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A proposed model of ICT facilities in the central zone vocational colleges, Malaysia

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ABSTRACT

The tide of globalization is moving so fast nowadays. Changes and its development are quite difficult to curb from spreading in our lives. These developments continue to have a positive impact on the community and no less giving various challenges to all of us especially to the world of education. The competency factor of the lecturer should increase in line with the changing environment. The opposite situation occurs in some educational institutions in Malaysia, such as vocational colleges (KV). Thus, the implementation of this study aimed to analyze the internal environment of vocational colleges involving information and communication technology (ICT) facilities as well as the effectiveness of ICT vocational colleges. Inferential analysis was used to identify contribution of exogenous variable to endogenous variable through Structural Equation Modeling (SEM-AMOS). To achieve the objectives of the study, a survey - type quantitative study design was implemented. Questionnaire instruments were distributed to 388 vocational college lecturers in the central zone of Malaysia using stratified random sampling. Furthermore, the questionnaire data were analyzed using Statistical Package for the Social Science (SPSS) version 25. The findings showed that there is a significant relationship between technological facilities (such as computers) with ICT effectiveness when $p<0.05$. In terms of moderators, the demographics of lecturers, namely gender, age and computer usage practices of KV lecturers affect the effectiveness of ICT KV when the mean score exceed 8.50. Furthermore, the developed model also meets the model fit indices requirements with RMSEA value at 0.060, CFI=0.973, TLI=0.968, Chisq/df=2.380 and GFI=0. 901.The implications of the study indicate that the role of lecturers as educators is important in developing appropriate reforms in supporting the innovations that take place in educational organizations.

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1. INTRODUCTION

Information and communication technology (ICT) has defined as a combination tools and technology resources used for manipulating and disseminating information, and supporting the learning process in the 21st century [1]. Among the most frequently used technological equipment at present it is electronic and digital equipment namely computers, internet, and multimedia technology [2]. In this era of globalization, the use of ICT is increasing important in all areas including the field education because of the ability to provide learning and teaching environment which is proactive [3]. Realize the benefits of ICT in education, The Ministry of Education Malaysia (MOE) has made a large investment each year for integrate ICT in education for the purpose of producing knowledgeable human capital and highly skilled. As such, the total allocation for the education sector is given privilege by increasing the amount allocation from RM36.5 billion in 2008 to RM60.2 billion in 2019. In addition, 19% of central government expenditure allocations are distributed to the education sector [4]. Distribution of financial allocations great for the implementation of ICT programs in education proves how serious Ministry of Education is in an effort to cultivate the use of

ICT among educational institution. All provisions this is spent on providing infrastructure, adequate equipment and training to Lecturers to ensure the integration of ICT in teaching and learning is implemented as planned [5]. Among the ICT programs which has been implemented by the MOE are Computer Club, Network Project, Computer in Education, Smart Schools, Computer Labs, Educational TV, supply of ICT equipment in Science Teaching and Learning Program and Mathematics in English (PPSMI), EduWebTV and School Net Project [6], [7]. Although the government has spent a large financial resource for ICT programs at the school level, but the State Audit Report 2013 revealed that the use of ICT among teachers and students is very low, which ranged from 0.01% to 4.69% [8]. Meanwhile, less than 80 percentage of the teachers using ICT is less than one hour per week [2]–[6], [8], [9]. This supports the results of the study [7] who stated that the level of ICT use among teachers are still low. Lectures are still less adept at integrating ICT material in teaching because it feels lacking confident in the usefulness of technology in teaching [10].

The field of teaching or education is a profession with heavy responsibilities and challenges [11]. To be specific, a lecturer needs to have extensive knowledge in all aspects of information technology besides the important skills and expertise in their field of teaching. Quality and skilled lecturers in the field of ICT specialization are able to deliver their teaching more effectively and efficiently. The use of computers in education could be categorized into three components, namely management, teaching and learning, and research. Specifically, the management component covers the applications in record keeping budgets, communication and gathering information in schools and classroom [7]. The management of educational institutions, including vocational colleges, is required to prepare a budget that covers teaching materials, visit costs, student activities, staff, and development among others. Management would use all the data offered by staff and lecturers, especially through computer applications. In the preparation of data and information for the management of education, the directors play the role of leaders and lecturers who will perform the task of providing this data and information. Thus, most past studies have demonstrated that demographic variables could make a difference in the perceptions of educational organizations. Based on the studies conducted by researchers on demographic variables including age, gender, academic level, involvement in teaching, and involvement in using computers could impact a lecturer's use and acceptance of information technology systems [1], [2], [11].

A quantitative study was conducted by Sulaiman *et al.* [12] to identify ICT readiness and the impact of demographic attributes (gender, age, and years of teaching experience), categories of ICT training, and support elements including administrative support, ICT facilities affecting ICT preparedness in the aspects of expertise, knowledge, and viewpoints and vocational lecturers in Malaysia. Data were collected from 329 technical and vocational lecturers and those who teach engineering subjects in Malaysian technical and vocational schools. As a result, there was no notable age and effect of teaching experience on the general ICT preparedness of the lecturers, although a notable gender impact was recorded on the overall ICT readiness of the teaching force. The results of the study show that male lecturers exhibited stronger ICT expertise compared to female lecturers. Furthermore, no notable impact was found on the educational background and supporting elements on the general ICT preparedness of the lecturers.

