaakkola, 2015). This kind of external collaboration is therefore important for firms practicing environmental management in order to have a better understanding of other competitors’ practices and current market needs, which provides a better insight into the appropriate refinement of the existing product. As absorptive capability helps firms to develop and maintain external networks, firms with a high level of absorptive capability are more likely to absorb information and knowledge about environmental management and quickly build their capability (Xie, Huo, et al., 2016). Building on the above discussion, the following hypothesis is posited:

H3b. Interaction between absorptive capability and environmental management practice produces a positive impact on product exploitation activities.

5.3 Research Methods

5.3.1 Research Setting and Sample

The empirical research was conducted based on a survey of UK small to medium manufacturing firms. We defined small to medium manufacturing firms as having an annual turnover of less than £25 million and/or having fewer than 250 employees (Department for Business Innovation & Skills, 2012). The FAME (Financial Analysis Made Easy) database was used to retrieve the list of manufacturers in the UK (Story et al. 2015; Deutz et al. 2013). We approached respondents from various backgrounds ranging from environmental managers to firm CEOs. In cases where no specific position was appointed to manage a firm's environmental activity, we asked for suitable respondents at managerial levels that would have access to the information that we required.

Before conducting the survey, we conducted a pilot interview among random business owners or top management representatives of small to medium manufacturing firms. In total, we conducted pilot interviews with seven firms. The respondents were asked to complete the online questionnaire and to indicate any ambiguous or unclear phrasing of items. Besides answering the survey, respondents were also asked to provide suggestions to improve it. After completing the pilot test, we improved the questions and produced the final questionnaire.

In this study, research assistants were hired to increase the effective response rate. Their job scope was to locate the suitable personnel to answer the questionnaire. Each firm only required one person to answer the questionnaire. The process involved the research assistants contacting companies from the FAME database list and explaining the details of the survey. We employed simple random sampling where 2,767 small to medium manufacturing firms were contacted by phone between August 2016 and December 2016. To ensure respondents were comfortable answering the survey questions, we guaranteed anonymity (López-Gamero and Molina-Azorín, 2016). In total, 1,887 firms agreed to participate in this research and were given a special link created specifically for that particular firm via email. Follow-up phone calls were made two weeks after sending the survey for two times in a row. Finally, 106 firms completed the survey giving a response rate of 5.6%. We benchmarked our response rate with

previous studies from the same domain and found ours comparable to similar survey-based research (e.g. Gualandris and Kalchschmidt, 2016; Jabbour et al., 2014; Mitra and Datta, 2014). The demographical profile of the firm sample is presented in Figure 5.1.

Table 5.1 Firm profiles

Demographics	Number of respondents	%
<i>Type of business</i>		
- Chemical / pharmaceutical	4	3.8
- Electrical / medical equipment / communication equipment	13	12.3
- Paper / textile / printing / leather	12	11.3
- Food	8	7.5
- Furniture / wood / rubber / plastic product	10	9.4
- Metal / machine / steel	22	20.8
- Other (s)	7	6.6
- Multiple industries	30	28.3
<i>Age of firm</i>		
- Less than 10 years	4	3.8
- 11-25 years	20	18.9
- 26-50 years	47	44.3
- 51-100 years	24	22.6
- More than 101 years	11	10.4
<i>Number of employees</i>		
- Less than 25	13	12.3
- 26-50	23	21.7
- 51-100	37	34.9
- 101-250	33	33.1
<i>Sales</i>		
- Less than £1,000,000	3	3
- £1,000,001 – 5,000,000	21	21.2
- £5,000,001-10,000,000	26	26.3
- £10,000,001-25,000,000	49	49.5

We performed some analysis regarding the collected data. The completed surveys were compared with the non-completed surveys with respect to the dependent variable to test the existence of mean difference. The results from the paired sample t-test showed no significant statistical difference between both categories at the significance level of 0.05, indicating absence of non-response bias (Wang and Ahmed, 2007). We acknowledge that common method bias is a source of threat since our survey was responded to by a single respondent from each firm. As suggested by Podsakoff

and Organ (1986), Harman's single factor test was employed to detect common method bias. The test was conducted via principle component analysis with varimax rotation. Four factors (eigenvalue>1) emerged totalling 83.28% of variance explained with no one factor accounting for more than 50% of the variance (Mattila and Enz, 2002).

5.3.2 Measurement and Validation of Constructs

Using a 7-point Likert scale ranging from 1 for "strongly disagree" to 7 for "strongly agree", all items in the questionnaire were measured from a firm-level perspective and were treated as reflective indices. The complete items can be found in the appendix.

Product exploration ($\alpha=.88$) was measured using four items from Jansen et al. (2006), capturing the extent to which new products are introduced to meet market demands.

Product exploitation ($\alpha=.93$) is the extent to which firms emphasize incremental innovation towards existing products and was measured using four items adapted from Jansen et al. (2006).

Environmental management ($\alpha=.89$) was examined by employing a five-item scale of environmental management adapted from Porter's (1985) value chain model. We asked respondents to rate the development of environmental management at their organisation in five areas: inbound logistics, outbound logistics, operations, marketing and sales, and services. We treated this construct as a formative measure.

Transformative capability ($\alpha=.95$) was measured with an existing 5-item scale from Gibson and Birkinshaw (2004) and Schilke (2014). Respondents were asked to rate their firm's ability to strategically adapt opportunities and knowledge within the firm.

Absorptive capability ($\alpha=.95$) used a four-scale measure adapted from García-Morales et al. (2008). Respondents were asked to rate their firm's ability to recognise new external opportunities and knowledge to undertake internal transformation.

