

DIGITALES ARCHIV

Kazi Sirajul Islam; Muthaiyah, Saravanan; Yong, Gun-Fie David

Article

Isomorphic drivers of institutional pressure and importance of environmental management system implementation towards the adoption propensity of Green ICT

Provided in Cooperation with:

International Journal of Energy Economics and Policy (IJEPP)

Reference: Kazi Sirajul Islam/Muthaiyah, Saravanan et. al. (2020). Isomorphic drivers of institutional pressure and importance of environmental management system implementation towards the adoption propensity of Green ICT. In: International Journal of Energy Economics and Policy 10 (6), S. 624 - 634.

<https://www.econjournals.com/index.php/ijeep/article/download/10618/5517>.

doi:10.32479/ijeep.10618.

This Version is available at:

<http://hdl.handle.net/11159/8074>

Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics

Düsternbrooker Weg 120

24105 Kiel (Germany)

E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)

<https://www.zbw.eu/econis-archiv/>

Standard-Nutzungsbedingungen:

Dieses Dokument darf zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden. Sie dürfen dieses Dokument nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen. Sofern für das Dokument eine Open-Content-Lizenz verwendet wurde, so gelten abweichend von diesen Nutzungsbedingungen die in der Lizenz gewährten Nutzungsrechte.

<https://zbw.eu/econis-archiv/termsfuse>

Terms of use:

This document may be saved and copied for your personal and scholarly purposes. You are not to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public. If the document is made available under a Creative Commons Licence you may exercise further usage rights as specified in the licence.



Isomorphic Drivers of Institutional Pressure and Importance of Environmental Management System Implementation Towards The Adoption Propensity of Green ICT

Kazi Sirajul Islam*, Saravanan Muthaiyah, David Yong Gun Fie

Faculty of Management, Multimedia University, Cyberjaya 63100, Malaysia. *Email: 1131600082@student.mmu.edu.my

Received: 01 July 2020

Accepted: 16 September 2020

DOI: <https://doi.org/10.32479/ijeeep.10618>

ABSTRACT

The rapid development of the Internet has amplified the use of information and communication technology (ICT). This has raised concerns regarding environmental sustainability in the ICT industry in relation to carbon emission, high electrical energy consumption, and vulnerable e-waste management practices. Therefore, this study investigates the relationship between the isomorphic drivers of institutional pressure such as coercive, normative, and mimetic pressures, and the importance of implementing the Environmental Management System (EMS) towards the adoption propensity of green ICT in Malaysia. 127 ICT-based organizations under the Multimedia Digital Economy Corporation (MDEC) in Malaysia are utilized to gather data using a survey based on a 5 and 7-point Likert scale questionnaire. A proportionate stratified random probability sampling procedure is used for this purpose. The results from this exploratory study prove that both normative pressure and the importance of EMS implementation have a positive and significant relationship with the adoption propensity of Green ICT. This finding will be beneficial in assisting policy makers, academicians, and future researchers in determining the significant factors in the adoption propensity of Green ICT along with the materialization of Malaysia's National Green Technology Policy.

Keywords: Green ICT, Normative Pressure, Coercive Pressure, Mimetic Pressure, EMS

JEL Classifications: M150, M160

1. INTRODUCTION

The Malaysian Multimedia Super Corridor (MSC) aims to revitalise the business world by using IT capabilities. The MSC is centrally located in the massively growing Asian market. It cultivates the full potential of the multimedia sub-sector by integrating world class IT infrastructures with relevant cyber laws located in the midst of innovative physical infrastructures (MDEC, 2017). The Multimedia Digital Economy Corporation (MDEC) was assigned by the Malaysian government to develop, coordinate, and promote ICT. The MDEC encourages the growth of MSC-based organizations in the international ICT arena by attracting global companies and local SMEs (Chong, 2018). It is widely acknowledged that both in Malaysia and globally, organizations

use Information Communication Technology (ICT) for many daily operational processes (Raston et al., 2010). ICT facilitates and simplifies the complex functions of creating, storing, and accessing data for present and future use. The ICT sector plays a huge role in realizing the country's vision to achieve a developed status. The ICT sector has a critical responsibility of supporting the implementation of a sustainable development programme that is aligned to the regulations set by the government in developing the National Key Economic Areas (NKEA) and other related sectors including Green ICT and other ICT based components in the industry (Chong, 2018). The pathway of achieving Green ICT categorically demonstrates the milestones that Malaysia aims to attain (Table 1). It has been estimated that from 1990 to 2016, more than 90% of electricity generated in Peninsular Malaysia

Table 1: Pathway of Green ICT in Malaysia

Wave 1 (2011-2015)	Wave 2 (2016-2020)	Wave 3 (2021-2025)
<ul style="list-style-type: none"> Developing the standards for establishing Green data. Telecommunication and teleworking. Promotion of local firms in providing business services in relation to Green ICT. Upgrading e-government initiatives. 	<ul style="list-style-type: none"> Supporting SMEs and consumers with e-services. Supporting organizations with the practice of Green ICT. Validating e-documents. 	<ul style="list-style-type: none"> Consolidating data centres for the government. Assisting in the increase of participation among local businesses.

Source: Green tech (2010)

is derived from fossil fuel. Electricity from fossil fuel plants is produced by burning carbon from coal, oil, and gas, and this emits carbon dioxide into the environment, which is a main constituent of GHG, a precursor to climate change (MESTECC, 2019). Since ICT heavily relies on electricity, Green ICT should be taken into consideration in an effort to reduce power consumption. It has been found that ICT is responsible for contributing 2-3% of the global carbon footprint annually (OECD, 2009). Previous studies have evaluated the roles of coercive, normative, and mimetic pressures in Green IT/IS adoption (Gholami et al., 2013); (Elisabeth and Mulyana, 2019). However, the importance of implementing the Environmental Management System (EMS) standards has not been empirically tested in its effect on the adoption propensity of Green ICT practices in Malaysia. Therefore, despite having guidelines for this industry to address these alarming issues, the ICT sector still needs to investigate the role of the factors contributing to the adoption propensity of Green ICT in Malaysia.