Teacher demographic factors (gender, age, involvement in teaching, involvement in the use of ICT, and ICT training) are associated with teachers who impact the degree of teaching technology incorporation [13]. Following that, the involvement in the use of ICT is another element influencing the preparedness of teachers for the integration of ICT into their teaching. Their involvement in the use of ICT also impacts the recurrence of ICT use and the degree of incorporation in the classroom. It could be seen that the increase in the teacher's exposure to ICT would reinforce their expertise and facilitate their adaptability to the implementation of new technologies. Another element that impacts the degree of ICT use among teachers is age. To be specific, teachers possess higher proficiency in the use of ICT in comparison to those from past generations and with more duration of involvement in teaching.

Based on another research work regarding the level of ICT application among 212 Malaysian secondary school teachers [7], elderly teachers were recorded with a higher inclination to adopt the use of information systems in schools. It was found that teachers of this age more frequently implemented ICT in classroom teaching compared to younger teachers. These results were regarded as distinct from other study results in the literature, which demonstrated the positive viewpoint among young teachers regarding the acquirement and application of ICT. However, there was a lack of studies on the impacts of age, gender, involvement in teaching, academic level, and involvement in the use of computers as moderators on the association between the administrators' technology leadership application and the acquirement and implementation of ICT among instructors.

To date, most of the studies that have been done in mainstream schools show the role of lecturers as mentors in achieving the excellence of educational organizations. However, after the recent transformation of vocational college education, so far, the research that has been done related to ICT facilities in organizational management and the effectiveness of ICT is still lacking [14]. In fact, education management also need to be

provided with good ICT facilities so that they can be emulated by students and influence learning in the classroom more effectively. Thus, it is clear that technology encompasses all aspects of organizational management in improving work and making effective users of technology, thus, it is important for lecturers to understand how technological advances can provide effectiveness in managing ICT facilities in organizations as well as student outcomes. Therefore, this study was conducted for answer the research objective is as: i) To test whether there is significant relationship between ICT facilities and the effectiveness of ICT in the Central Zone Vocational College, Malaysia; ii) To test the moderator effect of lecturer demographic variables influence the relationship between ICT facilities and ICT effectiveness in central zone vocational colleges, Malaysia; and iii) To test the model of structural equation and directly see the relationship between the facility ICT dimension, and the effectiveness of ICT in the Central Zone Vocational College, Malaysia.

2. LITRETURE REVIEW

2.1. Computer technology facilities (ICT facilities)

According to previous researchers [12], facility as something that is shaped, made, designed and installed to provide a service. Every single one provided for the convenience of its users is a facility. In this study, the perception of ICT facilities refers to the level of trust of lecturers on ICT facilities that is the position of the available infrastructure and the existence of technical assistance that allows ICT technology to be used [15]. The position of this ICT facility also includes the equipment provided, support from the management, training and the provision of support assistance to assist its use.

In this study, ICT facilities refer more to the infrastructure provided and the level of achievement of ICT equipment, especially computers used by lecturers in carrying out management tasks in vocational colleges. In this study ICT facilities dimension were measured based on the Unified Theory of Acceptance and Use of Technology instrument [16]. Based on the UTAUT model the component/construct state of a facility is defined as the level at which an individual believes that the technical establishments and infrastructure exist to support the use of the system/technology [1], [17].

2.2. The moderator effect of lecturer demographic variables

In the current era of technology, the function and role of computer technology can no longer be disputed. The function and role of computer technology for life is now becoming something very important. The practice of lectures using technology in educational organizations has been introduced since the beginning of the introduction of Smart Schools. Among the objectives of Smart school is to encourage the use of ICT to increase productivity, excellence and effectiveness in the management system of educational organizations. According to previous studies [18]–[20], the School Management System (SPS) involves modules such as, School Information Management, School Facilities Management, Administrator Management System, Staff Management, Student Information Management Timetable Management, Student Attendance Management, Counseling Guidance Management, Examination Management, Co-Curriculum Management as well as e-Holiday Management.

This section contains items related to the practices of lecturers applying computer technology in management tasks in vocational colleges. There are nine items contained in the dimension of lecturers' practice of applying computer technology in carrying out management tasks in college. This construct was adapted from instrument on Perception of Technology on Job Effectiveness (PTJE) [21]. This instrument is particularly suitable for assessing the level of satisfaction of lecturers in the organization [5], [7].

2.3. Effectiveness of ICT management

One of the goals of the use of ICT technology in organizational management is to increase productivity, excellence and effectiveness in the management system. Skills to manage information in a systematic, planned, creative, efficient and effective manner must be possessed to improve the work performance of an organization. Various issues have been raised and debated by educational technology scholars [22], [23] yet technology has proven to be a tool capable of increasing productivity, increasing motivation, supporting teaching indirectly, making teaching unique and improve information literacy.

This section contains items related to the effectiveness of lecturers in applying computer technology in management tasks in Vocational Colleges. This dimension is divided into two parts: i) Effective field of work using computers (Areas of Effective Duties Using Computers contains items of effective fields of duties of lecturers through computer applications); ii) Productivity contains items related to the relationship between technology leadership, ICT facilities, lecturers' practices of applying computer technology with productivity. Accordingly, the framework of this study is illustrated in Figure 1.