Several control variables were selected based on previous literature and the perception that they would affect the firm's environmental management and innovation activities. These were the firm's total years of operation, number of employees and

annual sales. These variables were normalised using natural logarithm alleviate univariate non-normalities and account for non-linear effects (Feng et al., 2010; Swamidass and Kotha, 1998).

5.4 Findings

5.4.1 Descriptive Statistics and Factor Analysis

The study employed factor analysis to reduce the items. To measure the reliability, the Kaiser-Meyer-Olkin Test was performed. The result show that the sampling adequacy is 0.873 indicating reliability of the model. The constructs with eigenvalues of more than 1 represented 83.28% of variance explained. The Cronbach alpha had values higher than 0.7 (minimum=0.844) showing internal consistency among the constructs (Nunnally and Bernstein, 1994). The factor loading of items within the constructs had a minimum value of 0.666. Higher loading scores for the items is important and have a greater influence to present a factor (Hair et al., 2006). Moreover, confirmatory factor analysis was employed to establish convergent validity and discriminant validity (Fornell and Larcker, 1981). For convergent validity, this study followed the work of Mitra and Datta (2014) where average variance extracted (AVE) should be at least 0.5 and composite reliability (CR) is above 0.7. The model was an overall fit where none of the items from the constructs needed to be removed. The minimum AVE was 0.666 and 0.887 for CR. For discriminant validity, following Fornell and Larcker (1981), an inter-construct correlation was conducted (Table 5.2). The result shows that the square root of AVE for each construct exceeded the correlation value between the two. Upon assessing the goodness-of-fit for our model, we confirmed that the model displayed an overall fit ($X^2=1.77$; GFI=.82; AGFI=.95; RMSEA=.09). Table 5.3 shows the construct and items representing the whole research model along with the item loadings, AVE and CR.

Table 5.2 Descriptive statistics and correlation coefficients

	Mean	SD	1	2	3	4	5	6
Product exploration	5.13	0.13	1					
Product exploitation	5.52	1.16	.57**	1				
Environmental management	20.12	7.61	.30**	.32**	1			
Absorptive capability	4.94	1.29	.32**	.29**	.17	1		
Transformative capability	4.33	1.52	.36**	.35**	.58**	.53**	1	
Years of operation	51.04	40.06	.08	-.01	.13	.14	.07	1

N= 106; *p<0.05; **p<0.01

Table 5.3 Summary of measurement scales

Items	Mean	SD	Item loading	Composite Reliability	AVE
Transformative capability					
T1	4.29	1.68	0.84	0.95	0.80
T2	4.36	1.65	0.88		
T3	4.43	1.69	0.92		
T4	4.41	1.70	0.89		
T5	4.16	1.60	0.81		
Absorptive capability					
A1	5.00	1.43	0.90	0.95	0.84
A2	4.99	1.33	0.90		
A3	4.97	1.31	0.90		
A4	4.78	1.43	0.84		
Product exploration					
P1	5.30	1.44	0.64	0.89	0.68
P2	5.24	1.67	0.85		
P3	5.18	1.61	0.89		
P4	4.79	1.68	0.81		
Product exploitation					
R1	5.39	1.28	0.83	0.93	0.78
R2	5.66	1.23	0.87		
R3	5.53	1.32	0.88		
R4	5.52	1.25	0.86		
Environmental management					
E1	3.67	1.80	0.89	0.88	0.67
E2	4.85	1.78	0.77		
E3	3.95	1.85	0.84		
E4	3.76	1.83	0.83		
E5	3.89	1.83	0.86		

Note: SD, standard deviation.

5.4.2 Analysis

In this study, a hierarchical regression method was employed (Ferrerias-Méndez et al., 2016). To detect any multicollinearity issues, two indicators were used, namely correlation between variables and the variance inflation factor (VIF). The highest correlation was 0.57 while the results show no VIF's higher than 2.14. Both results show that the analysis has no issue with multicollinearity. Hierarchical regressions were conducted in five steps. In the first step, the control variables were introduced, and the main effects were examined in the second step. The remaining steps were used to investigate the moderation effect. The overall results of the regression analysis are displayed in Table 5.4 which shows that control variables were not significant across the models. Hence, the number of years firms had been operating, number of employees in the firm, and firm accumulated sales has no effect on product exploitation and product exploration.

Regarding the effect of environmental management on product exploration and product exploitation, the analysis shows a mixed result. Models 3, 5, 7, 8 and 10 show a positive and significant relationship ($P < 0.05$), while models 2, 4 and 9 show no significant relationship between environmental management and product exploration/exploitation. This supports hypothesis *1a* and *hypothesis 1b*. On the one hand, the finding supports the role of environmental management on product exploration. As Prajogo et al. (2014) argue, environmental management involves a production process that relates to all aspects of product manufacturing, usage, handling, logistics and waste management, the most probable outcome is the creation of new products or refinement of existing products that abide by the environmental concerns at every step of the value chain. On the other hand, the findings also support the influence of environmental management on product exploitation. The reason is that product exploitation offers the quickest and easiest way to support environmental initiatives (Maletič et al., 2014). As practicing such a strategy may jeopardise the profitability, firms try to introduce environmental concerns through improvement of an existing product (Pujari et al., 2003). In this case, product exploitation may occur through minimising by-product waste and increasing the use of recycled material on some aspects of the existing product (Lenox et al., 2000). Overall, the findings support the

recent argument from Wang et al. (2019) that a firm's environmental culture and practice are the main elements of green innovation.

