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PERCEIVED ENVIRONMENTAL UNCERTAINTY, ENVIRONMENTAL MANAGEMENT ACCOUNTING AND CORPORATE SUSTAINABILITY PERFORMANCE IN MALAYSIAN MANUFACTURING SECTOR

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Abstract: *This study concentrates on the relationships between perceived environmental uncertainty and environmental management accounting (EMA) on corporate sustainability performance. This study employed the perceptual measurement in measuring the variables instead of using physical measurement. The empirical results show that there is a significant positive effect between the perceived environmental uncertainty and the use of EMA, which in turn can improve the sustainability performance. The findings suggest that EMA is as useful and important tool system to collect and analysis information to improve corporate sustainability performance in Malaysian manufacturing firms. Moreover, perceived environmental uncertainty has directly positive effect on the implement of EMA and corporate sustainability performance.*

Keywords: EMA, Perceived Environmental Uncertainty, Corporate Sustainability Performance

1. Introduction

With the rapid development of industry, environmental pollution is becoming more and more prominent in the world. "green environmental protection" has become the expectation of companies, countries and even the whole world. Now, corporate sustainability performance (CSP) has received more and more attention from the research field. Some researchers discuss the factors which affect corporate sustainability and offer effective operational methods to improve CSP (Abdul-Rashid, Sakundarini, Raja Ghazilla and Thurasamy, 2017; Cankaya and Sezen, 2019; Raharjo , 2019; Wijethilake, 2017; Orji, 2019; Islam, Tseng and Karia, 2019; Orazalin, Mahmood and Narbaev, 2019; Shamraiz, Yew, and Hassan ,2017; Ahmad, Hami, Shafie and Yamin, 2019). CSP as the internal indicator to measure the corporate sustainability, it evaluates the company comprehensive strength and developing prospect from three dimensions of economy, environment and society, so as to realize the corporate commitment, role and responsibility to the society. Sustainability attaches great importance to the environment and takes environmental protection as one of most important factors for the company to pursue the sustainability vision. Incorporating the environmental aspect to the CSP has attracted a new concern for academicians and practitioners. At present, although many academicians and practitioners have focused on the relationship between “green” practices and CSP, especially in the manufacturing industry (Abdul-Rashid et al., 2017; Cankaya and Sezen

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,2019; Raharjo, 2019; Wijethilake, 2017). Managers can control the corporate strategic decisions, management efficiency and employee deployment to ensure that the organization can adapt to the external environment. However, with the increase the uncertainty of the internal and external environmental system in the organization, managers are disturbed by environmental uncertainty in their decision-making, so the perceived environmental uncertainty becomes an valuable discussion in the firms. In this paper, the new focus on the relationship between the perceived environmental uncertainty (PEU) and environmental management accounting (EMA) with CSP, which may be fill up the gap of previous research. Therefore, this question will serve as the missing link which will be the focus of this study.

What's more, there is a lack of the discuss between PEU with the CSP, especially EMA with CSP, and has not taken into account the sustainability prospect in Malaysian manufacturing industry. In fact, environment-related regulations and measurements are mainly concentrated in developed countries, while Malaysia, as an emerging developing country, has an incomplete environmental system (Gunarathne and Alahakoon,2016; Qian et al., 2015). Therefore, a research on the implement of environmental initiative on the CSP, specially prospects for development in Malaysian manufacturing industry, deserves the effort.

2. Literature Review

2.1 Problem Statement

Bakar et al., (2017) proposed that the absence of environmental improvement is a major issue on the CSP. Malaysian government has taken several strategies on promoting environmentally sound and sustainable development (Aiyub, Gerrard and Martin, 2006). But, the Malaysian environmental issue is still severe. Through the study from Ridzuan (2015) that investigate the level of compliance to environmental regulations and the factors which affect compliance in Malaysian manufacturing industry. The finding is that a significant number of factories still do not comply with environmental regulations and holistic sector remains at passive environmental compliance. Therefore, Malaysian manufacturing sector is lack voluntary environmental initiatives. Based on Mohd Nasir and Ridzuan (2015), voluntary initiatives can help companies move toward more sustainability industrial systems but need to make full of using the potential of voluntary environmental initiatives. PEU is one of the key voluntary environmental initiatives, which consist of the internal environmental management to attain the voluntary environmental goal. Meanwhile, EMA is as a important mediator tool to adjust EMA and CSP to work better.

