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Does Environmental Collaboration Matter? Evidence on Environmental and Financial Performance of Malaysian Manufacturing Sector

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Abstract
The financial performance of business organisations is increasingly being affected by the societal needs to protect the environment. Collaboration with various stakeholders, including suppliers, customers/consumers and communities, enables firms to achieve their strategic outcomes as well as performance. This study focuses on environmental collaboration with various stakeholders as a capability for enhancing the firms' environmental and financial performance. In total, 124 completed questionnaires were received from proactive environmental manufacturing companies in Malaysia. The findings show that all relationships of the hypotheses are significant. The significant linkage between collaboration with various stakeholders and environmental performance is a pathway for the former to an excellent financial performance. The novel and beneficial impact of environmental collaboration with various stakeholders on firm performances are also unearthed in this study.

Keywords: *Environmental collaboration; environmental performance; financial performance; manufacturing companies; Malaysia.*

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I. INTRODUCTION

The business case for environmental sustainability (BCES) refers to the corporate practice of justifying environmental investments based on the potential of generating net economic benefits from those investments. Both business leaders (Kiron et al., 2014) and researchers of BCES (Henderson, 2015; Schaltegger and Burritt, 2018) highly recognise the economic value of environmental management, with many suggesting that successful environmental management enhances firm performance, a notion referred to as 'it pays to be green'. Proponents of BCES assert that businesses could leverage on environmental management to gain their competitive benefits by adopting a proactive stance in managing adverse impacts of their business activities on the natural environment (Calabrese et al., 2013; Endrikat et al., 2014). Firms stand to gain benefits from environmental management through innovations in finding solutions for process improvements and product differentiation regarding environmental issues (Hart, 1995; Porter and Van der Linde, 1995). Pollution is a form of waste that results from inefficiencies in the business processes. As proposed by a few environmental management scholars (Ambec and Lanoie, 2008; Hart, 1995; Sharma and Vredenburg, 1998), there are areas for lowering operational costs when firms take proactive steps to improve product design and

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business processes with a focus on pollution prevention. Collectively, these authors suggest a few potential environmental benefits, including (i) lower cost related to reduced waste production and disposal, (ii) lower regulatory compliance cost as pollution prevention minimises risks for regulatory interventions and (iii) lower materials costs from the better materials yields from the improved product design. Further, according to Ambec and Lanoie (2008), firms gain differentiation advantage through green products offering and stand to gain the benefits of first-mover advantage in the markets they compete when incorporating environmental considerations at an early stage of the product life cycle. Thus, given the potential of 'it pays to be green' notion, some businesses resort to building a BCES from their environmental strategies implementation.

From the perspective of dynamic capabilities (Eisenhardt and Martin, 2000; Teece et al., 1997), environmental collaboration conforms to environmental capabilities derived from the firms' ability to configure their environmental resources to establish, manage and maintain beneficial collaboration relationships. Moreover, a successful environmental collaboration demands complex managerial skills and experiences. According to the literature on strategic network (Gulati et al., 2000), inter-firm networking is highly complex, firm-specific and is path dependent on firms' previous collaborative efforts. The management of such collaborations contributes significantly to a firm's centrality position within its inter-firm network, enabling the firm to establish more collaboration ties (Powell et al., 1996). As such, environmental collaboration is valuable, rare, inimitable and non-substitutable (Hart, 1995). These capabilities lead to sustainable competitiveness in the form of above-normal rates of return (Barney, 1991). Fundamentally, this study focuses on environmental collaboration with various stakeholders to enhance the firms' environmental and financial performance.

The remainder of this paper is organised as follows. Section 2 states the literature review and hypotheses development and Section 3 presents the methodology used in this study. In Section 4, the results and discussions are illustrated, while Section 5 describes the conclusions of the study. Finally, in Section 6, the limitations and future directions of the study are included.

II. LITERATURE REVIEW

2.1 Environmental Collaboration

Environmental collaboration is defined as the direct involvement of an organisation with its suppliers and customers (Vachon and Klassen, 2008) and the communities (Porter and Kramer, 2011) in cooperativelyplanning for environmental solutions including greener product design, process improvements and waste reduction in logistic activities (Crossan and Apaydin, 2010). Environmental collaboration with suppliers, customers and local communities encourages engagement from stakeholders, fostering participation from key stakeholders (Sloan, 2009). Such a positive stakeholder relationship enables firms to achieve their strategic outcomes (Donaldson and Preston, 1995; Jones, 1995), particularly regarding the firms' competitive advantages or relational rent (Dyer & Singh, 1998).

Environmental collaboration aims to reduce environmental damages via improved products (Gnoni et al., 2011; Vachon and Klassen, 2008) and production processes (Vachon and Klassen, 2008). Such collaboration establishes regular inter-organisational interaction that leads to knowledge exchange (Parmigiani and Rivera-Santos, 2011), which then supports reconfiguration and creation of new environmental knowledge required for innovative solutions for environmental challenges (Svendsen and Laberge, 2005). Moreover, collaborative interaction with stakeholders creates a relational space conducive for the emergence of trust among the participating stakeholders (Bradbury-Huang et al., 2010). Trust-based interaction

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facilitates participation, leading to information sharing and collective learning. For these benefits, firms are likely to gain environmental capabilities from their strengths in managing inter-firm collaboration.

Environmental considerations at supply chain activities broaden the scope of a firm's environmental management by including the environmental performance of suppliers and customers (Carter and Easton, 2011; Carter and Rogers, 2008). The green approach requires cooperation and collaborative efforts between manufacturers, suppliers and customers to develop solutions for environmental issues across the supply chain (Gnoni et al., 2011). The essence of environmental collaboration with the suppliers is the mutual readiness of suppliers to pool resources and share ideas and information towards a collective goal of environmental protection across the supply chain. This requires active interaction and commitment between the suppliers and the firm in planning and exploring environmental solutions on an aggregate basis.

