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The Impact of Technology Adoption on Organizational Productivity

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Abstract

Purpose: This research investigates the impact of technology adoption on organisation productivity. The framework has three independent variables viz. technological change, information technology (IT) infrastructure, and IT knowledge management and one dependent variable as organisational productivity. **Research design, data and methodology:** An explanatory research design with a quantitative research method was employed, and data was collected using a self-administered questionnaire using online as well as an offline survey. The sample consisted of 300 IT managers and senior-level executives (production as well as service team) in leading IT companies in Malaysia selected using snowball sampling. Normality and reliability assessment was performed in the first stage utilising SPSS 22, and Confirmatory Factory Analysis (CFA) was performed with maximum likelihood estimation to assess the internal consistency, convergent validity, and discriminant validity. Finally, Structural Equation Model (SEM) and path analysis are conducted using AMOS 22. **Results:** The research findings demonstrated that technological change and IT infrastructure positively and significantly impact the organisation's productivity while IT knowledge management has significant but negative impact on organizational productivity of IT companies in Malaysia. **Conclusion:** The research concludes that all three factors plays important role in deciding organizational producvity. Recommendations, implications, limitations and future research avenues are discussed.

Keywords: Organisation productivity, IT adoption, technological change, IT infrastructure and IT knowledge management.

JEL Classification Code: M10, M15, O33

1. Introduction

Technological evolution will continue to accelerate the future in this modern world of rapid high-technology changes. Organisation productivity depends on the successful incorporation of appropriate technology into the organisation. Technological advancements have completely restructured organisations by making their business processes highly effective and smooth-running than ever. Previous studies have proved that technology use strengthens ICT effect. The adoption of technology is likely to be slow in the case where technology requires complex new skills and is expensive to implement and time-consuming (Long, Blok & Coninx, 2016). To face the rush of competition and to remain in existence, organisations need to change their strategies, processes, structure, and culture (Keong & Dastane, 2019). Choosing the right model of a planned change is of the utmost importance to ensure that the process of changing takes place without any interruption and the strategic goals of the changes are met (Igbaria & Tan, 1997).

Many studies examined the impact of Information Technology on organisations' services and performance (e.g. Beckey, Elliot, & Procket, 1996; McNutt, & Boland, 1999). Although most of these studies have suggested that IT plays a vital role in improving the quality and quantity of information, its potential for adoption and innovation is often uncertain (Mano, 2009). Firms allocate their resources differently in a way that maximises their objectives, and those firms that allocate more resources on IT perform better than those firms that allocate fewer resources

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(McAfee & Brynjolfsson, 2008). Appropriate and sufficient IT infrastructure supported by effective IT management is pre-requisite for achieving high performance. Information technology plays critical role in several core business functions as well as operations along with businesses' products and services. IT and related aspects attributes to more than 50% of organizations spending lately, however, effective management of such huge investment results in key factor of importance for organizations effectiveness and efficiency. It has been observed that poor alignment of IT with business resulted in failure of desired outcome of IT related investments in the past. Studies in the developed world have attested that given the proper infrastructure, IT can be an enabler for socio-economic development. Examples given from the developed world where significant IT investments have had major impacts include increasing the United States gross domestic product (GDP) by 7.8%, the UK by 8.0%, Singapore by 8.3% and Australia by 8.4% (Kamel & Rateb, 2009).

In the Malaysian context, the research has been done on ICT Adoption in Small and Medium Enterprises (e.g. Haba & Dastane, 2018; Tham, Dastane, Johari & Ismail, 2019). Besides this, Relationship between information technology acceptance and organisational agility (Zain, Rose, Abdullah & Masrom, 2005). Also, Adoption of the internet in Malaysian SMEs", Journal of Small Business and Enterprise Development (Alam, 2009). Despite the existence of these studies, very little attention has been given on how the adoption and incorporation of modern technology impacts an organisations' productivity suggesting that the impact of technology adoption on an organisations' productivity has not received adequate research attention in Malaysia. Thus, there is a significant gap in the relevant literature, which has to be covered by this research. Nowadays, many businesses have little understanding about what they are trying to achieve through technologies they adopt and never get the picture of the expected value. Analyses have shown that causes of low productivity in an organisation are highly measured by the use of incompetent technologies (Peslak, 2005). Technology changes at a fast pace and if the employees are working with old tools and methods, they will not be as effective as they could be (Deal, 2007). Malaysia needs to accelerate the adoption of digital technology to spur economic growth and bring more benefits, especially as the pace of digitalisation picks up around the world. To face the rush of competition and to remain in existence, organisations need to change their strategies, processes, structure, and culture (Keong & Dastane, 2019).

Therefore, this paper aims to investigate the impact of technology adoption factors such as technological change, IT infrastructure, and IT knowledge management on organisation productivity. The corresponding research questions are, does technology change impacts organisation productivity? IT infrastructure impacts organisation productivity? IT knowledge management impacts organisation productivity?

