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## Impact of ICT Usage on Employee Performance among Medium Manufacturing Enterprises (MMEs): Mediating Role of Employee Engagement and Knowledge Sharing

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### Abstract

Small and medium-sized businesses (SMEs) are an essential component of national economies worldwide since they are responsible for creating jobs, delivering services with added value, and advancing overall innovation. SMEs play an essential role in the generation of jobs in Malaysia, and the productivity of these enterprises is significantly correlated with employee performance. Literature on employee performance in SMEs still needs to be improved, despite the fact that these businesses significantly contribute to the country's GDP. This study investigates how ICT usage affects employee performance within Malaysian SMEs. In order to determine how the use of ICT usage influences employee performance in SMEs, the authors turned to the social exchange theory. This study presents a cross-sectional survey analyzed using SmartPLS 3.3.9 for multivariate statistical analysis. An integrated research framework was developed by bringing together significant aspects from existing literature. 301 employees of selected SMEs completed the survey. The findings of the study indicate that ICT usage affects employee performance. The study was done in SMEs, and the analysis is based on cross-sectional data that cannot be generalized to a broader range of industries. The study's outcomes will aid stakeholders, lawmakers, and SME management in lobbying for effective and well-articulated ICT usage strategies to enhance employee engagement, knowledge exchange, and performance. This study contributes to the literature by giving empirical evidence that ICT usage influences employee performance in Malaysian SMEs.

**Keywords:** Social Exchange Theory, ICT Usage, Employee Engagement, Knowledge Sharing, Employee Performance

### Introduction

Malaysian SMEs are frequently recognized as the country's primary economic engine Malaysia (Razali et al., 2018; Yusoff et al., 2018). Small and medium-sized businesses are widely recognized as economic development stimulants, promoting growth, employment,

and revenue production during Malaysia's economic transformation (Tahir et al., 2018). Malaysian SMEs continue to underperform despite the government's numerous programs and incentives to boost their output underperform (Nabila et al., 2020; SME Corp. Malaysia, 2016). Changing client requirements, globalization, intense competition, limited resources such as ICT facilities, and human resource (HR) difficulties are some challenges that SMEs face today. Given the significance of SMEs to Malaysia's economic development, the role of EP in enhancing SMEs' performance is crucial. Despite the high failure rate of various SME types in Malaysia during their first five years of operation, each category's limitations mean that SMEs need to function better.

ICT encourages knowledge sharing (KS) among coworkers and other organization members (Farooq, 2018; Ghabban et al., 2018). Numerous empirical knowledge management research indicates that employee KS is crucial to performance (Kuruppuge & Gregar, 2017b). However, fostering KS is problematic due to the inherent propensity to guard one's information and distrust the knowledge supplied by others (Davenport & Prusak, 1998). ICT can facilitate knowledge sharing among organizations by enhancing database access. According to Ajegbelen (2016), some hurdles to using ICT for KS are a need for digital fluency and insufficient technical experience. The absence of technology impedes successful knowledge sharing, demonstrating its role as a barrier. Ranjbarfard et al (2014) highlighted a lack of technical support as a barrier to knowledge creation, storage, distribution, application, and organizational learning in their research findings. The high cost of KS and the restricted ICT capabilities have proven to be a barrier to KS inside a business (Qureshi & Evans, 2015). As a result, the current study aims to investigate the impact of ICT usage on EP via KS among Malaysian SMEs.

Several scholars explore the field of ICT usage. Their studies address issues of ICT usage with KS, KM, and ICT adoption (Burke, 2012; Jaganathan et al., 2018; Nisar & Haque, 2018; Selamat et al., 2014). However, none of them have researched ICT usage with EE as the mediator. The present study's findings contribute to the body of knowledge in EP, especially in the ICT usage literature. This study adds to the literature by using SET to investigate how ICT usage and KS affect EP. For example, 'Technology Acceptance Model (TAM),' 'Theory of Reasoned Actions (TRA),' 'Diffusion of Innovations (DOI),' 'Theory of Planned Behavior (TPB),' 'Unified Theory of Acceptance and Use of Technology (UTAUT),' 'Model of the ICT Implementation Process,' and 'Information Systems Success Model' are commonly used to study ICT usage (Korpelainen, 2011). Therefore, adopting SET in a manner that is reciprocal to the research of ICT Usage is a significant contribution. In addition to this, the research utilized EE and KS in the role of a mediating factor between ICT usage and EP. The use of EE and KS with ICT usage has received very little research from the perspective of SMEs. The results of this investigation will shed a great deal more light on the mediating effect of EE and KS. In addition, it highlights the significance of ICT usage in hastening the dissemination of information among Malaysian SMMEs in order to sustain firm competitiveness and improve results. In conclusion, it will provide Malaysian SMEs with clear strategic recommendations that they may accept depending on the situation's urgency.

In order to have a deeper comprehension of the EP described in the literature, several research questions were formulated for this investigation. Specifically, this study will try to address the following six (6) key research questions in order to accomplish the research objectives:

**RQ1:** Does ICT usage has an impact on employee engagement?

**RQ2:** Does ICT Usage has an impact on knowledge sharing?

**RQ3:** Does employee engagement has an impact on employee performance?

**RQ4:** Does knowledge sharing has an impact on employee performance?

**RQ5:** Does employee engagement mediate the relationship between ICT Usage and employee performance?

**RQ6:** Does knowledge sharing mediate the relationship between ICT Usage and employee performance

This paper discusses the literature evaluation, methodology, data analysis, discussion, study limitations, recommendations, and future research. The literature review section establishes the research framework, while the methodology section describes the data collection strategy. Moreover, the section on data analysis details the measurement and structural model analyses. In the section that follows, the findings and the theoretical and practical implications are addressed. Finally, policy recommendations, limitations, and future research opportunities are highlighted.

## **Literature Review**

### *Theoretical Foundation*

The foundational theory for the present study is the "social exchange theory (SET)," developed by George Homans and was further enhanced by P. Blau. This study used the social exchange perspective to explain the conceptual framework because it is one of the most important approaches for comprehending organizational behavior (Cropanzano & Mitchell, 2005). Even though scholars have different ideas about social exchange, they all agree that it comprises a series of meetings that lead to obligations (Emerson, 1976). Blau (1964) says that social exchange is any action that depends on getting a positive response from others (M. Emerson, 1976). It is meant to show a two-way system of "transactions" or "exchanges" that are both essential and beneficial for both sides (Emerson, 1976). In this study, social exchange relationships represent the employment relationships between the employee and employer, represented by EP.

Furthermore, SET emphasizes the potential for these related transactions to build significant relationships, but, as we will see, this will only occur under particular conditions (Cropanzano & Mitchell, 2005). According to Atatsi et al (2019), SET is the most often cited theory in the study of EP. This effective use may be attributable to the fact that it is one of the most prominent conceptual theories for comprehending workplace behavior, relationships, and reciprocity that transcend beyond contractual agreement and result in positive exchanges. Most research on ICT USAGE is conducted within the context of recognized technical theories such as TAM, UTAUT2, TOE, CBHRT, TPB, MRT, and ANT. Consequently, this study examines ICT USAGE in the context of the reciprocity approach under SET. Rarely has SET been utilized to explore how supervisor-subordinate social exchange relationships influence subordinates' knowledge-sharing behavior (Wu & Lee, 2017).