Similarly, environmental collaboration with customers serves as the mechanism to involve customer experience individually or in groups to create values that enhance environmental protection. Firms advocating the value co-creation concept involve customers in co-design for sustainability that integrates customers' and users' environmental knowledge and experience in the early design phases of product development (Sanders and Stappers, 2008; Witell et al., 2011). The richness and diversity of experiences derived from customers strengthen a firm's environmental capabilities.

Further, collaboration with the communities serves as the mechanism to involve the local society knowledge and experiences' for value creation benefiting society. As suggested by shared value paradigm scholars (Googins and Escudero, 2014; Pfitzer, Bockstette, & Stamp, 2013), businesses can generate economic value through societal value creation by addressing communities' needs and challenges. One dominant strategy to achieve shared value is through building supportive industry clusters at the locality of the firm.

Therefore, environmental collaboration denotes environmental capabilities generated from firms' environmental network processes, which in turn strengthens their ability to compete. However, only a few studies have examined the effects of environmental collaboration on firm performance. Moreover, an empirical study is yet to include environmental collaboration as an independent variable within an integrated model that examines how proactive environmental strategies affect firm performance. Accordingly, this research posits that environmental collaboration functions as environmental capabilities that enhance the competitive capabilities of environmentally proactive firms (Gabler et al., 2015; Walls et al., 2011). Thus, this paper argues for the need to examine how environmental collaboration strengthens two significant competitive capabilities of environmentally proactive firms: environmental performance and environmental innovation.

2.2 Environmental Performance

Environmental performance is defined as 'organisation-wide commitment to environmental excellence relative to the rest of the industry in a variety of areas' (Judge and Douglas, 1998, p. 251). It represents the core construct indicating firms' achievements in environmental protection. Considerable empirical studies and meta-reviews of environmental management studies have modelled environmental performance as the outcome variable of firms' environmental management, thus differentiating environmental management and environmental performance as two distinct constructs of corporate environmentalism (Busch and Hoffmann, 2011; Delmas et al., 2013; Endrikat et al., 2014). Further, a meta-analysis by Nawrocka and Parker (2009) highlights that current empirical studies have primarily included a mix of internal

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environmental improvements (e.g. waste elimination) and external environmental benefits (e.g. environmental reputation) as environmental performance. Nevertheless, such an approach results in a general conclusion, limiting the usefulness of empirical findings. As such, this research adopts an internal dimension in conceptualising environmental performance. Furthermore, it relies on Delmas et al. (2013) to define environmental performance as the impact of companies' activities on the natural environment. From an internal perspective, a firm's superior environmental performance is indicated by its achievements in reducing adverse impact on the natural environment, including the following: reduction in waste and emissions from operations; reduction of the environmental impacts of products or services; reduced risk of environmental accidents, spills and releases and, lastly, reduced purchases of non-renewable materials, chemicals and components (Chow and Chen, 2012). Consequently, this research argues for the need to empirically examine how environmental performance strengthens two dominant constructs of economic performance: competitive advantage and financial performance.

2.3 Financial Performance

Financial performance is defined as 'the economic outcomes resulting from the interplay among an organisation's attributes, actions, and environment' (Combs et al., 2005, p. 261). According to the findings of a meta-study by Albertini (2013), empirical studies relating to environmental practices and firm performance have broadly conceptualised financial performance as the proxy of firm performance. Financial performance is a construct with a focus on firms' profitability that can be assessed using accounting returns, growth and stock market performance. Following extant environmental management literature, this research examines financial performance as regards accounting returns represented by profit margin, sales revenues, returns on investment and growth in terms of market share and new market opportunities.

2.4 Environmental Collaboration and Environmental Performance

Sustainable supply chain literature (Carter and Easton, 2011; Carter and Rogers, 2008) argues for the inclusion of environmental considerations in managing supply chain activities. The green approach requires cooperation and collaborative efforts among manufacturers, suppliers and customers to develop solutions for environmental issues at the supply chain level (Gnoni et al., 2011).

2.5 Environmental Collaboration with Suppliers and Environmental Performance

Environmental collaboration plays an antecedent in monitoring the environmental performance of suppliers (Green et al., 2012), which results in enhanced knowledge, information and skills to address environmental issues. Similarly, the literature on green supply chain supports the needs of a firm to work in collaboration with their customers to identify customers' environmental needs and then to integrate those environmental requirements into their supplies to customers (Green et al., 2012). The process of monitoring the environmental performance of supplier strengthens firms' environmental capabilities in terms of enhanced environmental knowledge, information and skills, which in turn improves environmental performance.

H1: Environmental collaboration with suppliers is positively related to environmental performance.

2.6 Environmental Collaboration with Customers/Consumers and Environmental Performance

Further, environmental collaboration represents the joint process between firms and their customers in generating environmental values in business (Prahalad and Ramaswamy, 2000, 2003, 2004), both in terms of physical products and the products' symbolic values (Galvagno and Dalli, 2014), to achieve the shared goal (Witell et al., 2011) of environmental protection. As such, environmental

collaboration with customers enables firms to gain access to customers' experiences related to (i) the environmental impact associated with products use and (ii) how environmental features included in firm's products complement or enhance products' functionality. Thus, co-designing with customers for sustainability enables firms to be equipped with customers' information required for the creation of new or improved products and environmentally safe processes. Hence, the richness and diversity of experiences derived from environmental collaboration with customers constitute the firms' environmental capabilities that, in turn, enhance environmental performance.

