

**ENVIRONMENTAL PERFORMANCE,
ENVIRONMENTAL MANAGEMENT ACCOUNTING
AND ENVIRONMENTAL INNOVATION IN THE
MALAYSIAN MANUFACTURING SECTOR**

JANICE ONG MAY LI



**FACULTY OF BUSINESS, ECONOMICS AND
ACCOUNTANCY
UNIVERSITY MALAYSIA SABAH
2020**

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ENVIRONMENTAL MANAGEMENT
ACCOUNTING AND ENVIRONMENTAL
INNOVATION IN THE MALAYSIAN
MANUFACTURING SECTOR**

JANICE ONG MAY LI

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**A THESIS SUBMITTED IN FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ACCOUNTING**

**FACULTY OF BUSINESS, ECONOMICS AND
ACCOUNTANCY
UNIVERSITY MALAYSIA SABAH
2020**

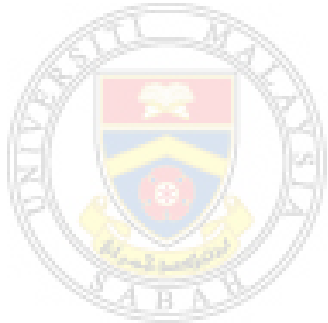
DECLARATION

I hereby declare that the material in this thesis is my own except for quotations, equations, summaries and references, which have been duly acknowledged.

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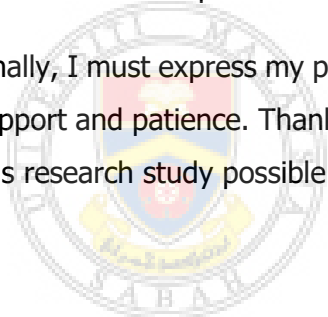
I would like to thank God for all wisdom and provision. I would also like to express my sincere gratitude to my main supervisor, Professor Madya Dr. Raman B. Noordin for his endless teachings, guidance and encouragements. Thank you for all the patience and dedication you have provided to me. My deepest gratitude to my co-supervisor, Dr. Junainah Jaidi for always educating and directing me in completing this research study. Thank you for your valuable knowledge. I appreciate my supervisors' time, commitment and generous help.

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Janice Ong May Li

14 February 2020



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ABSTRACT

As environmental concern increases, decision makers are expected to resolve issues pertaining to the natural environment. Specifically, the environmental performance of a company is scrutinized. Therefore, the objective of this study is to investigate the relationship of Environmental Management Accounting (EMA) (monetary and physical) and environmental performance. Further, the mediating role of environmental innovation is also looked into based on the Natural Resource Based View theory. Accordingly, this research seeks to investigate the relationship of EMA (monetary and physical) and environmental innovation. Additionally, the relationship of environmental innovation and environmental performance is investigated. Lastly, this study seeks to investigate environmental innovation mediating the relationship of EMA (monetary and physical) and environmental performance. This study investigates within the Malaysian large manufacturing companies due to its direct contribution to the natural environment. Questionnaires are sent to 337 large manufacturers with ISO 14001 Environmental Management System and only 69 returned and usable. Using quantitative method, data collected is analyzed using Statistical Package for Social Sciences (SPSS) and Structural Equation Modelling (SEM) with Partial Least Squares (PLS). The results indicate that there is no relationship between EMA (monetary and physical) and environmental performance. However, the results found positive relationship between EMA (monetary and physical) and environmental innovations as well as environmental innovations and environmental performance. Moreover, the results show that environmental innovation mediates the relationship between EMA (monetary and physical) and environmental performance. The results also indicate that environmental performance have shifted to more than just compliance. More research should be carried out in order to produce better understanding in the progress of environmental performance of the companies in Malaysia to sustain the ecosystem while improving a company's environmental performance and thereafter fostering Malaysia to be on par with other international developed country.

