IJEM
International Journal of Economics and Management
Journal homepage: http://www.ijem.upm.edu.my

The Relationship between Contingent Factors that Influence the Environmental Management Accounting and Environmental Performance among Manufacturing Companies in Klang Valley, Malaysia

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ABSTRACT

Environmental issues are attracting increasing attention in Malaysia with the tremendous increase in waste generation; the cost of production and waste treatment is getting expensive. Data from the Malaysian Environmental Department shows that 80% of the waste is generated by the manufacturing industry. Firms are constantly requested to change their business practices to incorporate environmental activities. It also indicates that future natural resources are being squandered as waste due to less exposure to environmental management accounting, which results in unproductivity, overproduction, increase in total delivery cost, or inefficiency in manufacturing plant. This research exploits the quantitative research methodology to understand the relationship between contingent factors, which are uncertainty in the environment, organizational size, environmental strategy, regulatory pressure, and top management commitment that influence environmental management accounting and environmental performance among manufacturing companies in Klang Valley, Selangor. The survey was conducted on manufacturing companies located in Klang Valley, based on the 2,400 companies registered in the Federal Malaysian Manufacturer (FMM) database. 600 questionnaires were sent out to manufacturing companies and the finding highlights that the uncertainty in the environment, regulatory pressure, and top management commitment significantly affect environmental performance.

JEL Classification: L25, M41

Keywords: Environmental Management Accounting; Contingent factors, Top Management Commitment, Regulatory Pressure, Uncertainty Environment, Environmental Strategy, Manufacturing and Sustainability

Article history:
Received: 3 July 2017
Accepted: 3 April 2018

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INTRODUCTION

Environmental issues like urban air pollution, water pollution, deforestation, loss of biodiversity, loss of mangrove habitats, as well as national and transboundary smoke/haze (Anbumozhi and Intal, 2015) are attracting increasing attention in Malaysia, with companies or businesses being requested to change their business practices to incorporate environmental activities. Bursa Malaysia requires all listed companies to disclose their corporate social responsibility (CSR) activities as a mandatory requirement. More and more incentives and rebates are being provided to encourage more environmental engagement, such as green tax incentives, duty exemptions for hybrid cars, pioneer status tax incentives for waste recycling facilities. However, companies are still not convinced about the benefits of reporting environmental-related issue, because it involves a high cost and no immediate return (Aragón-Correa and Rubio-Lopez, 2007).

Contingency theory (CT) examines the relationships between contingent factors and management accounting systems, which is the main idea of contingent fit. The contingency approach in management accounting is built on the evidence that there is no universally appropriate management accounting system that applies equally well to all organizations in all circumstances (Otley, 1980; Otley, 2016). Based on CT, the current research tries to address the contingent factors that can achieve better environmental performance. Organizations face pressure from stakeholders to become more environmentally friendly. The main underlying reason why many firms are pursuing environmental strategies is the growing body of evidence that green production improves efficiency and synergy among business partners; leads corporations to achieve better financial gain; helps to enhance environmental performance, minimize waste, and achieve cost savings and marketing exposure. In addition to that, for firms in the manufacturing industry, environmental friendly initiatives may not be seen positively by stockholders, employees, and consumers (Nishimura, 2014). Therefore, organizations are adopting environmental management practices, which have become an important part of their strategy (Wiengarten et al., 2013). As a result, this research was carried out to gather empirical evidence to address this important phenomenon regarding the relationship between contingent factors and environmental management accounting in Malaysian manufacturing industries.

Hopwood, Unerman, and Fries (2010) investigated the challenges faced by organizations in today's world; operating in an environmentally, socially, and economically sustainable manner is one of the most urgent challenges facing organizations today, and the basic issues are climate change, overconsumption of finite natural resources, and rapidly increasing destruction of the Earth's ecosystems. EMA refers to the design and use of physical and monetary environmental information to support business decision-making (Bartolomeo et al., 2000). According to Jasch (2003), environmental management accounting (EMA), established in 2003 by the United Nations Divisions for Sustainable Development, is significant for modernization strategies for cleaner production due to the better cost and benefits yielded. At the same

time, environmental management accounting provides information that can be used by the corporate management to assess opportunities for economic and environmental improvement.

Noor (2011) states that Malaysia is an environmentally rich country, and it is one of the fastest-growing economies in the Association of Southeast Asian Nations (ASEAN) region at present, though facing numerous environmental problems such as air pollution, water pollution, and exploitation of natural resources. The paper concludes that, although the Government of Malaysia has passed some important environmental laws along with the international initiatives for protecting the environment, it regrets the absence of environmental governance that deals with the human and environmental rights approaches, including good governance under the public international law and the international environmental laws along with ethics and social responsibilities. With that in mind, each organization has to plan well to guarantee efficient usage of resources and ensure that the future's needs can be satisfied. This again shows that Malaysia is at an infancy stage for environmental accounting.

The manufacturing sector has grown steadily in terms of value over the years and it is estimated that about 43.7% of Malaysia's FDI was contributed by this sector in 2014, as shown in Table 1 below. This indicates the need to perform studies on environmental issue by Malaysian manufacturers. Furthermore, Malaysia is ranked in the twenty-third position among the world's manufacturing countries (Source: news release in Malaysia Economy, 2010). Tan Sri Mustapa Muhamed, the Minister of International Trade and Industry, stated on 2nd July 2015 that Malaysia remains an ideal location for new investments and sustained confidence of existing investors' in reinvesting, which is especially relevant at a time of uncertainty in the global economy and ongoing turbulence in geopolitics.

Table 1 FDI Position by Sector, Malaysia, 2008-2014

Sector	2008		2009		2010	
	RM (Mil.)	%	RM (Mil.)	%	RM (Mil.)	%
Agriculture	8.7	3.4	9.2	3.4	9.4	3
Mining (Oil & Gas)	14.6	5.7	17.2	6.3	18.4	5.9
Manufacturing	125.6	49.3	126.7	46.8	146.8	46.8
Construction	1.1	0.4	1.1	0.4	1.4	0.4
Trade/Commerce	18.8	7.4	21.3	7.9	25.5	8.1
Finance Intermediate	53.5	21.0	64.3	23.8	73.9	23.6
Information & Communication	19.37	7.7	17.3	6.4	21.8	6.9
Other Services	13.0	5.1	13.6	5.0	16.3	5.2
Total	255.0	100.0	270.5	100.0	313.3	100.0

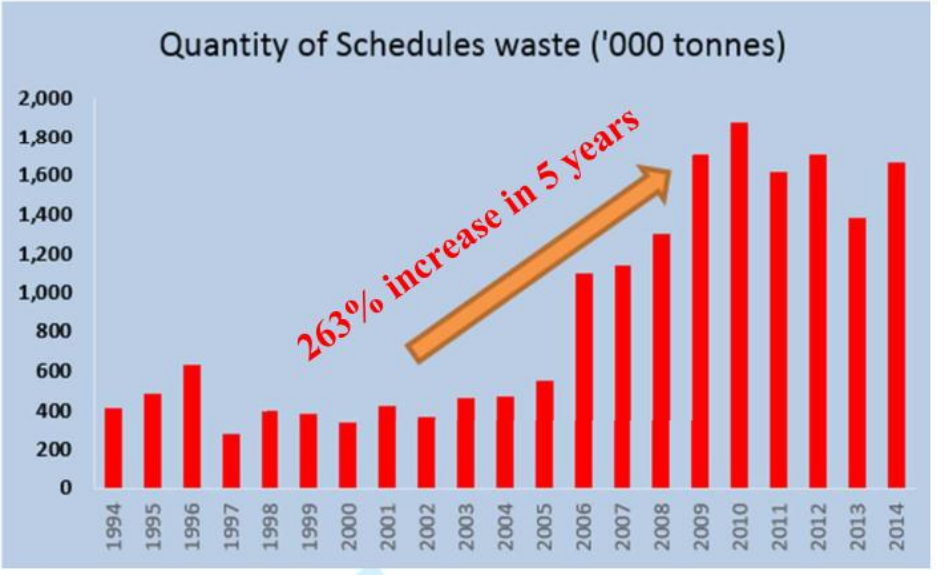
Source : Malaysia Economic Statistics Time Series (2014)

Table 1 Cont.