H2: Environmental collaboration with customers is positively related to environmental performance.

2.7 Environmental Collaboration with Communities and Environmental Performance

Additionally, the shared value paradigm (Googins and Escudero, 2014; Pfitzer et al., 2013; Porter and Kramer, 2011) suggests that businesses can generate economic value through societal value creation by addressing the communities' requirements and challenges. Collaboration with communities serves as a mechanism to leverage the local society knowledge and experiences' for value creation that benefits society. The members of a community constitute an important group of stakeholders for the survival and success of corporations (Freeman, 1984) because they have local environmental knowledge and expertise. Thus, firms' environmental capabilities are strengthened through environmental collaboration with the communities, improving their environmental performance.

H3: Environmental collaboration with communities is positively related to environmental performance.

In conclusion, through environmental collaboration, stakeholders are connected in a network of knowledge, skills and experiences that facilitates the discovery of innovative solutions for complex issues beyond a single organisation, thus strengthening the firms' environmental capabilities. An empirical study conducted on this matter indicates an improved environmental performance through proactive stakeholder engagement (Alt et al., 2015). Accordingly, the present research posits that more significant environmental collaboration, the better environmental performance at the firm level, thus arguing for the need to validate the effects of environmental collaboration on environmental performance empirically. As an empirical study on this link is sparse, this research proposes the following hypothesis:

2.8 Environmental Performance and Financial Performance

Following the NRBV (Hart, 1995; Hart and Dowell, 2011), the implementation of environmental strategies results in enhanced resource productivities and lower operational costs owing to innovations in environmental protections, which in turn enhances financial performance. Numerous empirical studies reported a positive association between environmental and firm performance (Chang, 2011; Chen, 2006; Forsman, 2013). Similarly, a longitudinal design study concluded that environmental performance improvements in a prior period was associated with financial performance improvements in the subsequent period, and vice-versa (Clarkson et al., 2011). Furthermore, empirical studies in Malaysia have reported a positive link between environmental initiatives and financial performance (Eltayeb et al., 2011; Lee et al., 2013). On the contrary, numerous empirical studies (Rassier and Earnhart, 2010; Sarkis and Cordeiro, 2001) found a negative relationship between environmental and financial performance. Nonetheless, some researchers found no relationship (Iwata and Okada, 2011; Wagner et al., 2002) between environmental and financial performance.

In conclusion, although a small number of studies have reported contrary pieces of evidence, the positive link between environmental and financial

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performance at the firm level has been validated by a large number of empirical studies including those conducted on manufacturing firms in Malaysia. Thus, underpinned by the NRBV, this research posits a positive link between environmental and financial performance among manufacturing firms in Malaysia. However, limited empirical studies have linked environmental performance to firm performance within an integrated model involving environmental innovation simultaneously, thus allowing concurrent tests of the effects of both competitive environmental capabilities on competitive advantage. Accordingly, the following hypothesis is proposed:

H4: Environmental performance is positively related to financial performance.

III. METHODOLOGY

Based on the discussion above, a conceptual framework (Figure 1) connecting the research constructs is developed as below.

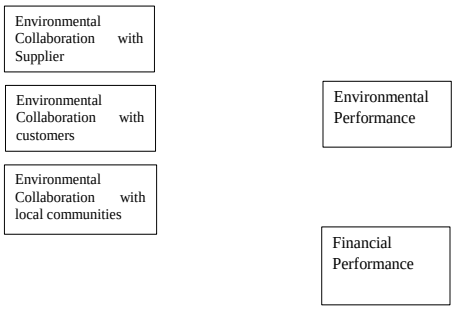

Figure 1. Research Framework

Table 1 indicates the primary constructs and the indicators as well as the source of references of each construct.

Table 1. Construct indicators and source of references

Construct	Indicator variables	Source of references
Financial performance	1. Increase in profit margin 2. Increase in market share 3. Increase in sales revenues 4. Increase in return on investment 5. New market opportunities 6. Increase in overall financial performance	adapted from scales of several authors (Karagozoglu & Lindell, 2000; Rao & Holt, 2005; Rao, 2002)
Environmental performance	1. Reduction of air emission 2. Reduction of waste water 3. Reduction of solid waste 4. Decrease in consumption for hazardous / harmful / toxic materials 5. Decrease in frequency of environmental accidents 6. Improved environmental situation.	Adapted from the scale developed by Zhu and Sarkis(2004)
Environmental collaboration with suppliers	1. Achieving environmental goals collectively. 2. Developing a mutual understanding of responsibilities regarding environmental performance. 3. Working together to reduce environmental impact of our activities. 4. Conducting joint planning to anticipate and resolve environmental-related problems. 5. Making joint decisions about ways to reduce overall environmental impact of our products.	Adapted from scale developed by Vachon and Klassen(2008)
Environmental collaboration with customers and consumers	1. Achieving environmental goals collectively. 2. Developing a mutual understanding of responsibilities regarding environmental performance. 3. Working together to reduce environmental impact of our activities. 4. Conducting joint planning to anticipate and resolve environmental-related problems. 5. Making joint decisions about ways to reduce overall environmental impact of our products.	Adapted from scale developed by Vachon and Klassen(2008)

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Construct	Indicator variables	Source of references
Environmental collaboration with the local communities	1. Collaboration with the community clusters for cleaner processes 2. Collaboration with the community clusters to substitute materials 3. Collaboration with the community clusters for recyclable products 4. Collaboration with the community cluster for cleaner technologies development.	Scale constructed based on key attributes suggested in Hofmann et al. (2012)
Control variable: Firm size	Number of employees in a firm	(Eltayeb et al., 2011; González-Benito & González-Benito, 2005)

3.1 Data Collection and Sample

This study focuses on Malaysian manufacturing companies and their environmental practices. According to the Federation of Malaysian Manufacturers 2017, there are 483 manufacturing companies with ISO14001 environmental management system (EMS) certification, spread unevenly throughout Malaysia. ES certification enables a firm to signal to its stakeholders about the quality of its environmental management and its commitment to environmental protection (Lee et al., 2013). This study adopted a census sampling technique, where all 483 companies have been included in the survey. Complete information for 124 responses was eventually obtained, representing a 25.7% response rate; this is considered acceptable because it was between 24% and 17% (Eltayeb et al., 2011; Lee et al., 2013).

