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Environmental Capabilities and Environmental Innovations of Manufacturing Firms in Malaysia

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Abstract: The popularity of achieving environmental sustainability among businesses is not exceptional in the green business literature. However, despite its popularity, businesses are still practically clueless about its benefits. This study employs the dynamic capabilities theory to investigate the relationship between environmental capabilities (i.e., environmental strategic focus, shared vision, management support, collaboration, and technological capabilities) and environmental innovation. To test the hypotheses, data from a sample of 124 firms were collected from managers of environmental management system 14001-certified Malaysian manufacturing firms. The collected data were analyzed using structural equation modeling with partial least squares version 3.0. The results indicated that environmental technological capabilities and environmental collaboration both have a positive impact in directly enhancing the firms' environmental innovations. The findings of this study indicate the possibility that manufacturers can remain competitive by integrating environmental considerations at the strategic level; collaborating with suppliers, customers, and the local community for environmental solutions; and investing in environmental technological capabilities.

Keywords: environmental collaboration and technological capabilities, environmental innovation, management support, shared vision, strategic focus.

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INTRODUCTION

Environmental degradation problems are on the rise in Malaysia. The country's environmental performance index (EPI), a world ranking for environmental evaluation based on high-priority environmental issues, has declined from 51st position in year 2014 to 63rd position in year 2016 (Hsu et al., 2014; Hsu & Zomer, 2016). Particularly, environmental degradation associated with manufacturing activities is a critical issue that needs immediate rectifications. This is due to the fact that manufacturing activities are associated with a substantial volume of pollutions and waste that caused environmental damages (Department of Statistics Malaysia, 2011, 2012).

According to findings of two consecutive annual surveys by the Department of Statistics, Malaysia, based on 7,601 business establishments in Malaysia, manufacturing sector was reported as the largest contributor to environmental expenditure: 80.8% and 72.2% for years 2010 and 2011, respectively (Department of Statistics Malaysia, 2011, 2012). Moreover, environmental degradation is further intensified with improper handling of toxic and hazardous waste by manufacturers. For example, the pollution of Semenyih River during year 2016 which caused closure of water treatment plant six times, was a result of illegal discharge of waste effluents into the river by factories nearby (Khalid et al., 2018). Likewise, litigation actions were initiated on Malaysian Vermicelli Manufacturers (Melaka) Sdn Bhd for discharging sewage and waste products into the Melaka River (Mustafa & Mohamed, 2015). Similarly, there were also cases whereby industrial wastes were burned or dumped into rivers or bushes or just stored in the warehouses (Hassan et al., 2005). The severity of these irresponsible handling of environmental waste is evidenced by increasingly larger penalty imposed by Malaysian courts on cases of environmental pollutions and environmental crimes relating to manufacturing activities (Mustafa & Mohamed, 2015). These environmental damages caused climate change that has far-reaching damages to the well-being of the world.

Consequently, it is of paramount importance that the manufacturing sector in Malaysia is to be proactive in mitigating environmental damages arising from their manufacturing processes. In fact, according to Muhammad et al. (2015), Malaysian manufacturers are facing intensified demand to green their manufacturing processes as prompted by regulators, customers, non-governmental bodies and society. Environmental implications on the manufacturers are enormous due to the high visibility of environmental damages caused by manufacturing activities. Across the world, manufacturers are subjected to increasing environmental laws and policies from the regulators (Banerjee et al., 2003; Henderson et al., 2017). Likewise, manufacturing firms are compelled to be environmentally responsible as increasingly more consumers and investors become environmentally conscious (Dangelico & Pujari, 2010). Moreover, manufacturers are also facing intense examinations of their environmental and social performance by those environmental advocacy groups. Consequently, manufacturing firms are obliged to take charge of the negative externalities created by their business activities on all stakeholders including the natural environment (Galbreath, 2011).

Accordingly, environmental issues constitute the major forces shaping business environment that exert profound effect on competitive landscape of manufacturers (Lubin & Esty, 2010). Indeed, failure to address environmental protection issues may subject these firms to the risks of losing competitiveness (Lubin & Esty, 2010; Henderson et al., 2017); and may even affect their survival (Kiron et al., 2014), which not only is with regard to Malaysian companies, but also companies worldwide because a proper consideration of capabilities that triggered innovation might enhance competitiveness over time (Stavropoulos et al., 2017).

