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Gender Managerial Workforce and Partial Least Squares On Small and Medium Enterprises (SMEs) Performances in Selangor, Malaysia

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Abstract:
This study aims to establish the relationships of the performances on Small and Medium Enterprises (SMEs) in Selangor, Malaysia. In addition, it also provides an overview on the appropriate analysis of structural equation modelling using the partial least squares method (PLS-SEM). A survey questionnaire is the instrument used for data collection on the services industries. The latent constructs for this study are: Entrepreneur Orientation (EO), Human Resource Management (HRM), Market Orientation (MO) and Information, Communication and Technology (ICT), meanwhile, the observe variable is the SME's performances. There are two components of an SEM; inner model and the outer model. PLS-SEM follows a two-step process that involves separate assessments of the measurement model and the structural model. Each process of model evaluation would follow a set of validity guidelines. The authors review on the application of PLS-SEM and its algorithm in evaluating the SMEs performances. The results obtained show that there are positive relationships between EO, HRM, MO and ICT with respect to SME's Performances and men play an active managerial role than women in the SMEs. Thus, this research can assist the entrepreneurial managers with the application of this technique.

Keywords: *Performances, Small and Medium Enterprises (SMEs), services industries, structural equation model (SEM), partial least square (PLS)*

1. Introduction

Today's global economic forces in the world economies are in pursuit to survive in this competitive environment (Hidayet & Mustafa, 2013) where the Small and Medium enterprises (SMEs) take full advantage of the resources available in order to sustain. Compared to large companies, SMEs have limited resources and little influence on the market (Rohde, 2004; Kouser *et al.*, 2011). Zhang *et al*. (2009) added that SMEs' survival would depend on available resources and promptly would find and adjust to a market niche. According to Rohde (2004), SMEs have simpler, more centralized decision making structures and thus rely more heavily on short-term planning compared to larger firms. In India, In Malaysia, the SMEs are a major contributor to the country's economy. In 2005 alone, the operation sectors generated 32% of country's GDP and 19% of the exports. Thus, realizing the important role of SMEs in all areas of operations. The Government is fully committed to further assisting the SMEs to realize their full potential, as can be seen in the national development agenda. Both the Ninth Malaysia Plan (9MP) and the Third Industrial Masterplan (IMP3) specifically had outlined key strategies for SME development from 2006 -2010 and 2006 - 2015 respectively (National SME Development Council, 2013).

Methods in Structural equation modeling (SEM) have a high potential for assessing and modifying theoretical models. Structural equation modelling (SEM) has become an important and well known diffused research tool for theory development in the social and behavioral sciences. SEM also enables researchers to conduct single, systematic and comprehensive analyses by modeling relationships among multiple independent and dependent variables (Kline, 2005). Partial Least Squares (PLS) modeling approach is aimed at maximizing the explained variance of the dependent latent constructs. PLS-SEM has been increasingly applied in marketing and other business discipline (e.g., Henseler *et al.*, 2009), with more than 100published studies featuring PLS-SEM in the top 20 marketing journals. PLS-SEM is conceptually and practically quite similar with multiple regression analysis. Additionally, PLS's evaluate the data quality on the basis of the measurement model characteristics (Hair *et al*., 2011).

The main objective of this paper is to focus on the Partial Least Squares method on the performances of the Small and Medium Enterprises (SMEs) in Selangor, Malaysia. The following sections explain and discuss on the SMEs in Malaysia with an overview on

PLS-SEM, followed by the sections on PLS-SEM algorithm and its analysis. The last section will be on the findings, discussions and conclusion of this study.

2. Overview of Small and Medium Enterprises (SMEs) in Malaysia

SMEs has played an important role in the development of the Malaysia's economy. SMEs in Malaysia has accounted for a huge rate of total number of businesses in various sectors. In the recent competitive environment, SMEs might face a financial crisis; hence, how well do they prepare for these issues? Previous studies had examined on several factors influencing the SMEs performances. The findings from Roslan *et al.*(2014) showed that there was a significance between entrepreneurial orientation (EO) and performance of SMEs in Malaysia. Besides, quite a number of studies had proven that EO carries valuable rewards in term of business performance as stated by Hughes & Morgan (2007).There was a positive impact on firm performance and human resource management (HRM) especially on recruitment, training and development (Moorthy *et al*., 2012). Recruitment, selection, appraisal and compensation were all needed in managing a workforce. On the other hand, Osman *et al.* (2011) also added that knowledge, skills, abilities, behaviours and interaction of the employees were the important tools of human resources which have the potential to affect the organization's performance.