2.1.1 PEU and Corporate Sustainability Performance

The environmental uncertainty is mainly due to the lack of sufficient external information, which makes the company unable to perceive environmental uncertainty in advance through information analysis. Perceived environmental uncertainty refers to the legal, social, political and environmental risks that a company encounters from its operating environment. When the firm meet the PEU increases, managers need the management accounting system (MAS) which involve in the external, non-financial and ex ante information to help them to make decision (Gordon and Narayanan, 1984; Chenhall and Morris, 1986; Mia, 1993). Environmental management accounting as a part of MAS, which assume the corporate non-financial and financial information collected and analysis. The company implements EMA, which can obtain completed information efficiently and help managers

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to cope with environmental uncertainty. One explanation for this view is that MAS information may help managers understand situations of uncertainty (Mia, 1993). Researchers (Gul, 1991; Mia, 1993; Mia and Chenhall, 1994; Chong and Chong, 1997) have positive relationship between PEU and broad-scope management accounting. But, Pondeville et al. (2013) proposed that environmental uncertainty factors do not affect the adoption of environmental accounting system. Therefore, based on the literature, the following hypothesis is developed:

H1: There is a positive relationship between perceived environmental uncertainty and environmental management accounting.

2.1.2 Environmental Management Accounting and Corporate Sustainability Performance

Klassen and McLaughlin (1996); Sharma and Vredenburg (1998) claimed that better environmental performance provides competitive advantage which cause financial performance enhancement. Corporate reputation, is as a part of corporate social performance, which depends on economic support and marketing, so companies are encouraged to collect environment-related information through EMA, and use environment, resources, management and green marketing as a source to improve reputation and competitive advantage (Miles and Covin, 2000). Bennett and James (1998) proposed that environmental management accounting is defined as the generation of financial and non-financial information, analysis and use for optimistic environmental and economic performance, then finish the sustainability business. Especially in recent years, the environmental management system by company as a kind of management and control means to implement environmental and social performance (Jasch and Stasiskiene, 2005).

H2: There is a positive relationship between EMA and CSP.

3. Method

The hypothesis of this research explored the relationship between CSP, PEU and environmental management accounting (EMA). This research is using cross-sectional study. Meanwhile, using letter questionnaire, email questionnaire and calling survey collect data. Sekaran and Bougie (2013) thought that wherever the information could be received by mail questionnaire and respondents could complete the questionnaire in their convenient places. Therefore, mail questionnaire could be accepted.

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3.1 Materials

3.1.1 Samples

To ensure enough sample size for analysis, we use G-power (Cohen, 1992) for F test- Linear multiple regression: Fixed model, R^2 deviation from zero. Assuming a medium effect size ($f^2 = 0.15$) for the one predictor, a significant level of 0.05 (α), and a desired power of 0.80 ($1 - \beta$), our analysis would require a sample size of 55. PLS-SEM instrument is to assess the relationship of the latent constructs and hypothesis (Hair et al.,2014; Ramayah et al., 2018).

3.1.2 Site

Manufacturing industry is responsible for a large amount of resource consumption and waste generation in Malaysia. Hence, it is suitable to set the study in the Malaysian manufacturing industry.

3.1.3 Procedures

The ISO 14001 certified companies were chosen. In this study, we can easily select from all the manufacturing enterprises in Malaysia that have more than three years of ISO14001 certification. The data collection began on December 1, 2019, and is still collecting. To date, 62 replies have been received.

3.2 Measurement

This study employed the perceptual measurement in measuring the variables since it is quite difficult to acquire the physical measurement for each variable due to the company policies. Moreover, perceptive measurement had been used by most of the similar studies in this field. The questionnaire uses five-point scale and seven-point scale.

3.3 Data Analysis

We evaluated the PLS model in two stages using the method proposed by Chin (1998) and Hulland (1999). First, we evaluate the measurement model to ensure that the indicators for each construct are reliable and valid. Second, we tested the direct effects and the indirect effects of EMA on the relationship between IV and DV in inner model.

3.3.1 Validity and Reliability

The recommended value of the loading factor, average variance extracted (AVE) and reliability derived from the analysis of the measurement model for all variables were loading factor > 0.60, composite reliability/rho_A > 0.70 and AVE > 0.50 (Henseler et al., 2017; Latan and Ghozali, 2015). Although there is the problem of loading coefficient < 0.60, as long as the value is AVE > 0.50, it is acceptable.