2. LITERATURE REVIEW

According to Hirsch (1975), the Institutional Theory refers to the external pressures that affect an organization in adopting organizational-wide practices. This theory examines the way in which organizations deal with Green issues based on external pressures (Jennings and Zandbergen, 1995). The external pressures highlighted in this study include three isomorphic drivers namely Coercive, Normative, and Mimetic pressures (DiMaggio and Powell, 1983). This is in alignment with most current studies that have used institutional pressures to examine the diffusion and adoption of information systems (Kasasbeh et al., 2018; Hawamdeh, 2018; Yu-Chi and Lin, 2018). Kilbourne et al. (2008) mention that coercive pressures are the driving force of environmental management practices. Government agencies can be coercive as they are strong institutions in enforcing organizations to adhere to green practices. Certain coercive methods include trade barriers and the issuance of penalties for non-compliance. Rivera (2004) adds that the government is a major force in the promotion of voluntary environmental practices. This pressure also leads to the voluntary implementation of green initiatives by organizations. Clemens and Douglas (2006) indicate that organizations with a lot of resources for environmental planning require less pressure. The

study by Ball and Craig (2010) finds that normative isomorphic drivers cause organizations to comply with regulations and standards by obeying legal organizational practices. Normative pressures occur when the market and consumers demand the manufacturers to address their environmental expectations by implementing green management practices (Sarkis et al., 2010). The term mimetic isomorphism refers to organizational activities that imitate successful organizations in the industry (Aerts et al., 2006). This action of imitating the competitors is known as competitive benchmarking. Competitive benchmarking is rather effective in developed countries such as France, Germany, and Canada (Aerts et al., 2006). China has also used this form of globalized mimetic pressure to learn about its foreign counterparts' successful methods of establishing environmentally friendly organizations (Christmann and Taylor, 2001).

Environmental issues are a major concern in many industry sectors given the current environmental regulations and market pressures. Manufacturers have begun considering clean production and green products as a critical issue. The International Organization for Standardization (ISO) established the ISO 14000, which is a series of standards for the different components of environmental management (Padma et al., 2008). Padma et al. (2008) claim that the ISO 14001 standard is a standard within the series of the ISO 14000 that outlines the requirements for the environmental management system (EMS). The adoption of EMS has been proven to reduce costs by increasing overall operational efficiency, reducing energy use, recycling product input, and improving service quality (Ambika and Amrik, 2004).

Global warming is one of the most crucial issues in creating an environment friendly world. In the recent Paris agreement, international communities reached an agreement to reduce global pollution to a tolerable level (Ahmad et al., 2019). The Intergovernmental Panel on Climate Change (IPCC) reports that climate change has caused sea levels and average temperatures to increase around the world, leading to extreme weather patterns (Tsai et al., 2016). The main constituent of this global warming is CO₂ and according to the International Energy Agency, approximately 80% of worldwide CO₂ emission comes from energy consumption. According to IPCC (2007), it is forecasted that GHG emissions will increase by 25-90% compared to the year 2000, and energy related CO₂ emissions will increase by approximately 40-110% by 2030. This is an alarming sign for all of us wanting to establish an environmentally sustainable society. Sohag et al. (2017) in their study reveal that energy usage and industry growth are positively related to CO₂ emissions. The study of Ben et al. (2017) found a causal relationship between CO₂ emissions and energy consumption. Given this scenario, Green ICT is a noble and important aim in energy utilization and reduction of GHG emissions caused by the ICT sector (Samyoung, 2010). Green ICT is able to reduce both energy consumption and GHG emissions. The ICT sector has a critical role in managing climate change by allowing other sectors including transport, construction, and power industries, to become more effective (Hyoung, 2010).

The study by Gholami et al. (2013) separates institutional pressure into two classes namely coercive and mimetic pressures in which

coercive pressure was found to have a positive influence while mimetic pressure had no significant influence on the adoption of green information system. The study by Kilbourne et al. (2008) discovers that coercive pressure is a prominent force when it comes to practicing environmental management. The research by Xiaohong et al. (2018) reveals that coercive and normative pressures are significantly related to corporate green innovation. The study by Ball and Craig (2010), in developed countries such as Canada and England, reveals that environmental cognizance and ethical values of consumers lead to normative pressures. The study by Zhu and Lian (2010) suggests that organizations in developing countries with joint ventures could ‘mimic’ their parent organizations and eventually disseminate pressure to other organizations. Thus, mimetic pressure can result in organizational initiatives to be more environmentally friendly. It was also found that implementation of EMS contributes to cost reduction by increasing the overall operating efficiency, reducing energy use, recycling product inputs, improving service quality, etc. (Ambika and Amrik, 2004). Based on the ambiguity of previous findings, this study is driven to investigate coercive, normative and mimetic pressures and their effects on the propensity to adopt Green ICT.

Therefore, four hypotheses have been postulated in this research as follows:

- H₁: A significant relationship exists between coercive pressure and the adoption propensity of green ICT.
- H₂: A significant relationship exists between mimetic pressure and the adoption propensity of green ICT.
- H₃: A significant relationship exists between normative pressure and the adoption propensity of green ICT.
- H₄: A significant relationship exists between the importance of EMS implementation and the adoption propensity of green ICT.

3. METHODOLOGY

This research uses the theory of institutional pressure based on its normative, mimetic, and coercive mechanisms of isomorphism. This research also amplifies the significance of the implementation of EMS in green ICT practices. Given the grave concern for environmental issues both in society and academia, the necessity and urgency of green practices among organizations is hardly surprising. Although there is a growing issue that environmentally friendly practices could diminish competitiveness, the need for environmental protection is prevalent as everyone wants to live in a sustainable environment (Porter and Vander, 1995). Therefore, it is proposed that the foremost consideration in the adoption of green practices would be to examine how the different kinds of pressures and EMS standards affect ICT firms in their adoption practices in order to make the industry green. By drawing upon the institutional theory and the importance of EMS implementation, a research model is proposed where the three isomorphic pressures known as coercive, mimetic, and normative pressures and the importance of EMS implementation are tested for their adoption propensity of Green ICT with the aim to find significant relationships among them in ICT firms.

3.1. Operationalization of Constructs

A questionnaire was constructed by adapting questions from previous research studies (Table 2). There are four items for each of the pressure variables namely normative, coercive, and mimetic. Each question is designed on a 5-point Likert scale where 1 represents Strongly Disagree and 5 represents Strongly Agree. Under the variable of the importance of EMS implementation towards the adoption propensity of Green ICT practices, each question is designed on a 7-point Likert scale where 1 represents Strongly Disagree and 7 represents Strongly Agree. Additionally, to understand the firms’ adoption propensity or tendency towards Green ICT, questions are designed on a 5-point Likert scale where 1 represents Strongly Disagree and 5 represents Strongly Agree.