However, to date, manufacturing businesses are still clueless about what factors could enable concurrent creation of environmental values and economic values. This is evidenced by high failures experienced by firms in gaining superior economic returns from their environmental investments. According to the findings of several global surveys conducted jointly by the Boston Consulting Group and MIT-Sloan Management Review from 2009 to 2013, there were only approximately 30–37% of companies surveyed manage to generate superior firm performance from implementing advanced environmental practices (Kiron et al., 2012, 2013, 2014). These surveys further reported increasing failures when firms attempt to justify business case for environmental sustainability (BCES). In particular, a survey by Kiron et al. (2013) based on a world sample of 1,847 corporate leaders indicated that only approximately 35% of the companies surveyed were able to enhance their profits as a result of their sustainability efforts. As such, it appears that businesses worldwide are still struggling to be able to fulfill their environmental accountability and yet be profitable. Moreover, environmental protection investments are expensive, complex, and time consuming in realizing the expected economic benefits (Li et al., 2017), and require effective implementation. Thus, environmental investments are associated with high risks resulting from high possibility of failures. Unsuccessful environmental implementations may possibly lead to large financial losses or firms going out of business due to inability to compete (Kiron et al., 2014).

Furthermore, the possible abandonment of environmental practices by these firms could hinder the potential of solving environmental degradation problems through corporate voluntary environmental accountability. As such, it is highly probable that businesses face difficulty to achieve a BCES, despite empirical evidences from "pays to be green" literature suggested otherwise. Hence, it appears that current literature on "pays to be green" is possibly lacking in informing firms on how to achieve a BCES. Consequently, there is a crucial need to extend the scope of investigation from the focus on "pays to be green" to "what pays to be green," thus enabling discovery of environmental capabilities fundamental in achieving superior firm performance (Dyllick & Hockerts, 2002; Figge & Hahn, 2012).

According to the dynamic capabilities view of firm performance (Eisenhardt & Martin, 2000; Teece, 2007; Kay et al., 2018), all firms need to be equipped with dynamic capabilities to continuously respond to their environmental challenges through reconfiguration of its resources and capabilities that result in maintenance of their competitive capabilities. However, despite investment made in environmental practices, little is known about how dynamic capabilities emerged from proactive environmental practices. Thus, it is important to identify what kind of environmental capabilities could emerge when a firm implements proactive environmental strategies and how these environmental capabilities affect environmental innovation of the firm. Such environmental capabilities can be expected to be the most critical in helping companies to build a BCES (Gabler et al., 2015). As such, this study aims to examine the relationship between environmental capabilities and environmental innovation of Malaysian manufacturing firms.

METHODS

Data gathering was conducted using questionnaires. Questionnaires were sent to respondents in the targeted firms and follow-up calls to the respective managers were made for improving response rate. A survey package containing: (i) cover letter addressed to the targeted respondent of the sample firms, (ii) questionnaire and (iii) a post-paid self-addressed envelope, was sent to every manager in the targeted sample via postal service. In some circumstances, the questionnaires were sent by fax or e-mail. Multiple telephone calls were made to targeted respondents who had not returned their questionnaire. Replacement questionnaire was provided to those who had missed the previous ones sent to them.

All ISO 14001 Environmental management system (EMS) certified manufacturing firms (483 to date) in Malaysia were selected as population of study. EMS represents advanced environmental practices by manufacturing firms, as its implementation consumes substantial resources of firms. A certified ISO 14001 EMS is not regulatory mandatory for manufacturing firms in Malaysia. However, EMS certification enables a firm to signal to its stakeholders about the quality of its environmental management as well as its commitment in environmental protection. Thus, firms equipped with ISO 14001 EMS reflect a higher level of environmental proactivity with the need to implement proactive environmental strategies.

The questionnaire was first pre-tested by six academic staff and then pilot tested by sending it to 20 companies. The questionnaire was then revised based on the feedback of the respondents. The pilot test is done to improve research design before executing the main field work. This is to ensure that the study runs smoothly and to get a qualifying output. A total of 124 survey responses were collected out of 483 questionnaires distributed in June 2018 to all ISO 14001 EMS certified manufacturing firms in Malaysia. The response rate was 25.7%, which was comparable to other firm-based survey studies in Malaysia (Eltayeb et al., 2011; Lee et al., 2013). Further, the sample size of 124 companies is adequate for structural equation modeling with partial least-squares (SEM-PLS) analysis as it falls within the acceptable range of the sample size (Hair et al., 1998).

Harman's single-factor test was performed on the date in order to examine the possibility of common method bias. Findings indicate that the first factor explains 36.99% of the total variance. This indicates that the common method bias is not an issue in this study.