Structural equation modelling (SEM) and more specifically partial least squares (PLS) was employed to analyse the data. SEM overcomes some limitations of the traditional multivariate techniques (Hair et al., 2014). Previous studies have employed this technique due to its capability to forecast multiple dependent variables of a research model with a limited theoretical base (Roldán, 2012).

IV. RESULTS AND DISCUSSIONS

Table 2 below shows the profiles of the 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 fibres (n = 16, 13%) and others (n = 39, 31%). The number of full-time employees indicates the relative size of the sampled firms. Regarding the labour force, the majority of the sampled firms (n = 52, 42%) are of small to medium size, employing less than 200 employees, followed by large-sized firms (n = 41, 33%), with an employee force between 200 to 500 employees. The remaining firms (n = 31, 25%) own a workforce above 500 employees.

Table 2. 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	52	42%
Between 200 and 500	41	33%
Above 500	31	25%

Table 3 indicates the descriptive statistics of the data; mean values range from 43.80 to 5.15 and standard deviations range from 0.67 to 0.97. All Kurtosis and skewness statistics (as shown in Table 3) were within the normality range of −1 to +1, which is within the acceptable range of normality (Hair et al., 2010; Kline, 2011).

Table 3. Data statistics

Constructs	Item code	Mean	SD	Kurtosis	Skewness
Financial performance (FP)	FP1	4.85	0.67	0.489	0.516
	FP2	4.89	0.74	(0.360)	0.425
	FP3	5.07	0.97	(0.789)	0.507
	FP4	4.95	0.91	(0.319)	0.690

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	FP5	5.11	0.87	(0.546)	0.391
Environmental performance (EP)	EP1	4.97	0.78	(0.007)	0.159
	EP2	4.96	0.78	0.362	0.280
	EP3	4.85	0.87	0.440	0.750
	EP4	4.94	0.90	(0.077)	0.537
	EP5	4.92	0.85	(0.214)	0.236
Environmental collaboration with suppliers (ECS)	ECS1	5.19	0.73	0.052	0.323
	ECS2	5.10	0.70	0.560	0.148
	ECS3*	4.93	0.73	0.489	0.615
	ECS4	4.98	0.92	(0.366)	0.678
	ECS5	5.02	0.76	(0.373)	0.299
Environmental collaboration with customers (ECC)	ECC1	5.03	0.76	(0.715)	0.167
	ECC2	5.05	0.78	(0.388)	0.325
	ECC3	5.03	0.86	(0.635)	0.398
	ECC4	4.96	0.91	(0.546)	0.600
	ECC5	5.15	0.86	(0.680)	0.256
Environmental collaboration with communities (ECM)	ECM1	4.97	0.78	(0.797)	0.262
	ECM2	4.94	0.74	(0.822)	0.211
	ECM3	4.80	0.77	0.345	0.793
	ECM4	4.97	0.89	(0.546)	0.553

4.1 Common Method Bias and Non-response Bias

Harman's single-factor test using the SPSS software version 24 was performed, and the findings indicate that the first factor explains 26.99% of the total variance. This indicates a common method bias, which did not critically affect the results. The results of the independent t-test analysis reported non-significance of Levene's values for all constructs. Thus, the risk of non-response bias was non-critical to this study.

Table 4 shows the factor loading and reliability of the research constructs. Average variances extracted range from 0.588 to 0.735, composite reliabilities ranged from 0.877 to 0.917, and Cronbach's alphas ranged from 0.826 to 0.879. These indicate that all measurement scales showed adequate convergent validity and reliable measurement scales.

The Fornell and Larcker (1981) criterion was used to assess the discriminant validity, which examines the correlations between constructs and identifies the potentiality of overlapping constructs. Table 5 presents the correlations between the research constructs. The items' cross-loadings were lower than items' loadings for each respective construct, implying that the measurement items loaded strongly on its respective construct. Overall, the measurement model displayed satisfactory convergent validity and discriminant validity.

	FP	EP	ECS	ECC	ECM
FP	**0.767**				
EP	0.458	**0.785**			
ECS	0.495	0.558	**0.813**		
ECC	0.566	0.603	0.654	**0.775**	
ECM	0.468	0.639	0.689	0.633	**0.857**

4.2 Hypotheses Testing

The results of the structural model (Table 6) indicate a causal relation between constructs, including the estimation of the path coefficients and the R2 value. The R2 value demonstrates that environmental collaboration with customers, communities and supplies causes 50% variance in environmental performance. Similarly, the results for **H1** (β = 0.198, p = 0.060), **H2** (β = 0.256, p = 0.018) and **H3** (β = 0.347, p = 0.000) indicate that environmental collaboration with customer, communities and suppliers have a positive relationship with environmental performance. The results for **H4** (β = 0.458, p = 0.000) indicate that environmental performance has positive and significant impacts on financial performance, as expected, explaining 21.3% of the variance. Figure 2 represents the structural model of the study. Regarding the control variable, findings reported no significant association between financial performance (β = −0.003, p > 0.05) and the natural logarithm of the size of the employee number. The findings in Table 6 below reported all paths with below medium effects (f^2<0.15).