Sany *et al.* (2009) has conducted a study on market orientation critical success factors of Malaysian manufacturers and its impacts on financial performance. Results of the study highlighted that there were five critical success factors of market orientation in Malaysian manufacturing firms, viz. market focus, market action, market planning, market feedback and market coordination. However, only market action and market planning were significant to financial performance. Besides, Walker (2001) had also included customer and competitor orientation to market orientation for financial performance.

Technological innovation has a higher growth impact compared to the SMEs which are not creative in the sales turnover, investment and job (Subrahmanya *et al.*, 2010). According to Chen and Mahani (2014), information technology could help SMEs in organizing data of business information and managed their financial accounts.

3. Overview of PLS-SEM

The basic goal of structural equation model (SEM) was to provide a quantitative test of a theoretical model hypothesized by the researcher using various types of models to depict relationships among the observed variables. An example would be an educational researcher might hypothesize that a student's home environment influenced her later achievement in school (Randal & Richard, 2010). Furthermore, SEM analysis is also aimed to determine the extent to which the theoretical model is supported by sample data. More complex theoretical models can be hypothesized if the sample data can support the theoretical models. If the sample data do not support the theoretical model, the original model can be modified and then tested. There are two major types of variables in SEM: latent variables and observed variables. Latent variables are indirectly observed or measured, and hence are inferred from a set of observed variables that we actually measure using tests, surveys and so on (Hair *et al*., 2011).

The observed, measured or indicator variables are a set of variables that we use to define or infer the latent variable or constructs, for example, gross national product, retail sales or export sales. In other words, these variables can also be defined as either independent or dependent variables. An independent variable is a variable that is not influenced by any other variable in the model. A dependent variable is a variable that is influenced by another variable in the model (Randal & Richard, 2010).

To provide a basis for subsequent discussion, a brief overview of SEM is presented in a path diagram as shown in Figure 1.

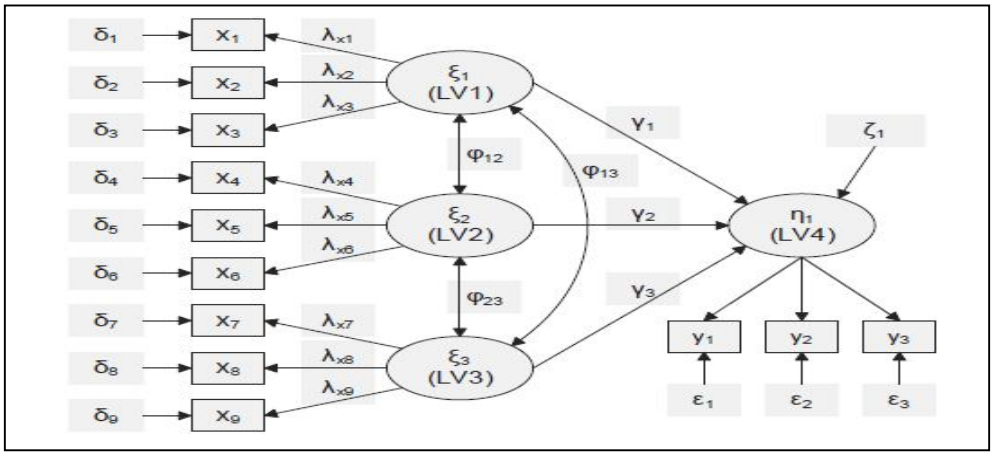

Figure 1: Path Diagram
Source: Roberts & Grover, 2009

A circle represented each of the four latent variables, and the boxes represent associated manifest or indicator variables. Measurement model are referred to the relationships between the latent variables and their indicators, in that it represents an assumed process in which an underlying construct determines or causes behavior that is reflected in measured indicator variables.Within this context, it is

important to note that the arrows go from the circles to the boxes, which is consistent with the processes as noted above in Figure 1. Thus, each factor serves as an independent variable in the measurement model and the indicator variables serve as the dependent variables.