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About composite reliability (CR), based on the latest literature in Hair et al., (2019), the maximum limit value of CR is 0.95. If the value exceeds 0.95, the indicator is redundancy, which affects the indicator validity. Therefore, this paper deletes 3 items (EMA4, EMA 6 and EMA11) of EMA and delete 3 items (CSP1, CSP6 and CSP8) of CSP in order to decrease CR values.

From the Table 3.1, It can be seen that the loading factor, AVE, CR and composite reliability/rho_A are suitable for the standard. Therefore, the reliability of the study is proven.

Table 3.1: Construct indicators and measurement model of PEU, EMA and CSP

	Items	Loading	AVE	CR	Rho _A
Perceived environmental uncertainty	PEU1	0.594	0.717	0.942	1.002
	PEU2	0.820			
	PEU3	0.924			
	PEU4	1.317			
	PEU5	0.761			
	PEU6	0.451			
	PEU7	0.786			
Environmental management accounting	EMA1	0.905	0.669	0.948	0.950
	EMA2	0.760			
	EMA3	0.714			
	EMA5	0.817			
	EMA7	0.851			
	EMA8	0.861			
	EMA9	0.774			
	EMA10	0.767			
	EMA12	0.890			
Corporate sustainability performance	CSP2	0.798	0.503	0.938	0.958
	CSP3	0.561			
	CSP4	0.590			
	CSP5	0.653			
	CSP7	0.621			
	CSP9	0.582			
	CSP10	1.046			
	CSP11	0.723			
	CSP12	0.538			
	CSP13	0.532			
	CSP14	0.595			
	CSP15	0.477			
	CSP16	1.057			
	CSP17	0.518			
	CSP18	0.822			
	CSP19	0.873			

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In addition, the discriminant validity was tested for all latent variables in the model using the Fornell-Lacker criterion, cross loading and heterotrait-monotrait ratio (HTMT).

Table 3.2: Cross Loading

Items	Corporate sustainability performance	Environmental management accounting	Perceived Environmental Uncertainty
CSP2	**0.798**	0.479	-0.032
CSP3	**0.561**	0.337	0.002
CSP4	**0.590**	0.354	-0.031
CSP5	**0.653**	0.392	0.001
CSP7	**0.621**	0.373	0.034
CSP9	**0.582**	0.349	-0.089
CSP10	**1.046**	0.628	0.034
CSP11	**0.723**	0.434	0.014
CSP12	**0.538**	0.323	-0.022
CSP13	**0.532**	0.320	-0.123
CSP14	**0.595**	0.357	-0.188
CSP15	**0.477**	0.286	0.091
CSP16	**1.057**	0.635	-0.049
CSP17	**0.518**	0.311	0.150
CSP18	**0.822**	0.493	0.070
CSP19	**0.873**	0.524	0.010
EMA1	0.526	**0.905**	-0.195
EMA2	0.451	**0.760**	-0.095
EMA3	0.428	**0.714**	-0.062
EMA5	0.510	**0.817**	0.067
EMA7	0.515	**0.851**	-0.041
EMA8	0.507	**0.861**	-0.140
EMA9	0.463	**0.774**	-0.076
EMA10	0.462	**0.767**	-0.052
EMA12	0.544	**0.890**	-0.010
PEU1	0.008	-0.049	**0.594**
PEU2	-0.009	-0.068	**0.820**
PEU3	0.126	-0.077	**0.924**
PEU4	0.000	-0.110	**1.317**
PEU5	-0.099	-0.063	**0.761**
PEU6	-0.034	-0.038	**0.451**
PEU7	-0.094	-0.065	**0.786**

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Table 3.2 provides for the cross loading between constructs. We can see, all loadings are highest on its own but lower on other constructs.

Table 3.3: Fornell and Larcker's Criterion

	Corporate sustainability performance	Environmental management accounting	Perceived Environmental Performance
CSP	0.709		
EMA	0.600	0.818	
PEU	-0.010	-0.083	0.846

In Table 3.3, it can be seen that the the square root of AVE (diagonal) is greater than the correlation(off-diagonal) between the constructs in the model. This means that the discriminant validity is sufficient (Chin,2010; Chin, 1998b; Fornell and Larcker, 1981).

Table 3.4: HTMT Criterion

	Corporate sustainability performance	Environmental management accounting	Perceived Environmental Performance
CSP			
EMA	0.563		
PEU	0.126	0.111	

We also used HTMT to test the discriminant validity. It can be seen from the analysis results in Table 3.4 that the value of HTMT is less than 0.85 (Kline,2011) or less than 0.90 (Gold et al.,2001), therefore the discriminant validity conforms to the standard.