An independent *t*-test was conducted across all constructs in order to assess whether data collected are significantly different among early (18 responses) and late (106 responses) respondents. The results reported non-significance of Levene's values, thus risk of non-response bias is non-critical in this study.

RESULTS AND DISCUSSION

Table 1 shows the profiles of sampled companies. The main activities of these firms include electrical and electronics (*n* = 29, 23%), basic metal products, motor vehicles and transport equipment (*n* = 22, 18%), rubber and plastics (*n* = 18, 15%), chemicals and chemical products and man-made fibers (*n* = 16, 13%), and others (*n* = 39, 31%). Majority of the sampled firms (*n* = 108, 107%) have more than 50% ownership by Malaysian.

Table 1 Company Profiles

Description	Frequency	%
N = 124		
Companies' main activities		
Electrical machinery, radio television & communication equipment, optical equipment	29	23
Basic metals and fabricated metal products, motor vehicles and transport equipment	22	18
Rubber and plastics products	18	15
Chemicals, chemical products and man-made fibres	16	13
Others	39	31
Employees size		
Below 200 (small and medium size)	52	42
Between 200 and 500 (large size)	41	33
Above 500 (large size)	31	25
Company's age (years)		
Below 20	13	11
Between 21 and 40	58	46
Above 40	53	43
Company's ownership		
>50% Malaysian owned	108	87
>50% Foreign owned or joint venture	16	13

Age and size profiles included in Table 1 indicate that majority of the sampled firms are long established with large-scale manufacturing operations. The biggest number of the sampled firms are aged between 21 and 40 years (*n* = 58, 46%); followed by above 40 years (*n* = 53, 43%); and the remaining are below 20 years of age (*n* = 13, 11%). The number of full-–time employees indicates the relative size of sampled firms. The majority of the sampled firms are of larger size, employing 200–500 employees (*n* = 41, 33%), and employing more than 500 employees (*n* = 31, 25%). The remaining firms are of smaller size with a workforce below 200 employees (*n* = 52, 42%) (SME Corporation Malaysia).

Table 2 represents the descriptive statistics of measurement items. The results indicate that mean values for all items range from lowest 4.93 to highest 5.19, which confirm the presence of environmental proactivity within the studied companies. All measurement items having kurtosis and skewness (Table 2) within the normality range of −1 to +1 (Hair et al., 2010).

Table 2 Descriptive Statistics

Constructs	Item code	Mean	SD	Kurtosis	Skewness
Environmental focus (EF)	EF1	5.07	0.77	(0.048)	0.189
	EF2	5.02	0.81	0.370	0.327
	EF3	5.11	0.87	(0.246)	0.367
	EF4	4.94	0.89	(0.550)	0.457
	EF5	5.04	0.88	(0.340)	0.418
	EF6	5.03	0.83	(0.165)	0.364
	EF7	5.07	0.88	(0.386)	0.357
Environmental shared vision (EV)	EV1	5.00	0.65	(0.591)	0.000
	EV2	5.03	0.71	(0.608)	0.093
	EV3	5.03	0.92	(0.753)	0.447
	EV4	5.07	0.84	(0.529)	0.372
Environmental collaboration (EC)	EC1	5.19	0.73	0.052	0.323
	EC2	5.10	0.70	0.560	0.148
	EC3	4.93	0.73	0.489	0.615
	EC4	4.98	0.92	(0.366)	0.678
	EC5	5.02	0.76	(0.373)	0.299
Environmental technological capabilities (ET)	ET1	5.02	0.62	(0.383)	(0.011)
	ET2	5.03	0.70	(0.109)	0.248
	ET3	5.09	0.88	(0.048)	0.67
	ET4	4.97	0.84	(0.106)	0.636
	ET5	4.94	0.84	0.035	0.695
	ET6	5.01	0.72	(0.726)	0.117
Environmental management supports (EM)	EM1	4.95	0.76	(0.940)	0.193
	EM2	5.00	0.75	0.036	0.462
	EM3	4.94	0.86	(0.451)	0.580
	EM4	4.99	0.96	(0.369)	0.692
	EM5	5.01	0.89	(0.034)	0.602
	EM6	4.96	0.77	(0.338)	0.505
	EM7	4.98	0.88	(0.482)	0.607
	EM8	4.98	0.78	0.046	0.355
Environmental product innovation (ENP)	ENP1	5.05	0.68	(0.419)	0.093
	ENP2	5.15	0.71	0.686	0.599
	ENP3	5.02	0.83	0.255	0.733
	ENP4	4.98	0.93	(0.302)	0.721
	ENP5	5.03	0.88	(0.620)	0.441
	ENP6	5.05	0.74	0.056	0.408
	ENP7	5.07	0.73	(0.155)	0.283
Environmental process innovation (ENC)	ENC1	4.98	0.73	(1.117)	0.025
	ENC2	4.99	0.76	(0.005)	0.466
	ENC3	4.95	0.74	0.318	0.563
	ENC4	4.99	0.93	(0.354)	0.688
	ENC5	4.84	0.79	(0.989)	0.397
	ENC6	4.88	0.85	(0.860)	0.476