## **Hypothesis Development**

### ***The Relationship between ICT Usage and Employee Engagement***

In this age of e-commerce and economic globalization, it is essential for all businesses, no matter how big or small, to have the correct information and communication technology (ICT) to meet their needs. A lack of ICT knowledge makes a business much less competitive (Hashim, 2007). In the past few decades, much research has been done to discover what

makes people embrace ICT (Eze et al., 2018), but more research needs to be done on how people implement SMEs. It has been said that small businesses differ from big businesses because they have different needs regarding technology and how they use it (Jaganathan et al., 2018). Postulated to that, the authors propose that

**Hypothesis 1 (H1).** ICT usage has a positive and significant impact on employee engagement.

#### ***The Relationship between ICT Usage and Knowledge Sharing***

According to Chen & Huang (2012), effective knowledge sharing (KM) can increase an organization's competitive advantage and profitability. KM aims to capture, distribute, and apply knowledge to improve strategic decisions and organizational performance (Jennex & Olfman, 2005). KS is one of the essential facets of KM. SMEs are increasingly embracing KS (Abdul-Jalal et al., 2013), greatly facilitated by ICT usage. These tools help businesses maximize their operations and competitiveness. According to Nasution et al (2021), the adoption rate of digital systems increases whenever an organization emphasizes knowledge acquisition and sharing. KS is often enabled by exchanging knowledge through ICT usage (Liao et al., 2007). The ability of ICT to increase employees' access to knowledge and promote collaborative work enhances SME productivity and KS. Numerous studies demonstrate that ICT usage has a positive relationship with KS. In light of this, the authors postulate

**Hypothesis 2 (H2).** ICT usage has a positive and significant impact on knowledge sharing.

#### ***The Relationship between Employee Engagement and Employee Performance***

Businesses must ensure that each employee is focused and fully engaged in maintaining high productivity and efficiency (Lai et al., 2020). Prior correlational research indicates that EE has a good impact on organizations and work, which has positively aroused the interest of businesses (Yin, 2018). In order to sustain high levels of efficiency and operational efficacy, businesses must ensure that their employees are engaged and apply their entire energy when completing tasks (Lai et al., 2020). The literature on performance management has broadened to include studies investigating the contribution of EE to EP and highlighting the importance of engagement. According to a study by Anitha (2014), EE has a considerable effect on EP. The study's findings revealed a statistically significant positive correlation between EE and EP. Numerous studies by Cesário & Chambel (2017), Kuruppuge & Gregar (2017a); Nazir & Islam (2017); Panda et al (2021) revealed that EE has a positive relationship with EP. Postulated to that, the authors propose that:

**Hypothesis 3 (H3).** Employee engagement has a positive and significant impact on employee performance.

#### ***The Relationship between Knowledge Sharing and Employee Performance***

According to Liao et al. (2004), KS empowers employees and organizations to attain goals and improve performance. When employees share their knowledge, their performance is improved (Alzghoul et al., 2018). According to Javadi et al (2012), boosting effectiveness, which can be attained through KS, is one of the most effective ways to boost organizational performance, meaning that KS improves better organizational performance. Knowledge is created and nurtured in the workplace when people produce and share their knowledge with coworkers (Swanson et al., 2020). Furthermore, the KS process has a direct and significant



impact on EP. Previous studies by Sajid (2016), Rohim & Budhiasa (2019), and Z. Wang et al. (2014) confirm that KS has a positive relationship with EP. Hence, the authors propose that: **Hypothesis 4 (H4)**. Knowledge sharing has a positive and significant impact on employee performance.

#### ***Mediating Role of Employee Engagement***

EE is one of the few conceptions and study domains that have captivated the interest of practitioners and researchers in such a short time. Consultants, businesses, and management researchers have become increasingly interested in EE within the last decade (Saks, 2014; Jose, 2012; Karatepe & Karadas, 2015). According to Choo (2020), one of the most beneficial and long-term ways to enhance performance in today's fast-paced and competitive markets is to have happy and engaged employees. When an employee is engaged, he or she is aware of his or her part in attaining the firm's goals and encourages coworkers to do the same. The term "positive emotional relationship to work" refers to a positive attitude toward one's employer and value system. In numerous scholarly works, the findings of EE as a mediator have demonstrated a considerable favorable impact.

Consequently, if ICT usage impacts EE and EE impacts EP, EE could mediate between ICT usage and EP. This study aims to determine if EE mediates the relationship between ICT usage and EP in Malaysian SMEs. Therefore, this study will examine the mediation role of EE, and the authors propose that

**Hypothesis 5 (H5)**. Employee engagement mediates the relationship between ICT usage and employee performance.

#### ***Mediating Role of Knowledge Sharing***

The value of knowledge, and KS, in particular, is recognized by many companies. This is so because the value of knowledge often rises as it is transferred to employees (Alhawary & Assistance, 2017). As a result, KS increases companies' existing knowledge value (Kuo et al., 2014). Alhawary & Assistance (2017) found that KS has a significant positive relationship between KS and EP. However, Ibrahim et al (2020) found that ICT usage harms KS. The study also found that ICT usage had no direct relationship with KS. In numerous scholarly works, the findings of KS as a mediator have demonstrated a considerable positive impact. If ICT usage influences KS and KS influences EP, it follows that KS may act as a mediator between ICT usage and EP. This study aims to determine if KS mediates the association between ICT usage and EP in the context of Malaysian SMEs. Hence, the authors propose that:

**Hypothesis 6 (H6)**. Knowledge sharing mediates the relationship between ICT usage and employee performance.

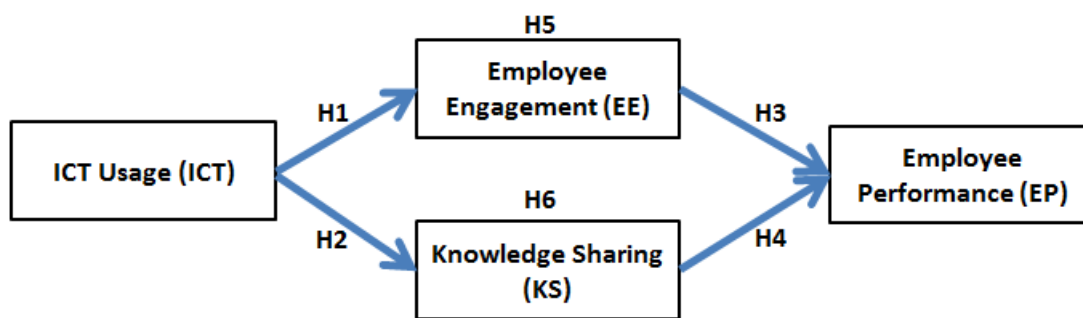


Figure 1. Research Framework

## Methodology

### *Research Design*

This cross-sectional survey research design employed a questionnaire to measure the SME employees' perception of ICT usage to employee performance which is mediated by knowledge sharing and employee engagement.