ABSTRAK

PERAKAUNAN PENGURUSAN ALAM SEKITAR DAN PERSTASI ALAM SEKITAR DALAM SEKTOR PERKILANAGAN MALAYSIA

Pembuat polisi dijangka mengambil tindakan yang lebih teliti berikutan isu persekitaran alam semula jadi yang semakin membimbangkan khususnya prestasi alam sekitar sesebuah syarikat. Oleh itu, objektif kajian ini adalah untuk menyiasat hubungan di antara Pengurusan Persekitaran Perakaunan (monetari dan fizikal) dan prestasi alam sekitar. Seterusnya, kajian ini juga melihat kepada hubungan inovasi persekitaran yang berperanan sebagai pengantara prestasi alam sekitar dan Pengurusan Persekitaran Perakaunan berdasarkan Teori Pandangan Semula Jadi. Selain itu, hubungan di antara inovasi persekitaran dan prestasi persekitaran juga akan dikaji. Akhir sekali, kajian ini juga akan mengkaji kesan penyederhana inovasi alam sekitar terhadap hubungan di antara Pengurusan Persekitaran Perakaunan (monetari dan fizikal) dan prestasi persekitaran. Kajian ini dijalankan dalam sektor pembuatan berskala besar kerana ia mempunyai hubungan secara langsung dengan alam sekitar. Sebanyak 337 borang soal selidik telah diedarkan kepada syarikat pembuatan yang mempunyai Sistem Pengurusan Alam Sekitar ISO 14001 tetapi hanya 69 yang dikembalikan dan dapat digunakan. Menggunakan kaedah kuantitatif, data yang diperolehi telah dianalisis menggunakan Statistical Package for Social Sciences (SPSS) dan Structural Equation Modelling (SEM) dan Partial Least Squares (PLS). Hasil kajian menunjukkan tiada hubungan di antara persekitaran pengurusan perakaunan (monetari dan fizikal) dengan prestasi alam sekitar manakala inovasi alam sekitar dan prestasi alam sekitar menunjukkan terdapat hubungan yang positif. Selanjutnya, inovasi alam sekitar menunjukkan kesan penyederhana ke atas hubungan persekitaran pengurusan perakaunan (kewangan dan fizikal) dengan prestasi alam sekitar. Hasil dapatan kajian ini menunjukkan bahawa tanggungjawab terhadap prestasi alam sekitar bukan sahaja untuk mematuhi undang-undang. Kajian lanjut perlu dijalankan untuk memastikan syarikat-syarikat di Malaysia lebih memahami kepentingan mengekalkan ekosistem dan memperbaiki prestasi alam sekitar agar dapat meletakkab Malaysia setanding dengan negara maju.

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CHAPTER 1

INTRODUCTION

1.0 Background of the Study

Environmental implications are now seen as more apparent. Decision makers are then expected to resolve issues beyond what is typically related to the operations of a company. Specifically, a company's environmental performance is scrutinized. Researchers and practitioners are concerned over linking the environment and a company's performance as it can lead to better financial performance and thereafter, better economic gain. A research by Al-Tuwaijri, Christensen and Hughes (2004) suggested that good environmental performance is positively related with good economic performance and can produce more in-depth environmental disclosures of specific pollution measures that are quantifiable. Thus, there should be the measurement of environmental performance, the significance of which is taken note in this particular study.

A preliminary study has been conducted to explore the perspective and position of environmental performance in Malaysia. In particular, two manufacturing companies that are certified with ISO 14001 Environmental Management Systems (EMS) are chosen in the preliminary data collection. Specifically, Environmental Executives are interviewed. Additionally, with the ISO certification, it is guaranteed that the companies are environmentally proactive and have resources on its physical environmental surrounding. Three environmental government agencies are also interviewed, one of which provides the ISO 14001 EMS certification to companies. The other two government agencies administer the Malaysian environmental laws. Officers of higher position in their respective agencies are interviewed due to their better knowledge of the Malaysian

environmental performance. All interviewees have been assured that their identities are kept confidential and their interview sessions are used only for research purposes.

Accordingly, the preliminary study found that companies are now much aware of its environmental impact to the ecology. Additionally, companies would rather measure environmental performance than to pay for environmental fines, cleanup fees or court costs resulting from environmental damage. Such fines can deteriorate a company's image and from an investment standpoint, shareholder value suffers (Ilinitch, Soderstrom and Thomas, 1998). Taking into account the effect of environmental performance, this study looks into the specific area of research. In order to measure environmental performance, the operational effects to the environment such as the process, products or services are scrutinized. However, environmental performance is seen to have shifted to a multidimensional construct with factors such as the environmental impact on the natural resource, local community, employees and is much more important to shareholders and stakeholders (Ilinitch et al., 1998). Therefore, environmental performance in this study is measured by company's internal system, stakeholder relation, financial impact and internal compliance towards the environment.