3.2. Population and Sampling

A primary data source approach is applied in this study, with questionnaires distributed among two hundred and forty-four MSC status organizations in Malaysia; responses from one hundred and twenty-seven MSC status organizations are used for the final data analysis after data screening. A proportionate stratified random sampling technique is used to perform this study. For a population of 3241 active companies (MDEC Annual Report, 2017) with four different clusters, the minimum sample size should be 119. As such, the sample size of one hundred and twenty-seven organizations satisfies the sample size estimation as recommended by Bartlett et al. (2001). Questionnaires were distributed from August 2017 to February 2018 among MSC status organizations to collect data on demographic profiles and variables used in this study. A minimum response rate of 50% as proposed by Lovric (2011) is acceptable in most high quality business research. In this study, 244 total questionnaires are distributed and 127 questionnaires are received, giving a response rate of 52% in compliance with research requirements. The instrument’s content validity was assessed by two subject matter experts (university professors) and the instrument was pre-tested among five respondents from five MSC status companies using a debriefing technique (Malhotra

Table 2: Items (Appendix) within the constructs and the supporting literature sources

Construct	Items no.	Source
Coercive Pressure	CP1-CP4	Chen et al. (2010) Teo et al. (2003) Gholami et al. (2013)
Normative Pressure	NP1-NP4	Sarkis et al. (2010) Christmann and Taylor (2001) Carter et al. (2000) Teo et al. (2003) Gholami et al. (2013)
Mimetic Pressure	MP1-MP4	Chen et al. (2010) Daniels and Perez (2007) Teo et al. (2003) Gholami et al. (2013)
Importance of EMS Implementation	EMS1-EMS5	Tan 2005; Quazi (1999) Chin et al. (1999) Sureshchandar et al. (2001)
Adoption propensity of Green ICT practices	APGICT1-APGICT10	Streicher-Porte et al.(2005) Nnorom and Osibanjo, 2008 do Valle et al. (2005) Chen et al. (2010) Melnyk et al. (2003) Gholami et al. (2013)

et al., 2004). Several minor adjustments were done in the final survey questionnaire.

3.3. Model Evaluation

This research utilizes the Partial Least Square (PLS) based on the structural equation modelling (SEM) for data analysis. This technique is able to examine the structural and measurement models simultaneously by providing a thorough analysis of the inter-relations. The PLS has minimum requirements on data distribution, measuring scales, and sample size. This is the preferred tool for this study as it is exploratory and thus, predictive in nature. The smart PLS version 3.2.7 is utilized for data analysis. A bootstrapping approach (1000 resamples) is utilized to decide on the significant levels of the loadings and path coefficients. This research examines the presence of common method variance (CMV) using measurement methods rather than the constructs of interest (Jarvis et al., 2003). The presence of CMV is determined when one factor is able to explain more than 50% of the variance. This research evaluates the CMV by utilizing the Harman's single factor test based on the study by Jarvis et al. (2003). The results reveal that none of the five constructs explain more than 50 per cent of the total variance. This shows that CMV is not an issue in this research. According to Blalock (1963), when two or more exogenous (Independent) variables are closely correlated, multicollinearity is present. This is a problem because the researcher is unable to identify the relationships of these variables with the dependent variable. With the existence of multicollinearity in the research model, the sampling error of the data collected becomes high. Thus, a poor experimental design will result in this problematic issue in the research (Haitovsky, 1969). Variance inflation factor (VIF) is used to assess the multicollinearity issue. VIF values for all constructs in this research study are below 5 which indicates that collinearity is not a major concern among the independent variables (Hair et al., 2017). Another more conservative cut-off value for VIF is <3.3 (Diamantopoulos and Siguaw, 2006) and again, the independent constructs of this study are well below this value, further indicating that multicollinearity is not an issue (Table 3). Partial least square-structural equation modelling, with the acronym PLS-SEM, is a non-parametric statistical method. It is different from the covariance based on structural equation modelling also known as the CB-SEM. Although there is no requirement of data to be normally distributed in PLS-SEM, it is important to check whether the data in the study is far from normal distribution (Henseler et al., 2009; Hair et al., 2011). In this study, skewness and kurtosis tests are applied to examine whether the data in this study is normally distributed. It is found that the skewness and kurtosis are not close to zero, thus indicating the data is not normally distributed. It is also found that the data is not very far from the normal distribution or extremely removed from +1 and -1.

4. RESULTS OF THE STUDY

4.1. Testing of Measurement Model

Jarvis et al. (2003) provide guidelines that determine if the measurement model is reflective as the direction of all the items are towards the constructs and the indicators or the items are interchangeable. Items are considered highly correlated when the removal of one or two items has very little effect on the overall construct reliability. Thus, this research starts with the evaluation of the reflective measurements whereby both the convergent and discriminant validity are analyzed. The composite reliability and average variance extracted (AVE) are utilized to evaluate the convergence validity factor loadings. The loadings for the reflective items such as APGICT2, APGICT6, and APGICT8 (Items under APGICT) and EMS2, EMS3 (Items under EMS), were deleted as they were far below the cut-off value of 0.708 (Hair et al., 2016). However, loadings for the reflective items such as APGICT7, APGICT9, and APGICT 10 were kept although their values (between 0.60 and 0.708) are below the cut-off value of 0.708 (Table 4). This is because they contribute to the Average Variance Extracted-AVE of the APGICT (Adoption Propensity of Green ICT) construct to become more than 0.50 (Hair et al., 2016). Loading values >0.6 are acceptable if the summation of the loading leads to high loading scores, and contribute to AVE scores of >0.5 (Byrne, 2016). The composite reliability for each construct is more than 0.7. Next, the convergent validity is evaluated based on the extent to which a set of indicators measure a similar construct. The average variance extracted for each construct has been determined and the value of the AVE for each construct exceeds the 0.5 cut-off value (Hair et al., 2016), which establishes that the items under each construct are in agreement and thus, the convergent validity is confirmed (Table 4). After this, the discriminant validity is assessed. Discriminant validity is discovered through the comparison of the correlations between the constructs and the square root of the average variance extracted for that construct. The results show that the square root of the AVE is more than the correlation with the other constructs, which indicates an adequate discriminant validity among the constructs of this study. Discriminant validity analysis is performed using the Heterotrait-Monotrait (HTMT) ratio of the correlation. The findings reveal that all the values are lower than the threshold value of 0.90 (Henseler et al., 2015; Gold et al., 2001). In addition, none of the HTMT confidence intervals include the value of 1, which demonstrates that all the HTMT values are significantly different from 1 (Henseler et al., 2015) (Table 5). Therefore, all the constructs in this research are distinct from each other. This shows that the convergent and discriminant validities of the reflective measurement model in this research have been attained.