### *Measures*

Table 1 presents all of the constructs, items, number of items, reliability of the construct, and Likert scale used in this study. A five-point Likert scale ranging from 1=strongly disagree to 5 = strongly agree was used to collect data for EP, KS, and ICT usage. However, EE was measured using a seven-point Likert scale. According to MacKenzie and Podsakoff's (2012) research, one way to account for standard method variance (CMV) is to employ multiple scales when measuring study variables. The measurement items are listed in Appendix A.

### *Population and Sampling*

Employees from medium-sized SMEs who have been through one cycle of appraisal review in the organization were the focus of the research, and the study level was individual level. The data collection started on 1st December 2021 and ended on 10th January 2022. The purposive sampling method was used because the size of the population was unknown, and there were clear rules for what counts as a valid response. Because the study used Smart PLS's structural equation modeling, Hair et al (2022) used the power of analysis and the complexity of the model to decide on the minimum sample size for the study. The research model's highest predictor is two, which indicates employee performance. Based on the study's two predictors and the power of 0.90, the minimum number of samples needed was 88. So, the sample size of 286 people was adequate to validate the model of the study.

Table 1 illustrates the demographic information of the respondents. Of eighty-seven respondents, 45.6% were male, and 54.5% were female. Most respondents (63.1%) were between 36 and 40 years old. 61.0% of the respondents had a degree. 53.7% were from central Malaysia (Selangor, Kuala Lumpur, and Putrajaya). In the sample, 46.3% were executives and professionals, and 38.3% had more than ten years of experience.

Initially, there were 287 respondents, but one was eliminated due to an outlier issue. The researcher determined the number of outliers based on the value of degrees of freedom,

which was three based on the chi-square statistical table (total number of variables which is 4-1). The value of p, according to Mishra et al (2013), is 0.001. Any case with a Mahalanobis  $D^2$  greater than or equal to 16.2662 must be omitted because it is a multivariate outlier. After removing the one outlier, 286 data remained for further analysis.

Table 1  
*Demographic profile of respondents.*

<b>Demographic</b>	<b>Frequencies</b>	<b>Percentage (%)</b>
<b>Gender</b>		
Male	131	45.6
Female	156	54.5
<b>Age</b>		
< 30 years old	41	14.3
30-35 years old	38	13.2
36-40 years old	181	63.1
> 40 years old	27	9.4
<b>Education</b>		
Ph.D	12	4.2
Masters Degree	80	27.9
Bachelor Degree	175	61.0
Diploma	2	0.7
Secondary School	15	5.2
Others	3	1.0
<b>Location</b>		
Northern	95	33.1
East Coast	8	2.8
Central	154	53.7
Southern	16	5.6
East Malaysia	14	4.9
<b>Occupation</b>		
Non-executive	19	6.6
Executive or professional	133	46.3
Manager	114	39.7
Others	21	7.3
<b>Years of Service</b>		
1-2 years	63	22.0
2-5 years	60	20.9
5-10 years	54	18.8
> Than 10 years	110	38.3

#### *Data Collection and Analysis Procedures*

The data for this study were acquired from employees of medium-sized SMEs in Malaysia from five Northern regions, East Coast, Central, Southern, and East Malaysia. Survey questionnaires were sent to HR departments. The survey is separated into two different parts. Section one needs to be filled out by the immediate supervisor of the respondent employee, and section two needs to be filled out by the employee. Collecting data from a double source



helped reduce the likelihood of bias. In addition, Human Resource departments received reminders in the form of follow-up phone calls, text messages, and emails. This is done to increase the response rates (Sekaran & Bougie, 2016).

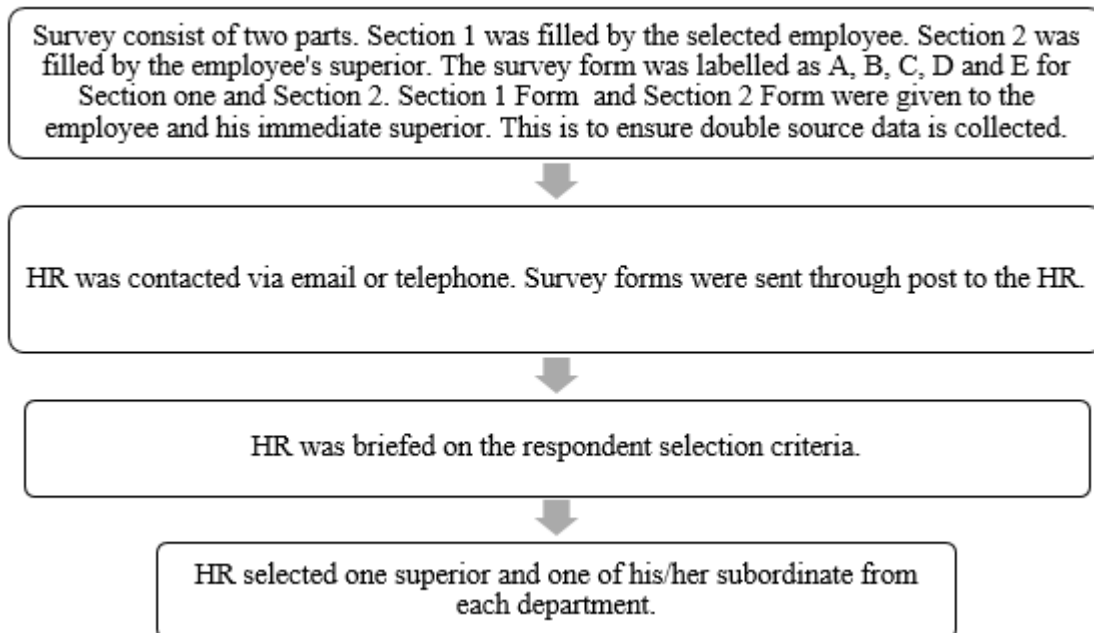


Figure 2. Sampling Plan

### **Data Analysis and Results**

#### *Data Analysis*

The predictive goals of the study were better met by using smart partial least squares (PLS) (Hair et al., 2019). Additionally, it has been established that structural equation models employing Partial Least Squares are preferable for analyzing mediation since they perform better in estimating than regression models (Preacher & Hayes, 2004). When the bootstrapping technique is applied, empirical evidence indicates that a statistical report summarising the direct and indirect effects between the two constructs and measurement error produces highly accurate and precise estimations of the mediation effect (Joe F. Hair et al., 2012). Furthermore, following suggestions from the literature (Allen et al., 2004; Baran & Sypniewska, 2019; Moliner et al., 2008), in the present study, the multivariate skewness and kurtosis were assessed. The results revealed that the data did not have a multivariate normal distribution: Mardia's multivariate skewness ( $\beta = 14.1634$ ,  $p < 0.01$ ) and Mardia's multivariate kurtosis ( $\beta = 98.0053$ ,  $p < 0.01$ ) indicated that the data did not follow a multivariate normal distribution. Hence, SmartPLS was chosen as the software for variance-based Structural Equation Modelling (SEM) that uses non-parametric multivariate analysis (Nasir & Ngah, 2022). This study used a two-stage approach, as proposed by experts (Anderson & Gerbing, 1998; Ngah et al., 2021), to examine the measurement and structural models (testing the hypothesized relationships). Bootstrapping was used to determine the vital path coefficients and loadings (10,000 resamples) (Becker et al., 2022).