The next analysis dealt with the interaction between the variables of environmental management and dynamic capabilities. To check whether transformative capability has a moderating effect on the connection between environmental management and product exploration, we observe the difference of an adjusted R^2 for the model without moderating effects (model 2) compared to the adjusted R^2 of the model with moderating effects (models 3 and 5). The table shows higher explanatory power in models 3 and 5 compared to model 2. Besides that, the moderating effect of transformative capability is significant and positive in both models 3 and 5 proving that the interaction between environmental management and transformative capability is significant. The finding confirms *hypothesis 2a* that transformative capability strengthens the impact of environmental management on product exploration. This finding is in agreement with prior research that supports the positive impact of internal knowledge acquisition and utilisation on firm performance (Wang et al., 2015) and innovativeness (Jiang et al., 2018) . In line with the concept of dynamic capability, having transformative capability promotes the combination of internal resources in the development of new products (Teece, 2016). Unfortunately, the findings failed to confirm any support for the argument that transformative capability moderates the relationship between environmental management and product exploitation. The results were insignificant based on models 8 and 10 for such a relationship. Before adding the interaction effect (model 7), the adjusted R^2 was 13.9% but after including the interaction effect (model 10), the explanatory power dropped to 13.1%. Thus, *hypothesis 2b* was not supported, as the result suggests transformative capability has no moderating effect on the connection between environmental management and product exploitation. One explanation might be due to the nature of product exploitation itself that is associated with an incremental innovation and a well-defined return (Yang et al., 2014). The process might not require integration with existing knowledge to proceed such a strategy as compared to a product exploration strategy which involves higher uncertainty due to its more radical innovation (Maijanen and Virta, 2017). While this result is insignificant, it enhances the dynamic capability literature to argue that not all aspects of dynamic capability are able to influence firm innovation strategy.

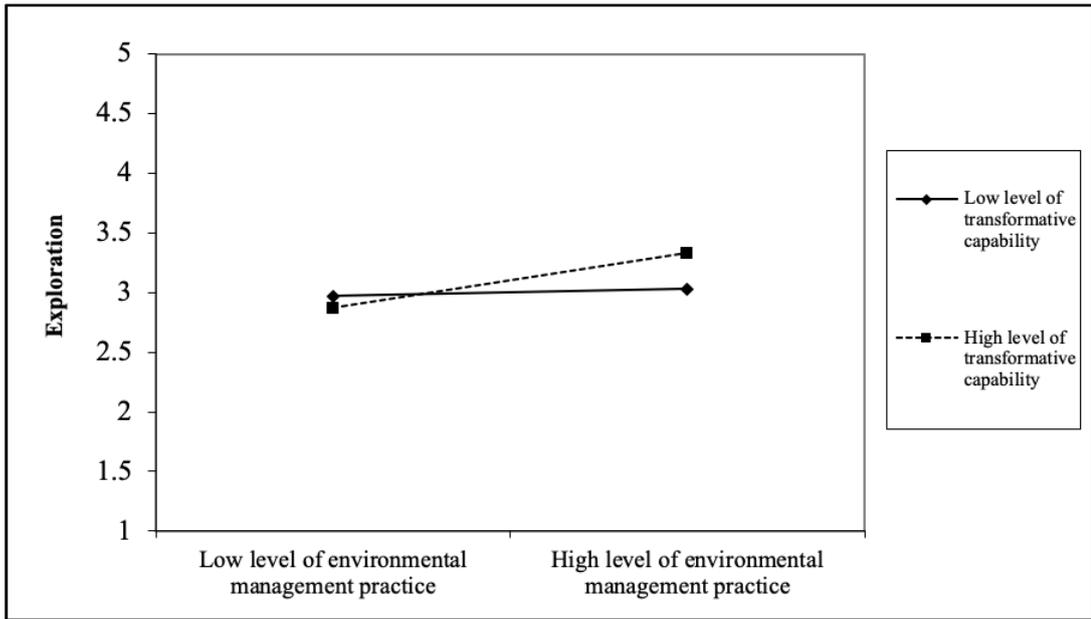
The next analysis concerned the interaction effect of environmental management and absorptive capability. The findings (models 3 and 4) suggest that the interaction effect does not influence product exploration. Therefore, we could not support Hypothesis 3a. This result seems to indicate that, among small to medium manufacturing firms, resources and knowledge gained from transformative capability may play a more important role in determining a firm's environmental management practice with regard to product exploration than knowledge gained from absorptive capability. Interestingly, the finding (models 8 and 9) suggests that the interaction between environmental management and absorptive capability has a negative impact on product exploitation ($P < 0.05$), which supports *hypothesis 3b*. One explanation could be that collaborating with external organisations to absorb new knowledge and resources exposes risks of technology leakage and also incurs a higher cost due to the collaboration process (Chen et al., 2011). Though dynamic capabilities are viewed as an enabler towards the success of organisations during changing circumstances (Helfat and Winter, 2011), having the capacity to value external knowledge and ability to leverage it (i.e. absorptive capability) (Ferrerias-Méndez et al., 2016) may not help to complement processes of product refinement and instead potentially disturb the current focus of the organisation.