Table 3: Inner VIF values

	Adoption propensity	Coercive pressure	EMS	Mimetic pressure	Normative pressure
Adoption propensity					
Coercive pressure	1.856				
EMS	1.38				
Mimetic pressure	2.397				
Normative pressure	2.418				

Table 4: Item (Appendix) loadings and construct reliability and validity

Construct	Type of measure	Items	Loadings	Cronbach's alpha	Composite reliability	AVE
Adoption propensity	Reflective	APGICT1	0.731	0.841	0.88	0.514
		APGICT3	0.731			
		APGICT4	0.735			
		APGICT5	0.817			
		APGICT7	0.613			
		APGICT9	0.679			
		APGICT10	0.695			
Coercive pressure		CP1	0.882	0.859	0.905	0.705
		CP2	0.83			
		CP3	0.9			
		CP4	0.735			
Normative pressure		NP1	0.833	0.855	0.902	0.697
		NP2	0.843			
		NP3	0.836			
		NP4	0.827			
Mimetic pressure		MP1	0.702	0.814	0.874	0.635
		MP2	0.85			
		MP3	0.79			
		MP4	0.836			
EMS		EMS1	0.882	0.842	0.903	0.757
		EMS4	0.907			
		EMS5	0.82			

Table 5: Discriminant validity (Heterotrait-Monotrait, HTMT)

	Adoption propensity	Coercive pressure	EMS	Mimetic pressure	Normative pressure
Adoption propensity					
Coercive pressure	0.548 CI 90 (0.429,0.671)				
EMS	0.726 CI 90 (0.610,0.806)	0.388 CI90 (0.224,0.537)			
Mimetic pressure	0.556 CI90 (0.434,0.685)	0.746 CI90 (0.628,0.839)	0.518 CI90 (0.381,0.651)		
Normative pressure	0.75 CI 90 (0.629,0.841)	0.712 CI 90 (0.597, 0.808)	0.579 CI 90 (0.431,0.700)	0.835 CI 90 (0.729,0.923)	

4.2. Testing of Structural Model

Figure 1 and Table 6 below present the findings from the structural model. The results reveal that coercive pressure ($\beta = 0.130, P > 0.05$) is not significant in its relationship towards the adoption propensity of Green ICT. Therefore, H1 is not supported. Mimetic pressure ($\beta = -0.04, P > 0.05$) also presents a similar result. Therefore, H2 is not supported as well. On the other hand, significant relations are found between normative pressure and the adoption propensity of Green ICT ($\beta = 0.384, P < 0.05$), as well as between the importance of EMS implementation and the adoption propensity of Green ICT ($\beta = 0.405, P < 0.05$). Thus, H3 and H4 are supported in this research.

5. DISCUSSION AND FINDINGS

The demographic characteristics reveal that the percentage of male and female are 74 and 26 percent, respectively (Table 7). Most of the respondents (80%) in this study are between 25 and 45 years of age. The total percentage of respondents holding bachelor and

master's degrees is 77%; the percentage of companies having more than 10 years' experience is 69%, and company equity ownership is 50% each for Malaysian and foreign owned companies (Table 7). Based on the experience and maturity of the respondents given their educational background, the responses provided in the questionnaires are satisfactory in gaining insights into the adoption propensity of Green ICT among MSC status companies in Malaysia. The research model explains 54% ($R^2=0.541$) of the variance in the adoption propensity of Green ICT (Figure 1), which is predictable from the independent variables including coercive pressure, mimetic pressure, normative pressure, and the importance of the implementation of EMS standards.

Coercive pressure in this study is found to be insignificant towards the adoption propensity of Green ICT. The reason behind this could be that proprietors or owners of these ICT organizations assume that this pressure might increase the environmental cost of the firms which will place additional financial pressure on the firms' corporate operational management. This finding is similar to the results from the study by Amores-Salvadó (2014).

Figure 1: Results of the structural model

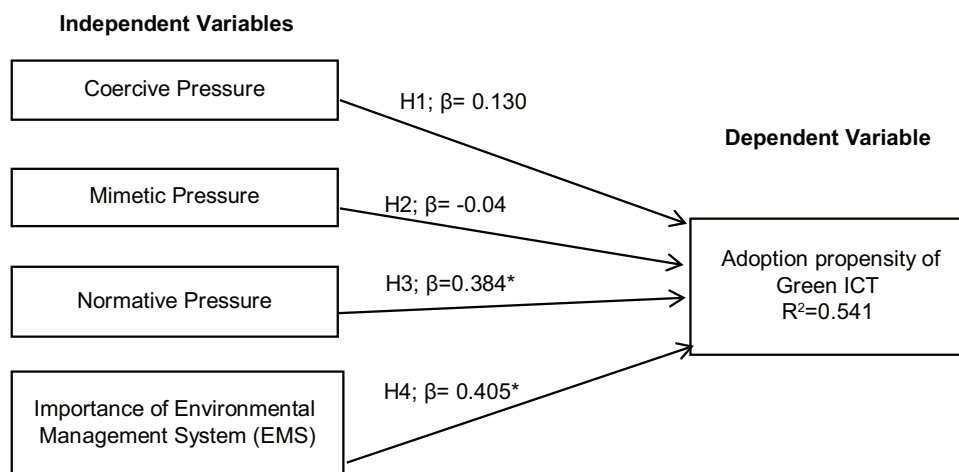


Table 6: Summary of the structural model

Hypothesis	Description	Path Coefficient	T statistics	P-values	Results
H1	Coercive Pressure -> Adoption Propensity of Green ICT	0.130	1.595	0.111	Not Supported
H2	Mimetic Pressure -> Adoption Propensity of Green ICT	-0.04	0.437	0.662	Not supported
H3	Normative Pressure -> Adoption Propensity of Green ICT	0.384	4.285	0.000	Supported
H4	EMS -> Adoption Propensity of Green ICT	0.405	5.757	0.000	Supported