According to Robert & Grover (2009), by using the matrix algebra, three sets of equations can be written as shown in Table 1. The first equation relates the indicators of the exogenous variables (x) to their associated measurement error (δ) and the latent exogenous variable (ξ). The second equation describes the relationship between the indicators of the endogenous variables (y), their associated measurement error (ε) and the latent endogenous variable (η). Finally, the last equation deals with the relationship between the latent endogenous (η) and exogenous (ξ).

$x = \lambda_x \xi + \delta$	.....(1)
$y = \lambda_y \eta + \varepsilon$	.....(2)
$\eta = B\eta + \Gamma X + \zeta$	.....(3)

Table 1: Structural Equations using Matrix Algebra

4. Methodology

This study used questionnaires as the instrument for data collection. A survey using questionnaires was conducted on the SMEs owners/managers in the services industries, located in Shah Alam in the state of Selangor, Malaysia using the contact information which was given by National SME Development Council (2013). Figure 2 showed the research framework used throughout this study where the dependent variable was the SME's performances, while there were four independent variables, viz. Entrepreneur Orientation (EO), Human Resource Management (HRM), Market Orientation (MO) and Information Communication Technology (ICT).

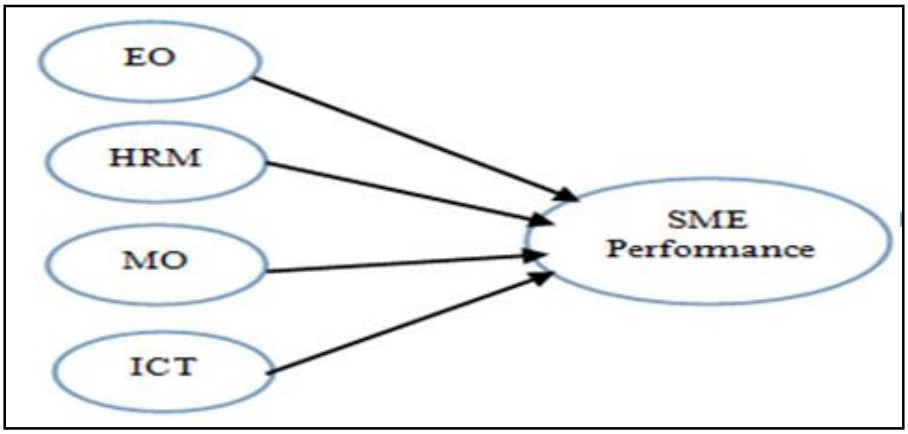

Figure 2: Research Framework

4.1. PLS-SEM Algorithm

There are two components of an SEM with latent constructs. The first component is referred to as the inner model in the PLS-SEM context. This inner model shows the relationships (or paths) between the latent constructs. The second component is referred to as the outer model. The measurement model would include the unidirectional predictive relationships between each latent construct and its associated observed indicators (Hair *et al.*, 2011).

The basic PLS-SEM algorithm follows a two-stage approach (Lohmoller, 1989). The stages and steps involved can be summarized as shown in Table 2. The first stage, which is the latent constructs' scores are estimated via a four-step process. In step 1, the latent constructs' scores outer proxies are computed as linear combinations of the values of all indicators associated with a particular latent construct. Later, iterations would use the estimated coefficients of the paths between the latent constructs and the indicator variables from step 4. Step 2 of the PLS-SEM algorithm computes the proxies for the structural model relationships. In step 3, the inner proxies of the latent construct scores are calculated as linear combinations of their respective adjacent latent constructs outer proxies from step 1 using the previously determined inner weights of step 2. Finally, in step 4 the outer weights are calculated in two different ways, depending on the type of measurement model represented by each construct. If a construct is measured reflectively, then the correlations between the inner proxy of each latent constructs and its indicator variables are applied. If a construct is measured formatively, then the regression weights are applied.