2011		2012		2013		2014	
RM (Mil.)	%	RM (Mil.)	%	RM (Mil.)	%	RM (Mil.)	%
9.5	2.6	9.9	2.4	10.9	2.4	11.1	2.4
24.3	6.6	27.5	6.8	35.0	7.8	35.8	7.7
173.2	47.4	187.6	46.2	203.4	45.6	204.1	43.7
1.4	0.4	1.6	0.4	2.8	0.6	3.4	0.7
30.5	8.4	34.1	8.4	32.3	7.2	34.5	7.4
81.4	22.3	87.3	21.5	94.8	21.2	98.0	21.0
25.6	7.0	33.5	8.2	34.7	7.8	45.0	9.6
19.7	5.4	24.1	5.9	32.4	7.3	35.8	7.6
365.5	100.0	405.7	100.0	446.4	100.0	467.5	100.0

Source : Malaysia Economic Statistics Time Series (2014)

In Malaysia the amount of waste generated by industry is currently increasing tremendously, as shown in the Figure 1 below. Comparing 2003 with 2011, it spiked by 263%, and the trend increased continuously until 2014.



Source : Department of Environment (2014)

Figure 1 Schedule Waste Trend 1994 to 2014

Referring to Figure 2 below, the top five industries waste generation contributors are from the chemical, power station, electronics, metal, and premises industries. In summary, 80% of the wastage is contributed by manufacturing industries. The treatment cost or dumping cost of the waste generated by industries is expected to increase and indirectly affect the operating cost of companies. Under local regulations, the waste should undergo additional treatment before being dumped in landfill to avoid any environment-related issues for the ecosystem, which incur costs.

As mentioned above, CT explains the phenomenon of contingent fit in order to determine which factor leads to better EMA and ultimately improves their environmental performance. After identifying the key factor, organizations can then improve their environmental and financial performance and generate higher returns for shareholders. This implies that the waste generated and the cost of production will be lower, thus yielding better performance for the organization. To achieve successful environmental management accounting, manufacturing leaders and managers need to know which contingent factors influence the companies' operating costs and how it can be embedded into their daily routine, which can then provide significance in the modernization strategy in cleaner production by yielding better cost.

The relationships explained in the current study are based on CT, including a number of contextual variables that were used in existing management accounting and EMA literature. Although EMA research is still at an infancy level and based on CT, there is a gap in the existing literature concerning antecedents and consequences of EMA practices and development (Qian et al., 2011; Christ and Burritt, 2013). Using survey questionnaire, this study sought to attain a better understanding of contingent factors influencing the EMA and its outcome in organizations.

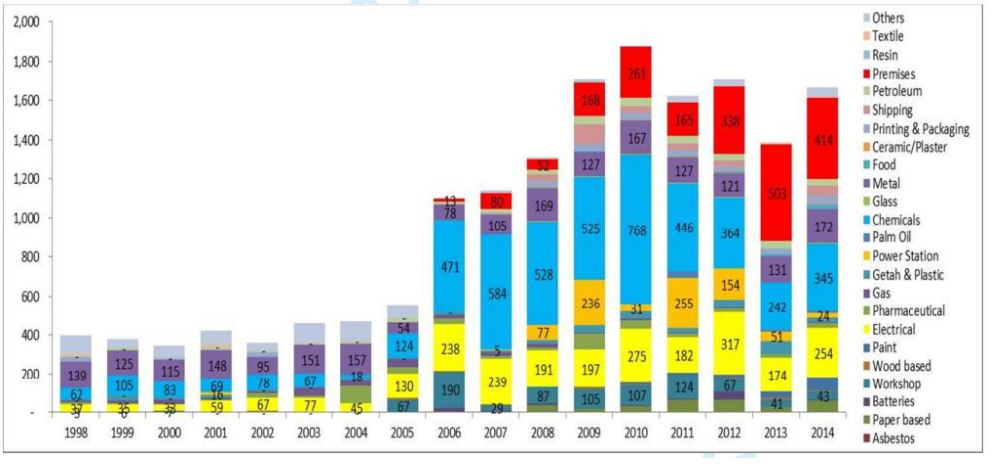


Figure 2 Schedule Waste generated by Industry 2007 to 2014

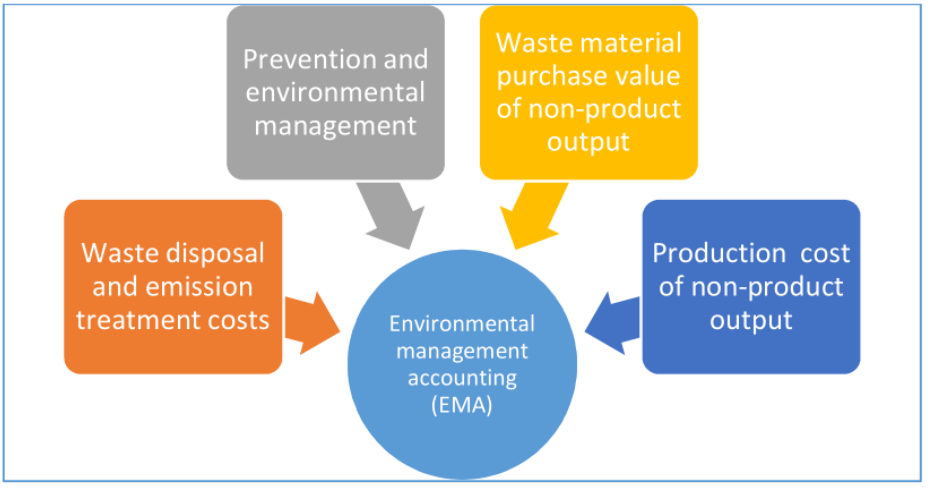
Environmental Management Accounting

Environmental management accounting (EMA) is the next step in the evolution of management accounting (Jasch, 2006). EMA plays a significant and important role not only in environmental management system and decisions, but also in contributing to the production process, budgeting, procurement, and performance appraisal system. EMA can also be described as the identification, allocation, generation, and use of physical and monetary environmental information to support business decision-making in order to achieve a sustainable business (Bartolomeo, Bennett, and Bouma, 2000; Bennett, Bouma, and Wolters, 2002; Christ and Burritt, 2013; Wilmshurst and Frost, 2001). The data from financial and cost accounting have been used to increase material efficiency and reduce environmental impact (Herzig, Viere, Schaltegger, and Burritt, 2012; Jasch, 2003).

Table 2 EMA metrics (for internal decision making)

Physical Metrics	Monetarized Metrics
• Material & Energy Consumption	• Cost-saving initiatives
• **Disposal cost**	• Revenue driven from sales of waste

Source: Jasch (2003)



Source : Jasch (2003)

The working group also established the definition of environmental cost, as this was not clearly defined in traditional accounting standards. An accountant has most of the information, but is unable to separate the environmental part without further guidance, since they have limited experiences within the framework of existing accounts. Even an environmental manager rarely has access to the actual cost accounting documents of the company and is only aware of a tiny fraction of the cumulative environmental cost.

Figure 3 Environment cost categories

Based on Figure 3, the environmental protection cost is summarized into waste disposal and emission treatment, environmental management and pollution prevention in Jasch's (2003) research. The first categories of waste disposal and emission treatment comprise of all treatment, disposal, and clean-up costs of existing waste and emission. The second categories' main focus for prevention and environmental management is the annual cost of waste and emission prevention without cost-saving components. Even environmental revenues that derive from sales of waste or grants of subsidies are accounted for in separate grouping.