*p<0.05

Table 7: Demographic profiles of respondents

Characteristics	n	Percentages (%)
Age	127	100
<25	3	2.4
25-35	53	41.7
36-45	48	37.8
46+	23	18.1
Gender	127	100
Male	94	74
Female	33	26
Educational background	127	100
Diploma	11	8.7
Bachelor degree	53	41.7
Master’s degree	44	34.6
PhD	7	5.5
Professional degree	9	7.1
Others	3	2.4
Company’s experience	127	100
<1 year	1	0.8
1 year-<5 years	25	19.7
5 years-<10 years	14	11.0
10 years and more	87	68.5
Equity ownership	127	100
Malaysian owned	58	45.7
Foreign owned	60	47.2
50-50 (Joint ventures)	9	7.1

Several studies identify this condition as the ‘Porter Hypothesis’ (Porter and Vander, 1995; Cai and Li, 2018; Ramanathan et al., 2018). Previous studies by Chen et al. and Butler (2011) find that adopting Green IS practices and technologies increases when governments enforce stricter regulations.

The results from prior studies are inconsistent and this could be because only some of the isomorphic drivers of institutional pressure have a significant effect if they are tested separately against the dependent variable. Previous studies provide reasons such as the institutional pressure being a complex concept with three different dimensions including coercive, normative, and mimetic pressures (DiMaggio and Powell, 1983; Berrone et al., 2013). Several other studies reveal a significant relationship depending on certain boundaries including firm resources, willingness, ability, and industrial traits (Qi et al., 2010; Durand et al., 2017). Moreover, this study did not find any significant relationship between mimetic pressure and the adoption propensity of Green ICT in Malaysia as well. This result is identical to past research findings by Gholami et al. (2013), in which mimetic pressure was not significant in the adoption of Green IS. It can be assumed that in the near future when many ICT firms will embrace Green ICT, a large number of them will be motivated and interested to ‘mimic’ green firms to enhance their contribution towards environmental sustainability. Therefore, it can be concluded that when more companies are moving towards environmental sustainability, mimetic pressure can have a new direction towards the adoption propensity of green ICT among organizations in the future. On the other hand, this research finds that normative pressure is significant towards the adoption propensity of Green ICT in Malaysia. This finding is aligned with the study by Zhu (2016), which claims that normative pressure consists of soft constraints on organizations.

Past research reveals that coercive pressure has the potential to weaken a firm’s market competitiveness as well (Jaffe and Stavins, 1995; Eiadat et al., 2008). Thus, its influence on the adoption propensity of Green ICT in the Malaysian ICT industry is not significant. Coercive pressure might be a fruitful driver in the adoption propensity of Green ICT only if proper and flexible environmental regulations are imposed by policymakers. It could be used by the firms to achieve competitive power in the long run.

In addition, moral standards and social norms help organizations to comply with the respective environmental regulations and laws. Thus, this pressure influences green adoption propensity (Krell et al., 2016). Several earlier studies found that suppliers, customers, the public, and the media are proponents of normative pressure (Delgado-Ceballos et al., 2012; Zhu, 2016). Moreover, studies have revealed that firms are eager to take on innovative green approaches towards environmental sustainability to fulfil the international market demand for sustainability by consumers, suppliers, and partners (Huang et al., 2016; Radnejad et al., 2017; Zhang et al., 2008; 2015). This study confirms a significant relation between the importance of EMS implementation and the adoption propensity towards Green ICT. Prior studies have revealed that EMS reduces energy usage and recycling of product inputs, improves operational efficacy and service quality, and reduces damage to the environment (Ambika and Amrik, 2004; Lee, 2005). This study found two path coefficients to be significant out of the four independent variables. The respondents in this study are managers and proprietors of ICT companies with MSC status and their insight on the performance of the companies should act as a catalyst to policymakers to push the ICT sector towards becoming environmentally sustainable. As discussed previously, out of the three isomorphic drivers, only normative pressure is significant. This illustrates the cultural norm of the Malaysian ICT sector that is keen to embrace a green environment. The other two drivers, mimetic and coercive pressures, do not have a significant effect on the adoption propensity of Green ICT. This is also a significant contribution of this research, as many other researches in other fields have found these two drivers to have a significant effect on Green IS or Green IT.

5.1. Policy Implications and Knowledge Claim

These research findings are important for policymakers to enhance the ICT sector. The insightful knowledge discovered in this research is important for policymakers to prioritize their strategy towards making ICT companies environmentally sustainable. Policymakers are aware of pollution and climate change. They need to address these issues with ICT companies to get their views and opinions in order to contribute towards environmental sustainability. The policy makers must guide the companies to achieve success while reducing pollution from its sector, thus contributing to a greater extent towards curbing climate change. The policymakers' role is highly important in achieving the best from the ICT industry. To achieve sustainable business practices, pressure from the customers, competitors, regulators, and society must be ensured with proper guidelines and initiatives from the highest officials of the country to make the ICT industry greener. Thus, a good framework must be established to assess a successful Green ICT in Malaysia. The strategies must be also articulated in accordance with the companies' wellbeing and their long lasting effect on the society as one of their fundamental corporate responsibilities besides financial gains. Since this research found coercive pressure and mimetic pressure to be insignificant, policymakers should increase business incentives to motivate companies to be more committed in establishing green policies. In the near future, government initiatives will be much higher for companies to become greener.

The results show that Malaysian ICT firms do not follow or copy others as they want to be unique. Coercive pressure does not work here as governmental pressure does not play a vital role in making ICT firms greener. Rather, it is found that it is better when policymakers are able to motivate or give incentives to ICT firms as a reward for their contribution towards the society as a whole. Thus, this research gives a strong indication that punishments will not work unless the firms discover the advantage of adopting green aspects on their own for the benefit of this world. The firms also highly acknowledge the importance of EMS implementation in their respective organizations to facilitate the adoption of Green ICT. Therefore, policymakers must concentrate on the normative pressure and the importance of EMS implementation towards the adoption propensity of Green ICT in Malaysia.