Table 6. Results of Hypothesis Testing

Hypothesis	Path	Standard beta	Standard error	t value	p value	Results	f^2	R^2
H1	ECS>EP	0.198	0.105	1.881*	0.060	Supported	0.035	
H2	ECC>EP	0.256	0.108	2.370**	0.018	Supported	0.063	0.500
H3	ECM>EP	0.347	0.092	3.778***	0.000	Supported	0.116	
H4	EP>FP	0.458	0.065	7.011***	0.000	Supported	0.271	
Control Variable	Log EY>FP	−0.003	0.073	0.345^{NS}	0.965	Unsupported	0.000	0.213

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Note: NS = non-significant; *p ≤ 0.1,**p ≤ 0.05, ***p ≤ 0.0001

Note: FP = Financial performance, EP = Environmental performance, ECS = Environmental collaboration with supplier, ECC = Environmental collaboration with customers, ECM = Environmental collaboration with communities

f2 or effect size is a measure used to assess the relative impact of a predictor construct on an endogenous construct.

R2 or coefficient of determination is a measure of the model's predictive accuracy and is calculated as the squared correlation between a specific endogenous construct's actual and predicted values.

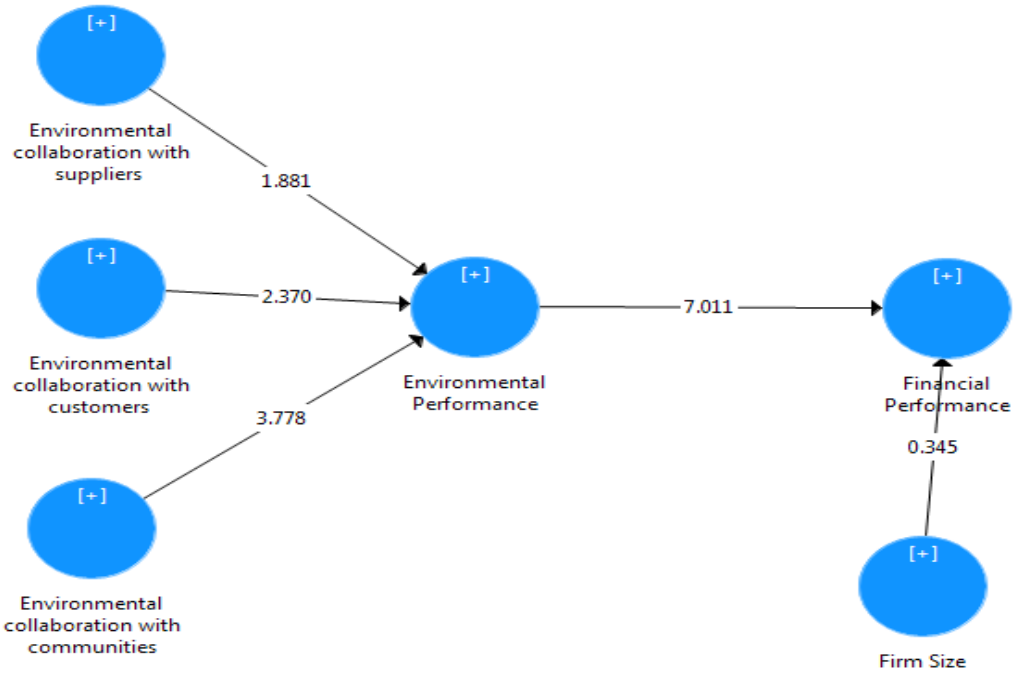

Figure 2. Structure Model

V. DISCUSSION

5.1 Environmental Collaboration with Suppliers and Environmental performance

This finding confirms the existence of environmental collaboration with the supplier as a predictor of environmental performance. Manufacturers are more likely to be efficient in managing adverse environmental impact owing to their efforts to involve suppliers in their environmental management actions. This is probably accorded to the fact that manufacturers' environmental capabilities are dependent on the environmental collaboration executed by them. A firm's environmental capabilities could be strengthened from the benefits embedded within the environmental collaboration with suppliers such as broadening the scope of environmental management, enhancing environmental knowledge, information and skills and increasing knowledge

sharing. Thus, such firms have access to a common source of environmental resources with suppliers that effectivelyhelp them solve environmental impact.

5.2 Environmental Collaboration with Customers and Environmental Performance

The results endorsing environmental collaboration with customers are likely to enhance environmental performance. The collaboration with customers enables firms to embed customers' environmental expectations, which enhance a firm's capability to innovate and produce products that fulfil customers' requirements. Access to market information embedded within customers' experiencesis one of the benefits of this collaboration. This result is consistent with past empirical studies such as Moreira and Silva (2014), who reported a positive association between cooperation with the customer and environmental performance.

5.3 Environmental Collaboration with Communities and Environmental Performance

According to the findings obtained in this study, it was confirmed that a more significant environmental collaboration with communities such as local universities, trade association and community groups is likely to improve environmental performance. Through collaboration with communities, firms obtain access to more insights from them, such as environmental-related knowledge related technologies, resources and infrastructure embedded within the communities. Firms can then work along with these communities to create win-win situations regarding environmental investments. This could, in turn, strengthen firms' ability to facilitate the green process and product development.

5.4 Environmental Performance and Financial Performance

According to the findings reported in Table 6, environmental performance has no effects on financial performance (standardised beta = 0.458, p $\leq$ 0.0001), and H4 was supported. As predicted, this study discovers that environmental performance does act as a contributing factor towards financial performance among environmentally proactive manufacturers in Malaysia. These firms are expected to gain financial performance from their environmental performance, such as a reduction in air emissions, wastewater, solid waste, hazardous materials use and environmental accidents. These environmental performances would directly decrease operating costs and increase the firms' financial performance.