THEORY AND HYPOTHESES DEVELOPMENT

Contingency Theory (CT)

Contingency theory is a very traditional approach to organizational performance and identifies the relationship between variables. All organizations use this theory during their performance management system design phase, as it is also a classic basic management tool that has been used since the beginning of the management theory (Chenhall, 2003; Donalson, 2001; Ong and Teh, 2008). Christ et al.'s (2013) research suggested that the extension of contingency factors is required in the field of environmental management accounting (EMA), as the business world is becoming extremely competitive and various stakeholders are demanding that managers meet the challenges of environmental sustainability. Therefore, various techniques and tools need to be designed to assist organizations in managing their environmental activities. Otley (2016) argued that the majority of the research in management accounting is based on contingent factors. These contingent factors decide when a particular framework may be more suitable for specific firms in a particular circumstance. This research argues that, based on Otleys' definition that improved industrial environmental performance, it is essential that the Malaysian manufacturing industry is competitive in the international market.

Hypotheses Development

The research in the area of EMA is growing with time. Researchers are trying to understand the impact of the contingent factors of EMA, as well as the consequences (see Bouma and van der Veen, 2002; Qian et al., 2011). The result is a significant knowledge gap concerning EMA. By looking into these factors, it appears to be an impasse between the effort made by Malaysian Government in promoting EMA activities and the level of EMA uptake in manufacturing industry, and there is a clear need to develop a greater understanding of the variables that influence and drive EMA adoption at the organizational level. CT offers an appropriate way to investigate this relationship (Abdel-Kader and Luther, 2008), as it is a widely used theoretical approach in contemporary management accounting research, a discipline from which EMA has developed and evaluated with the passage of time. Based on the assumption that an organizational activity is the direct result of organizational context, CT posits that when an appropriate match or fit between accounting activities and context is achieved, organizational performance is likely to be enhanced (Chenhall, 2003; Ong and Teh, 2008).

Similarly, a series of studies conducted by the Council on Economic Priorities (CEP) in the 1970s found that the expenditure on pollution control (petroleum refining, steel, pulp and paper, and electric utility industries) is significantly correlated with financial performance. In this research, the authors identified a significant positive correlation between various financial returns and an index of environmental performance developed by the CEP (Russo and Fouts, 1997). Konar and Cohen's (2001) key finding showed that there is a significant positive relationship between environmental performance and financial performance. Publicly traded firms in the S&P 500 that have poor environmental performance have lower intangible asset values, as well as negative abnormal returns when they have bad environmental news such as oil spills. However, positive returns are foreseen when firms receive environmental awards. Clarkson et al. (2011) took a positive outlook: firms that choose to improve their environmental performance tend to experience an improvement in their financial resources or management capability immediately prior to the material improvement in their relative environmental performance.

i) Uncertainty Environment and EMA

Henri's (2010) research highlighted the perceived environmental uncertainty that reflects the changes in the external environment promotes innovation in management control system (i.e. EMA). The findings concluded that when a firm faces a higher level of perceived uncertainty, its managers need additional information to understand the changing situation in order to reduce the information gap and undertake a periodic review of performance alignment among the strategies, actions, and measures for sustainability performance measurement. As a result, more advanced management control system is used to facilitate the requirement. Carlos et al. (2010), focusing on the

impact of the changing competitive environment on organizational practices, stated that recent environmental and market changes have left their unmistakable marks on performance measurement literature and lead to the development of advanced management control techniques. In short, uncertainty environment promotes organizations to adopt more advanced management control techniques such as EMA.

ii) Size and EMA

The current research argues that advanced management accounting system such as EMA is more adoptable in large organizations compared with small organizations (Cadez and Guilding, 2008; Chenhall, 2003). Abdel-Kader and Luther (2008) summarized this position by suggesting that "moving from naive to more sophisticated management accounting practices requires resources and specialists only affordable by large and very well established organizations. Large firms tend to invest more extensively on environmental management (Murphy et al., 1995) due to better availability of resources (Judge and Douglas, 1998) and also greater need to protect their reputation. As a result, in this study size, it is anticipated that firm size will have an impact on EMA adoption.

iii) Environmental Strategy and EMA

Literatures show that corporate environmental strategies are more likely to bring positive financial performance when firms obtain environmental competencies (Walls et al., 2011). Sharma and Vredenburg (1998) articulated the notion of proactive corporate environmental strategies to conceptualize voluntary environmental practices such as leading to EMA adoption from firms. Common strategies developed in contingency-based studies include product-differentiation cost leadership (Porter, 1980; Chenhall, 2003). Firms with environmental strategic focus regard environmentalism as a new product concept and respond with actions to go green with its products, as well as with environmentally improved system such as EMA (Mccloskey and Maddock, 1994). Previous literatures suggest that environmental strategy may become the contingent factor for environmental management system. This can be found in the studies of Qian et al. (2011) and Qian and Burritt (2009), where they included the environmental strategy within their research framework. They found that the level of proactivity added into environmental strategies to have a direct impact on EMA in waste management system of local governments. In sum, environmental strategy implementation facilitates the emergence of firm's adoption of EMA.

iv) Regulatory Pressure and EMA

According to Liu et al. (2010), government agencies are the obvious actors that influence organizations' adoption of green practices. For instance, in order to reduce pollution towards the environment, organizations need to use pollution-control

technology and report their pollution emissions. Otherwise, organizations may face legal sanctions that affect business progress. The fear of legal sanctions is considered the main reason why organizations practice going green (Hoffman, 1997). The government's environmental policy and regulations are critical drivers in which firms have to comply with (Schrettle et al., 2014). Banerjee (2001) suggested that regulatory requirements have a significant impact on organizational green approaches, profitability, and growth. Jamaluddin et al. (2009) stated that Malaysia, following the vision of 2020, has introduced environmentally sound and sustainable development as two main factors in social, cultural, and economic progress and enhancement of the quality of life of Malaysians. Therefore, companies are encouraged by the Malaysian Government to enhance their performance by minimizing their activities that exert an impact on the environment and increasing their innovative capacity through superior environmental cost information for creating and sustaining competitive advantages. Therefore, it brings the role of regulatory pressure to implement the EMA as a new tool in management accounting. This could be viewed as a strategic management technique that is embedded in the current management accounting practices, which create and drive companies' values to a higher level of environmental performance.

v) Top Management Commitment and EMA

The successful implementation of EMA activities requires the commitment from different functional departments (Lee, 2011; Yakhou and Dorweiler, 2004). The literature recommends that the absence of correspondence between accounting and EMS can possibly hinder firms' efforts with respect to EMA adoption (Bartolomeo et al., 2000; Bennett and James, 2017; Lee, 2011), it is sensible to accept that EMA will probably be actualized and effective when the organizational structure of a business supports parallel communication and exchange of ideas within a firm. Pondeville et al.'s (2013) findings highlighted the importance of top management in the development of a corporate environmental strategy and adoption of a more advanced management control system to drive business success. In summary, top management commitment is crucial in driving any change in management or new implementation such as EMA.

vi) EMA and Environmental Performance

According to the International Federation of Accountants (IFAC; 1998, para. 1): "EMA is the management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices. While this may include reporting and auditing in some companies, EMA typically involves life-cycle costing, full-cost accounting, benefits assessment, and strategic planning for environmental management". EMA allows for a better integration of the environmental information into the existing accounting systems. As it explicitly treats environmental costs and tracks environmental information, EMA also highlighted hidden environmental costs and benefits (Jasch 2003; Jasch and

Lavicka, 2006) and helps firms to work to face their environmental responsibilities (Schaltegger and Burritt, 2000).

vii) Mediating Role of EMA between Contingent Factors and Environmental Performance