5.2. Limitations

The limitations in this study include identifying other determinants that could influence the adoption propensity of firms towards green ICT. Furthermore, the results were based on the ICT industry from only one country; the results might be different from other countries in the same industry with various cultural norms and administrative legislation. Future researchers studying the adoption propensity towards Green ICT in the ICT industry are encouraged to compare their output with findings of this study to have a vivid insight that could be beneficial to everyone.

5.3. Conclusion

This study revealed that coercive pressure from the organization or government is not welcomed by the companies. As firms operate independently with sufficient knowledge about the society's wellbeing, they are voluntarily willing to impress the society on their own. It is one of the major contributions gained from this study. Prior studies found that coercive pressure is significant towards Green IS or environmental issues but this study revealed that it may not be the case in Malaysia. Therefore, policymakers can motivate and support companies amicably in their propensity towards green ICT adoption. Mimetic pressure is also not significant in this research which proves companies are not willing to copy others blindly. Companies have their own image and commitment towards the society as described earlier. Normative pressure, which is the companies' norm, is significant as they are eager to go green on their own. The importance of environmental management system implementation is regarded as significant towards the adoption propensity of Green ICT as it directs the companies to go green with top management commitment, following the international code of conduct for EMS. Effective guidance and sufficient incentives are motivation for companies to become green.

This study found that policymakers' role is a catalyst for the overall output of environment friendly MSC companies in Malaysia. The propensity towards the adoption of Green ICT can be a long term process which will boost the companies' image in the future. The study takes into account the whole of Malaysia as it generalizes well by giving directions to other industries to gear up towards creating an environment friendly society. Despite some limitations faced by this study such as the lack of availability of managers due to their busy schedule at their respective organizations, it has

been successful in giving a practical scenario of the Malaysian ICT sector and its tendency to become green. Nowadays, information on climate change, greenhouse gas emissions, carbon footprint, and global warming are the most commonly heard issues around the world and managers in the ICT sector must also be well equipped to manage these issues as well. The more knowledge this sector has on these aspects, the more successful it will be in making the sector environmentally sustainable.

REFERENCES

- Aerts, W., Cormier, D., Magnan, M. (2006), Intra-industry imitation in corporate environmental reporting: An international perspective. *Journal of Accounting and Public Policy*, 25(3), 299-331.
- Ahmad, N., Du, L., Tian, X.L., Wang, J. (2019), Chinese growth and dilemmas: Modelling energy consumption, CO₂ emissions and growth in China. *Quality and Quantity*, 53(1), 315-338.
- Ambika, Z., Amrik, S.S. (2004), Adoption and maintenance of environmental management systems: Critical success factors. *Management of Environmental Quality*, 15(4), 399-419.
- Amores-Salvadó, J., Martín-de Castro, G., Navas-López, J.E. (2014), Green corporate image: Moderating the connection between environmental product innovation and firm performance. *Journal of Cleaner Production*, 83(2), 356-365.
- Ball, A., Craig, R. (2010), Using neo-institutionalism to advance social and environmental accounting. *Critical Perspectives on Accounting*, 21(4), 283-293.
- Bartlett, J.E., Kotlik, J.W. Higgins, C.C. (2001), Organizational research: Determining appropriate sample size in survey research information technology. *Learning, and Performance Journal*, 19(1), 43-50.
- Ben, M., Kais, M., Mohammad, S., Rahman, M. (2017), Renewable and non-renewable energy consumption, environmental degradation and economic growth in Tunisia. *Quality and Quantity*, 52(3), 1105-1119.
- Berrone, P., Fosfuri, A., Gelabert, L., Gomez-Mejia, L.R. (2013), Necessity as the mother of green inventions: Institutional pressures and environmental innovations. *Journal of Strategic Management*, 34(8), 891-909.
- Blalock, H.M. (1963), Correlated independent variables: The problem of multicollinearity. *Social Forces*, 42(2), 233-237.
- Butler, T. (2011), Compliance with institutional imperatives on environmental sustainability: Building theory on the role of IT for Green. *Journal of Strategic Information Systems*, 20(1), 6-26.
- Byrne, B.M. (2016), *Structural Equation Modeling with AMOS: Basic Concepts, Applications and Programming*. United Kingdom: Routledge.
- Carter, C.R., Kale, R., Grimm, C.M. (2000), Environmental purchasing and firm performance: an empirical investigation. *Transportation Research Part E: Logistics and Transportation Review*, 36(3), 219-228.
- Chen, A.J., Watson, R.T., Boudreau, M.C. Karahanna, E. (2010), An institutional perspective on the adoption of green IS and IT. *Australasian Journal of Information Systems*, 17(1), 23-45.
- Chen, A.J.W., Boudreau, M.C., Watson, R.T. (2008), Information systems and ecological sustainability. *Journal of Systems and Information Technology*, 10(3), 186-201.
- Chen, Y.S. (2008), The driver of green innovation and green image-Green core competence. *Journal of Business Ethics*, 81(3), 531-543.
- Chin, K.S., Chiu S., Pun K.F. (1998), Critical factors of evaluating ISO 14000 environmental management system standards implementation. *International Journal of Management*, 15(2), 237-247.
- Chong, H.W. (2018), *Digital Economy: Malaysia's New Growth of Digital Economy*. United States: World Bank.
- Christmann, P., Taylor, G. (2001), Globalization and the environment: Determinants of firm self-regulation in China. *Journal of International Business Studies*, 32(3), 439-458.
- Clemens, B., Douglas, T.J. (2006), Does coercion drive firms to adopt voluntary green initiatives? Relationships among coercion, superior firm resources, and voluntary green initiatives. *Journal of Business Research*, 59(4), 483-491.
- Daniels, J.D., Perez, R. (2007), Environmental dynamics and collaboration: Case studies of U.S.-Russian aerospace joint ventures. *The Journal of High Technology Management Research*, 17(2), 175-185.
- Delgado-Ceballos, J., Aragon-Correa, J.A., Ortiz-de-Mandojana, N., Rueda-Manzanares, A. (2012), The effect of internal barriers on the connection between stakeholder integration and proactive environmental strategies. *Journal of Business Ethics*, 107(3), 281-293.
- DiMaggio, P.J., Powell, W.W. (1983), The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147-160.
- do Valle, P.O., Rebelo, E., Reis, E., Menezes, J. (2005), Combining behavioural theories to predict recycling involvement. *Environment and Behaviour*, 37, 364-396.
- Durand, R., Hawn, O., Ioannou, I. (2017), Willing and able: A general model of organizational responses to normative pressures. *Journal of Academy Management Review*, 44(2), 0107.
- Eiadat, Y., Kelly, A., Roche, F., Eyadat, H. (2008), Green and competitive? An empirical test of the mediating role of environmental innovation strategy. *Journal of World Business*, 43(2), 131-145.
- Elisabeth, E., Mulyana, B. (2019), Factors that influence profitability of general insurance issuers in Indonesia. *The Economics and Finance Letters*, 6(1), 25-39.
- Gholami, R., Sulaiman, A., Ramayah, T., Alemayehu, M. (2013), Senior managers' perception on green information systems (IS) adoption and business value: Results from a field survey. *Information and Management*, 50(7), 431-438.
- Gold, A.H., Malhotra, A., Segars, A.H. (2001), Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185-214.
- Green Technology. (2010), *Green ICT the Malaysia's Perspectives*. Malaysia: Green Technology Malaysia.
- Hair, J.F. Jr., William, C.B., Babin, B.J., Anderson, R.E., Tatham, R.L. (2013), *Multivariate Data Analysis: A Global Perspective*. New Jersey: Prentice Hall.
- Haitovsky, Y. (1969), Multicollinearity in regression analysis: A comment. *The Review of Economics and Statistics*, 51, 486-489.
- Hawamdeh, G. (2018), Countering the crimes of administrative corruption in the international law. *International Journal of Asian Social Science*, 8(9), 751-769.
- Henseler, J., Ringle, C.M., Sarstedt, M. (2015), A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academy of Marketing Science*, 43(1), 115-135.
- Hirsch, P.M. (1975), Organizational effectiveness and the institutional environment. *Administrative Science Quarterly*, 20(3), 327-344.
- Hyoung, J.K. (2010), ETRI. *Green ICT International Standard Report in ICT Forum*, Korea. United Kingdom: ISO Standards.
- Intergovernmental Panel on Climate Change. (2007), *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Cambridge: Cambridge University Press.
- Jaffe, A.B., Stavins, R.N. (1995), Dynamic incentives of environmental regulations: The effects of alternative policy instruments on technology diffusion. *Journal of Environmental Economic Management*, 29(3), 43-63.
- Jarvis, C.B., Mackenzie, S.B., Podsakoff, P.M. (2003), A critical review of construct indicators and measurement model misspecification in