Figure 5.2 illustrates the role of dynamic capability in moderating the relationship between environmental management and product innovation using a simple slope analysis (Aiken et al., 1991). In the figure, the dependent variables are placed on the vertical axis while the independent variable is shown along the horizontal axis. Panel A in Figure 5.2 depicts the interaction between transformative capability and environmental management on product exploration. When transformative capability is available to firms, environmental management has a positive effect on product exploration. Moreover, it also reveals that the impact of environmental management on product exploration decreases for firms with a low level of transformative capability. Panel B in Figure 5.2 visualises the pattern of interaction between environmental management and absorptive capacity. The findings failed to identify a positive interaction between environmental management and product exploitation. In other words, when a firm's absorptive capability is low, its practice of environmental management leads to a stronger positive effect on product exploitation compared to when a firm's absorptive capability is high.

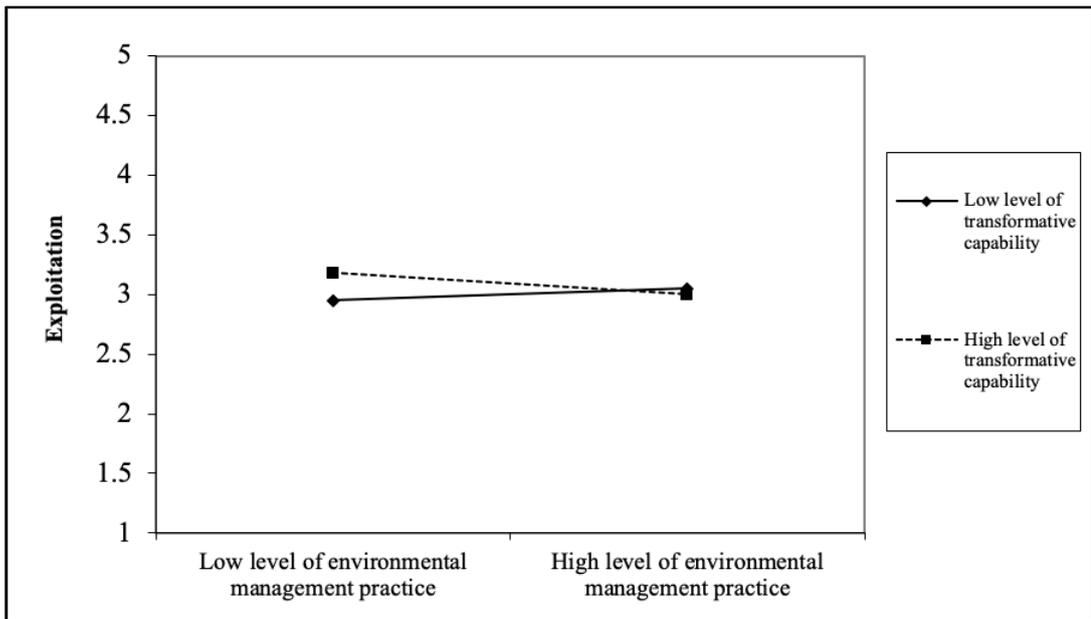
Table 5.4 Result of hierarchical regression

	Product Exploration										Product Exploitation									
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 6	Model 7	Model 8	Model 9	Model 10	Model 6	Model 7	Model 8	Model 9	Model 10
<i>Main effects</i>																				
Environmental Management (EM)		0.04 (0.01)	0.05* (0.02)	0.03 (0.01)	0.05* (0.01)			0.04* (0.01)	0.03 (0.02)	0.03 (0.02)			0.04* (0.01)	0.03* (0.02)	0.03 (0.02)	0.05* (0.02)				
Transformative capability (TC)		0.12 (0.11)	0.25* (0.13)	0.10 (0.11)	0.23 [†] (0.13)			0.08 (0.10)	0.23* (0.11)	0.13 (0.10)			0.08 (0.10)	0.23* (0.11)	0.13 (0.10)	0.09 (0.11)				
Absorptive capability (AC)		0.23 (0.12)	0.10 (0.12)	0.25 (0.12)	0.11 (0.12)			0.19 (0.10)	0.06 (0.11)	0.15 (0.10)			0.19 (0.10)	0.06 (0.11)	0.15 (0.10)	0.18 (0.11)				
<i>Interaction effects</i>																				
EM x TC			0.04** (0.00)	0.04** (0.01)										0.02 [†] (0.01)	0.00 (0.00)					
EM x AC			-0.01 (0.01)		0.01 (0.01)									-0.04** (0.01)					-0.02* (0.01)	
<i>Control</i>																				
Firm age	0.00 (0.0)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)				
Firm size	0.01 (0.02)	-0.01 (0.01)	0.00 (0.01)	0.01 (0.02)	0.00 (0.02)	0.00 (0.01)	0.01 (0.02)	0.00 (0.02)	0.00 (0.02)	0.00 (0.01)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.01 (0.01)	0.00 (0.01)				
Sales	0.16 (0.09)	0.18 (0.07)	0.07 (0.09)	0.15 (0.10)	0.17 (0.08)	0.18 (0.08)	0.11 (0.10)	0.09 (0.08)	0.16 (0.07)	0.15 (0.09)										
Adjusted R ²	-0.00	0.13	0.18	0.14	0.20	-0.01	0.15	0.21	0.19	0.14										
p-value	0.40	0.01	0.00	0.00	0.00	0.94	0.00	0.00	0.00	0.00										

N = 106. Standard errors are in parenthesis; *p<0.05; **p<0.01; ***p<0.001



Panel A: Product Exploration = environmental management x transformative capability