#### *Common Method Bias*

Common method variance (CMV) may be a concern, even though several procedures were undertaken prior to the distribution of the questions. When surveys are self-administered, CMV testing is essential, primarily when the dependent and independent variables are

gathered from the same person (Podsakoff et al., 2003). This study utilizes both procedural and statistical strategies to decrease the CMV. The statistical approach with full-collinearity analysis (Kock, 2015; MacKenzie & Podsakoff, 2012) was used to resolve the issue. A procedural measurement method with a distinct anchor scale was employed to assess independent and dependent variables. The CMV could be severe if the variance-inflated factor (VIF) value were more than 3.30 (Kock, 2015). Table 2 shows tolerances between 0.673 and 0.761 which are significantly greater than 0.1, and VIF values between 1.314 and 1.487, which are significantly smaller than 3.3. Hair et al (2010); Pallant (2010) indicate low collinearity by tolerance values greater than 0.10 and VIFs less than 3.

Table 2

*Full collinearity testing.*

<b>Collinearity Statistics</b>	<b>ICT</b>	<b>EE</b>	<b>KS</b>	<b>EP</b>
VIF	1.407	1.487	1.389	1.314
Tolerance	.711	.673	.720	.761

Note: ICT = ICT Usage, EE = Employee Engagement, KS = Knowledge Sharing, EP = Employee Performance.

Harman's single-factor method was used to assess if a single factor emerges from principal component analysis or if unrotated factor analysis explains the majority of covariance among variables (Podsakoff et al., 2003). The data are subject to a common method bias (Lin et al., 2014). When factor analysis is employed, the Harman single-factor test method can be used with or without rotation. Based on the Harman single-factor test, the researcher finds that the common method bias problem does not exist because 33.682% is less than 50%, as shown in Table 3 (Chang et al., 2010).

Table 3

*HARMAN SINGLE-FACTOR TEST: Total Variance Explained.*

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	14.052	35.129	35.129	13.473	33.682	33.682
2	4.561	11.403	46.532			
3	3.442	8.605	55.138			
4	1.756	4.391	59.529			
5	1.356	3.390	62.919			
6	1.050	2.624	65.544			
7	1.027	2.567	68.111			
8	.965	2.413	70.524			
9	.843	2.107	72.631			
10	.786	1.966	74.597			
11	.751	1.878	76.475			
12	.713	1.783	78.258			
13	.636	1.590	79.848			
14	.620	1.550	81.398			
15	.545	1.362	82.759			
16	.536	1.341	84.100			
17	.502	1.254	85.354			
18	.488	1.221	86.575			
19	.444	1.110	87.685			
20	.423	1.058	88.743			
21	.396	.990	89.733			
22	.376	.939	90.672			
23	.360	.901	91.573			
24	.335	.837	92.410			
25	.319	.797	93.207			
26	.300	.750	93.957			
27	.283	.709	94.665			
28	.256	.639	95.304			
29	.242	.604	95.908			
30	.222	.554	96.462			
31	.203	.507	96.969			
32	.191	.477	97.446			
33	.178	.445	97.891			
34	.168	.419	98.310			
35	.147	.368	98.678			
36	.139	.346	99.024			
37	.119	.297	99.321			
38	.103	.258	99.579			
39	.091	.227	99.805			
40	.078	.195	100.000			

Extraction Method: Principal Axis Factoring.

*The Measurement Model: Convergent and Discriminant Validity*

The first step of the study is to determine convergent validity. The convergent validity will determine which items measure each concept and how well they correlate to that concept (Nasir & Ngah, 2022; Podsakoff et al., 2003). Hair et al (2017) proposed that the loading and AVE must be  $\geq 0.5$ , and the composite reliability (CR) should be  $\geq 0.7$  to assure convergent validity (Hair et al., 2013; Ngah et al., 2021). According to Table 4, EE6 was eliminated since its HTMT was above 0.90. However, the loading for all other components fell within an acceptable range in the measurement model (0.597-0.923), with AVE ranging from 0.577 to 0.771, CR from 0.843 to 0.944, and Cronbach Alpha from 0.759 and 0.924. The measuring model for the first-order construct is, thus, valid.

Table 4

*The measurement model and convergent validity.*

First Order	Items	Loadings	CA	AVE	CR
ICT USAGE (ICT)	ICT1	0.617	0.759	0.577	0.843
	ICT2	0.722			
	ICT3	0.875			
	ICT4	0.801			
VIGOUR (VIG)	EE1	0.876	0.899	0.670	0.924
	EE2	0.919			
	EE3	0.860			
	EE4	0.783			
	EE5	0.764			
	EE6	0.688			
DEDICATION (DED)	EE7	0.901	0.924	0.771	0.944
	EE8	0.921			
	EE9	0.923			
	EE10	0.921			
	EE11	0.704			
ABSORPTION (ABS)	EE12	0.751	0.869	0.605	0.902
	EE13	0.731			
	EE14	0.799			
	EE15	0.848			
	EE16	0.795			
	EE17	0.737			
KNOWLEDGE SHARING (KS)	KS1	0.751	0.878	0.624	0.908
	KS2	0.597			
	KS3	0.851			
	KS4	0.875			
	KS5	0.836			
	KS6	0.797			
QUALITY (QUAL)	EP1	0.816	0.838	0.609	0.886
	EP2	0.819			

	EP3	0.798			
	EP4	0.765			
	EP5	0.698			
QUANTITY (QUAN)	EP6	0.776	0.798	0.619	0.866
	EP7	0.822			
	EP8	0.822			
	EP9	0.723			
TIME (TIM)	EP10	0.856	0.865	0.709	0.907
	EP11	0.825			
	EP12	0.837			
	EP13	0.851			

Note: Item E6 was deleted due to HTMT

ICT = ICT Usage, VIG = Vigour, DED = Dedication, ABS = Absorption, KS = Knowledge Sharing, QUAL = Quality, QUAN = Quantity, TIM = Time

The heterotrait-monotrait (HTMT) assessment is then used to determine discriminant validity. The analysis determines whether or not all model constructs differ (J. Hair et al., 2017). As demonstrated in Table 5, discriminant validity has been established because all HTMT values are less than 0.90 (Henseler et al., 2015), as Franke & Sarstedt (2019) mentioned.