EMA can drive organizations into developing a system that supports environmental strategy-making and strategic alignment in order to address environmental issues (Gond et al., 2012). Thus, EMA based on the contingent fit facilitates an effective integration of environmental issues within the processes of strategy-making and strategy implementation, align corporate decision-making and employee behaviors and actions with environmental objectives, and improve the identification of emerging threats and opportunities (Gond et al., 2012; Henri and Journeault, 2010; Lisi, 2015). Hence, EMA may simultaneously foster environmental performance by translating environmental accounting objectives and activities into a competitive advantage. Past literatures (Abdel-Kader and Luther, 2008; Henri and Journeault, 2010; Bennett and James, 2017) posit that contingent factors such as environmental uncertainty (Carlos et al., 2010; Garengo et al., 2007; Gimzauskiene and Kloviene, 2012; Henri, 2010), environmental strategy (Pondeville et al., 2013), size (Garengo et al., 2005; Jabar, 2011; Mohammad, 2011; Pondeville et al., 2013; Pugh and Hickson, 1976), regulatory pressure (Lam, 2011; Shamsudin, 2006), and top management commitment (Pondeville et al., 2013) are associated with the emergence of environmental innovation (i.e. the adoption of EMA) that enables firms to realize its competitive benefits in the form of environmental performance. This argument leads to the development of EMA as a mediator to investigate the role of EMA between contingent factors and environmental performance. Figure 4 and Table 3 indicate the research framework and operationalization of the research variables.

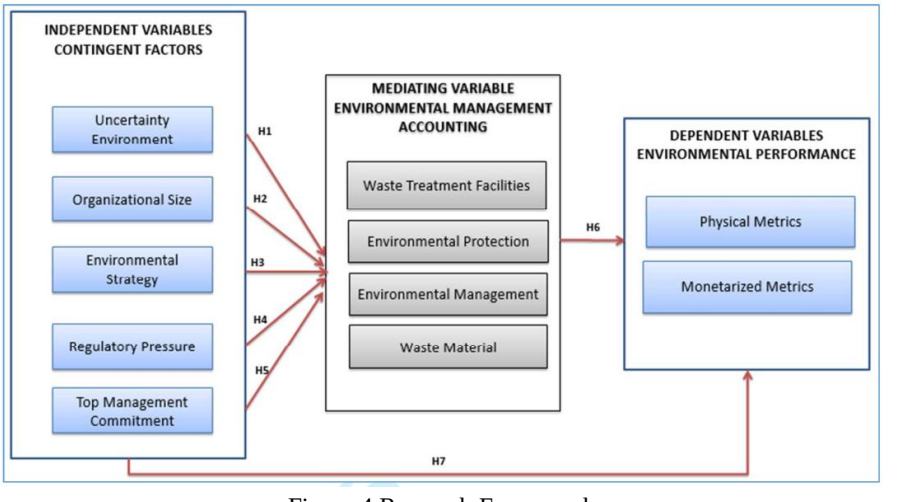


Figure 4 Research Framework

Table 3 Operationalization of Research Variables

Variables	Definition	Operational	References
Organization-Contingent Factors			
Uncertainty Environment (UE)	This refers to the environment, market changes, and regulations, which creates an environment of uncertainty	• In an uncertainty operating environment, the manner organizations compete with the competitors. • Do organizations respond in adopting the manufacturing technology to improve their productivity? • The organizational ability to sustain while dealing with uncertainty environment change. • The organizational ability to detect market and environment changes and encourage employees to accept and identify the goals; and • Organizational progress in launching new products that indicate clear market/customer focus.	Henri (2010); Carlos (2010); Neely et al. (2005); Pondeville et al. (2013)
Organizational Size (OS)	In pursuit to understand if company size is really concern. Will that impact the Environment Management Accounting implementation?	• A large organization with more resources is able to develop performances metrics in depth. • Larger organizations especially multinational companies have already embarked EMA.	Pondeville et al. (2013); Henri (2010); Neely (1999)

Table 3 Cont.

Environmental Strategy (ES)	To understand the implementation of Environmental Strategy in the improvement of a manufacturing company's condition.	• The organization's ability to translate key performance indicators that reach bottom-line employees and fit the manufacturing process; • The organization's ability to align those strategies with appropriate tools that could demonstrate to the management commitment and decision making; • The ability to detect a gap in the responsiveness to markets, which impacts on the organization's effectiveness; and • Leader's effectiveness from environmental perspective on environmental policy, review that is being embedded into products and processes.	Pondeville et al. (2013); Henri and Journeault (2008); Chenhall (2003); Garengo et al. (2005a); Henk and Joost (2009); Siti-Nabiha (2010)
Regulator Pressure (RP)	This is to understand the impact of regulator pressure on performances of the company. At the same time what are their opinions about it.	• The organization's sharing on their opinion on regulator pressure; • How do they find the support and subject matter experts provided to them? and • Effectiveness and implementation that required additional resources and cost to company.	Shamsudin (2006); Norhayati (2009); Pondeville et al. (2013); Gestel and Hertogh (2006)
Top Management Commitment (TMC)	This distinguishes commitment from top management to drive and enforce on environmental matter and improvement.	• The management's ability to communicate and sustain via key strategies of the company; • The environmental improvement, initiatives and review being periodically done by the top management; • They are always vigilant on the changes occurring in environmental policy.	Pondeville et al. (2013); Henri (2008); Lam (2011)

Table 3 Cont.

Environmental Management Accounting (EMA)	To understand Environment Management Accounting capabilities in leading to better performances.	• Frequency of the organization practices on EMA that the company is engaged with; • Accounting and environmental teams are engaging and exchanging information; • Companies understanding on EMA that could is cost saving and provides opportunities for lower manufacturing cost; and • Type of initiatives and techniques that is being established by the company.	Jasch (2003); Buritt et al. (2009); Christ (2013)
Physical Metrics (PM)	To cultivate the culture of reuse to enhance productivity	• To cultivate the culture of reuse to enhance productivity and at the same time reduce waste disposal. • Are there continuous innovative initiatives to drive lower manufacturing cost? • Companies are looking to invest in higher end equipment to promote less waste creation. • Understanding use of energy efficiency or renewable resources at their company.	Wedel (2011); Pondeville et al. (2013); Jasch (2003); Henri (2008)
Monetarized metrics – Cost Saving Initiatives (MM)	To drive the management approach on opportunities for cost saving	• Clear segregation of waste for recycling purpose at the same time revenue generation from this waste too. • Recycling opportunities or remanufacture facilities that are available in that company. • Advance or lesser material initiatives being considered as opportunities of cost saving and lower manufacturing cost	Jasch (2003); Wedel (2011)

Based on above arguments, current study's hypotheses can be summarized in the following manner:

H1 There is a positive relationship between the uncertainty environment and environmental management accounting.

H1a Environmental Management Accounting mediates the relationship between uncertainty environment and environmental performances.

H2 There is a positive relationship between the organization size and environmental management accounting.

H2a Environmental Management Accounting mediates the relationship between organization size factors and environmental performances.

H3 There is a positive relationship between the environmental strategy and environmental management accounting.

H3a Environmental Management Accounting mediates the relationship between environmental strategy and environmental performances

H4 There is a positive relationship between the regulatory pressure and environmental management accounting.

H4a Environmental Management Accounting mediates the relationship between regulatory pressure and environmental performances.

H5 There is a positive relationship between the top management commitment and environmental management accounting.

H5a Environmental Management Accounting mediates the relationship between top management commitment and environment performances.

H6 Environmental management accounting has mediating relationship between contingent factors and environmental performance.