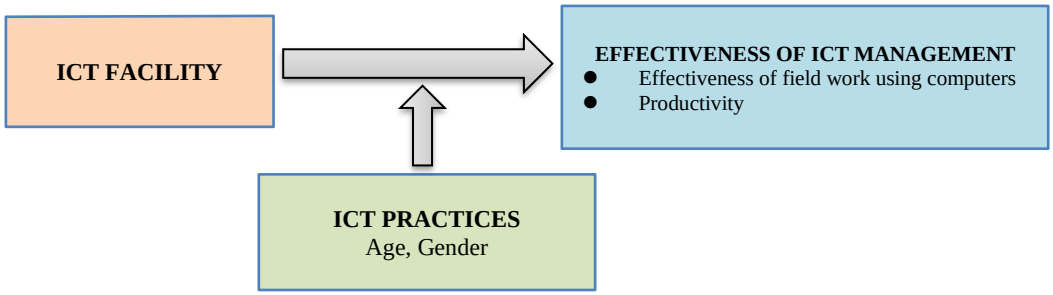

Figure 1. Research conceptual

3. RESEARCH METHOD

3.1. Research design

A quantitative approach was used in this study to answer the research questions. The study was conducted descriptively using survey method. The design of the study is a researcher's plan so that the study can be conducted easily to answer questions or problems of the study. This study aims to examine the information and communication technology facilities and the effectiveness of ICT management of the Central Zone Vocational College, Malaysia. According to Merriam [24], the selection of a study design is determined by how a problem is formed, the questions raised and the type of final product (conclusion) desired. Researcher use questionnaires in collecting information from respondents to speed up time and reduce low costs compared to qualitative methods [25].

3.2. Population and Sample

Random sampling method was used by the researcher to select the sample through the population of this study. The study population involved lecturers who teach at the Central Zone Vocational College of Malaysia. The total current lecturer population for year 2020 is 1069 people. Researcher have referred to several researchers' opinions, such as Pallant [26] in setting the appropriate and accurate sample size requirements of studies involving multivariate analysis. Thus, the total number of samples proposed by Hair *et al*. [27], for a population of 1069 people [8]. They suggested that the minimum sample size was 278 people. However, the researchers selected, a total of 400 respondents were randomly selected from 10 Vocational Colleges of Central Zone Malaysia. There were 12 forms had to be dropped due to incompleteness. So, the researcher determined 388 respondents in this study. Based on 388 respondents, 21.9% (n=85) were among male lecturers while the remaining 78.1% (n=303) were female lecturers. The analysis showed that 4.98% (n=70) respondents were less than 30 years old, 18.0% (n=128) were between 31 to 40 years old, 33.0% (n=137) were between 41 to 50 years old, and 13.7% (n=53) aged 51 years and above. The details of the distribution of study respondents are described in Table 1.

Table 1. Respondent demographic analysis

Variable	Category	Frequency (n)	Percent (%)
Gender	Male	85	21.9
	Female	303	78.1
Age	Less than 30 years	70	18.0
	31-40 years	128	33.0
	41-50	137	35.3
	More 51 years	53	13.7

3.3. Instruments

Essentially, two instruments were used in this study. Specifically, ICT facility instruments were adapted from the instruments found in the Unified Theory of Acceptance and Use of Technology (UTAUT) model. Based on the UTAUT model, the component/construct state of a facility was described as the degree of an individual's belief regarding the presence of technical establishments and infrastructure to support the use of the system/technology [17]. Meanwhile, the ICT management effectiveness instrument was adapted from the Perception of Technology on Job Effectiveness (PTJE) instrument [21]. This instrument consists of several sections: Section A addresses the background of the respondents, such as gender and age; Section B contains eight items in the dimension of ICT Facilities; Section C comprises nine items on the dimension of computer use practices; and section D presents 15 items on the effectiveness of ICT management of

vocational colleges. In line with this study objective, the 10-point interval scale scoring method (1 to 10) was used, with a score equal to 1 indicating 'strongly disagree' and a score of 10 indicating 'strongly agree'. Moreover, item parceling was used as it minimizes the influences of individual items' systematic errors on the model estimation and assists in obtaining better fit model data [28], [29].

3.4. Pilot study

A total of 162 respondents (3 Central Zone Vocational colleges) were selected for data analysis of the pilot study. Cronbach's alpha statistical analysis was used to identify the degree of reliability of the questionnaire. Analysis was conducted on the gathered through Statistical Package for the Social Sciences (SPSS) version 25.0 to gain internal constancy of the instrument [1], [30], [31]. The results of the pilot study are presented in Table 2.

It was recorded from the analysis of the pilot study data (N=162) that the Cronbach's alpha value for the entire ICT Facilities dimension of the lecturers amounted to .96; the value for computer use practices was .92; the value for the overall dimension of ICT management effectiveness was .93, and; the value for each subdimension was in the range of .88-.93. The conclusion of the findings of this reliability test was that at this phase, validity and reliability were present in the research instruments, could be used for actual research, and could be distributed to all study respondents.

Table 2. Cronbach's alpha values for the pilot study (N=162)

Section/Variables	Dimension	Cronbach's alpha
ICT facilities	-	.96
Computer use practices	-	.92
Effectiveness of ICT management	Effective field of work using computers	.93
	Productivity	.88

3.5. Validity

Expert validation is required to determine the accuracy of item measurements and the use of easy-to-understand language [30]. Both instruments have been reviewed by experts in the field of educational management and experts in the field of technology leadership. The experts from the University of Malaya (UM), Institute of Aminuddin Baki (IAB) and Vocational Colleges in Malaysia.