According to the proponents of value-based eco-management (Figge, 2005; Hart and Milstein, 2003; Wagner and Schaltegger, 2004), in most cases, firms with the ability to integrate their environmental performance and economic performance are more likely to benefit financially from their environmental activities.

VI. CONCLUSION

Consequentially, environmental collaboration with suppliers, customers and the local communities is extremely essential to the manufacturing firms, as they are the dominant sources of environmental capabilities to improve environmental performance. Moreover, the large path coefficient shows that environmental collaboration has the most substantial driver effect on the environmental performance among environmentally proactive manufacturing firms in Malaysia. Accordingly, it is plausible to conclude that manufacturing firms with a high level of environmental collaboration are more likely to achieve superior environmental performance. The reported positive influence of environmental collaboration on environmental performance provides empirical 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 and Martin, 2000; Helfat and Peteraf, 2003). These environmental capabilities eventually

form the basis of dynamic capabilities that strengthen a firm's competitive capabilities in the form of environmental performance.

VII. LIMITATIONS AND FUTURE DIRECTIONS

Some limitations of this study need to be addressed, as they could lead to possible future directions. First, this study examines the environmental practices adopted only by the environmentally proactive manufacturing firms certified with ISO14001 in Malaysia. Thus, caution should be taken to generalise the findings to other manufacturing firms in Malaysia. The expansion of the current findings to other non-ISO14001-certified manufacturing firms would likely be more insightful for future studies.

Second, this study researches the mediating roles of environmental innovation in the relationship between environmental and financial performance. However, there are other factors such as corporate environmental strategies and a competitive environment that might be considered in the future.

Third, the sole use of the Likert scale in assessing the items of construct indeed contributed to the inherent deficiencies of the survey method. Thus, future studies could use secondary data to verify the findings of this study and enhance the generalisation of the findings.

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REFERENCES

[1]. Alt, E., Díez-de-Castro, E. P., Lloréns-Montes, F. J. 2015. Linking employee stakeholders to environmental performance: The role of proactive environmental strategies and shared vision. J. Bus. Eth.128(1), 167–181. https://doi.org/10.1007/s10551-014-2095-x

[2]. Ambec, S., Lanoie, P. 2008. Does it pay to be green? A systematic overview. Acad. Manag. Perspect. 22(4), 45–62. https://doi.org/10.5465/amp.2008.35590353

[3]. Barney, J.B. 1991. Firm resources and sustained competitive advantage. J. Manag. 17(1), 99–120. https://doi.org/10.1177/014920639101700108

[4]. Bradbury-Huang, H., Lichtenstein, B., Carroll, J.S., Senge, P.M. 2010. Relational space and learning experiments: The heart of sustainability collaborations, in: Pasmore, W.A., Shani, A.B., Woodman, R.W. (Eds.), Research in Organizational Change and Development (Vol. 18). Emerald Group Publishing Limited, pp. 109–148.

[5]. Busch, T., Hoffmann, V.H. 2011. How hot is your bottom line? Linking carbon and financial performance. Bus. Soc. 50(2), 233–265. https://doi.org/10.1177/0007650311398780

[6]. Calabrese, A., Costa, R., Menichini, T., Rosati, F., Sanfelice, G. 2013. Turning corporate social responsibility-driven opportunities in competitive advantages: A two-dimensional model. Knowl. Process Manag. 20(1), 50–58. https://doi.org/10.1002/kpm.1401

[7]. Carter, C.R., Easton, P.L. 2011. Sustainable supply chain management: Evolution and future directions. Int. J. Phys. Distr. Log. Manag. 41(1), 46–62. https://doi.org/10.1108/09600031111101420

[8]. Carter, C.R., Rogers, D.S. 2008. A framework of sustainable supply chain management: Moving toward new theory. Int. J. Phys. Distr. Log. Manag. 38(5), 360–387. https://doi.org/10.1108/09600030810882816

[9]. Chang, C.-H. 2011. The influence of corporate environmental ethics on competitive advantage: The mediation role of green innovation. J. Bus. Eth. 104(3), 361–370. https://doi.org/10.1007/s10551-011-0914-x

[10]. Chen, Y.S., Lai, S.B., Wen, C.T. 2006. The influence of green innovation performance on corporate advantage in Taiwan. J. Bus. Eth. 67(4), 331–339. https://doi.org/10.1007/s10551-006-9025-5

March - April 2020
ISSN: 0193-4120 Page No. 12278 - 12292

[11]. Chow, W.S., Chen, Y. 2012. Corporate sustainable development: testing a new scale based on the mainland chinese context. J. Bus. Eth. 105(4), 519–533. https://doi.org/10.1007/s10551-011-0983-x

[12]. Clarkson, P.M., Li, Y., Richardson, G.D., Vasvari, F.P. 2011. Does it really pay to be green? Determinants and consequences of proactive environmental strategies. J. Account. Public Policy, 30(2), 122–144. https://doi.org/10.1016/j.jaccpubpol.2010.09.013

[13]. Combs, J.G., Crook, T.R., Shook, C.L. 2005. The dimensionality of organizational performance and its implications for strategic management research, in: Ketchen D.J. (Ed.), Research Methodology in Strategy and Management (Vol. 2). Elsevier, Amsterdam, pp. 259–286.