RESEARCH METHOD

This research exploited the quantitative research methodology to understand the relationship between contingent factors, environmental management accounting, and environmental performance. Environmental management accounting is a mixed approach that provides financial and non-financial information for smooth operation in the production process with the aim to reduce the impact on the environment and bring efficiency into the production process. With these correlations, accountants or plant managers can act more precisely in handling issues and making decisions with the figures provided by other departments. This transparency enables organizations to focus on continuous improvement to achieve their strategies and objectives with a competitive cost advantage. This will bring combined efforts from all functional departments for better environmental performance.

Sample

The sampling frame used for the study is the directory of manufacturers published by the Federation of Malaysian Manufacturers (FMM). The population consists of the manufacturing companies in Klang Valley, Selangor, Malaysia. The majority of the manufacturing companies are located here, and it is the preferred location for investors. It is supported with Table 4 below, which shows the GDP by state for Malaysia, which shows Selangor (Klang Valley) as the highest, with 28.8% of the GDPs by state economy.

Table 4 GDP by State and Economic for Year 2010 to 2014

MANUFACTURING	2010	2011	2012	2013e	2014p	%2014p
JOHOR	25,532	24,637	26,048	27,228	28,769	12.4%
KEDAH	7,959	8,790	9,395	9,714	10,097	4.3%
KELANTAN	987	1,029	1,059	1,056	1,077	0.5%
MELAKA	10,213	10,540	11,146	11,067	12,160	5.2%
NEGERI SEMBILAN	13,187	14,089	14,845	14,854	14,980	6.4%
PAHANG	8,147	8,526	9,135	9,512	9,841	4.2%
PULAU PINANG	24,299	25,221	25,617	26,617	29,183	12.5%
PERAK	7,568	8,326	8,756	9,361	10,051	4.3%
PERLIS	321	363	381	395	410	0.2%
SELANGOR	54,869	57,576	60,648	62,863	67,032	28.8%
TERENGGANU	8,256	8,230	8,585	8,828	9,552	4.1%
SABAH	4,823	5,147	5,091	5,328	5,721	2.5%
SARAWAK	24,121	25,712	26,044	26,745	27,835	12.05%
WP KUALA LUMPUR	3,456	3,907	4,235	4,670	5,175	2.2%
WP LABUAN	756	889	937	979	983	0.4%
TOTAL	192,494	202,960	211,922	219,217	232,866	

Source: Times Series 2015 Department of Statistics

Data Collection

The seven-point Likert scale gives more theoretical range to the respondent. It increases the answer quality, while the respondent just checks his or her answers intuitively. In addition to that, 7-point Likert scales tend to produce better distributions of data (Finstad, 2010; Leung, 2011). The questionnaire distribution relied on both postal and electronic mail and targeted the most suitable person to participate in the survey, namely accountants or finance managers who have comprehensive knowledge of the company's environmental management practices. A pilot test on 10 selected companies was conducted to ensure the clarity of the questions before field work. A total of 600 survey questionnaires were distributed. The questionnaire was distributed via email and postal mail to each of the selected companies in this research. A follow-up mail was sent 1 month later, as well as a gentle reminder on a monthly basis and phone calls. Continuous follow-up via phone calls was carried out to ascertain the progress and status of the questionnaires. Collecting the questionnaires took 4 to 5 months; 150 surveys were finally received from various respondents in manufacturing companies in the Klang Valley area, which makes the response rate at 25%. There were 36 responses, with missing data and not completed eliminated from the final analysis. Thus, the final response rate was 19%, which is similar to other management accounting studies (Guilding et al., 2000; Clinton and Hunton, 2001). The reason for nonresponse is due to

the length of the questionnaire or the sensitivity of the study regarding environmental issues, where people might be reluctant to respond. Another reason is the suspicious response pattern, whereby some respondents seem to adopt the straight-lining approach. This response should be discarded to improve the quality of data (Hair et al., 2016). Table 5 contains a summary of the sectors and sizes of the surveyed companies. The chemical and food industries represent 50.9% of our sample.

Table 5 Profile of Respondents

Industry	N	Percentage
Chemicals, petroleum. Coal, rubber and plastic products	31	27.2%
Food, beverage and tobacco	27	23.7%
Fabricated metal products, machinery and equipment	15	13.2%
Electrical and electronic products	16	14.0%
Others	21	18.4%
Textile, wearing apparel and leather	4	3.5%
Total	114	100%
Organization size (number of employees)	N	Percentage
20 – 49 (Small)	43	38%
50-249	50	44%
>250(Large)	21	18%

Measures

Hair et al.'s (2016) research stated that statistical analysis is an essential tool for social science, with advanced technological tools that can comprehend complex relationships and sophisticated multivariate data analysis methods. With this requirement and acceptance, statistical analysis that allows large amounts of data to be handled paved the way for future development and next-generation analysis techniques, namely the structural equation model. It is classed as a multivariate technique that combines factor analysis and regression to examine relationships among latent variables. The variables and measures were all adapted from published literatures that were discussed in the operationalization of research variables, summary as shown in Table 6 below.

Table 6 Variables and Measures

Item code	**Variable name**	**Source**
UE1 to UE7	Uncertainty Environment (UE)	Adapted from Henri (2010)
ES1 to ES8	Environmental Strategy (ES)	(ES) Adapted from Pondeville et al. (2013) and Henri (2008)
RP1 to RP7	Regulator Pressure (RP)	Adapted from Shamsudin (2006) and Gestel and Hertogh (2006)
TM1 to TM9	Top Management Commitment (TMC)	Adapted from Pondeville et al. (2013) and Henri (2008)
EMA1 to EMA7	Environmental Management Accounting (EMA)	Adapted from Jasch (2003), Buritt (2009) and Christ (2013)
PM1 to PM2	Environment Performance (PM)	Adapted from Jasch (2003), Wedel (2011) and Henri (2008)
Size	Organizational size (OS)	Adapted from Pondeville et al. (2013)

Convergent Validity

Next, we tested the convergent validity, which is the degree to which multiple items to measure the same concept are in agreement. The authors used factor loadings, composite reliability, and average variance extracted (AVE) to assess convergence validity. The AVE describes the average amount of variation that a latent construct is able to explain in the observed variables to which it is theoretically related (Yi and Gong, 2013). As suggested by Hair et al. (2016), a measurement model is said to have satisfactory indicator reliability when each item's loading is at least above 0.7. According to Hair et al. (2016), the AVE value is computed as the mean of the square loadings for all the indicators associated with the construct. The AVE is 0.50 or above, and it explains that the construct describes over 50% of the variance of the items. Table 7 summarizes the results of the measurement model. The results showed that all seven constructs are valid measures based on their parameter estimates and statistical significance.

Table 7 Result of measurement model

Constructs	Measurement	Loadings	AVE	CR	CA
ENVIRONMENTAL MANAGEMENT ACCOUNTING	EMA1	0.806	0.655	0.919	0.895
	EMA2	0.857			
	EMA3	0.834			
	EMA4	0.854			
	EMA6	0.770			
	EMA7	0.729			
ENVIRONMENTAL STRATEGY	ES1	0.828	0.712	0.952	0.942
	ES2	0.877			
	ES3	0.761			
	ES4	0.844			
	ES5	0.865			
	ES6	0.824			
	ES7	0.875			
	ES8	0.870			
ENVIRONMENT PERFORMANCE	PM2	0.859	0.614	0.934	0.921
	PM3	0.719			
	PM4	0.740			
	PM5	0.732			
	PM6	0.742			
	PM7	0.802			
	PM8	0.723			
	PM9	0.871			
	PM10	0.84			

REGULATORY PRESSURE	RP1	0.828	0.647	0.902	0.864
	RP2	0.781			
	RP4	0.817			
	RP5	0.821			
	RP6	0.775			
TOP MANAGEMENT COMMITMENT	TM1	0.884	0.725	0.959	0.952
	TM2	0.868			
	TM3	0.810			
	TM4	0.833			
	TM5	0.844			
	TM6	0.879			
	TM7	0.859			
	TM8	0.851			
	TM9	0.833			
UNCERTAINTY ENVIRONMENT	UE2	0.817	0.674	0.912	0.880
	UE3	0.835			
	UE4	0.866			
	UE6	0.775			
	UE7	0.808			
SIZE	SIZE	1.000	1.000	1.000	1.000