3.6. Normality test

The normality test aims to determine each data used in the study, which comprises normally distributed properties. Notably, this test should be performed prior to data analysis. Normality test is commonly determined through skewness and kurtosis values. The assessment of normality of each construct and sub-construct found that the skewness and kurtosis values ranged from -2 to+2. This range has proven that the assumption of normality is met [32]. Overall, all the data obtained were normally distributed. Table 3 illustrates the normality tests for the study variables.

Table 3. Normality tests

No.	Construct	Skewness	Standard error	Kurtosis	Standard error
1.	Facility ICT	-.559	.124	.006	.247
2.	Practice of Computer usage	-.773	.124	.491	.247
3.	Effectiveness of ICT management	-	-	-	-
	i) Effectiveness of field work using computers	-.599	.124	-.077	.247
	ii) Productivity	-.822	.124	.564	.247

3.7. Data analysis

To produce a structured equation model, large sample size must be determined to create meaningful results. A sample size of 200 or larger was recommended by Kline [33]. It was also proposed by Hair *et al.* [27] that the sample size should range between 200 to 400, considering that a sample size larger than 400 for Structural Equation Modeling (SEM) would result in sensitivity issues, which could reduce the goodness fit of the model. Therefore, the total sample size used in this study was 388. While ICT facility construct was measured by eight items, namely facility 41 to facility 48. The effectiveness of ICT comprised two subconstructs, including the areas of work that effectively used computers and productivity and 14 items. Additionally, the use of item parceling has been widespread in empirical SEM analyses since its introduction

by Cattell in 1956 [28], [34], [35]. Parceling denotes a process of calculating the total or average scores throughout multiple items. Instead of the individual item scores, this was followed by the use of the total or average scores (known as parcel scores) as the measures of latent factors in the SEM analysis [34], [36].

Confirmatory factor analysis (CFA) was employed to measure and verify the measurement model. This analysis should be conducted for all constructs involved in this study prior to the structural model. The item with low factor loading should be eliminated from the model to achieve better fit indexes in the measurement model [37]. Notably, the evaluation of convergent validity, construct validity, and discriminant validity was also important before conducting the structural model. Verification of the convergent validity could be performed through the calculation of the average variance extracted (AVE) for every construct. The convergent validity for the measurement model would be gained with the entire average variance extracted values of over 0.50, while the construct validity for the measurement model would be gained with all fitness indexes that fulfil the aimed degree. The discriminant validity would be obtained with the deletion of the redundant items or their constraint as "free parameter" and the less significant correlation between the exogenous construct of below 0.85.

Three general fit indices types are present, which include parsimonious fit, absolute fit, and incremental fit. To be specific, parsimonious fit comprises the Chi-Square/Degree of Freedom (Chi-Square/df). The absolute fit performs measurement on the overall goodness-of-fit for the measurement and structural models that comprise the RMSEA and GFI. Following that, an incremental fit is a group of goodness-of-fit indices that evaluate the level of fit that a specified model has in relation to several alternative baseline models. Incremental fit comprises Adjusted Goodness of Fit (AGFI), Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and Normed Fit Index (NFI). The fitness index fit indices values for GFI, CFI, TLI, and NFI must be higher than 0.90, which indicates the correct degree of fit, while the RMSEA of lower than 0.80 and Chi-Square/df of lower than 5.0 denote a good fit [38]. The index category and acceptance degree for each index are presented in Table 4 [29].

Table 4. Index categories and minimum index

Category	Name of index	Level of acceptance	Comment
Absolute fit	Chi-Square two (χ^2)	$p > 0.05$	Sample size > 200
	Root of Mean Square Error of Approximation (RMSEA)	RMSEA < 0.08	Range of 0.05 to 0.10 is acceptable
	Goodness of Fit Index (GFI)	GFI > 0.90	GFI=0.95 is good fit
Incremental fit	Comparative Fit Index (CFI)	CFI > 0.90	CFI=0.95 is good fit
	Tucker Lewis Index (TLI)	TLI > 0.90	TLI=0.95 is good fit
Parsimonious fit	Chi-square/df (χ^2/df)	(χ^2/df) < 5.0	Should < 5.0

4. RESULTS AND DISCUSSION

The current chapter presents the study findings corresponding to the delineated objectives fulfilled by two statistical analysis procedures. Structural equation modelling and analysis were conducted on moderator variables to determine the respective relationships, while simultaneously computing the correlations between constructs and assessing the measurement model. Subsequently, the proposed model, ICT facilities, and ICT effectiveness were evaluated to discover the data fitness after collecting the data from vocational college lecturers in the Malaysian central zone.

4.1. Measurement model evaluation

Figure 2 illustrates the confirmatory factor analysis (CFA) findings regarding data fitness indices and factor loadings of all measurement items with respective R2 values. Although the factor loadings exceeded 0.60, several fitness indices of the pooled constructs remained below the threshold. Accordingly, item redundancy was investigated via the modification indices (MI), in which two correlated measurement errors of redundant items were defined as a 'free parameter'. Hence, several measurement errors were categorized as 'free parameters' to enhance the model fitness, as outlined in Figure 3. The findings showed that the revised re-specified Confirmatory Factor Analysis model does meet the required level of fitness index. It was found that ICT facilities was significantly correlated with effectiveness of ICT, showing a weak positive relationship ($r=0.38$, $p<.05$). Table 5 shows the findings of the revised re-specified Confirmatory Factor Analysis model does meet the required level of fitness index. It was found that ICT facilities was significantly correlated with effectiveness of ICT, showing a weak positive relationship ($r=0.38$, $p<.05$).