With the increase of pressure to examine the environment performances of companies, the emergences of various management accounting begin to develop. Specifically, the interest of quantifying the environment became increasing as environmental costs are not considered to be significant in traditional management accounting (Burrirt, 2004; Christ and Burrirt, 2013; Qian, Burrirt and Chen, 2015; Guenther, Endrikat and Guenther, 2016). This argument has been evident in prior research which has provided that the traditional costs accounting has failed to recognize environmental costs to the specific processes and products that aggregate them (Jasch, 2003; Gibson and Martin, 2004; Burrirt, 2004). In particular, the conventional method may also call for the subtraction in a lump sum from operating income (Jasch, 2003; de Beer and Friend, 2006). Hence, the traditional management accounting system then overestimates the costs of an item that may generate too little waste or underestimates the costs of an item that may generate too much waste.

Additionally, financial liabilities such as the legal costs for unlawful environmental conducts are often unaccounted for (Frost and Wilmshurst, 2000). Staniskis and Stasiskiene (2006) observed that the use of overheads in general is usually due to the firm's previous failure to monitor and control its environmental costs, and therefore hidden in the overhead. Hence, many opportunities for improvements of environmental performance have not been identified. Not only that, at the heart of this traditional modus is the suggestion that a firm's pollution equates inefficiency (Cullen and Whelan, 2006). This includes both in terms of wasted resources and non-value-added activities that are necessary to dispose wastes. However, the only thing that should actually leave a firm is a product or service for sale unless the particular wastes can be represented as a cost to the company such as the sale of waste as feedstock (Gale, 2006). By extending the management accounting range, the result of it is the better improved environmental performances which indirectly establish better business endings.

Thus, environmental management accounting (EMA) has been suggested as a beneficial tool to overcome the limitation of traditional management accounting (Burrirt, Hahn and Schaltegger, 2002; Fuadah and Arisman, 2013). In this study, EMA refers to the management accounting tool for identification, collection and thereafter analysis of financial and non-financial information for decision making (IFAC, 2005). According to Burrirt et al. (2002), EMA is the generic term for monetary EMA and physical EMA. In this study, monetary EMA is the monetary environmental information tool that addresses all environmental aspects of company activities on its past and future financial flow which is expressed in monetary units (Burrirt et al., 2002). Physical EMA refers to the physical environmental information tool that addresses all environmental aspects of company activities on its past and future material and energy flow which is expressed in physical units. The general intention of monetary EMA and physical EMA is to include environmental information into every decision making at every level of a corporate. Both EMA allows decision makers to track, thereafter treat environmental information and revenues, providing a link between environmental related activities and the companies' present and future monetary flow. Prior literature has demonstrated the many benefits that can be reaped from EMA which include superior cost saving and sustaining

competitive advantage (i.e. Frost and Wilmshurst, 2000; Jasch, 2003; Khalid, Lord and Dixon, 2012; Fuadah and Arisman, 2013; Jaidi, Noordin, Mail and Lim, 2018).

However, as environmental concern becomes more widespread, this forces a company to further scrutinize activities at every step of the value chain. The internal competencies of a company will then be further explored. According to Perez, Ruiz and Fenech (2007), the process of continuous environmental improvements entails corporate resources and capabilities. Thus, according to the natural resource-based view (NRBV) theory, the heterogeneous resources and capabilities will enable a company to innovate their processes and products to become more environmentally conscious. Specifically, the roles of resources and capabilities in addressing the natural environment can assist in better environmental performance using environmental management, in this case, monetary EMA and physical EMA. This suggests that environmental innovation may serve as a mediator to the relationship between EMA (monetary and physical) and environmental performance. Environmental innovation in this study is the new or modified process and product to avoid or reduce environmental harms. Further, this study investigates these relationships in the Malaysian manufacturing companies.