Panel B: Product Exploitation = environmental management x absorptive capability

Figure 5.2 Plotting significant two-way interactions

5.5 Conclusion and Discussion

Business has been seeing a critical shift in that sustainability and environmental management are now top priorities on many firms' agenda with the intention of maintaining a cleaner production process. Practices aimed at conserving the environment have penetrated at a deeper level of organisations, from production and operational to innovation management, supporting pollution prevention and waste (Aragón-Correa and Sharma, 2003; Triguero et al., 2013). Following the current trend in the literature, this study's aim was to examine the role of environmental management and dynamic capability on product exploration and exploitation in the context of small to medium manufacturing firms. The summary of findings is shown in Table 5.5. This study found that environmental management practice has a positive impact on product exploration and product exploitation (*H1a* and *H1b*) which is in line with recent findings from the literature on environmental management and sustainability (e.g. Papagiannakis et al., 2019; Masri and Jaaron, 2017; De Medeiros et al., 2014; Azman et al., 2013). As there is increasing pressure to consider environment and sustainability aspects in business, small to medium manufacturing firms are now keen to adapt their products to create cleaner production and more efficient use of resources such as energy, water and human capital. This would therefore result in an improved product or a new product that consumes fewer materials, uses sustainable materials, reduces waste and energy, and decreases the inflow of raw material inputs and water (Ribeiro Massote and Moura Santi, 2013).

Moreover, the study also found that dynamic capabilities matter and their role has been confirmed in numerous recent studies (e.g. Jiang et al., 2018; Zhou et al., 2018). Furthermore, it allows firms to leverage available resources and knowledge to update and exploit product innovation in response to changing business environments (Qiu et al., 2020). For product exploration, the alignment between environmental management and transformative capability produces a significant and positive impact on product exploration while environmental management and absorptive capability have a significant but negative impact on product exploitation. Generally, most of the literature suggests dynamic capabilities are a strong predictor for environmental management practices among firms (Arend, 2014). However, in this study, we find that

different types of dynamic capability (transformative or absorptive capability) can have different impacts depending on a firm's external or internal conditions.

Table 5.5 Summary of findings

Hypothesis	Proposed Effects	Hypothesis Supported?
H1a: EM → Product exploration	+	Yes*
H1b: EM → Product exploitation	+	Yes*
H2a: EM*Transformative capability → Product exploration	+	Yes**
H2b: EM*Transformative capability → Product exploitation	+	No
H3a: EM*Absorptive capability → Product exploration	+	No
H3b: EM*Absorptive capability → Product exploitation	+	No**

*p<0.05; **p<0.01

These findings warrant further discussion. The interaction between environmental management and transformative capability (*H2a*) produces a significant and positive effect on product exploration while the same interaction has a positive but insignificant effect on product exploitation (*H2b*). Apparently, the capability to utilise internal resources is more effective during exploration than during exploitation activities. While on average, our samples showed that most firms are engaged with the product exploitation process ($\bar{x}=5.52$), firms engaging in environmental management might not be dependent on internal sources of knowledge or information to aid them with the exploitation strategy. On the other hand, firms combine their internal knowledge, expertise and resources to explore opportunities in the product or market as a result of implementing environmental management.

Furthermore, our results failed to confirm the role of absorptive capability (*H3a*) as a moderator for an environmental management-product exploration relationship. In most cases, absorptive capability enables firms to adapt to changes in strategy to remain competitive (Winter, 2003). However, in the context of implementing environmental management during product exploration, internal resources and knowledge might be sufficient to assist firms during the product development process. Another explanation is because the small to medium manufacturing firms in our sample come from diverse sectors where context and domestic spillover effect of environmental management might have different impacts. For instance, knowledge about environmental innovation

in the chemical industry cannot be applied in the textile industry. This finding supports previous studies such as from Braun et al. (2010) that found the importance of absorptive capacity in capturing the domestic spillover effect in the case of wind and solar technology. In their study, it was evident that domestic spillovers have more significant impacts than international spillovers. In other word, knowledge about applying environmental management in product innovation requires contextual understanding.

Lastly, the study found that absorptive capability negatively moderates the relationship between environmental management and product exploitation (*H3b*). This means that having a high level of absorptive capability together with practising environmental management will result in lower engagement with product exploitation. The possible explanation is because the engagement with external networks forces firms to focus more on product exploration rather than product exploitation. In this case, the potential returns as a result of developing a new product or new market is higher than exploiting a current product or market. This finding is in line with earlier studies (e.g. Arbolino et al., 2018) that while environmental management in product innovation may produce a positive effect on the environment, it can weaken firms' productivity performance. Pacheco et al. (2018) who looked into the moderating role of absorptive capability towards organisational factors on green innovation performance, finds this capability leads to new green products but not refinement of existing products. Moreover, the negative effect of absorptive capability might also be caused by some level of negative spillovers. In this case, the success of implementing environmental management during product innovation in one sector is associated with a decline in another (Truelove et al., 2014). It might be the case that firms have introduced environmental management practices in their product innovation process as a result of copying others' strategy without fully understanding the impact on their product, market and organisation.

5.5.1 Contributions of the Study

The findings of this study suggest several theoretical implications. First, the findings add to the emerging stream of literature on environmental management. Previous studies focused on linking environmental management to general issues of product development (e.g. Sihvonen and Partanen, 2016) without specifying the type of activity

during the product development process. This study extends Maletič et al's (2016; 2018) work in studying the impact of environmental management on exploration and exploitation activities. Our study contributes to the development of knowledge in this subject by investigating the role of dynamic capability towards environmental management and innovation management (product exploration and product exploitation).