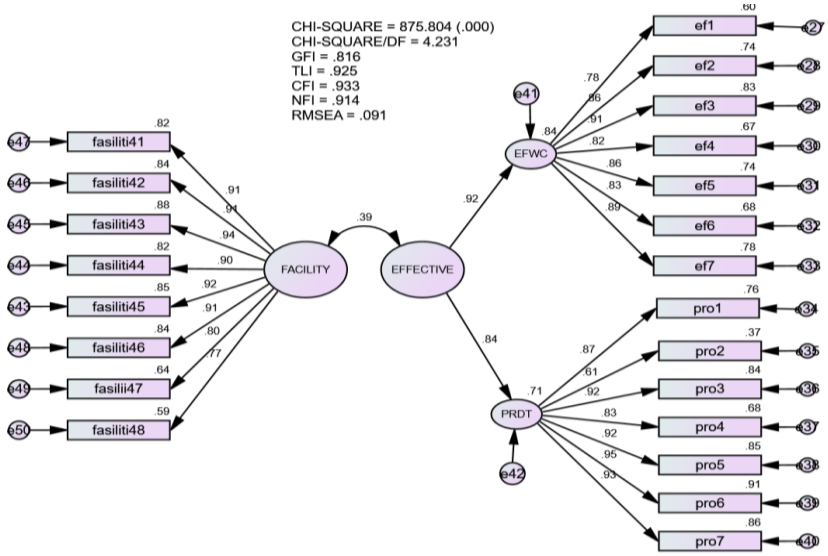

Figure 2. Measurement model for pooled constructs

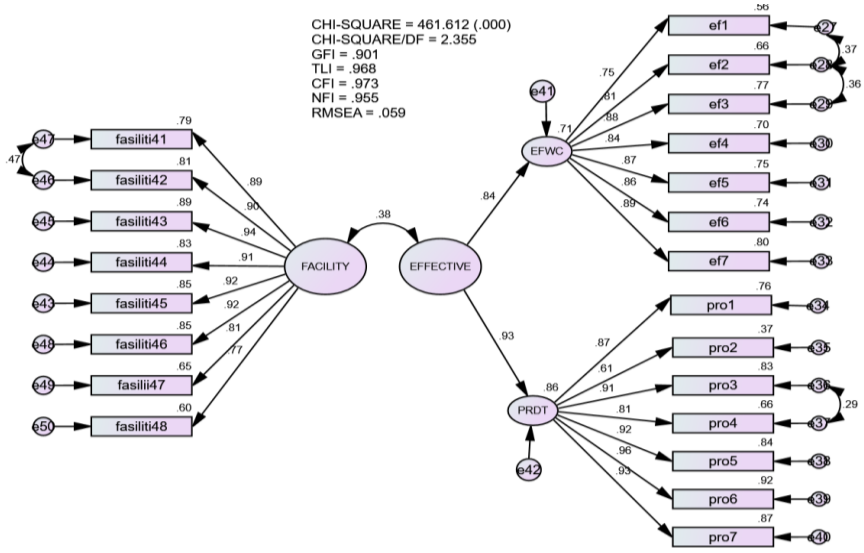

Figure 3. Re-specified pooled measurement model

Table 5. The fitness indexes for re-specified pooled measurement model

Name of category	Fitness statistics	Index value for measurement model	Index value for re-specified measurement model	Comments
Absolute fit	RMSEA	0.091	0.059	The required level is achieved
	GFI	0.816	0.901	The required level is achieved
Incremental fit	CFI	0.933	0.973	The required level is achieved
Parsimonious fit	Chisq/df	4.231	2.355	The required level is achieved

4.2. Appraising model validity and reliability via CFA

The average variance extracted (AVE) was conducted to establish convergence validity when a construct achieved above 0.50 of the AVE value, wherein the present findings revealed that all constructs possessed AVE values above 0.50. Simultaneously, discriminant validity was ascertained when the correlations between latent constructs (ICT facilities and ICT effectiveness) remained under 0.85, which was determined in the current study. Therefore, both convergent validity and discriminant validity were established, as demonstrated in Table 6.

Table 6. Validity and reliability of CFA

Construct	Subconstruct/item	Factor loading	CR>0.60	AVE>0.50	Cronbach alpha
ICT facilities	Adequate ICT (computer) equipment	0.890	0.966	0.783	0.964
	ICT equipment (Computer) that can be used	0.900			
	The latest ICT (Computer) equipment	0.943			
	Maintenance of ICT equipment (computers) in the form of specialized staff	0.912			
	Adequate space to use ICT equipment (computers)	0.921			
	ICT equipment (computers) with updated software	0.920			
	Quality internet access facilities	0.806			
	Assistance by the coordinator when dealing with issues of the use of computer technology.	0.772			
Effectiveness of ICT	Effective field of work using computers	0.752	0.946	0.714	0.849
	Productivity	0.872			
Effectiveness of field work using computers	I easily retrieve student data using a computer	0.752			0.946
	I was able to identify various local and international policies related to my field of work using computers	0.815			
	Uses analytical skills to draw logical conclusions in the management of daily tasks	0.880			
	I design students' professional self -development programs based on surveys using computers	0.837			
	I inform the overall assessment of student performance via computer	0.865			
	I disseminate college information to a wide range of audiences such as colleagues, students, parents and the community through computers	0.862			
	I display the annual plan of the development of student academic performance using technology	0.894			
Productivity	I became more productive due to the use of computers	0.872	0.954	0.750	0.944
	I am satisfied with the technological facilities provided for me to carry out management duties	0.606			
	Able to reduce my management workload by using a computer	0.909			
	Able to reduce management costs in carrying out tasks by using a computer	0.813			
	Able to save management time in carrying out tasks by using a computer	0.919			
	I was able to improve my work performance by using a computer	0.957			
	I can commit to tasks using a computer	0.934			