Table 3 shows the factor loadings and reliability of the measurement scales. The factor loadings for all measurement items range from the lowest at 0.700 to the highest at 0.887. The composite reliability values range from 0.847 to 0.923. The average variances extracted range from 0.557 to 0.856. Cronbach's alpha values range from 0.764 to 0.853.

Table 3 Factor Loadings and Reliability for Constructs

Items	Loadings	Constructs	AVE	CR	CA
EF1	0.799	Environmental focused (EF)	0.557	0.862	0.802
EF2	0.700				
EF3	0.751				
EF6	0.713				
EF7	0.764				
EV1	0.728	Environmental shared vision (EV)	0.582	0.847	0.764
EV2	0.732				
EV3	0.791				
EV4	0.798				
ET2	0.701	Environmental technological (ET) capabilities (ET)	0.595	0.854	0.771
ET4	0.730				
ET5	0.829				
ET6	0.818				
EM1	0.839	Environmental management supports (EM)	0.568	0.887	0.847
EM2	0.748				
EM3	0.723				
EM4	0.749				
EM5	0.739				
EM8	0.719				
EC1	0.864	Environmental collaboration (EC)	0.772	0.911	0.853
EC2	0.885				
EC3	0.887				
ENC1	0.855	Environmental innovation (EI)	0.856	0.923	0.832
ENC2	0.806				
ENC4	0.796				
ENC5	0.868				
ENC6	0.853				
ENP2	0.705				
ENP4	0.737				
ENP7	0.731				

Note: AVE, average variance extracted; CR, composite reliability; CA, Cronbach's alpha

The research question is: "To what extent do environmental capabilities related to environmental innovation?" Therefore, to answer the research question, a hypothesis was established as "Environmental capabilities are positively related to environmental innovation," hypotheses H1, H2, H3, H4 and H5 were developed.

The findings in Table 4 reported that environmental strategic focus has no effects on environmental innovation (standardized beta = −0.023, $p > 0.05$), andH1 was unsupported. Contrary to the anticipation, the result of this study reveals that environmental strategic focus does not act as a contributing factor toward environmental innovation among environmentally proactive manufacturers. These firms are unlikely to directly gain environmental innovation from their environmental protection priorities when devising strategic planning and implementation, such as corporate goals setting, setting quality criteria to be followed, developing new products, as well as advertising strategies.

Table 4 Results of Hypothesis Testing

Hypothesis	Path	Standard beta	Standard error	t value	p value	Results	f^2
H1	EF > EN	−0.023	0.095	0.239^{NS}	0.811	Unsupported	0.001
H2	EV > EN	−0.004	0.077	0.046^{NS}	0.964	Unsupported	0.000
H3	ET > EN	0.166	0.077	2.152**	0.031	Supported	0.039
H4	EM > EN	0.101	0.086	1.185^{NS}	0.236	Unsupported	0.012
H5	EC > EN	0.484	0.122	3.979***	0.000	Supported	0.221

Note: NS, non-significant; *p ≤ 0.01, ***p ≤ 0.0001

The finding of this study reveals manufacturing firms with a higher level of environmental strategic focus do not directly enhance environmental innovation. The reported non-predictive role of environmental strategic focus on environmental innovation fails to provide evidence to validate environmental strategic focus as environmental capabilities among environmentally proactive manufacturers in Malaysia, as underpinned by the dynamic capabilities theory of firm performance (Peteraf, 1993; Teece et al., 1997; Eisenhardt & Martin, 2000; Helfat & Peteraf, 2003). Instead, the reported full mediating role of environmental performance provides evidence to validate environmental performance as the environmental capabilities among environmentally proactive manufacturers in Malaysia.