Stage One:	Iterative estimation of latent construct scores
↓ Step 1:	Outer approximation of latent construct scores
↓ Step 2:	Estimation of proxies for structural model relationships between latent constructs
↓ Step 3:	Inner approximation of latent construct scores.
↓ Step 4:	Estimation of proxies for coefficients in the measurement models.
Stage Two:	Final estimates of coefficients (outer weights, loadings, structural model relationships) are determined using the ordinary least squares method for each partial regression in the PLS-SEM model.

Table 2: Stages and Steps in PLS-SEM
Source: Kamarul (2012)

The four steps in stage one are repeated until the sum of the outer weights changes between the two iterations is sufficiently low. In stage two, the final latent constructs scores are used to run the ordinary least square regressions for each construct to determine the estimates of the structural model relationships, which are the path coefficients.

4.2. PLS-SEM Analysis

The PLS-SEM follows a two-step process that involves separate assessments of the measurement model and the structural model. The first step is to examine the measures' reliability and validity according to certain criteria associated with formative and reflective measurement model specification. Table 3 summarizes the validity guidelines of the measurement model and structural model evaluation.The structural model can only be analyzed after the measurement model has been validated successfully. In PLS, a structural model can be evaluated using the coefficient of determination (R^2) and the path coefficients.

	Validity Type	Criterion	Guidelines
Measurement Model	Internal consistency	CR	CR>0.7 (exploratory study) CR>0.8 (advance research) CR<0.6 (lack reliability)
	Indicator reliability	Indicator loadings	Item's loading >0.7 and significant at least at the 0.05 level
	Convergent validity	AVE	AVE>0.50
	Discriminant Validity	Cross loading Fornell and Lacker	Item's loading of each indicator is highest for its designated constructs. The square root of AVE of a construct should be greater than the correlations between the construct and other construct in the model
Structural Model	Model Validity	(R^2)	0.67- substantial 0.333- moderate 0.190- weak
	Model Validity	Path Coefficients	At least 0.100 and at significance of 0.05.

Table 3: Validity Guidelines in Structural Equation Modelling (SEM)
Source: Kamarul (2012).

5. Findings and Discussions

Using the contact information obtained from the National SME Development Council (2013), a total of 200 questionnaires were distributed to the SMEs, owners/managers in the services industries through appointments and emails; however, only 150 usable responses were obtained which produced a response rate of 75 percent. Table 4 on the gender distribution showed that 86 percent of the respondents were males, while 14 percent were females. This revealed that more than half of the of the SME's owners/managers in Selangor were dominated by men and low participation by the women workforce. Even though Selangor is an urbanized state where most of its infrastructural development are accessible and with high population based centers in the region of study, these potentials would enhance the growth of SMEs but insufficient to attract women as entrepreneurial owners or managers.

		Frequency	Percent	Valid Percent	Cumulative
Valid	Male	129	86.0	86.0	86.0
	Female	21	14.0	14.0	100.0
	Total	150	100.0	100.0	

Table 4: Gender Distribution

The research model for this study is tested using the partial least squares (PLS) in SEM. The Smart PLS 3.0 M3 is used to assess the measurement and structural models obtained (Ringle *et al.,* 2004).

5.1. Measurement Model Assessment

The validity and reliability of the measurement model are evaluated using the internal consistency reliability, indicator reliability, convergent validity and the discriminant validity. As in the methodology section, a measurement model has satisfactory internal consistency reliability when the composite reliability (CR) of each construct exceeds the threshold value of 0.7. It can be seen in Table 5 that the CR for the constructs range from 0.860 to 0.928 respectively. The results thus indicate that the items used have satisfactory internal consistency reliability.