4.3. Relationship between ICT facilities and the effectiveness of ICT in the Central Zone Vocational College, Malaysia

To answer the objectives of the first study a total of 388 lecturers were involved in answering the questionnaire. The data obtained are able to provide an overview of the relationship between ICT facilities and the effectiveness of ICT in the Central Zone Vocational Colleges. Questionnaire data were analyzed using inference method, structured equation modeling (SEM) was used.

4.3.1. Structural model

In this section, evaluations on structural model are discussed to study the effects of exogenous variables on endogenous variables. Table 7 shows the fitness indexes for structural model. Meanwhile, Figure 4 depicts the structural model and the causal relationships between variables, with discovered acceptable factor loading and regression coefficients. Specifically, the fitness indices in the model satisfied previous researchers' recommended thresholds, which were 2.380 (<5.0) of the normed chi-square value ($\chi 2/df$), 0.973 (>0.90) of the comparative fit index (CFI), 0.968 (>0.90) of the Tucker-Lewis index (TLI), 0.901 (>0.90) of the GFI value, and 0.060 (<0.08) of the RMSEA value. Moreover, a 14% variance in the construct ICT effectiveness could be explained by the variable ICT facilities. Figure 4 manifests that the beta coefficient is 0.37, which confirms that ICT facilities significantly influence ICT effectiveness ($p<0.001$). Meanwhile, Table 8 delineates the standardized regression coefficients.

Table 7. The fitness indexes for structural model

Name of category	Fitness statistics	Index value for structural model	Comments
Absolute fit	RMSEA	0.060	The required level is achieved
	GFI	0.901	The required level is achieved
Incremental fit	CFI	0.973	The required level is achieved
Parsimonious fit	Chisq/df	2.380	The required level is achieved

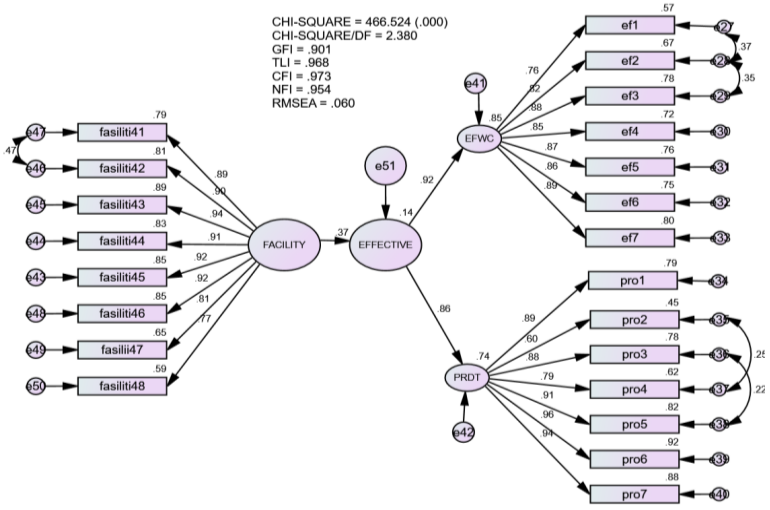

Figure 4. Model of ICT facilities in the central zone vocational college, Malaysia

Table 8. Standardized regression weight

Variable	Variable	Beta estimate	S.E	C.R	*p*
Effectiveness of ICT	ICT facilities	.374	.034	6.440	<0.001*

4.4. Vocational college lecturers' demographics moderated the relationship between ICT facilities and ICT effectiveness in the Malaysian central zone

From a total of 388 participating lecturers, the collected data disclosed that vocational college lecturers' demographics significantly moderated the relationship between ICT facilities and the ICT effectiveness in the Malaysian central zone. A moderator is a variable affecting the strength of an association between the manipulated variable and the outcome variable, wherein the effect of the manipulated variable on the outcome variable was contingent on the moderator [25], [37]. According to previous researchers [27], [39], the existence of a statistically significant direct effect of the manipulated variable on the outcome variable was a prerequisite for determining the moderator. Figure 4 portrays the relevant findings, in which gender and age were included as moderators after establishing the statistically significant direct influence effect of ICT facilities on ICT effectiveness. Subsequently, Table 6 illustrates the analysis of the moderator role by comparing two data sets, with one set (constrained) controlling the role of gender as a moderator, while another did not regulate (unconstrained). To determine the model fitness with the collected data, the chi-square value ($\chi 2$), baseline comparisons, namely the normed fit index (NFI), relative fit index (RFI), incremental fit index (IFI), TLI, CFI, and RMSEA, and nested model comparisons were referred to.

4.4.1. Gender as moderator

The gender construct comprised two categories, namely male and female with several assumptions, which were the effect of males was equivalent to females in a constrained framework, while inequality existed between both categories in an unconstrained framework. Table 9 highlights the comparison results between the constrained framework and the unconstrained framework, while Table 10 depicts the fitness indices of baseline comparisons, namely the NFI, RFI, IFI, TLI and CFI, which exceeded 0.90 in measurement and structural models, whereas the RMSEA was below 0.08 in both models. The indices indicated that both models possessed satisfactory fitness with the collected data.