The findings presented in Table 4 reported environmental shared vision has no effects on environmental innovation (standardized beta = −0.004, $p > 0.05$), and hypothesis H2 was not supported. Contrary to prediction, the result of this study indicates environmental shared vision does not act as a contributing factor toward environmental innovation among environmentally proactive manufacturers. These firms were unlikely to gain better environmental innovation directly as a result of their efforts in fostering a shared vision on environmental protection among their employees, such as instilling a common environmental goal, an agreement to company's strategic environmental direction, a commitment to environmental strategies of the company; and enthusiasm about environmental mission of the company. The reported insignificant direct relationship between environmental shared vision and environmental innovation was inconsistent with past studies that stress vision plays an antecedent role on environmental innovation performance of a firm (Lawson & Samson, 2001; Chen et al., 2015).

One possible explanation for the insignificant result could be due to the contextual differences experienced by the sampled firms included in this study. In most cases, firms' organizational work culture affects outcomes of their organizational practices. Malaysian firm work within a collectivist cultural background (Abdullah, 2005), and tend to adopt a transactional leadership with focus more on task efficiency, risk prevention, complying with time limits, and process control oriented (Jogulu, 2010). Hence, the sampled firms tend to exhibit high level of power distance whereby decision-making power is associated with hierarchical authority with emphasis on autocratic leadership (Si & Wei, 2012), and leaders normally focus on task assessments rather than interaction among employees. Hence, despite of being equipped with a high level of environmental shared vision among employees, however, these firms were not able to achieve improved environmental innovations. This is probably due to a lack of autonomous authority to initiate environmental improvement actions which hinder employees' creativity for improving environmental innovation. Employees' creativity is the pre-requisite for innovation. It involves challenging conventional processes while searching for discoveries of new business processes and/or new product designs.

Taken together, the findings of this study reveal manufacturing firms with a high level of environmental shared vision are not likely gaining superior environmental innovation. The reported non-predictive role of environmental shared vision on environmental innovation fails to provide evidence to validate environmental shared vision as environmental capabilities among environmentally proactive manufacturers in Malaysia (Eisenhardt & Martin, 2000; Helfat & Peteraf, 2003).

The findings presented in Table 4 provide strong support for H3 (standardized beta = 0.166, $p < 0.05$). As anticipated, firms' environmental innovation is positively predicted by their efforts in creating environmental technological capabilities. This result is consistent with Figueiredo (2002b), which reported technological capabilities as the resource which enables a firm to generate innovations in products, processes, and engineering projects.

This result confirms environmental technological capabilities as contributing factors toward environmental innovation. These firms are more likely to be better in their environmental innovation due to their efforts to identify and respond to environmental technology change, constantly master state-of-the-art environmental technologies, develop environmental technology innovations, and incur a high ratio of sales value on environmental research and development. This is probably due to the fact that manufacturer's environmental capabilities are dependent on the environmental technological capabilities created by them. Firms environmental capabilities could be strengthened as a result of outcome benefits gained from creation of environmental technological capabilities. These outcome benefits include enhancement of absorptive capacity when a firm is able to evaluate and utilize environmental technical knowledge from external sources and integrate them as part of its environmental technologies stocks. The technical knowledge would determine to a large extent the features and design of green products offered by a firm (Afuah, 2002). Further benefits derived from the creation of environmental technological capabilities is a high intensity in technological learning, which enables effective use of technologies, and foster discovery of new ways of applying technical knowledge into production and products design. Moreover, accumulation of technological capabilities is path dependent on technological learning process of a firm (Figueiredo, 2002a, 2002b), which serve as an antecedent of innovation. As such, environmental technological capabilities are crucial to the manufacturing firms as they represent key sources of environmental capabilities for improving environment innovation arising from environmental technology management. Moreover, the path coefficient shows that environmental technological capabilities as the second strongest predictor of environmental innovation among environmentally proactive manufacturing firms in Malaysia.

Accordingly, it is reasonable to conclude that manufacturing firms with a high level of environmental technological capabilities are more likely to achieve superior environmental innovation. In line with the assertion that environmental technologies act as enablers of environmental innovations (Bartlett & Trifilova, 2010), the reported predictor role of environmental technological capabilities on environmental innovation provides evidence to endorse environmental technological capabilities as environmental capabilities among environmentally proactive manufacturers in Malaysia, as underpinned by the dynamic capabilities theory of firm performance (Eisenhardt & Martin, 2000; Helfat & Peteraf, 2003). These environmental capabilities eventually form basis of dynamic capabilities that strengthen firms' competitive capabilities in the form of environmental innovation.