Table 5

*Discriminant Validity HTMT.*

	ABS	DED	ICT	KS	QUAL	QUAN	TIME	VIG
ABS								
DED	0.884							
ICT	0.470	0.442						
KS	0.398	0.397	0.580					
QUAL	0.497	0.461	0.351	0.297				
QUAN	0.537	0.517	0.337	0.410	0.858			
TIME	0.295	0.289	0.250	0.230	0.844	0.814		
VIG	0.871	0.897	0.445	0.458	0.463	0.601	0.335	

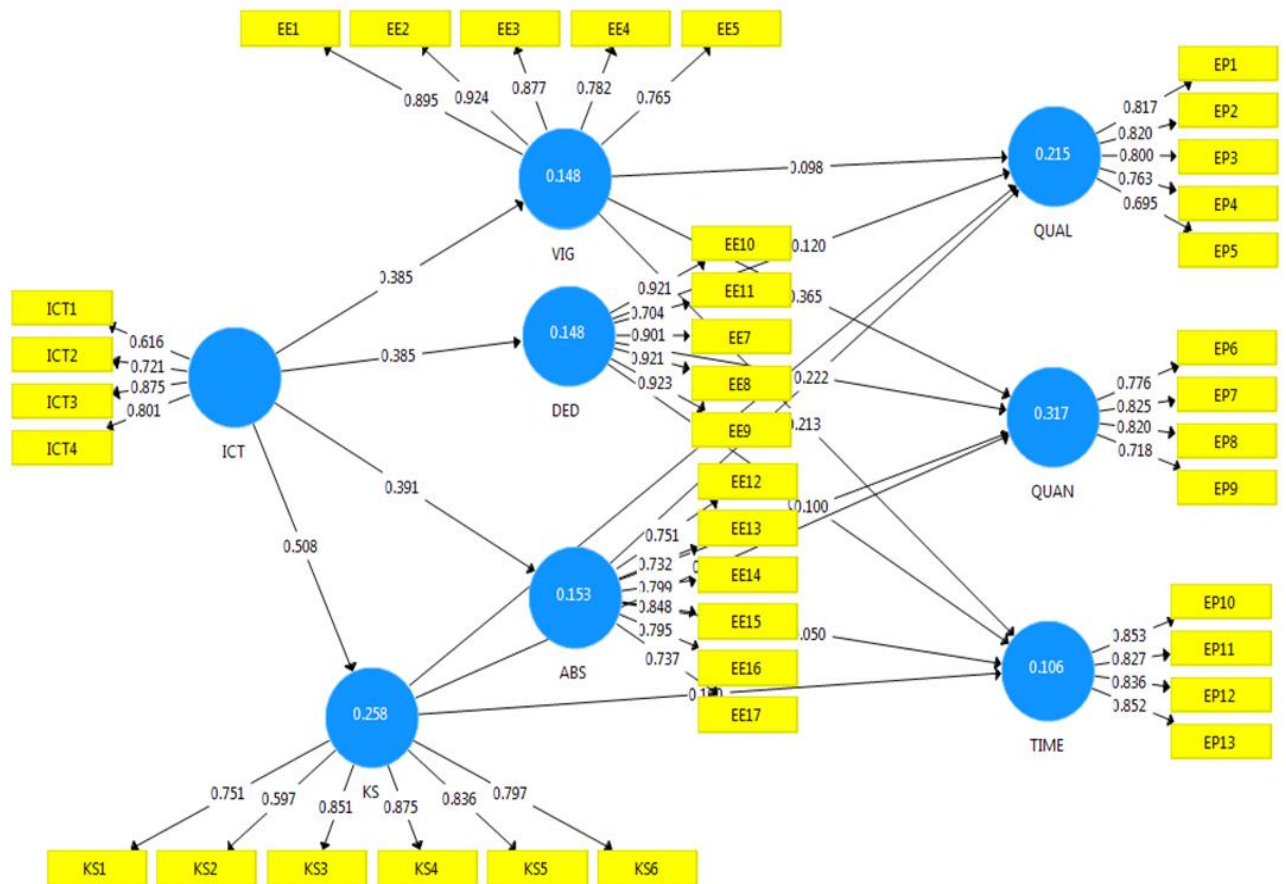


Figure 3. Measurement Model: Lower Order Construct

Higher-order constructs help improve model parsimony because they make the path model simpler to comprehend (Johnson et al., 2011; Sarstedt et al., 2019). The author used the two-stage method because it better restores path model parameters from exogenous to higher-order constructs and from higher-order to endogenous constructs (Becker et al., 2022; Sarstedt et al., 2019). The author used the disjoint two-stage approach in the path model, which only looks at lower-order components (that is, without the higher-order components). The second-order latent constructs EE and EP were used in this study. Path model analysis can begin if the first-order latent variables can be explained by their second-order antecedents. The Reflective-formative measures EE and EP, which are all higher-order constructs. When both the VIF values and the t-values are statistically significant for the weights, convergent validity is established (Hair et al., 2019). Table 6 shows that the VIF values are all less than 5 and that the t-values were significant (t-value  $\geq 1.645$ ) for variables representing vigor, absorption, quality, quantity, and time but not for dedication (t-value 1.308) in EE. Thus, as stated by Hair and Hult (2017), the study should depend on the significance of the outer loading. Since all variables passed the significance level of 1.645, the convergent validity of the study's higher-order constructs was established.



Table 6  
 Higher Order Construct Validity.

HOC	LOCs	Outer Weight	T Statistics	Outer Loadings	VIF
EE	VIG	0.523	3.760	0.957	3.572
	DED	0.195	1.308	0.909	3.932
	ABS	0.353	2.710	0.911	3.045
EP	QUAL	0.400	2.630	0.789	2.448
	QUAN	0.883	7.498	0.963	2.067
	TIM	-0.300	2.177	0.553	2.239