Table 9. Chi-square value of the model fit statistic and the gender comparison model as moderators

Model	NPAR	CMIN	df	*p*	CMIN/df
Unconstrained	118	775.866	388	<0.001*	2.000
Constrained	59	947.415	447	<0.001*	2.119

Table 10. Model fit summary for baseline comparisons and RMSEA (gender)

Model	CFI	TLI	NFI	IFI	RMSEA
Unconstrained	0.962	0.954	0.927	0.962	0.051
Constrained	0.951	0.949	0.911	0.951	0.054

Moreover, by assuming the unconstrained model pertinence in this study, Table 11 manifests the nested model comparisons which differentiated the gender equivalence in both models. The results demonstrated a significant difference ($p<0.05$) in the Chi-square goodness of fit between the measurement and structural models. It propounded a statistically significant difference between males and females in moderating the relationship between ICT facilities and ICT effectiveness.

Table 11. Nested model comparisons (gender) assuming model unconstrained model to be correct

Model	df	CMIN	*p*	Result
Constrained	59	171.549	<0.001*	Significant

4.4.2. Age as moderator

Age variable consisted of two groups which are 40 years and below, and 40 years above. The assumption that researcher made are in the constrained model, the effect of the age group is equal, while in the unconstrained model, the inequality exists between first and second group. Then the comparison between these two models would be performed. Table 12 illustrates the comparison results between the constrained and the unconstrained models. Meanwhile, Table 13 delineates the fitness indices of the baseline comparisons, including the NFI, RFI, IFI, TLI, and CFI, which exceeded 0.90 in the measurement and structural models, while the RMSEA values were below 0.08 in the two models. Hence, the measurement and structural models achieved a satisfactory fit with the collected data.

Table 12. Chi-square value of the model fit statistic and the gender comparison model as moderators

Model	NPAR	CMIN	df	*p*	CMIN/df
Unconstrained	114	801.142	392	<0.001*	2.044
Constrained	57	919.712	449	<0.001*	2.048

Table 13. Model fit summary for baseline comparisons and RMSEA (age)

Model	CFI	TLI	NFI	IFI	RMSEA
Unconstrained	0.959	0.952	0.924	0.959	0.052
Constrained	0.953	0.952	0.912	0.953	0.052

Table 14 highlights the nested model comparisons of the age group equivalence in the measurement and structural models by assuming acceptable unconstrained model veracity. The findings revealed a significant difference ($p<.05$) in the chi-square goodness of fit between the measurement and structural models, which posited a statistically significant difference between the two age categories. Therefore, age significantly moderated the association between ICT facilities and ICT effectiveness.

Table 14. Nested model comparisons (age) assuming model unconstrained model to be correct

Model	df	CMIN	*p*	Result
Constrained	57	118.570	<0.001*	Significant

4.5. A proposed structural model of ICT facilities and the effectiveness of ICT in the Central Zone Vocational College, Malaysia

In addition, model testing was performed to ascertain the goodness of fit between the proposed structural model and the sample data [40]. Figure 5 demonstrates that the fitness indices of the proposed structural model did not achieve the threshold level (0.90), with the GFI as 0.895. By adhering to the MI suggestion, several measurement errors were calibrated as 'free parameters' to enhance the model fitness, wherein correlations were necessitated between e35 and e37 (MI=29.811) and between e36 and e38 (MI=15.494). Subsequently, the re-specified structural model was measured again to determine the fitness indices as presented in Figure 6. All indices [RMSEA=.060 (<.08), GFI=.901 (>.90), CFI=.973 (>.90), and $\chi 2/df=2.380$ (<5.0)] were above the threshold values, hence confirming an acceptable fit between the re-specified model and the data.