Construct	Item	Loading	CR	AVE
	E1	0.843		
	E2	0.725		
	E3	0.201		
EO	E4	0.222	0.860	0.607
	E5	0.815		
	E6	0.725		
	E7	0.122		
	H1	0.893		
	H2	0.562		
	H3	0.759		
HRM	H4	0.789	0.928	0.684
	H5	0.736		
	H6	0.854		
	H7	0.916		
	M1	0.893		
	M2	0.547		
	M3	0.833		
MO	M4	0.824	0.906	0.707
	M5	0.627		
	M6	0.811		
	I1	0.895		
	I2	0.941		
ICT	I3	0.189	0.911	0.775
	I4	0.158		
	I5	0.799		

Table 5: Internal Consistency, Indicator Reliability and Consistency Reliability

Next, the indicator reliability of the measurement model is measured by looking at the item loadings. From the validity guidelines, it is said to have satisfactory indicator reliability when each item's loading is at least 0.7, and this is significant at least at the level of 0.05. Based on the PLS-SEM analysis, all items have exhibited loadings exceeding 0.7 except for items E3, E4, E7, H2, M2, M5, I3 and I4 respectively. Thus, it can be said that the items which have exceeded 0.7 in this study have demonstrated satisfactory indicator reliability, while items which are less than 0.7 are not reliable, and thus implied are insignificant to the model.

The measurement model's convergent validity is assessed by the value of the average variance extracted (AVE). Table 5 shows that the constructs have AVE values ranging from 0.607 to 0.775, which have exceeded the recommended threshold value of 0.5. In this study, the discriminant validity is assessed by using the Fornell and Lacker's (1981) criterion. Based on Table 6 of the discriminant validity, the bolded elements represent the square roots of the AVE and the non-bolded values represent the inter-correlation values between the constructs.

	EO	HRM	ICT	MO	SME
EO	**0.779**				
HRM	0.785	**0.827**			
ICT	0.871	0.733	**0.880**		
MO	0.875	0.957	0.760	**0.841**	
SME	0.942	0.966	0.866	0.959	**0.977**

Table 6: Discriminant Validity

5.2. Structural Model Assessment

The following subsections discuss about the validity of the structural model in this study. The validity of the structural model is assessed using the coefficient of determination (R^2) and the path coefficients.

The R^2 value indicates the amount of variance in the dependent variables that is explained by the independent variables. The larger the R^2 values, the higher predictive ability of the structural model. The R^2 for this study is 0.992. The results of the structural model are presented in Figure 3 in the Appendix. In addition, the SMartPLs bootstrapping function is used to generate the T-statistics values. Each path connecting the two latent variables represents a hypothesis. It allows the researcher to confirm or disconfirm each hypothesis. Besides, it helps to understand the strength of the relationships between dependent and the independent variables. Moreover, according to Wong (2013) the T-statistics are observed to explore the significance of the outer model. Table 7 in the Appendix thus, shows that all of the T-statistics are larger than 1.96, hence indicated that the outer model loadings are highly significant.

5.3. Hypothesis Testing

The proposed hypotheses and the structural model are validated through the path coefficients between the latent variables. According to Hair *et al.* (2011), the path coefficient values need to be at least 0.1 to account for a certain impact within the model. Table 7 in the Appendix indicates that all the proposed hypotheses are hence supported. From the analysis, supported hypotheses are significant at the level of 0.05, have a positive sign direction and consists of a path coefficient value (β) ranging from 0.146 to 0.523 (Hair *et al*., 2011; Wetzels *et al*., 2009).

6. Conclusion

Small and medium enterprises (SMEs) can be important tools and indicators for economic growth in Selangor, Malaysia based on their performances. As Barot (2015) has pointed out any economic development of a country is enhanced by the involvement of entrepreneurship by the SMEs. In addition, the SMEs are found to have contributed to employment and poverty reduction. This study also sees the active involvement of men entrepreneurs compared to women in Selangor. This is further implicated by Jaiswal (2014). The PLS-SEM results obtained show that there are positive relationships between EO, HRM, MO and ICT with respect to SME's performances. The structural model on the SMEs has demonstrated satisfactory validity and reliability. This study, hence has highlighted on the application of the partial least squares method which is used to analyze the SMEs' performances and its relationship between EO, HRM, MO and ICT. For the sustainability of the SMEs, this research can thus assist the SMEs managers with the application of the PLS technique. Further research is suggested to be conducted on other sectors of industries.