The findings presented in Table 4 reported environmental management supports have no effects on environmental innovation (standardized beta = 0.101, $p > 0.05$), H4 was not supported. Contradicting to prediction; the result of this study indicates environmental management supports do not act as driving factor toward environmental innovation among environmentally proactive manufacturers. These firms are unlikely to gain superior environmental innovation from their environmental management supports adoptions, such as implementing EMS, obtaining ISO 14001 EMS certification, environmental audits, environmental reporting, installing cross functional environmental management team, and life-cycle assessment of products development. The results of this study show the benefits of environmental management supports were not successfully converted into anticipated achievements in terms of environmental innovation. This result contradicts with past studies, despite under different perspectives. Earlier studies show EMS was positively associated with eco-innovation (Horbach, 2008; Kesidou & Demirel, 2012); greening of supplier is positively associated with environmental innovation (Rao, 2002; Chiou et al., 2011); and environmental policy is positively associated with environmentally related innovation activities (Dangelico & Pujari, 2010; Lanoie et al., 2011).

The findings of this study reveal manufacturing firms with a high level of environmental management supports are not likely gaining superior environmental innovation. The reported non-predictive role of environmental management supports on environmental innovations fails to provide evidence to validate environmental shared vision as environmental capabilities, as underpinned by the dynamic capabilities theory of firm performance (Eisenhardt & Martin, 2000; Helfat & Peteraf, 2003).

The findings presented in Table 4 strongly supported this hypothesis (standardized beta = 0.484, $p < 0.01$), thus H2e was supported. In line with prediction, firms' environmental innovation is positively affected by their efforts in securing environmental collaboration. This result was consistent with past empirical studies despite in different perspectives. Moreira & Silva (2014) reported positive association between cooperation with customers and marketing innovation. Others reported positive associations between customer engagement and innovation (Witell et al., 2011; Moreira & Silva, 2014).

The result of this study endorses environmental collaboration as a predictor of environmental innovation. The manufacturers are more likely to be better in their environmental innovation as a result of involving suppliers, customers and the local communities in their environmental management activities. This is probably due to their environmental capabilities that could be strengthened as a result of outcomes gained from environmental collaboration. These benefits include access to market information embedded within customers' experiences (Prahalad & Ramaswamy, 2003; Moreira & Silva, 2014), and access to pool of environmental knowledge and skills embedded across the supply chain (Vachon & Klassen, 2008), which facilitates green product and green process development. As such, environmental collaboration with suppliers, customers and the local communities is highly important to the manufacturing firms as it represents dominant sources of environmental capabilities for improving environmental innovation arising from collaborating with partners along supply chain. Moreover, the large path coefficient shows that environmental collaboration has a strongest driver effect on environmental innovation among environmentally proactive manufacturing firms in Malaysia.

In sum, this study reveals that manufacturing firms with high level of environmental collaboration are more likely to achieve superior environmental innovation. The reported positive role of environmental collaboration on environmental innovation provides evidence to validate environmental collaboration as environmental capabilities among environmentally proactive manufacturers in Malaysia, as underpinned by the dynamic capabilities theory of firm performance (Eisenhardt & Martin, 2000; Helfat & Peteraf, 2003). These environmental capabilities eventually form the basis of dynamic capabilities that strengthen firms' competitive capabilities in the form of environmental innovation.

CONCLUSION

Further, the study proposes and empirically examined the antecedents of environmental competitive capabilities. Current literature has mainly focused on evaluating effects of environmental competitive capabilities on economic performance. This research study articulated the concept of environmental capabilities, and posit them as sources of dynamic capabilities which helps firms to maintain its ability to compete. The findings reveals environmental strategic focus, environmental collaboration and environmental technological capabilities serve as environmental capabilities as they enhance environmental innovation. The findings of this study suggest possibility for manufacturers to remain competitive via integrating environmental consideration at strategic level, collaborates with suppliers, customers and the local community for environmental solutions, and invest in environmental technological capabilities. This is highly probable as long as the benefits of environmental strategic focus, environmental collaboration and environmental technological capabilities are being converted into environmental innovation. Government policies tailored at strengthening overall technologies infrastructure at industry and country level are needed in order to enable firms to realize superior environmental performance from technology factor. For example, the National Green Technology Policy enforced in year 2009 provides incentives for green technologies adoptions; and financing assistance is established via Green Technology Financing Scheme (Bakar et al., 2011). Such measures should be continued and enhanced in order to enable manufacturers to realize radically improved environmental performance and environmental innovations from technology factor.

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