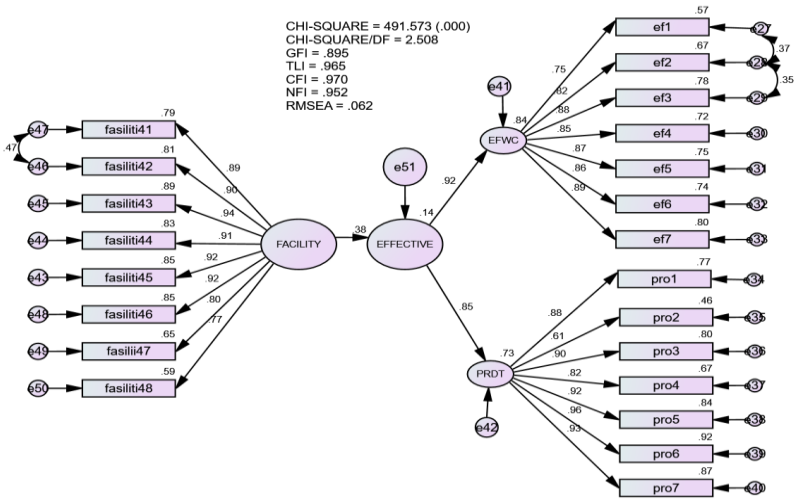

Figure 5. The proposed structural model

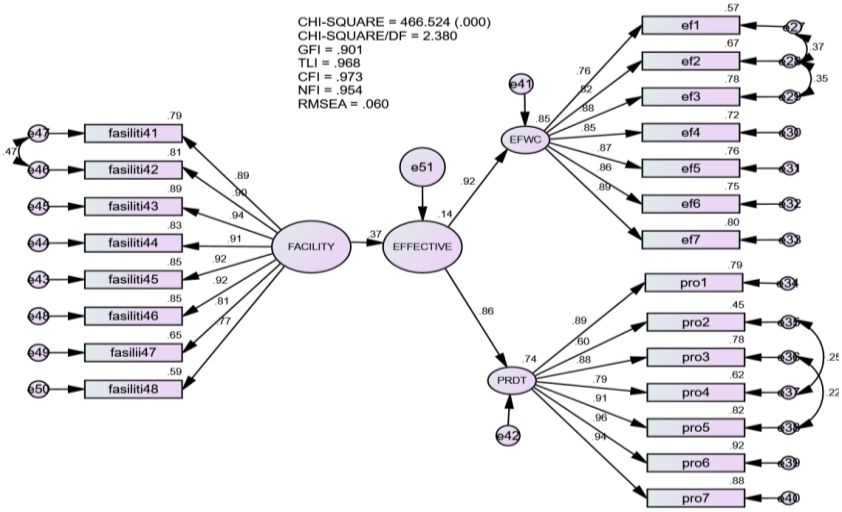

Figure 6. Re-specified structural model

4.6. Discussion

The results of a survey study [41] found that in an organization, facility is the level of individual trust in the position of infrastructure and the existence of technical assistance that allows the technology to be used. Computer technology facilities include equipment provided, support from management, training and the provision of support assistance to assist its use in improving the effectiveness of the organization [42]. The findings of this study are consistent with the previous studies discussed [43], [44], although the government has spent a lot of money in providing ICT facilities in schools but the level of facilities is still a question that there are barriers to accessibility, against 350 teachers in secondary schools in Nigeria on the challenge in applying ICT in schools is the lack of qualified and skilled teachers using ICT in addition to the provision of high facility costs [45]. The findings are also supported by past studies conducted by researchers on issues and barriers to the application of technology in educational organizations [7], [18], [46], [47].

Researchers have categorized the issues and barriers to ICT applications in educational organizations into two forms, namely first level barriers that relate to external factors that are beyond the control of ICT users. These external factors include the provision of ICT facilities, namely the provision of computer hardware and training in using computer hardware by superiors. The second barrier factor is a factor related to the self of ICT users individually that is psychological barriers such as attitudes, confidence, knowledge and trust of ICT users to computer hardware [48].

Meanwhile, a quantitative study conducted by [7] to identify the relationship between the number of computers used in courses for secondary school graduates at the undergraduate and postgraduate levels, perceptions of task effectiveness using computer technology and computer use in assessment and global course assessment. The findings of the study [49] are quite different from expectations that there is no significant relationship between the number of computers, the perception of the effectiveness of computer use with the evaluation and evaluation of global courses but there is a positive relationship between student learning experience with evaluation and assessment of students. involved. The students involved also gave a positive assessment of the use of computers in learning. This finding is different from the study [50] which found that more computer facilities are offered in schools, teachers are more motivated in using computers. On the other hand, a study conducted [51] on chief administrators in Southern Nigeria found that the use of ICT is necessary in the era of globalization yet administrators are not competent in managing ICT facilities. From previous studies, it can be concluded that there are different findings between facility factors such as the provision of computer equipment and infrastructure and attitudes towards the use of technology resources, especially the number of computers with a sufficient number and in usable condition and ancillary equipment appropriate to the determination of computer technology integration in an educational organization [52]. However, sufficient and appropriate time to use computers is required, after taking into account the time used for teaching and learning tasks, Support of the leadership of educational organizations is also needed in the form of expertise including conducting training for professional development of teachers and other staff to complete problems related to the use of computer technology.

Prior researchers [2], [7], [27], [43], [50], [53]–[57] elucidated that teachers' demographics, including age, gender, teaching experience, educational level, and computer usage experience, significantly affected ICT embracement, employment, and integration. Specifically, teachers' demographics could determine personal perceptions of principals' technology leadership and ICT effectiveness in respective organizations. Conversely, the current moderator effect analysis discovered that lecturers' demographics, namely age and gender, significantly moderated the relationship between ICT facilities and ICT effectiveness. The results suggested that lecturers' perceptions of personal directors' effectiveness in exhibiting technology leadership practices to increase ICT acceptance and usage were not determined by personal gender, age, and computer usage experience. Similarly, past results [58] disclosed an insignificant relationship between computer usage and perceptions of principals' technology leadership.

5. CONCLUSION

In sum, it can be concluded that the lecturers as educators play a significant role to integrate ICT facilities in developing appropriate reforms in supporting the innovations that take place in educational organizations. Furthermore, the developed model also meets the model fit indices requirements. Meanwhile, these findings indicate that lecturers' perceptions of their directors can indicate technology leadership practices to improve ICT effectiveness among lecturers are not influenced by their demographic variables in terms of gender, age, and computer use experience in the Central Zone Vocational College, Malaysia. Among the research proposals in the future are: i) This study was conducted entirely using a quantitative methodology that is using questionnaire instrument only. Therefore, it is proposed that further studies be conducted in the form a combination of quantitative as well as qualitative approaches to investigate further in depth on the level of technological knowledge, skills and use of ICT; ii) The respondents of this study only involved lecturers from the Central Zone Vocational College, Malaysia only. Further studies can be performed using the study population in levels of different educational institutions in Malaysia. Comparisons based on differences of educational institutions are also among the interesting studies to be explored.

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