TN50 (Transformasi National 2050) is the ambition of the Malaysian country to be among the top 20 countries in the world over the next three decades after the year 2020. In focusing on the economy, environment and the people, a constant overall growth can be seen in Malaysia. As of the year 2017, Malaysia's Gross Domestic Product (GDP) grew from RM 254.7 billion to RM 265.8 billion. Table 1.1 presents the constant increase of GDP with each year and with the clear trend, the country's GDP will most likely continue to increase by the year. One of the main driving forces behind the impetus of the economy is the manufacturing sector. Provided in Figure 1.1, the manufacturing sector is seen to have contributed to the Malaysian GDP at 23%, making the sector to be the second largest contributor because it consists of the following industries: electrical and electronic products; petroleum, chemical, rubber and plastic products; non-metallic mineral, basic metal and fabricated metal products; wood furniture and paper products; textile, wearing apparel and leather products; food, beverage and tobacco products; and transport equipment and other manufacturing products.

Table 1.1: GDP by Year

	2013	2014	2015	2016	2017
GDP (RM billion)	219.2	232.5	243.9	254.7	265.8

Source: Economic Planning Unit Malaysia (2017)

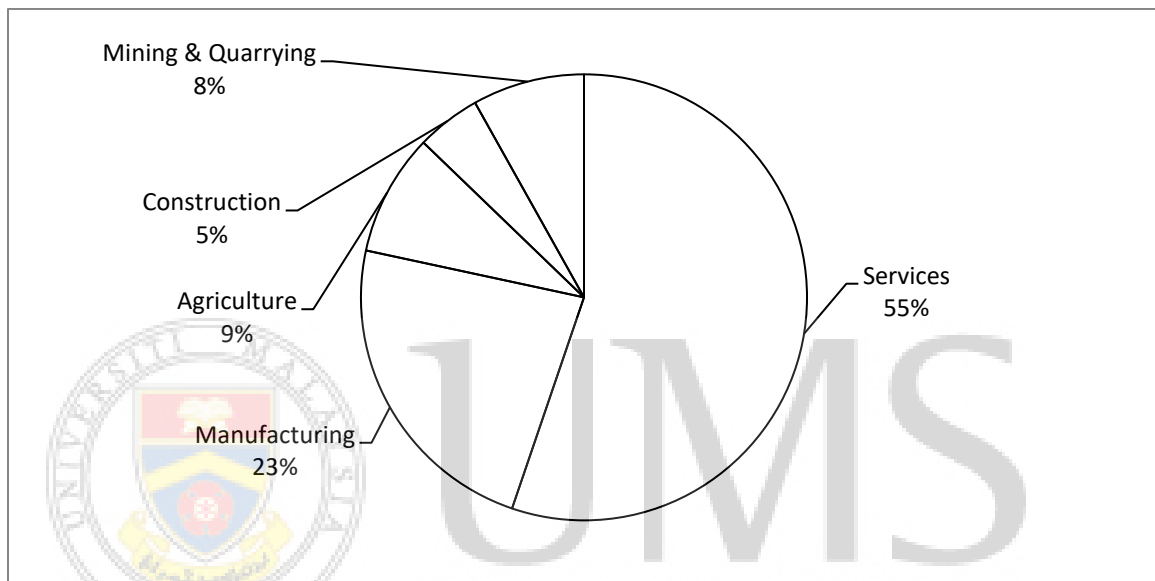


Figure 1.1 : Percentage Share to GDP at Constant 2010 Prices

Source : Department of Statistics Malaysia (2017)

According to The Star Online (2017) and The Sun Daily (2017), the manufacturing sector is seen to have supported the country's GDP growth especially through the electrical and electronics (E&E) industry. The E&E industry is the leading industry in the manufacturing sector wherein it contributes to a significant 36.6% to the country's exports in 2016 (MIDA, 2017). With regards to the total gross exports in the manufacturing sector of Malaysia, there is a constant increase trend as provided in Table 1.2. Additionally, the Malaysian trade exports are dominated by the manufacturing sector. Figure 1.2 provides for a chart on the Malaysian export.