[14]. Crossan, M.M., Apaydin, M. 2010. A multi-dimensional framework of organizational innovation: a systematic review of the literature. J. Manag. Stud. 47(6), 1154–1191. https://doi.org/10.1111/j.1467-6486.2009.00880.x

[15]. Delmas, M., Etzion, D., Nairn-Birch, N. 2013. Triangulating environmental performance: What do corporate social responsibility ratings really capture? Acad. Manag. Perspect. 27(3), 255–267. https://doi.org/10.5465/amp.2012.0123

[16]. Donaldson, T., Preston, L.E. 1995. The stakeholder theory of the corporation: concepts, evidence, and implications. Acad. Manag. Rev. 20(1), 65–91. https://doi.org/10.5465/amr.1995.9503271992

[17]. Dyer, J.H., Singh, H. 1998. The relational view: Cooperative strategy and sources of interorganizational competitive advantage. Acad. Manag. Rev. 23(4), 660–679. https://doi.org/10.5465/amr.1998.1255632

[18]. Eisenhardt, K.M., Martin, J.A. 2000. Dynamic capabilities: What are they? Strategic Manag. J. 21(10–11), 1105–1121. https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E

[19]. Eltayeb, T.K., Zailani, S., Ramayah, T. 2011. Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: investigating the outcomes. Resour. Conserv. Recycl. 55(5), 495–506. https://doi.org/10.1016/j.resconrec.2010.09.003

[20]. Endrikat, J., Guenther, E., Hoppe, H. 2014. Making sense of conflicting empirical findings: A meta-analytic review of the relationship between corporate environmental and financial performance. Eur. Manag. J. 32(5), 735–751. https://doi.org/10.1016/j.emj.2013.12.004

[21]. Figge, F. 2005. Value-based environmental management. From environmental shareholder value to environmental option value. Corp. Soc. Resp. Env. Manag. 12, 19–30. https://doi.org/10.1002/csr.74

[22]. Fornell, C., Larcker, D.F. 1981. Evaluating structural equation models with unobservable variables and measurement error. J. Mark. Res. 18(1), 39–50. https://doi.org/10.1177/002224378101800104

[23]. Forsman, H. 2013. Environmental innovations as a source of competitive advantage or vice versa? Bus. Strategy Environ. 22(5), 306–320. https://doi.org/10.1002/bse.1742

[24]. Freeman, R.E. 1984. Strategic management: a stakeholder approach. Pitman, Boston.

[25]. Gabler, C.B., Richey, R.G., Rapp, A. 2015. Developing an eco-capability through environmental orientation and organizational innovativeness. Ind. Mark. Manag. 45, 151–161. https://doi.org/10.1016/j.indmarman.2015.02.014

[26]. Galvagno, M., Dalli, D. 2014. Theory of value co-creation: a systematic literature review. Manag. Serv. Qual. 24(6), 643–683. https://doi.org/10.1108/MSQ-09-2013-0187

March - April 2020
ISSN: 0193-4120 Page No. 12278 - 12292

[27]. Gnoni, M.G., Felice, F.D., & Petrillo, A. 2011. A multi-criteria approach for strategic evaluation of environmental sustainability in a supply chain. Int. J. Bus. Insights Transfor. 3(3), 54–61.

[28]. Googins, B., Escudero, M. 2014. Entrepreneurship: Introducing shared innovation into the business model, in: Weidinger, C., Fischler, F., R. Schmidpeter (Eds.), Sustainable Entrepreneurship. CSR, Sustainability, Ethics & Governance. Springer Berlin, Heidelberg, pp. 117–126.

[29]. Green, K.W., Zelbst, P.J., Bhadauria, V.S., Meacham, J. 2012. Do environmental collaboration and monitoring enhance organizational performance? Ind. Manag. Data Syst. 112(2), 186–205. https://doi.org/10.1108/02635571211204254

[30]. Gulati, R., Nohria, N., Zaheer, A. 2000. Strategic networks. Strategic Manag. J. 21(3), 203–215. https://doi.org/10.1002/(SICI)1097-0266(200003)21:3<203::AID-SMJ102>3.0.CO;2-K

[31]. Hair, J.F., Hult, G.T.M., Ringle, C., Sarstedt, M. 2014. A primer on partial least squares structural equations modeling (PLS-SEM). Sage Publications, Thousand Oak.

[32]. Hart, S.L. 1995. A natural-resource-based view of the firm. Acad. Manag. Rev. 20(4), 986–1014. https://doi.org/10.5465/amr.1995.9512280033

[33]. Hart, S.L., Dowell, G. 2011. A natural-resource-based view of the firm: Fifteen years after. J. Manag. 37(5), 1464–1479. https://doi.org/10.1177/0149206310390219

[34]. Hart, S.L., Milstein, M.B. 2003. Creating sustainable value. Acad. Manag. Exec. 17(2), 56–67. https://doi.org/10.5465/ame.2003.10025194

[35]. Helfat, C.E., Peteraf, M.A. 2003. The dynamic resource-based view: Capability lifecycles. Strategic Manag. J. 24(10), 997–1010. https://doi.org/10.1002/smj.332

[36]. Henderson, R. 2015. Making the business case for environmental sustainability. Harvard Business School Working Paper, No. 15-068. https://doi.org/10.1093/acprof:oso/9780198704072.001.0001

[37]. Iwata, H., & Okada, K. 2011. How does environmental performance affect financial performance? Evidence from Japanese manufacturing firms. Ecol. Econ. 70(9), 1691–1700. https://doi.org/10.1016/j.ecolecon.2011.05.010

[38]. Jones, T.M. 1995. Instrumental stakeholder theory: A synthesis of ethics and economics. Acad. Manag. Rev. 20(2), 404–437. https://doi.org/10.5465/amr.1995.9507312924

[39]. Judge, W.Q., & Douglas, T.J. 1998. Performance implications of incorporating natural environmental issues into the strategic planning process: An empirical assessment. J. Manag. Studies 35(2), 241–262. https://doi.org/10.1111/1467-6486.00092

[40]. Kiron, D., Kruschwitz, N., Rubel, H., Reeves, M., & Fuisz-Kehrbach, S.-K. 2014. Sustainability's next frontier. MIT Sloan Manag. Rev. 55(2), 1–25.