Second, we focus on a different perspective on the measurement of environmental management. Unlike previous work (e.g. Burgos-Jiménez et al., 2013), this study defines environmental management as Porter's (1985) value chain. The framework developed in this study can be adapted to other contexts or industries. This functional-based measure was established to view environmental management from another viewpoint besides activity-oriented measures. By reflecting on environmental management from a different functional level, this study looks to overcome the common problem of latent variables as having non-observable items (Vidal-Salazar et al., 2012) which contributes towards having a more precise measurement of environmental management.

Third, this study adds more understanding regarding the role of dynamic capabilities. Limited empirical research has ventured into environmental management, especially among small to medium manufacturing firms. We followed the work of Wang et al. (2015) that identified dynamic capability across firms (through a reflective construct approach). The importance of dynamic capability has been addressed over the past few years where several researchers have highlighted that specific knowledge capabilities are crucial to enhancing a firm's environmental practice since they connect to internal and external drivers (Melander, 2018; Hashim et al., 2015) The findings of this study show the unique characteristic of absorptive and transformative capability that has different impacts on the relationship between environmental management and innovation management. Thus, while agreeing to the positive potential of firm resources, there are some attributes that may lead the implemented strategy to reduced efficiency and effectiveness (Barney, 1991). To some extent, this study provides empirical evidence of the impact of spillovers in the context of environmental management and innovation. As recent studies (e.g. Aldieri et al., 2019; Truelove et al., 2014) have started to open the debate regarding the positive and negative impact of

spillovers, this study shows that in adapting and practicing environmental management, especially in the context of product innovation, the role of locality and sectoral dimension should be considered. In this case, firms need to develop capability not only in acquiring and integrating internal and external knowledge but also adapting it to their own context.

In addition to their theoretical contribution, the findings offer insights and practical recommendations. First, the results suggest that environmental management plays an important role in understanding product innovation among small to medium manufacturing firms. Moreover, they further explain why environmental management should be prioritised among the selection of firm strategies. Second, the negative association between environmental management, absorptive capability and product exploitation reported in this study signals that small to medium manufacturing firms wishing to pursue superior performance in product exploitation through environmental management need to avoid engagement with absorptive capabilities. This finding is in line with the ideas from Maijanen and Virta (2017) that associate operational capability with incremental innovations and dynamic capability with radical innovations.

5.5.2 Limitation and Recommendation for Further Study

The limitations of this study offer avenues for future research. First, the sample was limited only to manufacturers categorised as small to medium manufacturing firms which limits the generalisability of the findings. Therefore, future work could focus on medium or large firms to compare with this study. In addition, we included all sectors within the manufacturing industry, such as metal, chemical, food, etc., and so neglected the possibility that different sectors might have their own approach leading to different findings. Further study can examine the practice of environmental management in each sector. Besides that, studies that specify the sector type would be useful since there are numerous sectors in the manufacturing industry with various characteristics. Second, we tested the hypothesis by means of a questionnaire thus providing cross-sectional data, which is limited to evaluating variables at different stages of firm development. The older firms may accumulate knowledge and experience to adapt to environmental management practice better than young firms. Therefore, future research could be longitudinal and designed to investigate environmental management, dynamic and product innovation at firms of different ages. Third, we gathered data using perception-

based measures where surveys were answered by a single respondent representing the views of the sampled firm. We appreciate there could be potential bias and/or inaccurate reporting in answering the questionnaire. Future research could consider using secondary data as a replacement for the existing measures to counter this issue. Fourth, not all of our significant results scored a great statistical significance of less than 0.001. Since research on statistical significance has evolved, our concern towards lack of reproducibility for claims of new discoveries has grown, signalling that a lower threshold for statistical significance is needed. Following Benjamin et al. (2018), we recommend that hypothesis 3b which has a statistical significance lower than 0.005 should be supported with further evidence based on future research.

APPENDIX

Scale Items
<p>Environmental management <i>To what extent has your firm engaged in voluntary environmental activities with:</i> Inbound logistics Operations Outbound logistics Marketing and sales Services</p>
<p>Absorptive capability <i>How did your firm adapt to newly acquired knowledge from outside the firm?</i> Our firm had the necessary skills to implement newly acquired knowledge Our firm had the competences to transform the newly acquired knowledge Our firm had the competences to use the newly acquired knowledge Our firm had a clear division of roles and responsibilities for acquiring new knowledge</p>
<p>Transformative capability <i>How did your firm adapt knowledge gained from within the firm?</i> Our firm encouraged its personnel to challenge outmoded practices Our firm evolved rapidly in response to shifts in our business priorities Our firm was flexible enough to allow us to respond quickly to changes in our markets Our firm established its identity in order to be competitive in the open market Our firm sought to determine areas of internal synergy</p>
<p>Product Exploration Our firm has accepted demands that go beyond existing products and services Our firm has invented new products and services Our firm has experimented with new products and services in our local market Our firm has commercialized products and services that were completely new to our organization</p>
<p>Product Exploitation Our firm has frequently refined the provision of existing products and services Our firm has regularly implemented small adaptations to existing products and services Our firm has introduced improved iterations of existing products and services for our local market Our firm has improved the efficiency of our provision of products and services</p>

CHAPTER 6: CONCLUSION

6.1 Discussion

This dissertation helps to supplement the existing literature on antecedents and outcomes of environmental management. For this dissertation, four related studies were combined into a single integrated framework (Figure 1.1). Different perspectives of factors related to environmental management were explored as an effort to extend the existing knowledge in this research area. The focus of these four studies could be divided into three parts, namely, literature review on antecedents of environmental management, antecedents of environmental management, and outcome of environmental management.