Table 1.2: Gross Exports by Year in the Manufacturing sector

	2013	2014	2015	2016
Gross exports (RM billion)	548.1	587.2	625.4	645.7

Source: Economic Planning Unit Malaysia (2017)

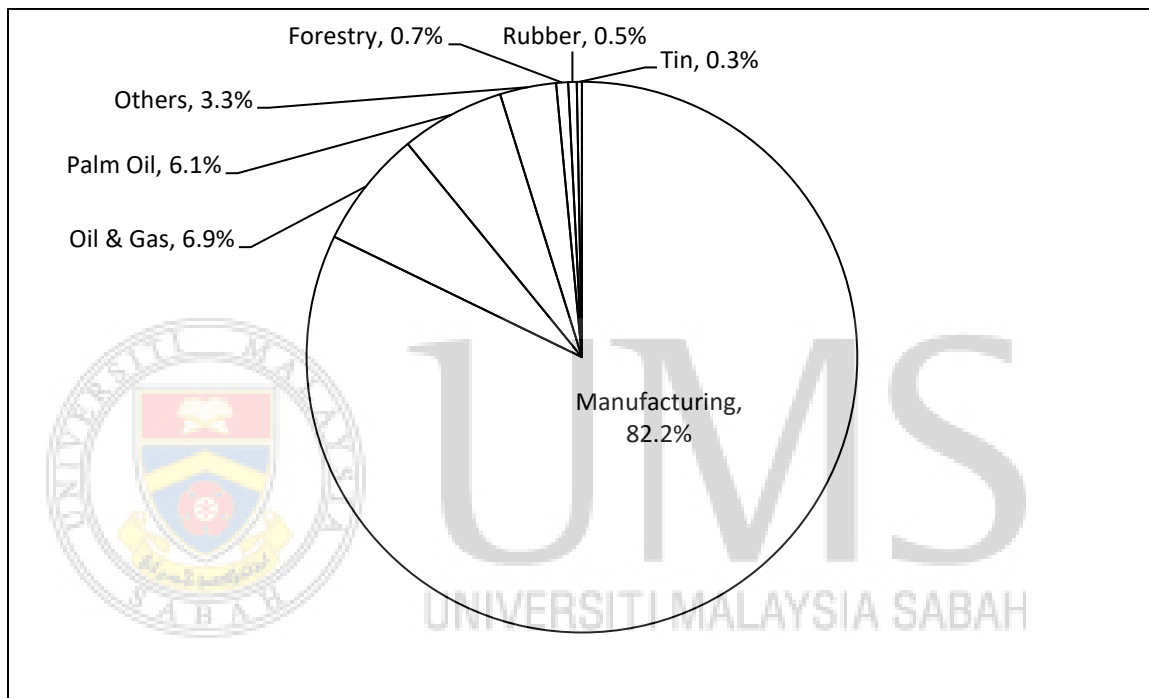


Figure 1.2 : Diversification of Exports

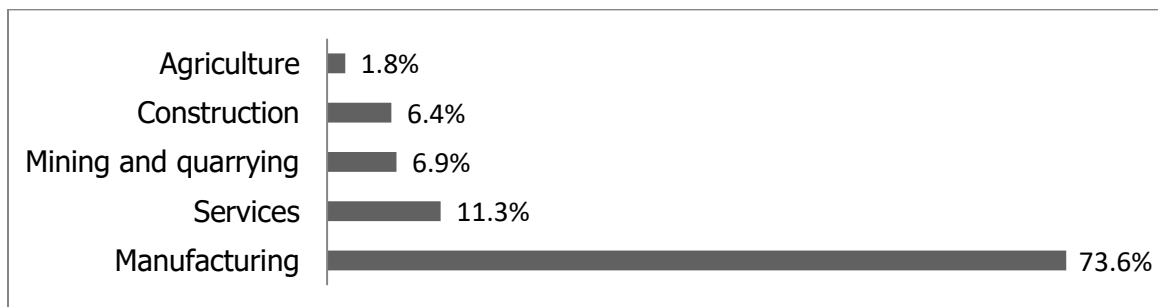
Source : Economic Planning Unit Malaysia (2017)

It is evident that the Malaysian economic is driven by the manufacturing sector and the economy is rising by each year. However, with the increase of the demand from the economy means that business should increase. With the increase in business and especially in the development of the manufacturing sector also means that the sector will have direct impacts to the Malaysian environmental health. For example, out of 473 rivers in Malaysia which are monitored by the Department of Environment, 186 rivers are slightly polluted and 43 are polluted (Malaysian Digest, 2016). Currently, the increase

of the pollution level come from industrial wastewater, domestic and commercial activities (Sakundarini and Ghazila, 2018).