7. Acknowledgement

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Appendix

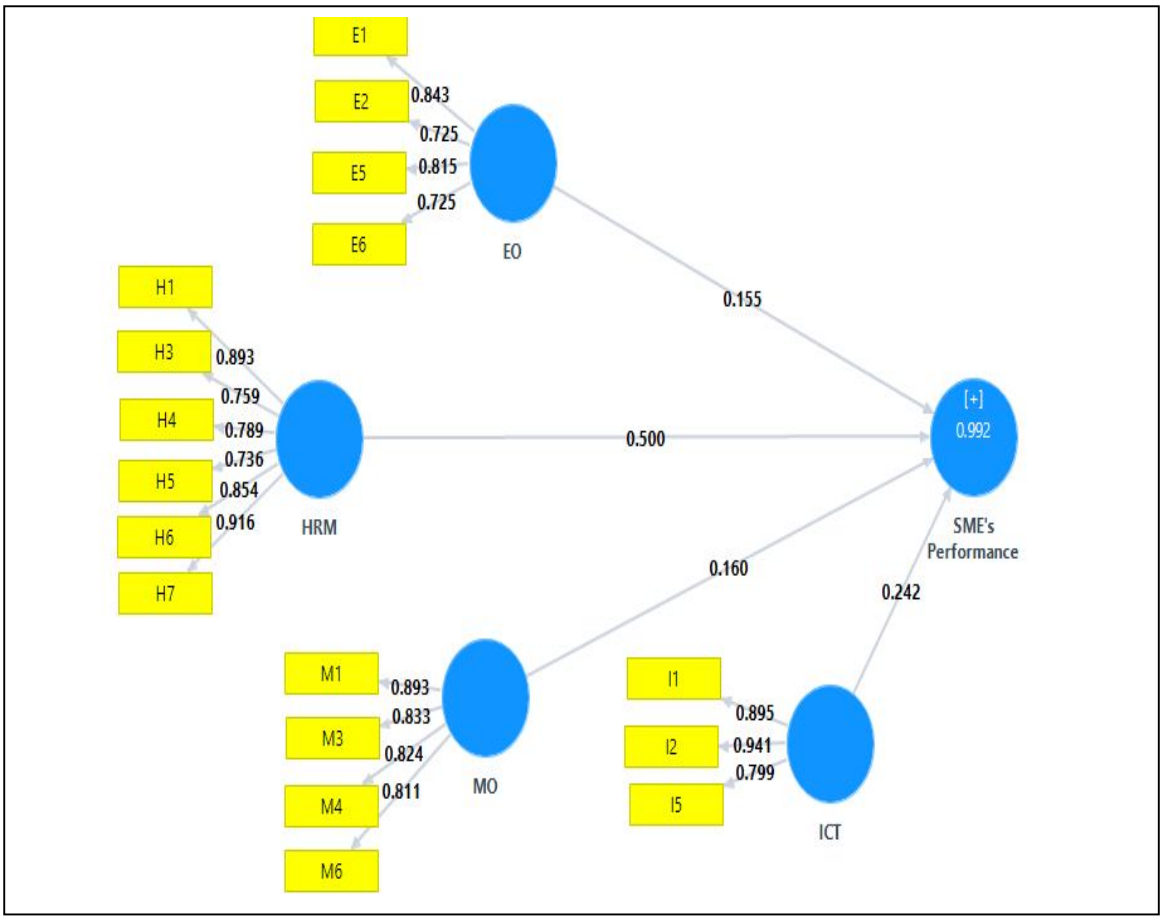

Figure 3: Results of Structural Model

	Path Coefficients (β)	T Statistics	Supported	Hypotheses
EO => SMEs Performance	0.155	4.189	YES	H1
HRM => SMEs Performance	0.500	10.431	YES	H2
MO => SMEs Performance	0.160	8.078	YES	H3
ICT => SMEs Performance	0.242	4.153	YES	H4

Table 7: Path Coefficients