[41]. Lee, V.-H., Ooi, K.-B., Chong, A.Y.-L., Lin, B. 2013. A structural analysis of greening the supplier, environmental performance and competitive advantage. Prod. Plan. Control Manag. Oper. 26(2), 116–130. https://doi.org/10.1080/09537287.2013.859324

[42]. Moreira, J., Silva, M.J.A.M. 2014. Cooperation between the consumer and firms as a determinant of marketing innovation: empirical study of Portuguese firms. Contemp. Manag. Res. 10(3), 215–232. https://doi.org/10.7903/cmr.12370

[43]. Nawrocka, D., Parker, T. 2009. Finding the connection: environmental management systems and environmental performance. J. Clean. Prod. 17(6), 601–607. https://doi.org/10.1016/j.jclepro.2008.10.003

March - April 2020
ISSN: 0193-4120 Page No. 12278 - 12292

[44]. Parmigiani, A., Rivera-Santos, M. 2011. Clearing a path through the forest: A meta-review of interorganizational relationships. J. Manag. 37(4), 1108–1136. https://doi.org/10.1177/0149206311407507

[45]. Pfitzer, M., Bockstette, V., Stamp, M. 2013. Innovating for shared value. Harv. Bus. Rev. 91(9), 100–107.

[46]. Powell, W.W., Koput, K.W., Smith-Doerr, L. 1996. Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. Adm. Sci. Q. 41(1), 116–145. https://doi.org/10.2307/2393988

[47]. Prahalad, C.K., Ramaswamy, V. 2000. Co-opting customer competence. Harv. Bus. Rev. 78(1), 79–90.

[48]. Prahalad, C.K., Ramaswamy, V. 2003. The new frontier of experience innovation. MIT Sloan Manag. Rev. 44(4), 12–18.

[49]. Prahalad, C.K., Ramaswamy, V. 2004. Co-creating unique value with customers. Strategy Leadersh. 32(3), 4–9. https://doi.org/10.1108/10878570410699249

[50]. Rassier, D.G., Earnhart, D. 2010. Does the porter hypothesis explain expected future financial performance? The effect of clean water regulation on chemical manufacturing firms. Environ. Resour. Econ. 45(3), 353–377. https://doi.org/10.1007/s10640-009-9318-0

[51]. Roldán, J.L., Sánchez-Franco, M.J. 2012. Variance-based structural equation modeling: guidelines for using partial least squares in information systems research, in: Mora, M., Gelman, O., Steenkamp, A.L., Raisinghani, M. (Eds.), Research Methodologies, Innovations and Philosophies in Software Systems Engineering and Information Systems.Information Science Reference, Hershey, pp. 193–221.

[52]. Sanders, E.B.N., Stappers, P.J. 2008. Co-creation and the new landscapes of design. CoDesign 4(1), 5–18. https://doi.org/10.1080/15710880701875068

[53]. Sarkis, J., Cordeiro, J.J. 2001. An empirical evaluation of environmental efficiencies and firm performance: Pollution prevention versus end-of-pipe practice. Eur. J. Oper. Res. 135(1), 102–113. https://doi.org/10.1016/S0377-2217(00)00306-4

[54]. Schaltegger, S., Burritt, R. 2018. Business cases and corporate engagement with sustainability: Differentiating ethical motivations. J. Bus. Ethics 147(2), 241–259. https://doi.org/10.1007/s10551-015-2938-0

[55]. Sharma, S., Vredenburg, H. 1998. Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. Strategic Manag. J. 19(8), 729–753. https://doi.org/10.1002/(SICI)1097-0266(199808)19:8<729::AID-SMJ967>3.0.CO;2-4

[56]. Sloan, P. 2009. Redefining stakeholder engagement: From control to collaboration. J. Corporate Citizensh. 36, 25–40.

[57]. Svendsen, A.C., Laberge, M. 2005. Convening stakeholder networks: A new way of thinking, being and engaging. J. Corporate Citizensh. 19, 91–104.

[58]. Teece, D.J., Pisano, G., Shuen, A. 1997. Dynamic capabilities and strategic management. Strategic Manag. J. 18(7), 509–533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

[59]. Vachon, S., Klassen, R.D. 2008. Environmental management and manufacturing performance: The role of collaboration in the supply chain. Int. J. Prod. Econ. 111(2), 299–315. https://doi.org/10.1016/j.ijpe.2006.11.030

[60]. Wagner, M., Schaltegger, S. 2004. The effect of corporate environmental strategy choice and environmental performance on competitiveness and economic performance: an empirical study of EU manufacturing. Eur.

Manag. J. 22(5), 557–572. https://doi.org/10.1016/j.emj.2004.09.013

[61]. Wagner, M., Van Phu, N., Azomahou, T., Wehrmeyer, W. 2002. The relationship between the environmental and economic performance of firms: An empirical analysis of the European paper industry. Corp. Soc. Resp. Env. Manag. 9(3), 133–146. https://doi.org/10.1002/csr.22

[62]. Walls, J.L., Phan, P.H., Berrone, P. 2011. Measuring environmental strategy: Construct development, reliability, and validity. Bus. Soc. 50(1), 71–115. https://doi.org/10.1177/0007650310394427

[63]. Witell, L., Kristensson, P., Gustafsson, A., Löfgren, M. 2011. Idea generation: Customer co-creation versus traditional market research techniques. J. Serv. Manag. 22(2), 140–159. https://doi.org/10.1108/09564231111124190