3.3.2 Structural Model

The measurement in a structured method of latent collinearity, path coefficients, the level of R square values, effect size (f^2) and predictive relevance(Q^2) (Hair et al.,2014).
The thresholds of effect size (f^2) > 0.02 means small effect, > 0.15 means moderate effect and > 0.35 means strong effect. Additionally, the inner VIF values need to be tested are less than 5.

Table 3.5: Effect size (f^2) and Lateral collinearity (VIF)

	f^2	VIF
PEU→EMA	0.007	1.000
EMA→CSP	0.563	1.000

From Table 3.5, we can know EMA has a strong effect on CSP. But, the not supported (H2) are not accepted because do not reach the small effect value. All the VIF (< 5) fit for the standard and the structural model can be recommended. All the lateral collinearity in Table 3.4 fit for the standard and the structural model can be recommended.

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Stone and Geisser's Q^2 is applied using the blindfolding procedure (Ramayah et al., 2018). The predictive relevance (Q^2) from Table 3.5 values are greater than 0, which conform with the recommended rule.

Table 3.6: Predictive Relevance (Q^2) and Coefficient of Determination (R^2) Result

	Q^2(=1-SSE/SSO)	R^2
EMA	0.004	0.007
CSP	0.148	0.360

R^2 measures the model's predictive accuracy and higher values indicate higher levels of predictive accuracy. According to Falk and Miller (1992), R^2 values should be greater than 0.1. But R^2 of EMA is low than 0.1 and is not suitable. However, based on the prior study, Eberl (2010) provided the explanation for low R^2. Little R2 might have happened by accident. In the questionnaire survey, the problem of common method variance will appear. There might be a little R^2, because people answer likert scales in terms of a special view. Therefore, in this study, low R^2 is accept.

In this procedure, 500 sub-samples are taken from the original sample to use a bootstrapping procedure (Chin, 1998b). Table 3.7 presents the path coefficient result for direct and indirect hypothesis.

Table 3.7: Path Coefficient Result

Hypothesis	Relationship	Std. Beta	Std. Error	t-value	P value	Decision
H1	PEU→EMA	-0.088	0.204	0.398	0.691	Not supported
H2	EMA→CSP	0.601	0.077	7.392	0.000	Support

The threshold in this study is that p value less than 0.05 proposed by Hair et al. (2017) and indicate a t-value greater than 1.96 (Peng and Lai, 2012) to support the hypothesis. Therefore, in Table 3.6, H2 is support and H1 is not support.

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4. Results and Discussion

This study explored whether perceived environmental uncertainty can directly affect corporate sustainability performance or indirectly by the use of EMA. Through the analysis, the results provide evidence to support H2 but H1 is rejected. Environmental management system is as a kind of management and control means to implement environmental, economic and social performance (Miles and Covin, 2000; Bennett and James, 1998; Jasch and Stasiskiene, 2005). This study also proves the positive relationship between EMA and CSP.

In term of H2, according to the prior studies, Pondeville et al. (2013) that perceived environmental uncertainty does not have relationship in the EMCS (Environmental management control systems). This study also confirms Pondeville et al. (2013) finding. Environmental uncertainty is a challenge for every company today. It is related to the lack of green accounting information. Under the conditions of high uncertainty, complex environmental information can help managers improve the accuracy of decision-making and solve environmental problems. But, EMA is only a tool, after the company obtains enough information through EMA, it needs professionals to analyze and process the information, which requires the company's employees to be highly professional. However, in Malaysia, environmental awareness is still in its infancy, so despite the company's ISO14001 environmental management system, there is still a lack of staff to analyze environmental uncertainties.

5. Conclusion

In conclusion, with the increasing call for sustainability and the increasing awareness of people, the importance in corporate sustainable performance has become increasingly prominent. This study focuses on the implement of environment-related resources to improve corporate sustainability performance. Using PLS-SEM instrument to analysis the data from Malaysian manufacturing companies. The findings suggest that EMA is a useful and important tool to provide environment-related information to boost corporate sustainability performance. However, perceived environmental uncertainty has not affected on the implement of EMA and EMA has positive effect on improvement in corporate sustainability performance. Through the results in this study, we can use appropriate methods to improve the corporate sustainability performance.

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