EE = Employee Engagement, EP = Employee Performance

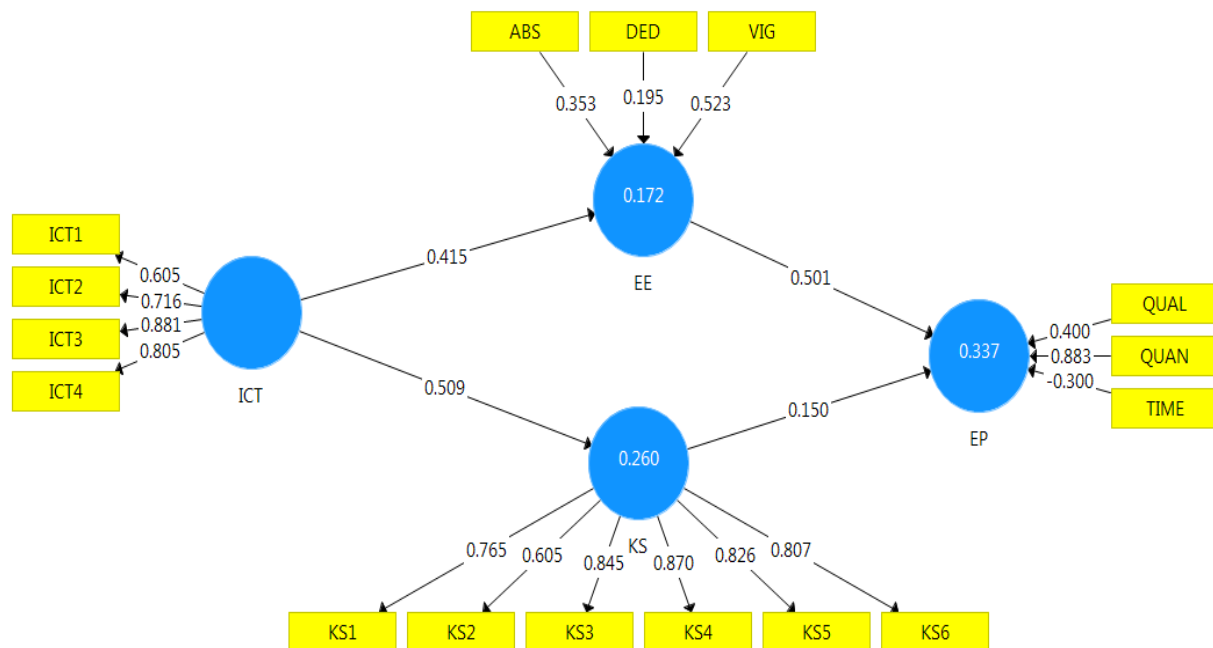


Figure 4. Measurement Model: Higher Order Construct.

*Structural Model*

According to Hair et al (2019), the study referred to the beta value (the direction of the beta value must coincide with the direction of the hypothesis), t-values ( $\geq 1.645$ ), p-values ( $\leq 0.05$ ), and confidence intervals obtained from a bootstrapping procedure (no zero value between the lower level (LL) and the upper level (UL)) with 10,000 resamplings (Becker et al., 2022) techniques to indicate that the hypothesis is supported. Table 7 summarizes the study's hypotheses criteria, focusing on the direct effect, whereas Table 8 details the mediating effects. All of the direct and indirect hypotheses were supported.

It is essential to check that the study is free of multi-collinearity issues before conducting additional analysis (Nasir & Ngah, 2022). The study's multi-collinearity is not severe, as shown by the VIF values in Table 7, which are all lower than 3.3 (Diamantopoulos & Siguaaw, 2006). As a result, the study can be used for hypothesis testing.

Table 7  
 Structural Model: Hypotheses Testing Direct Effects.

Hypothesis	Relationship	Beta	Std Error	T Value	P Value	BCI LL	BCI UL	VIF	F <sup>2</sup>	R <sup>2</sup>	Decision
H1	ICT -> EE	0.415	0.044	9.427	0.001	0.333	0.480	1.000	0.208	0.170	Supported
H2	ICT -> KS	0.509	0.049	10.324	0.001	0.415	0.579	1.000	0.351	0.257	Supported
H3	EE -> EP	0.501	0.052	9.562	0.001	0.403	0.578	1.215	0.311	0.332	Supported
H4	KS -> EP	0.150	0.058	2.573	0.005	0.054	0.246	1.215	0.028		Supported

Note: LL = lower level; UL = upper level; f2 = effect size; R2 = variance explained; VIF = variance-inflated factor.

\*:p<0.1; \*\*:p<0.05;\*\*\*:p<0.01

Note: We use a 95% confidence interval with a bootstrapping of 10000.

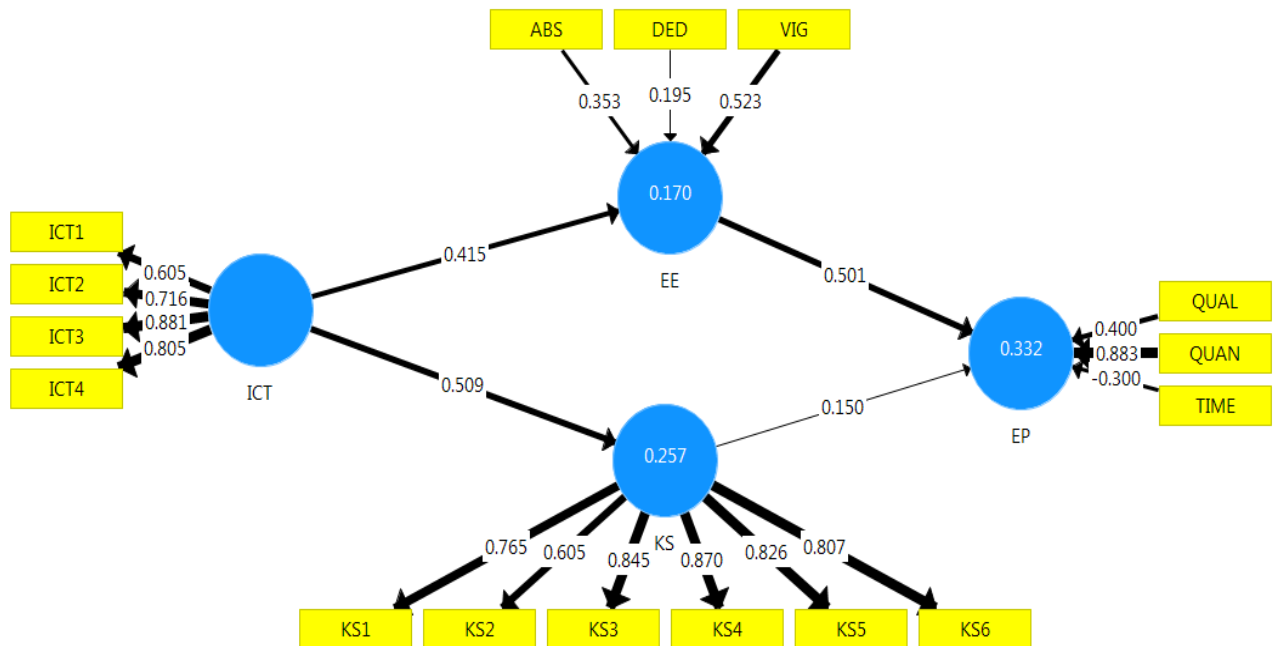


Figure 5. Structural Model: PLS bootstrapping.