6.1.1 Discussion for Literature Review on Antecedents of Environmental Management

This study contains a literature review on research about the influence of organisational traits on environmental management. My findings reveal that a firm's level of environmental management can be divided into proactive, reactive and hybrid categories. Previous studies have shown that firms mostly either implement a defensive approach (reactive) with a narrow focus on compliance towards environmental regulations when dealing with environmental issues (Delgado-Ceballos et al., 2012) or drive new opportunities through voluntary approaches with regards to environmental matters (Nath and Ramanathan, 2016). However, in certain cases, firms have an unclear standpoint on environmental management (e.g. Uhlaner et al., 2012). For this situation, this ambiguous situation is defined as a hybrid practice of environmental management. Since research on environmental management has existed, there has been a mixture of understanding towards the terminology. This matter is important to be addressed since strategic options are vital when it relates to environmental issues (Banerjee, 2001). Hence, in this study, the different types of environmental management levels were established.

The results also reveal that most studies suggest a positive relationship between organisational traits (executive perception, strategic experience, motivations, firm size,

proactiveness attitude) and a firm's environmental management. Nevertheless, this finding could not be generalised in all contexts. For example, in certain industries such as healthcare, clinical and administrative decision-making must be done by physicians as the issues may not be understood by non-physicians (Battilana, 2011), which makes top management's perspective and suggestions on environmental management less important if they do not come from a physician's background.

6.1.2 Discussion for Antecedents of Environmental Management

This study explores several factors that can influence the practice of environmental management among firms: decentralisation, external pressure for social relationships, global environmental awareness, pressure for technological dynamics, absorptive capability, firms' size, and social ties with customers.

The findings reveal that a positive direct effect was confirmed between decentralised firms and environmental management practices. The advantages of decentralised firm structure have been addressed in previous research. It promotes decision-making at a lower level of authority hence avoiding distortion and hoarding (Davis-Sramek et al., 2015). A study by Perez-Valls et al. (2016) also verifies that firms applying flexible decision-making in a dynamic environment will potentially receive "above average" returns for the practice of environmental management.

This current study finds decentralised firms can produce high environmental management practices in the presence of global environmental awareness. However, with no support from the presence of other factors, this will result in low practice of environmental management. The logic is that decentralised firms are effective in matching and responding to current environmental conditions (Cadeaux and Ng, 2012). Surprisingly, in a separate study, I also found that external pressure from global environmental awareness can negatively influence decentralised firms towards environmental management. This explains that decentralised firms may not simply focus on the current trend (due to similarities with other competitors and tough regulations) but rather emphasises on other strategic direction that brings better competitive advantage to the business. Furthermore, another reason for this situation relates to the location of data collection for both studies, where the former was collected

in the UK and the latter was collected in Malaysia. Both countries have different demographic and economic backgrounds, hence resulting in different findings.

Other findings also reveal that the existence of technological dynamics was found to support decentralised firms to increase their environmental management practice. Studies have shown that technological dynamics assist firms' environmental management target (Ogbeibu et al., 2019). In a decentralised firm, they are usually more autonomous, hence the decision-making process is faster, thus helping with the practice of environmental management (Davis-Sramek et al., 2015).

6.1.3 Discussion for Outcome of Environmental Management

The environmental management literature is not conclusive on how to enhance development of products in the context of environmental initiatives (Chen and Chang, 2013). Issues of environmental management have been associated with innovative activities, but fewer studies have explored the details of product development. In this study, the factor of environmental management was tested as an outcome towards product exploration and product exploitation. Furthermore, the factors of dynamic capability (transformative capability and absorptive capability) were included as the moderating variable.

Generally, it was shown that environmental management does have a positive impact on product exploration and product exploitation. However, the moderating variables tested in this study produced two contradictory findings. While transformative capability was found to positively influence the relationship between environmental management and product exploration, absorptive capability showed a negative impact towards the environmental management-product exploitation relationship. The results for transformative capability are in-line with previous literature that supports the positive role of internal knowledge acquisition on firm performance (Wang et al., 2015). In terms of absorptive capability, one of the downside is the risk of technology leakage as well as high costs incurred from the collaboration process with external parties (Chen, 2011).

6.2 Theoretical Contribution

This study contributes to the existing environmental management literature in three ways:

First, this study explores the different types of environmental management based on selected papers (*Chapter 2*). Despite the increasing engagement of scholars with the domain of environmental management, neither an undisputed definition nor an unequivocal conceptualisation of its nature and dimensionality has been established so far (Trumpp et al., 2013). Lack of a consistent terminology also makes it difficult to have a better understanding of antecedents and outcomes of environmental management (Gilley et al., 2000). In this study, we found that different authors had their own definition of environmental management and that they were divided into three types, namely proactive, reactive and hybrid.

Second, the findings add to the emerging literature stream on antecedent and outcome of environmental management. Topics on the impact of environmental management on product development have been analysed at a general level (e.g. Chen and Chang, 2013). Nevertheless, it is important for us to have a better understanding on the type of product development that the organisation ventures. In this study, the product development activity is extended specifically into two categories: product exploration and product exploitation. Through focusing on exploration and exploitation activities, business entities will attain better understanding of innovation while able to balance short- and long-term objective simultaneously (Zuraik and Kelly, 2019). Besides that, this study explores the impact of organisational roles, namely, firms' decentralisation level, dynamic capabilities and social relationships with regard to environmental management. These variables have been widely explored in extant management research but have received less attention in the area of environmental management.