- marketing and consumer research. *Journal of Consumer Research*, 30(3), 199-218.
- Jennings, P.D., Zandbergen, P.A. (1995), Ecologically sustainable organizations: An institutional approach. *The Academy of Management Review*, 20(4), 1015-1052.
- Kasasbeh, H.A., Mdanat M.F., Khasawneh, R. (2018), Corruption and FDI inflows: Evidence from a small developing economy. *Asian Economic and Financial Review*, 8(8), 1075-1085.
- Kilbourne, W.E., Beckmann, S.C., Thelen, E. (2002), The role of the dominant social paradigm in environmental attitudes: A multinational examination. *Journal of Business Research*, 55(3), 193-204.
- Krell, K., Matook, S., Rohde, F. (2016), The impact of legitimacy-based motives on IS adoption success: An institutional theory perspective. *Journal of Information Management*, 53(6), 683-697.
- Lovric, M. (2011), *International Encyclopedia of Statistical Science*. Berlin, Heidelberg: Springer-Verlag.
- Malhotra, N.K., Kim, S.S., Agarwal, J. (2004), Internet users' information privacy concerns (IUIPC): The construct, the scale, and a causal model. *Information Systems Research*, 15(4), 336-355.
- MDEC. (2017), *Multimedia Digital Economy Corporation Annual Report*. Malaysia: MDEC.
- Melnyk, S.A., Sroufe, R.P., Calantone, R. (2003), Assessing the impact of environmental management systems on corporate and environmental performance. *Journal of Operations Management*, 21(3), 329-351.
- MESTECC. (2019), *Ministry of Energy, Science, Technology, Environment and Climate Change Achievement*. Malaysia: MOSTI.
- Nnorom, I.C., Osibanjo, O. (2008), Overview of electronic waste (e-waste) management practices and legislations, and their poor applications in the developing countries. *Resources, Conservation and Recycling*, 52, 843-858.
- Padma, P.L.S., Ganesh, R. (2008), A study on the ISO 14000 certification and Organizational performance of Indian manufacturing firms, Benchmarking. *An International Journal*, 15(1), 73-100.
- Porter, M.E., Vander, L.C. (1995), *Green and Competitive: Ending the Stalemate*. Brighton: Harvard Business Review. p73.
- Qi, G.Y., Shen, L.Y., Zeng, S.X., Jorge, O.J. (2010), The drivers for contractors' green innovation: An industry perspective. *Journal of Cleaner Production*, 18, 1358-1365.
- Quazi, H.A. (1999), Implementation of an environmental management system: Experience of Companies operating in Singapore. *Industrial Management and Data Systems*, 99(7), 302-311.
- Radnejad, A.B., Vredenburg, H., Woiceshyn, J. (2017), Meta-organizing for open innovation under environmental and social pressures in the oil industry. *Technovation*, 66-67, 14-27.
- Raston, N.A., Awang, Z., Hamzah, N.H. (2010), The effects of information communication technology (ICT) policy on security compliance among department of irrigation and drainage (DID) staff in Kelantan. *Journal of Statistical Modeling and Analytics*, 1, 28-44.
- Rivera, J. (2004), Institutional pressures and voluntary environmental behavior in developing countries: Evidence from the Costa Rican hotel industry. *Society and Natural Resources*, 17, 779-797.
- Samyoung, C. (2010), *KCC, ASTAP-16 ICT and Climate Change*. New Delhi: Ministry of Finance.
- Sarkis, J., Zhu, Q., Lai, K.H. (2010), An organizational theoretical review of green supply chain management literature. *International Journal of Production Economics*, 130, 1-15.
- Sohag, K., Al Mamun, M., Uddin, G.S., Ahmed, A.M. (2017), Sectoral output, energy use, and CO₂ emission in middle-income countries. *Environmental Science Pollution Research*, 24(10), 9754-9764.
- Streicher-Porte, M., Widmerb, R., Jainc, A., Baderd, H.P., Scheideggere, R., Kytziaf, S. (2005), Key drivers of the e-waste recycling system: Assessing and modelling e-waste processing in the informal sector in Delhi. *Environmental Impact Assessment Review*, 25, 472-491.
- Sureshchandar, G.S., Rajendran, C., Anantharaman, R.N. (2001), A holistic model for total quality service. *International Journal of Service Industry Management*, 12(4), 378-412.
- Tan, L.P. (2005), Implementing ISO 14001: Is it beneficial for firms in newly industrialized Malaysia? *Journal of Cleaner Production*, 13, 397-404.
- Teo, H., Wei, K., Benbasat, I. (2003), Predicting intention to adopt interorganizational linkages: An institutional perspective. *MIS Quarterly*, 27(1), 19-49.
- Tsai, B.H., Chang, C.J., Chang, C.H. (2016), Elucidating the consumption and CO₂ emissions of fossil fuels and low-carbon energy in the United States using Lotka-Volterra models. *Energy*, 100, 416-424.
- Xiaohong, C., Na, Y., Lu, Z., Dayuan, L. (2018), Does institutional pressure foster corporate green innovation? Evidence from China's top 100 companies. *Journal of Cleaner Production*, 188, 304-311.
- Yu-Chi, S., Lin, H.P. (2018), Causality relationship between Tourism, Foreign direct investment and economic growth in Taiwan. *Asian Journal of Economic Modelling*, 6(3), 287-293.
- Zhang, B., Bi, J., Yuan, Z., Ge, J., Liu, B., Bu, M. (2008), Why do firms engage in environmental management? An empirical study in China. *Journal of Cleaner Production*, 16(10), 1036-1045.
- Zhang, B., Wang, Z., Lai, K.H. (2015), Mediating effect of managers' environmental concern: Bridge between external pressures and firms' practices of energy conservation in China. *Journal of Environmental Psychology*, 43, 203-215.
- Zhu, Q. (2016), Institutional pressures and support from industrial zones for motivating sustainable production among Chinese manufacturers. *International Journal of Production Economy*, 181, 402-409.
- Zhu, Q. Liu, Q. (2010), Eco-design planning in a Chinese telecommunication network company: Benchmarking its parent company, Benchmarking. *An International Journal*, 17(3), 363-377.