Table 8

*Hypothesis Testing Indirect Effects.*

Hypothesis	Relationship	Beta	Std Error	T Values	P Values	LL	UL	Decision
H5	ICT -> EE ->	0.20				0.15	0.26	Supported
	EP	8	0.030	6.941	0.000	0	6	
H6	ICT -> KS ->	0.07				0.01	0.13	Supported
	EP	7	0.031	2.446	0.014	6	9	

The explained Variance ( $R^2$ ) for the predictor of EE was 0.170, meaning that ICT usage accounts for 17% of the Variance in EE. Furthermore, the analysis revealed that H1 (ICT usage) was positively significant to EE ( $b = 0.415$ ,  $t = 9.427$ ,  $LL = 0.333$ ,  $UL = 0.480$ ,  $p < 0.01$ ). Next, ( $R^2$ ) for the predictor of KS was 0.257, meaning that ICT usage accounts for 25.7% of the Variance in KS. So, the analysis revealed that H2 (ICT usage) was positively significant to KS ( $b = 0.509$ ,  $t = 10.324$ ,  $LL = 0.415$ ,  $UL = 0.579$ ,  $p < 0.01$ ). Lastly, ( $R^2$ ) for the predictor of EP was 0.332, meaning that EE and KS account for 33.2% of the Variance in EP. So, the analysis revealed that H3 (EE) was positively significant to EP ( $b = 0.501$ ,  $t = 9.562$ ,  $LL = 0.403$ ,  $UL = 0.578$ ,  $p < 0.01$ ) and H4 (KS) was positively significant to EP ( $b = 0.150$ ,  $t = 2.573$ ,  $LL = 0.054$ ,  $UL = 0.246$ ,  $p < 0.01$ ). In short, all of the direct effect hypotheses are supported. The study also focused on the effect size of the supported hypotheses for further analysis. The effect size ( $f^2$ ) indicates the change in  $R^2$  when a particular construct is eliminated from the model. The  $f^2$  values of 0.02, 0.15, and 0.35 represent small to medium, medium to large, and significant effects, respectively (Cohen, 1988). Although all four hypotheses are supported, the study found that all of the supported hypotheses have a medium effect size, except for ICT usage on KS, which has the most significant effect size, showing that ICT usage is the most critical construct of the study.

The research adhered to Preacher & Hayes's (2008) recommendations for testing the mediation analysis by bootstrapping the indirect effect. ICT -> EE -> EP ( $\beta = 0.208$ ,  $t = 6.941$ ,  $p < 0.01$ ) and ICT -> KS -> EP ( $\beta = 0.077$ ,  $t = 2.446$ ,  $p < 0.01$ ) were all significant, as indicated in Table 8. The 97.5% corrected confidence intervals did not contain any intervals straddling a 0, supporting the findings. Thus, H5, and H6, are all supported.

Table 9

## PLS-Predict.

Item	PLS RMSE	LM RMSE	PLS-LM	Q <sup>2</sup> _predict	Decision
ABS	0.927	0.936	-0.009	0.147	
DED	0.929	0.936	-0.007	0.142	
VIG	0.930	0.930	0.000	0.141	Medium
QUAL	0.969	0.976	-0.007	0.070	
QUAN	0.974	0.985	-0.011	0.062	
TIME	0.986	0.991	-0.005	0.037	Strong
KS1	0.930	0.942	-0.012	0.133	
KS2	0.975	0.946	0.029	0.075	
KS3	0.682	0.683	-0.001	0.224	
KS4	0.633	0.635	-0.002	0.181	
KS5	0.767	0.780	-0.013	0.156	Medium

KS6	0.874	0.875	-0.001	0.143
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Ngah et al (2021); Shmueli et al (2019) suggested that PLS makes predictions using a sample-based holdout procedure that makes case-level predictions at the item or constructs level using a 10-fold procedure to look at prediction. According to their logic, if all of the item differences (PLS-LM) are low, there is predictive power; if the majority is low, there is moderate predictive power; if there is a minority, there is low predictive power; and if they are all high, there is not enough evidence to support the predictive relevance. Table 9 shows that most of the PLS model's errors were lower than those of the LM model, leading us to conclude that our model has a mixed predictive power comprising medium and strong predictive power.

### **Discussion**

In this study, the non-parametric analysis software SmartPLS and the rarely used variance-based structural equation modeling (SEM) for confirmatory analysis are used to assess the measurement reliability and validity. The majority of the items in the first-order constructs had a loading greater than 0.60, according to the study's findings. The average variance extracted (AVE) values for all constructs exceeded 0.50, while the composite reliability (CR) value exceeded 0.80, and the Cronbach Alpha (CA) exceeded 0.75. As a result, it is demonstrated that this analysis is carried out following the suggestions of Hair et al (2017); Cohen (1988) and thus confirms the measurements' reliability, convergent validity and discriminant validity. This demonstrates that each of the sub-constructs has been proven to be a good indicator for measuring their respective constructs.

The study discovered that ICT usage positively affected EE, in line with Pletnev and Kozlova (2022), whereby ICT usage had a positive relationship with EE and acted as a driver to increase EE in SMEs. According to the research conducted by Vorina et al (2013), increasing employee ICT skills would also increase employee engagement. Hence, ICT usage in SMEs is vital for EE. Consequently, to enhance EE, SMEs must enhance ICT usage among SME employees to improve the EE. The issue is not about employees in SMEs not being highly engaged, but there is no well-established ICT infrastructure in SMEs. This slows down the work process, and employees become disengaged at work. Based on the reviewed literature, it appears significant that ICT usage positively impacts EE; hence, the hypothesis is accepted.

ICT usage has been found to have a positive and significant relationship with KS. According to the findings, ICT usage is a significant predictor of KS among SME employees. SET (Blau, 1964) creates a cross-level relationship between ICT and KS. According to SET, employers should initiate exchange relationships with their employees by providing benefits such as ICT facilities that promote enhanced KS, which employees repay through reciprocal behaviors (Lorinkova & Perry, 2014; Wu & Lee, 2017). According to Podrug et al (2017), there is a positive relationship between ICT usage and KS. This finding is widely in line with previous findings from (Ul Haq & Haque, 2018; Ghabban et al., 2018; Davidavičiene et al., 2020). Besides, Cheng et al (2009) argued that it is crucial to create a people-oriented environment rather than a technological one to boost KS activity. Even though technology helps to lower barriers and increase the natural propensity to share knowledge, they believe that KS is still a human process. Based on the literature that was looked at, it seems likely that ICT usage has a positive effect on KS, so the hypothesis is accepted.

The study reveals that EP has a positive and significant relationship with EE. According to the findings, EE is a significant predictor of EP among SME employees. Numerous prior studies

reveal a significant relationship between EE and individual performance (Bakker & Bal, 2010; Demerouti & Cropanzano, 2010). Employees that are engaged show effort because they are emotionally involved in their work (Ohemeng et al., 2019). Gupta et al (2015) conclude that when EE is high, EP rises.

Similarly, Ismail et al (2019) stated that there is a strong correlation between EP and EE. This finding is substantiated by a recent longitudinal study by Carter et al (2018), which discovered a strong and positive relationship between EE and EP and the prediction of EP by EE. Based on the literature presented, it is feasible to conclude that EE positively affects EP, and the proposed hypothesis is accepted.

KS is found to have a significant and positive relationship with EP. The study revealed that KS is a significant predictor of EP for employees of SMEs. SET is commonly used to explain people's behavior in various domains, including ICT and KS (Yan et al., 2016). Blau (1986) believed that social exchange leads to a social exchange between individuals. The two parties will only continue to engage with each other if both sides can get crucial knowledge and information from the other. The findings of Rohim & Budhiosa (2019) show that KS significantly impacts EP. It is plausible to infer that higher performance attainment will follow from increased KS activities among SME employees. Therefore, it is plausible to conclude that KS positively impacts EP based on the literature discussed, and the proposed hypothesis is accepted.