Third, this research introduced an alternative method of measuring environmental management. There is no real consensus on how to measure environmental practice and performance (Boiral et al., 2018). The existing measures in the extant literatures vary which can be based on different and non-comparable indicators (Nawrocka and Parker, 2009). In previous research, most studies used activity-based measures (i.e. Gallear et al., 2015; Li et al., 2016; Darnall et al., 2010). I

argue that this type of measure is wrong to be generalised since each business is unique and has its own way of implementing environmental management. Furthermore, there is no consistency in the items used to measure environmental management. Hence, this study introduced Porter's value chain because it is standardised and covers different functional activities in a business entity.

Fourth, this study finds unique findings. For example, strong global awareness on the environment reduces the practice of decentralised firms in implementing environmental management. Logically, certain trends followed by firms strengthen their position. However, in matters of environmental trends and awareness, decentralised firms tend to focus on other strategies which may bring them better competitive advantage. On another hand, the results of this study further show that decentralised firms that operate under the strong influence of global environmental awareness will produce weak environmental management practice. Though presence of environmental awareness and trends usually lead firms to commit with activities and programs related to environmental management (Roxas and Coetzer, 2012), certain types of firms may have the opposite thinking and view this situation as a trend not to be followed. A decentralised firm connotes a higher authority which is given to lower level workers, functionaries and executives, allowing for better and quicker utilisation of information dispersed throughout the organisation (Kaufmann et al., 2019). As more attention are brought towards the issue of environmental awareness, new regulations and standards are established which burdens business entities that favours the implementation of environmental management (Zhang et al., 2019). Decentralised firms would usually notice the coming implications faster than centralised firms, hence avoid engaging heavily in environmental strategy. Besides that, this study also shows that firms practicing strong environmental management, having a high level of absorptive capability will reduce the engagement with product exploitation activities. In previous literature, absorptive capability has mostly been related to strong firm performance (e.g. Açıkgöz et al., 2016; Najafi-Tavani et al., 2016). However, in the context of this study, absorptive capability may not be suited to exploitation activities and rather causes negative spillovers. This finding is also in-line with a study by Pacheco et al. (2018) that finds absorptive capability has positive impacts on the creation of new products but not refinement of existing ones.

Fifth, this study introduces the method of fsQCA to the domain of environmental management. Most quantitative studies in this research area have relied almost exclusively on multiple regression analysis (e.g. Feng et al., 2014; Wong et al., 2012; Ateş et al., 2012). The method of fsQCA supplements the regression method when the relationship between the dependent and independent variables are asymmetric (Kraus et al., 2018). Applying the fsQCA method to this study helps to complement certain phenomena. For example, certain studies have mentioned the need to incorporate both internal and external driven factors to enhance environmental management practices (e.g. Menguc et al., 2010; Gleim et al., 2019). However, the findings were limited to a linear relationship. In this study, I examine different combinations of internal and external factors and how they can produce the same outcome (low or high levels of environmental management).

6.3 Practical Contribution

The *first* practical application of this study applies to managers in terms of their choice of approach to improve their firm's practice of environmental management. The results from *study 2* prove that strong decentralised firms promote better environmental management practices. Since the establishment of environmental practices is complex (Lucas and Noordewier, 2016), firms need to align their level of flexibility in terms of decision-making to produce the desired practice level of environmental management. Hence, managers can choose the optimised level of organisational decision-making flexibility to help achieve the required level of environmental management.

Second, firms should also assure both aspects of existing internal resources and external involvement are present if they choose to commit to the strategic planning of environmental management. The absence of any one of these two can result in weak achievements of environmental management. Previous research has tested the factors involved (internal and external) independently and is in-line with my research (e.g. Gonzalez-Benito and Gonzalez-Benito, 2005; Perez-Valls et al., 2016; López-Gamero et al., 2016; Aboelmaged and Hashem, 2019). In *Study 3*, I find that different configurations of internal resources and external involvement can lead to higher environmental practices. Thus, for firms with the intention to venture into an environmental management strategy can refer to the different configurations and choose the one that fits well with the position of their firm.

Third, decentralised firms that intend to pursue product exploitation should avoid engagement with absorptive capability. Though absorptive capability can complement a firm's existing internal capacity to create solutions for customer needs (Aboelmaged and Hashem, 2019), activities involving absorptive capability, such as collaboration with external organisations to absorb new knowledge, can result in technology leakage (Chen, 2011). On the other hand, decentralised firms that plan to engage with product exploration strategies can benefit from the presence of transformative capability. The strength of transformative capability lies in its ability to integrate internal knowledge to support environmental management practice and to produce strong environmental performance (Nath and Ramanathan, 2016).

6.4 Limitations and Directions for Further Research

This study has some limitations. First, it focuses solely on manufacturing firms. Even other industries should not be neglected as they also have a negative environmental impact. A cross-sectional study can be conducted to compare different industries to get a better perspective of environmental management. Second, the data was collected using the means of a single questionnaire. A mixture of different demographic backgrounds creates chances for bias to occur. For example, older firms tend to be more experienced and knowledgeable on the implementation of environmental management compared to younger firms. Hence, a future longitudinal study on the implementation of environmental management could be considered. Besides that, a future study can complement the current one by replacing existing measures with secondary data. Third, most of the significant findings had a significance level of higher than 0.005. Following the recommendation of Benjamin et al. (2018) that new discoveries should have lower threshold levels for statistical significance (0.005), future research can extend this study into different contexts to support and compare with the findings from this current research.

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