Note: UE1, UE5, RP3, RP7, EMA 5, PM1, PM11 and PM12 were deleted due to low loadings. AVE = Average Variance Extracted; CR = Composite Reliability; CA = Cronbach's Alpha

Direct Hypotheses Testing

The analysis was conducted on the structural model allowed to confirm or disconfirm each hypothesis, as well as to understand the strength of the relationship between independent and dependent variables. To test the significance level, t-statistics for all the paths were generated using the two-tailed Smart PLS bootstrapping function resamples of 5,000 at the significance level of 0.05 (Hair et al., 2016). Figure 5 shows the results of the path analysis, which showed that the R^2 value was 0.62, suggesting that 62% of the variance in environmental management accounting can be explained by uncertainty environment, regulatory pressure, top management commitment, size, and environmental strategy. A closer examination showed that regulatory pressure is positively related ($\beta = 0.376$, $p < 0.01$) to the extent of top management commitment, as is the uncertainty of the environment ($\beta = 0.125$, $p < 0.05$), whereas size and environmental strategy are not significant predictors of the extent of environmental management accounting.

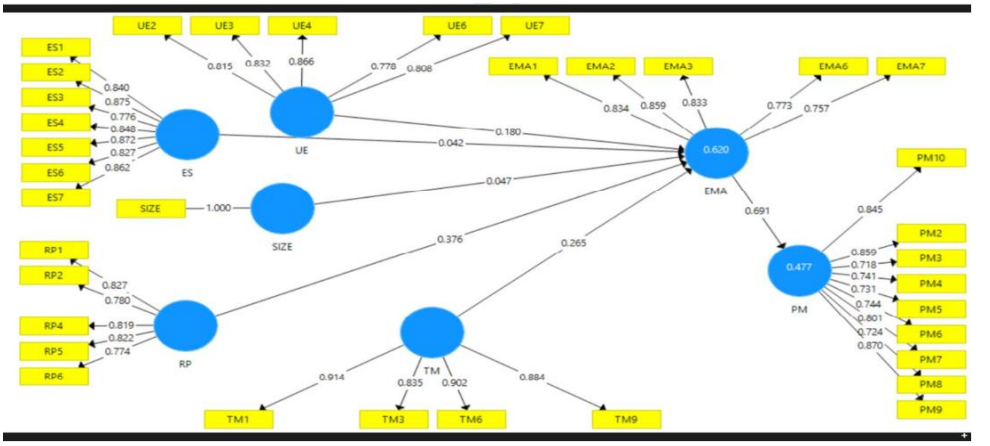


Figure 5 Results of path analysis

Based on the analysis shown in Table 8, H1, H4, and H5 of this study are supported, whereas H2 and H3 are not. H6 is supported by the R2 value of 0.477, which suggests that 47.7% of the variance in environmental performance can be explained by the extent of environmental management accounting, and there is a positive relationship ($\beta = 0.691$, $p < 0.01$) between the extent of environmental management accounting and environmental performance. In this study, it was found that regulatory pressure is the most significant predictor of the extent of environmental management accounting, followed by top management commitment. The greater the extent of environmental management accounting, the better the environmental performance. At the same time, organization size, a single-item measure with path coefficients of 0.047 and 0.032, which are < 0.30, in accordance with the research study of Diamantopoulos et al. (2012), indicates path coefficients of < 0.30, highlighting a weak correlation. Thus, in this study H2 and H2a concerning organization size are not supported due to the weak correlation with environmental performance and environmental management accounting. Thus, H2 is rejected.

Table 8 Direct Relationship path coefficients and hypothesis

Hypothesis	Description	Path Coefficient	Observed t-value	Supported
H1	UE -> EMA	0.125	0.189	* $p \leq 0.05$
H2	SIZE -> EMA	0.047	0.793	NS – not significant
H3	ES->EMA	0.042	0.382	NS–not significant
H4	RP -> EMA	0.376	0.183	** $p \leq 0.01$
H5	TM -> EMA	0.265	1.973	** $p \leq 0.01$
H6	EMA -> EP	0.691	11.331	** $p \leq 0.01$

Note: t-values > 1.96 * $p \leq 0.05$; t-values >2.58 ** $p \leq 0.01$ NS – not significant

Mediation Test

To test the mediating effect of environmental management accounting (EMA), a mediating variable was introduced into the relationship between contingent factors and environmental performance, as shown in Table 9. The analysis showed that contingent factors influence the EMA, which is consistent with the argument of CT. The introduction of the mediating variable increases the coefficient value between environmental uncertainty and environmental performance from 0.125 to 0.180. It also showed that the introduction of environmental management accounting increases the R2 value from 0.477 (or 47.4%) to 0.620 (or 62.0%). Based on Preachers and Hayes's (2008) guidelines, this study concludes that environmental management accounting mediates the relationship between contingent factors and environmental performance. To further analyze the mediating factor's impact on the contingent factors, based on Hayes's (2009) bootstrapping analysis, the indirect effect showed that mediation happens from time to time, but not at the same time. The results (in Table 8) showed that the indirect effect ($\beta = 0.691$, t-value of 11.331) is significant, indicating that there is a mediating effect.

From the analysis (in Table 8), this study was able to demonstrate that environmental performance is influenced positively by environmental uncertainty ($\beta = 0.125$, $t = 2.189$, $p < 0.05$); environmental uncertainty is related positively to environmental management accounting ($\beta = 0.180$, $t = 2.169$, $p < 0.05$); regulatory pressure ($\beta = 0.376$, $t = 3.183$, $p < 0.01$) is related positively to environmental management accounting ($\beta = 0.260$, $t = 3.083$, $p < 0.05$); and environmental performance is influenced positively by environmental management accounting ($\beta = 0.691$, $t = 11.331$, $p < 0.01$). These findings sustain the guidelines of Preacher and Hayes in determining a mediation effect.

This study also applied the analytical approach that Preacher and Hayes (2008) described with a 95% Boot CI lower limit (LL) and upper limit (UL); if they do not straddle a 0, they indicate a mediation effect. To assess the mediation effect, the indirect effect of 0.691, 95% Boot CI: (LL= 0.598, UL = 0.818) does not straddle a 0, which indicates that there is a positive mediating relationship between environmental management accounting and environmental performance, as shown in Table 9

Table 9 Indirect/mediating Effects of EMA

Indirect Effect	Original Sample (O)	Sample Mean (M)	Bias	Boot Confident Interval		Mediating
				2.50%	97.50%	
EMA->EP	0.691	0.698	0.007	0.598	0.818	Yes
ES->EMA	0.042	0.043	0.001	-0.173	0.263	No
RP->EMA	0.376	0.376	0.001	0.152	0.606	Yes
SIZE->EMA	0.047	0.043	-0.004	-0.079	0.145	No
TM->EMA	0.265	0.262	-0.003	-0.002	0.522	No
EU->EMA	0.180	0.186	0.006	0.040	0.366	Yes

The analysis also demonstrated that environmental management accounting has a partial mediating effect on the relationship between contingent factors and environmental performance. This is because the introduction of environmental management accounting as a mediating factor increases the coefficient value between environmental uncertainty and environmental performance from 0.125 to 0.180. The introduction of environmental management accounting as a mediating variable increases the R2 value from 0.477 to 0.620. This result is consistent with previous studies conducted by Hair et al. (2016) and Hashim (2012).