#### *Theoretical Contribution*

Like earlier studies, this one gives academics and scholars essential new information. The findings make significant theoretical contributions to EP in SMEs in Malaysia. The current study used an empirical approach to evaluate whether ICT usage relates to EP. The current study also examined how EE and KS impacted the relationships between independent and dependent variables. This research is likely to be very helpful for business people who want to know more about how EP affects the performance of SMEs, especially in developing countries like Malaysia.

The first theoretical contribution of this study is that it blended the independent variable ICT usage and the mediators' EE and KS into a single model that predicts EP. All the results have a significant positive effect on EP. The second theoretical contribution of this study is that it looked at how ICT usage and KS are related. This study provides more information about how important it is for KS to predict EP. The findings revealed that KS mediated the relationship between ICT Usage and EP in Malaysian SMEs. Finally, most EP research has occurred in Southeast Asian, European, and Western countries. Sadly, very few studies have been conducted in Asian countries. Only a handful of studies on EP in SMEs were conducted in Malaysia. This study could be one of the first in Malaysian SMEs to develop an integrative view of EP, EE, and KS, and it could also help and support SMEs in other Asian countries.

#### *Practical and Managerial Implications*

This study's findings indicate that most of the variables tested in the framework are equally significant in influencing the EP. Understanding the factors will thus provide great insight to employers, SME managers, and scholars. The study provided significant practical contributions for SME managers to enhance ICT usage in SMEs. The knowledge of ICT usage in SMEs still needs to be improved in SMEs. Understanding the factors that influence EP enables managers to devise more effective and meaningful ICT facilities and a KS approach to increase EE among employees in SMEs. Government should also design an SME ICT usage

policy. By utilizing government-provided ICT benefits, these types of policies will enable more SMEs to compete in a global arena.

#### *Limitations and Future Research Recommendations*

The study has several limitations, despite its theoretical and practical implications. First, the analysis was restricted to Malaysian SMEs only. Therefore, the research should be repeated among SMEs in other countries to verify model consistency. In the future, Malaysia's findings should be compared with those of other ASEAN countries using similar benchmarks. In addition, additional variables should be considered to improve the model's ability to forecast the EP in SMEs. Secondly, this study used a quantitative methodology and only one method to collect data. Respondents may be hesitant to provide accurate responses because only a survey questionnaire was used to collect data for the study. Because of the inconsistent and inaccurate responses in measuring the study's variables, future research could use a mixed-method approach to conduct an in-depth evaluation of EP in Malaysian SMEs. Thirdly, data were collected using a cross-sectional method. The cross-sectional method complicates determining a relationship between variables (Sekaran & Bougie, 2011). On the other hand, longitudinal studies allow for the development of causal links and conclusions (Cohen et al., 2013). As a result, a longitudinal study is recommended in light of this constraint to truly comprehend the long-term behavior of EP in Malaysian SMEs. Finally, the findings were applied to SMEs from all states in Malaysia. EP in Malaysia may differ between urban areas, rural areas, and states. As a result, future research could compare EP in SMEs in different geographical locations in Malaysia.

#### **Conclusion**

In conclusion, EP is not a prominent study area among Malaysian SMEs. However, it is a significant aspect that determines the performance of SMEs. Organizations should be proactive in identifying the effects of the EP on Malaysian SMEs. This would help improve the performance of Malaysian SMEs, substantially boosting their contribution to Malaysia's GDP. This study, which employed SET as its underlying theory, explains why and how ICT usage influences EP. By integrating ICT usage towards EP, the SEM analysis provided additional empirical validation for the framework. The results of the EE and KS mediating effects also support the EP. Incorporating KS into the framework and investigating its mediating impact on ICT USAGE and EP within the context of SET is a noteworthy contribution made by the present study.

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## APPENDIX A

Second Order Constructs	First Order Constructs	Items	No. of Items	Reliability	Likert Scale	Source
Employee Engagement (EE)	Vigour	At my work, I feel bursting with energy. <sup>a</sup>	6	.90	Seven-point likert scale	Schaufeli et al (2006)
		At my job, I feel strong and vigorous. <sup>a</sup>				
		When I get up in the morning, I feel like going to work. <sup>a</sup>				
		I can continue working for very long periods at a time.				
		At my job, I am very resilient mentally.				
		At my work, I always persevere, even when things do not go well.				
	Dedication	I find the work that I do full of meaning and purpose.	5	.95		
		I am enthusiastic about my job. <sup>a</sup>				
		My job inspires me. <sup>a</sup>				
		I am proud of the work that I do. <sup>a</sup>				
		To me, my job is challenging.				

	<b>Absorption</b>	Time flies when I am working.	6	.90		
		When I am working, I forget everything else around me.				
		I feel happy when I am working intensely. <sup>a</sup>				
		I am immersed in my work. <sup>a</sup>				
		I get carried away when I am working. <sup>a</sup>				
		It is difficult to detach myself from my job.				
Employee Performance (EP)	Quality	Job performance is neat and accurate.	5	.894	Five-Point Likert Scale	Na-nan et al (2019)
		Job performance meets the required standards.				
		Materials and equipment used for work operations meet the required standards.				
		Before products are delivered, quality standards are always assessed.				
		Work quality is acceptable for external organisations and provides full benefits for users.				

	Quantity	<p>Work quantity is balanced with the fleets in the work unit.</p> <p>Work quantity achieves the expectations of the work unit.</p> <p>Work quantity under my responsibility is appropriate with my capability.</p>	4			
		Assigned work quantity is always completed in time.				
	Time	<p>Assignments are always completed in time.</p> <p>Each workpiece is completed successfully within the appropriate time duration.</p> <p>Work is delivered within the deadlines.</p> <p>Employees operate according to the goals and deadlines required by the organisation.</p>	4			
	ICT Usage	Employees make extensive use of electronic storage (such as online databases and data		4	.86	Five-Point Likert Scale

		warehousing) to access knowledge.				
		Employees use knowledge networks (such as groupware, intranet, virtual communities, etc.) to communicate with colleagues.				
		Our company use technology that allows employees to share knowledge with other persons inside the organisation.				
		Our company use technology that allows employees to share knowledge with other persons outside the organisation.				
	Knowledge Sharing	In our firm, employees shared their work reports and documents with other employees.	6	-	Five-Point Likert Scale	Sveiby & Simons (2002)
		In our firms, employee shared their experience with other organisation members.				
		In our organisation, KS with colleagues is an enjoyable experience.				
		Our employee provides				

		knowledge at the request of other colleagues.				
		When our colleagues learned something new, they share with me and all of us.				
		In our firm, employees shared their work reports and documents with other employees.				

a. Shortened version (Utrecht Work Engagement Scale–9 [UWES-9]).