In another example, the clearing of land has also increased for industrial purposes. While two thirds of the Malaysian land are shielded with forestry, much of the land have been heavily impacted with illegal logging and the expansion of rubber and oil palm plantations (WWF, 2016). Currently, Malaysia is one of the world's largest exporters in the wood industry and a total of 80% of the furniture manufactured in Malaysia is made of rubber wood (MIDA, 2018). As such, the need for a continuous supply of raw materials has encouraged the decrease of forest resources. This has resulted in the sudden downpours of rain, flood, climate change, mudslides and polluted rivers. It is therefore already apparent that the manufacturing sector has been contributing to the environmental damage. The Malaysian government is also recognizing this and under the Economic Census (2016), environmental protection expenditure was provided majorly to the manufacturing sector. Table 1.3 provided the expenditure by sector and can be seen that an evidently large portion of the expenditure was granted to the manufacturing sector.

Table 1.3: Environmental Protection Expenditure by Sector



Source: Department of Statistics Malaysia (2016)

In the preliminary study done, it was found that the manufacturing companies are knowledgeable about the Malaysian environmental health and have performed some kind of environment management to assess environmental performance. Traditionally,

financial performance is the only form of performance investigated. In other words, companies choose a particular strategy and system based on if the financial benefits outweigh the costs (Clemens and Bakstran, 2010). Performances of a company have since shifted to more than financial performance and have looked into other ways to assess a company which can bring direct impact to a company's profit. According to the preliminary study, manufacturing companies are now well equipped with environmental knowledge because of various reasons. Particularly, stakeholders are now demanding more environmental conscious process and products causing environmental awareness to be specifically high amongst employees.

Among other issues that had been highlighted during the interviews are that environmental laws in Malaysia are enough and any environmental standards are voluntary. However, stakeholders are demanding more, and the level of environmental awareness has shifted to a higher and global level than before. For example, the executive of one of the manufacturing companies that has been interviewed stated that measuring noise performance is not mandatory by the government environmental law but is still under the guidelines. The executives of the companies stated that companies usually go until compliance. But there is a difference in measuring environmental performance beyond compliance as their environmental tools has helped them to further reduce costs. The company reiterated that managing the environmental is seen as costly because there is the need to only comply. However, going for environmental performance has assisted the company to reduce wastes, water usage, and electricity and at the end there is return of investment.

Moreover, the manufacturing companies have stated that they perform environmental performance through an environmental system. In Malaysia, the ISO 14001 EMS is an international certification that assesses environmental performance thus can reflect that a company has good environmental performance. A lot of the manufacturing companies apply ISO 14001 EMS to evaluate environmental performance. On more enquiries during the preliminary study, it was found that the manufacturing companies with ISO 14001 EMS have monetary EMA and physical EMA but do not

specifically understand the term. On further elaboration, the companies agreed that they do assess environmental information both in terms of monetary and physical.

Thus, it can be said that both monetary and physical EMA has been applied in the manufacturing sector of Malaysia, but the term is not yet widespread. In recognizing the use of EMA as a management accounting tool to measure environmental performance, this study aims to investigate the relationship between both EMA (monetary and physical) and environmental performance in the Malaysian manufacturing companies. This study further investigates the role of environmental innovation as a mediator, supported by the natural resource-based view (NRBV) theory.

1.1 Problem Statement

Measuring environmental performance has now been seen as a significant area of study due to several reasons as it is much discussed in the previous sections. In Malaysia, the manufacturing sector can be seen as one of the main contributors to the Malaysian environmental damage. This is due to the rapid growth of the sector as one of the main contributors to the GDP of Malaysia. The fact that the Malaysian government is granting environmental protection expenditure majorly to the manufacturing sector suggests that the Malaysian government is recognizing the importance of environmental performance. At the corporate level, the preliminary study also suggests that environmental performance is a significant area of study. For example, one manufacturing company specified that their customers requested a report on package handling as part of wastes even after their products are sent out. This means that environmental performance has now shifted from mere documentation to the real operations of a company.

However, literature within the environmental performance context is very much broad and more often assessed within specific environmental issues i.e. energy and emission savings and environmental reporting. There are also limited studies within the context of the Malaysian manufacturing sector as most studies looked into bigger and larger companies. However, such research may provide varying results within the study of environmental performance as larger companies has more access to resources and profits which may automatically leads to better environmental performance. This study,