APPENDIX

Questionnaire

Isomorphic drivers of Institutional pressure and importance of environmental management system (EMS) implementation towards the adoption propensity of green ICT in Malaysia

Section A:

Green Information Communication Technology-Green ICT is the wise usage of ICT to minimize and consume efficiently the IT resources, manage the hazardous waste efficiently and reduce Green House Gas emission that leads to environment protection and better life in Society.

The following questions are designed to measure the determinants for the Adoption Propensity of Green ICT. Please use the following rating scale for your responses indicating your level of agreement/disagreement with them. Please tick (√) in the boxes (all questions are mandatory to be replied).

Variables	Item No	Items	1	2	3	4	5
Coercive Pressure	CP1	To Adopt Green ICT, our firm is getting pressure from... Current and foreseeable regulations.					
	CP2	Suppliers.					
	CP3	Major customers.					
	CP4	Our own staff.					
Normative Pressure	NP1	Our firm Follows the rigidness of environmental products.					
	NP2	Regards Green ICT adoption as competitive advantage.					
	NP3	Has its brand image for environmental reputation.					
	NP4	Is itself sensitive to the Environmental issues					
Mimetic Pressure	MP1	Our firm's main competitor gets benefitted financially by adopting Green ICT.					
	MP2	Other firms who are adopting Green ICT are being perceived favorably by the customers					
	MP3	Others firms' adoption of Green ICT is an opportunity for us to enrich					
	MP4	Our firm follows worlds renowned Green ICTs.					

1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly agree

Section B:

An Environmental Management System-EMS, is an organization's overall management structure and system which aims to address "the immediate and long-term impact of its products, services and processes on the environment".

Please indicate your level of agreement/disagreement on the importance of the Environmental Management System (EMS) implementation at your firm.. The following are the rating scale:

Variable	Item No	Items	1	2	3	4	5	6	7
Importance of EMS Implementation	EMS1	Top Management Commitment							
	EMS2	Competitive advantage							
	EMS3	Company Image							
	EMS4	Workforce motivation through training and awareness							
	EMS5	Reduction of cost							

1= Strongly disagree; 2=Somewhat disagree; 3= Slightly disagree; 4= Neither agree/Disagree (Neutral); 5=Slightly agree; 6= Somewhat agree; 7= Strongly agree

Sections C: Adoption propensity of green ICT

Please indicate your level of agreement/disagreement with the Adoption Propensity of Green ICT at your firm.. The followings are the rating scale:

Variable	Item No	Items	1	2	3	4	5
Adoption Propensity Of Green ICT	APGICT1	Our firm has policies to					
		Install software to reduce overall hazardous and toxic materials.					
	APGICT2	Transform its business process to be fully paperless.					
	APGICT3	Have online collaboration tools to substitute for travel (e.g. video conferencing)					
	APGICT4	Our firm					
		Emphasizes on environmental certification.					
	APGICT5	Values the corporate social responsibility (CSR) to facilitate the Green ICT practices					
	APGICT6	We					
		Use reliable and repairable IT devices.					
	APGICT7	Shift PCs to perform other tasks when it is unusable to one task (e.g. High performance)					
APGICT8	Sell spare parts through intermediaries when their life ends.						
APGICT9	Dispose the obsolete items each year through enviromentally certified intermediaries.						
APGICT10	Outsource/ Have recycling activities for devices that are completely unusable						

1=Strongly disagree; 2=Disagree; 3= Neutral; 4= Agree; 5= Strongly agree

Section D: Demographic characteristics

1 Gender:
 Male Female

2 Age
 Below 25 25 to 35
 36 to 45 46 Or Above

3 Highest Level of Education:
 Diploma Bachelor
 Master's PhD
 Professional Degree Others

4 Company's Equity Ownership:
 Malaysian Foreign Owned 50-50 Joint
Owned Venture

5 Company's Experience:
 <1 year 1-<5 years
 5 years-<10 years 10 years and
above