Another way to determine the strength of this mediation is to use the VAF (variance accounted for), which determines the size of the indirect effect in relation to the total effect. The direct effect of environmental uncertainty on environmental performance has a value of 0.125, while the indirect effect via environmental management accounting is 0.180. Thus, the total effect has a value of 0.125 + (0.180.0.691) = 0.249. The VAF equals the direct effect divided by the total effect and has a value of 0.124/0.249 = 0.499. Consequently, 49.9% of the environmental uncertainty effect on environmental performance is explained by environmental management accounting. Since the VAF is larger than 20%, but smaller than 80%, this situation is classified as partial mediation. Thus, this study confirms that environmental management accounting has a partial mediating effect on the relationship between contingent factors and environmental performance.

DISCUSSION

The primary purpose of this study was to identify the contingent factors that influence environmental management accounting and environmental performance. Generally, the respondents in the sample perceived that their organizations would engage in EMA practices and result in better environmental performance.

The current study found that uncertainty environment, regulatory pressure, and top management have a significant relationship with EMA. Firstly, environment-related issues are becoming important for stakeholders, and companies nowadays are trying to mitigate environmental uncertainty by adopting more advanced management control techniques. This is also evident in Malaysia, in which companies implement EMA to mitigate the impact of current environmental issues such as industrial waste or water pollution and sustain their current businesses. Secondly, in a developing country like Malaysia, regulatory pressure is more effective in enforcing new initiatives, and this result is consistent with previous studies that examine EMA adoption (Christ, 2013; Pondeville, 2013). However, the previous study by Pondeville (2013) stated that there is a significant effect of regulatory pressure, but not the degree of corporate environmental proactivity. Regulatory pressure only prompts companies to collect environmental information. Thirdly, any management changes or innovations must be supported by top management because they are the ones to develop and implement the changes. As a result, top management commitment would ensure the successful adoption of more advanced management control techniques, i.e. EMA. This result is similar to Pondeville

et al.'s (2013) study, which highlighted the importance of top management commitment to driving the culture of EMA and performance by developing environmental proactivity and audits.

Contrary to existing EMA literatures, this study did not find any significant association between (1) organizational size and EMA, and (2) environmental strategy and EMA. Environmental strategy as the contingent factor is not supported in this analysis due to a lack of internal written environmental policy in local organizations compared with multinational and global companies, in which the environmental awareness is more prominent. However, Christ and Buritt's (2013) research demonstrates a high level of reliability for the present and future use of environmental strategy in environmental management accounting. In this study, environmental strategy correlates with top management commitment, and leaders' effectiveness matters. Therefore, future research should raise more environmental concerns that should be integrated with corporate strategy to be adapted into a questionnaire. In terms of organizational size, size would not matter when it comes to organizational innovation such as adoption of EMA. For example, some large companies with more resources find it difficult to accept changes due to the complexity and red tape in management decision.

From the analysis, this study was able to demonstrate that environmental performance is influenced positively by environmental management accounting. These findings support the guidelines on the indirect effects of Preacher and Hayes (2008), who were both confident in the interval and determine the mediation effect. It also indicated that part of the impact of environmental uncertainty and part of the effect of regulatory pressure on environmental performance have been overtaken by EMA. Furthermore, this study demonstrated that environmental uncertainty and regulatory pressure have a more dominant mediating effect on environmental performance.

Implication

These findings have a number of implications for both theoretical and policy development in the EMA area. First, from a theoretical perspective, there was sufficient evidence for three of the contingent variables to suggest organizational context does play a significant role in determining whether organizations choose to adopt EMA practices. The findings of the current study are consistent with the CT, in which organizations match their practices to the circumstances they find themselves in. Furthermore, as suggested by Qian et al. (2011), while organizations may face sources of environmentally induced institutional pressure to address environmental issues, the manner in which they respond to such pressure is likely to be shaped by the specific circumstances faced by individual organizations. Hence, the findings support the extension of contingency research into the field of EMA, as previously suggested by Parker (1997), Bouma and van der Veen (2002), and Qian et al. (2011). The results also suggest that in order to obtain a more thorough understanding of EMA in practice,

researchers need to look beyond social system-based theories that have traditionally dominated environmental accounting literature.

This study also contributes practical implications. Most importantly, this research's findings may help top management or accountants to understand the current problems faced by manufacturing industries. This research shows that top management is vigilant regarding environmental policy and changes. At the same time, the sharing of environmental improvements and initiatives creates awareness and implants them well from the lower level of employees in most companies. However, a lack of training given to employees about the environmental segment was found in this study. Therefore, organizations could have more training awareness so that the importance of the environment can spread mentally from the bottom level up to the higher levels in the organization.

CONCLUSION

This study sought to investigate whether finance managers or accountants perceived there to be a present and future role for EMA in the manufacturing industry in Malaysia. Drawing on CT, a research framework was developed that incorporated the following contingent variables: uncertainty environment, size, environmental strategy, regulatory pressure, and top management commitment. Overall, the quantitative research showed that the manufacturing firms in Klang Valley are aware of the issue of environmental performance and the implementation of EMA practices, regardless of the company age or size. The results revealed that those companies do not impose the issue of environmental performance well on their daily production cycle, business practices, and strategies, which resulted in inefficiency in the production process. Furthermore, the implementation of environmental management accounting in companies' practices is time-consuming; the companies' environmental strategy and culture are also not easily changed in a short time. Thus, the environmental strategy factors are not favorable to EMA. Therefore, future research should raise more environmental concerns that should be integrated with corporate strategy to be adapted into a questionnaire. Since environmental issues have progressively become essential, the need for improvement in environmental performance has become apparent. Therefore, companies in Malaysia should consider environmental performance as an important metric during their strategy planning, development of new product design, selection of vendors, as well as the development of culture. Finally, the study provided empirical knowledge towards the understanding of the driving factors of environmental management accounting practices in Malaysia. It considers that environmental issues are closely associated with business sustainability agendas; policy-makers should recognize the need to instill regulatory pressure to promote environmental business practices.

REFERENCES

Anbumozhi, V. and Intal, P. S. (2015), "Can Thinking Green and Sustainability Be an Economic Opportunity for ASEAN?", Economic Research Institute for ASEAN and East Asia (ERIA), Jakarta.

Aragón-Correa, J. A. and Rubio-Lopez, E. A. (2007), "Proactive corporate environmental strategies: myths and misunderstandings", *Long Range Planning*, Vol. 40 No. 3, pp. 357-381.

Bartolomeo, M., Bennett, M., Bouma, J. J., Heydkamp, P., James, P. and Wolters, T. (2000), "Environmental management accounting in Europe: current practice and future potential", *European Accounting Review*, Vol. 9 No.1, pp. 31-52.

Bennett, M. D., Bouma, J. J. and Wolters, T. J. (Eds.). (2002), "Environmental management accounting: Informational and institutional developments (Vol. 9)", Springer Science & Business Media.Bennett, M., and James, P. (Eds.). (2017). The Green bottom line: environmental accounting for management: current practice and future trends. Routledge.

Cadez, S. and Guilding, C. (2008), "An exploratory investigation of an integrated contingency model of strategic management accounting", *Accounting, organizations and society*, Vol. 33 No. 7, pp. 836-863.

Carlos, F. G., Mahmoud, M. Y. and Joao, V. L. (2010), "Performance measurement practices in manufacturing firms revisited", *International Journal of Operations & Production Management*, Vol. 31 No. 1, pp. 7-8.

Chenhall, R. H. (2003), "Management control systems design within its organizational context: findings from contingency-based research and directions for the future", *Accounting, Organizations and Society*, Vol. 28, pp. 127-68.

Christ, K. L. and Burritt, R. L. (2013), "Environmental management accounting: the significance of contingent variables for adoption", *Journal of Cleaner Production*, Vol. 41, pp. 163–173.

Clarkson, P. M., Overell, M. B. and Chapple, L. (2011), "Environmental reporting and its relation to corporate environmental performance", *Abacus*, Vol. 47 No. 1, pp. 27-60.

Clinton, B. D. and Hunton, J. E. (2001), "Linking Participative Budgeting Congruence to Organization Performance (Retracted)", *Behavioral research in accounting*, Vol. 13 No. 1, pp. 127-141.

Delai, I. and Takahashi, S. (2011), "Sustainability measurement system: a reference model proposal", *Social Responsibility Jounral*, Vol. 7 No. 3, pp. 438-471.

Federal of Malaysian Manufacturers (FMM) directory (2014), "Malaysian Industries 45th Edition".

Finstad, K. (2010), "Response interpolation and scale sensitivity: Evidence against 5-point scales", *Journal of Usability Studies*, Vol. 5 No. 3, pp. 104-110.

Garengo, P. and Bititci. U. (2007), "Towards a contingency approach to performance measurement: an empirical study in Scottish SMEs", *International Journal of Operation & Production Management*, Vol. 27 No. 8, pp. 806-807.

Guilding, C., Cravens, K. S. and Tayles, M. (2000), "An international comparison of strategic management accounting practices", *Management Accounting Research*, Vol. 11 No. 1, pp. 113-135.

Hair, J. F., Hult, G., Ringle, C. and Sarstedt, M. (2016), "A primer on partial least squares structural equation modeling (PLS-SEM)", Sage.

Hashim. K (2012), "Understanding the determinants of continuous knowledge sharing intention within business online communities", pp. 105-110.

Hayes, A. F. (2009), "Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium", *Communication Monographs*, Vol. 76 No. 4, pp. 408-420.

Henri, J. F. (2010), "The Periodic Review of Performance Indicators: An Empirical Investigation of the Dynamism of Performance Measurement Systems", *European Accounting Review*, Vol. 19 No. 1. pp.73-96.

Henri, J. F. and Journeault, M. (2008), "Environmental performance indicators: An empirical study of Canadian manufacturing firms", *Journal of environmental management*, Vol. 87 No. 1, pp. 165-176.

Herzig, C., Viere, T., Schaltegger, S., Burritt, R. L. (2012), "Environmental Management Accounting", Case Studies in South-east Asian Companies, Routledge, London and New York.

Hopwood, A., Unerman, J. and Fries, J. (2010), "Accounting for Sustainability: Practical Insights", London: Earthscan.

Indicators of Sustainable Development (2007), "Guidelines and Methodologies", 3rd Edition United Nation Publication.

International Federation of Accounts (IFAC), "Global Sustainability and Growth Recommenations for G-20 Leaders", Summit 2012

Jabar. J, Soosay, C. and Santa, R. (2011), "Organisational learning as an antecedent of technology transfer and new product development: A study in manufacturing firms in Malaysia", *Journal of Manufacturing Technology Management*, Vol. 22, pp. 25-45.

Jamaluddin, J., Kadaruddin, A., Kadir, A. and Azahan, A. (2009), "Development, Environmental Degradation and Environmental Management in Malaysia", *European Journal of Social Sciences*, Vol. 9 No. 2, pp. 257-264.

James R. B (2010), "Managing the retail format portfolio: An application of modern portfolio theory", *Journal of Retailing and Consumer Services*, Vol. 17.

Jasch, C. (2003), "The use of Environmental Management Accounting (EMA) for identifying environmental costs", *Journal of Cleaner Production*, Vol. 11 No. 6, pp. 667–676.

Jasch, C. (2006), "Environmental management accounting (EMA) as the next step in the evolution of management accounting", *Journal of Cleaner Production*, Vol. 14, pp. 1190-1193.

Katsikeas, C. S., Leonidou, C. N. and Zeriti, A. (2016), "Eco-friendly product development strategy: antecedents, outcomes, and contingent effects", *Journal of the Academy of Marketing Science*, Vol. 44 No. 6, pp. 660-684.

Kennerley, M. and Neely, A. (2002), "A framework of the factors affecting the evolution of performance measurement systems", *International Journal of Operations & Production Management*, Vol. 22 No. 11, pp. 1222–1245.

Konar, S. and Cohen, M. A. (2001), "Does the market value environmental performance?", *The review of economics and statistics*, Vol. 83 No. 2, pp. 281-289.

Kotter, J. P. (1996), "Leading Change", Harvard Business School Press, Boston, MA.

Lam, M. L. L. (2011), "Challenges of sustainable environmental programs of foreign multinational enterprise in China", *Management Research Review*, Vol. 34, pp. 1153-1168.

Lee, K. H. (2011), "Motivations, barriers, and incentives for adopting environmental management (cost) accounting and related guidelines: a study of the Republic of Korea", *Corporate Social Responsibility and Environmental Management*, Vol. 18 No. 1, pp. 39-49.

Leung, S. O. (2011), "A comparison of psychometric properties and normality in 4-, 5-, 6-, and 11-point Likert scales", *Journal of Social Service Research*, Vol. 37 No. 4, pp. 412-421.

Lucas, C. H. and Baroudi, J. (1993), "The Role of Information Technology in Organization Design", *Center of Digital Economy Research*, pp. IS-93-48.

Malaysia Economic Statistics Time Series 2014, Department of Statistics Malaysia.

Malaysia in Focus, Investment booklet 2013, PWC Malaysia, 2012 Pricewaterhouse Coopers.

Mohammad, N. (2011), "Environmental law and policy practices in Malaysia: An empirical study", *Australian Journal of Basic and Applied Sciences*, Vol. 5 No. 9, pp. 1248-1260.

Morse, J. M., Barrett, M., Mayan, M., Olson, K. and Spiers, J. (2002), "Verification strategies for establishing reliability and validity in qualitative research", *International Journal of Qualitative Methods*, Vol. 1 No. 2.

Ong, T. S. and Teh, B. H. (2008), "Factors influencing the design and use of performance measurement systems in the Malaysian electrical and electronics industry", *Int J Eco Man't*, Vol. 2, pp. 437–457.

Otley, D. (2016), "The contingency theory of management accounting and control: 1980–2014", *Management accounting research*, Vol. 31, pp. 45-62.

Otley, D. T. (1980), "The contingency theory of management accounting: Achievement and prognosis. Accounting", *Organizations and Society*, Vol. 5 No. 4, pp. 413-428.

Pondeville, S., Swaen, V. and Ronge, Y. (2013), "Environmental management control system: The role of contextual and strategic factors".

Porter, M. (1980), "Competitive Strategy", The Free Press, New York.

Preacher, K. J. and Hayes, A. F. (2008), "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models", *Behavior research methods*, Vol. 40 No. 3, pp. 879-891

Pugh. D. S., Hickson, D. J, Hinings, C. R. and Turner, C. (1976), "The Context of Organization Structure", *Administrative Sciences Quarterly*, Vol. 14, pp. 91-104.

Qian, W., Burritt, R. L. and Monroe, G. (2011), "Environmental management accounting in local government: a case of waste management", *Account. Audit. Account*, Vol. 24, pp. 93e128.

Russo, M. V. and Fouts, P. A. (1997), "A Resource-Based Perspective on Corporate Environmental Performance and Profitability", *Academy of Management Journal*, Vol. 40 No. 3, pp. 534–559.

Wiengarten, F., Pagell, M. and Fynes, B. (2013), "ISO 14000 certification and investments in environmental supply chain management practices: identifying differences in motivation and adoption levels between Western European and North American companies", *Journal of Cleaner Production*, Vol. 56, pp. 18–28.

Wilmshurst, T. D. and Frost, G. R. (2001), "The role of accounting and the accountant in the environmental management system", *Bus. Strat. Environ*, Vol. 10, pp. 135e147.

Yi, Y. and Gong, T. (2013), "Customer value co-creation behavior: Scale development and validation", *Journal of Business Research*, Vol. 66 No. 9, pp. 127.