2. Literature Review

2.1. Review of Key Concepts

Technology adoption: The availability of new technologies does not automatically lead to development. Technologies must be adopted, and the adoption of technology occurs in the case where it is useful to the people and industries who adopt them. When the new technology is widely diffused and used, only then the contribution of new technology to economic growth can be noticed (Stoneman, 2001). The adoption of new technology is characterised by unpredictability over future profit areas and irreversibility that creates some fall costs (Dixit, Dixit & Pindyck, 1994). The speed of adoption accelerates when technology advances, as more people get familiar with it (Mansfield, 1961). Organisation productivity: Organisation Productivity can be stated as a ratio to measure an organisation's capability to convert input resources (labour, materials, machines, etc.) into goods and services. To remain competitive in this environment, the ability of companies to enhance the productivity of their resources is important (Amacha & Dastane, 2017; Jallow & Dastane, 2016). The measurement of productivity is used as a key tool by organisations to establish functional accountability, define responsibilities, monitor and evaluate activities, link the key organisational processes, set up the targets, and initiate necessary changes to ensure continuous improvement (Amah & Ahiauzu, 2013).

Technological change: The development and innovation in technology results in a change termed as technological change. This is the process which starts with invention then followed by innovation and lastly diffusion of technology. Such change can be defined as "the introduction of new tools, facilities, services and new technical procedures". According to some scholars, the outcome of innovation is referred to as technological change. In other words, the action that leads to technological change is innovation (Gerstenfeld, 1979; Myers & Marquis, 1969). In operational terms, change in productivity caused by changes in the input is described as technological change (Bell & Pavitt, 1993). Technological change is a switch in the production function (Rosenberg, 1963). To an organisation, technological change is defined as "the change in industrial techniques". IT Knowledge Management: Knowledge management is defined as the organised arrangement of a company's knowledge

resources for meeting business requirements and creating value. It is composed of the various policies and structure that strengthen the development of knowledge. The process of gaining, sharing and productively using knowledge is defined as Knowledge management (Davenport, 1994). Knowledge management encourages a combined strategy to identify, evaluate, and share all of a company's knowledge resources. The organisation's databases, policies, and experience in individual workers are included in the knowledge assets. Information technology and the desire to put the new technology (the Internet) to work and find its effectiveness, was the driving force behind Knowledge management. After a few years, it became recognised that only integrating new technology was not functional enough to facilitate knowledge sharing. It was apparent that human and cultural factors are required to be included.

IT Infrastructure: In the information technology (IT) context, the hardware, software, network resources, data centres, facilities and associated resources required for the operation and management of an IT enterprise is referred to as IT Infrastructure. Through the IT Infrastructure, an organisation can deliver IT services to its employees, customers and partners (Broadbent, Weill & Clair, 1999). It can be deployed internally in an enterprise within owned facilities or within cloud management, or a fusion of both. All the components that play an important part in overall IT and operations form the IT infrastructure (Broadbent et al., 1999). The business operations and IT or business solutions require the IT infrastructure to function properly. According to Gartner, IT infrastructure is all the components that support the IT processes and business systems delivery. The term IT infrastructure includes Information Technology. However, it does not include the associated People and processes. Infrastructure is the base on which a system or an organisation is supported (McKay & Brockway, 1989). In computing, the physical and virtual resources that help to manage and process data, form the information technology infrastructure.

2.2. Hypotheses Development and Conceptual Framework

Technology is developing with blinding speed and is becoming the principal instrument for meeting the concern of improved productivity for all organisations, both public and private. An organisation should be able to compete within the industry and with other competitors in the international sector to succeed. Business processes are the day to day operations of an organisation. They can be seen through the sales requests, work approvals, and financial reports that must be completed as workflows through the organisation. These processes can be ingrained into the culture of the company, and have a significant impact on how the organisation does business. While changes to business processes can be difficult to implement, they may be necessary to take advantage of the information technology available to the organisation. Looking at the significance of innovation and modernisation in today's times, an organisation must acquire this culture (Al-Nashmi & Amer, 2014; Bougrain & Haudeville, 2003). Technological innovation capability has an extensive impact on the company's performance (Haba & Dastane, 2019). According to Galende and Fuente (2003), business resources, enterprise resources and intentions are influenced by technological innovation. It affects the business, suppliers and customers as they observe flexibility, transformation, productivity and relatively higher speed (Kelly & Kranzberg, 1978). Hence the first hypothesis formulated is as follows:

H1: Technological Change has a significant positive impact on Organisation Productivity

The superior organisations in today's knowledge-based economy age are dependent on their knowledge-based capital to sustain and to get through with the changes (Choi, Poon, & Davis, 2008). Therefore, for various organisations, the Knowledge Management implementation has become the most probable resource to boost Organisational Performance (Haas & Hansen, 2005). The improvement of the process of acquisition, incorporation and utilisation of knowledge is the most important goal of knowledge management (Heisig, 2009). Knowledge Management is a process that helps to enhance organisational performance and achieve the organisation goals through creating, acquiring, organising and utilising knowledge (Bhatti, Zaheer, & Rehman, 2011). According to Beccera-Fernandez and Sabherwal (2015), the below mentioned four forces lead to knowledge management in today's dynamic economy. Increasing Domain Complexity: The knowledge required to complete a particular business task becomes more complex. Accelerating Market instability: Rate of change in market trends has increased significantly over the years to the extent that market changes may happen overnight. Employee Turnover: Employee mobility is even greater than before, thus leaving organisations with major challenges of maintaining their intellectual capital (Beccera-Fernandez & Sabherwal, 2015). Intensified Speed of Responsiveness: Decision-makers are now given much less time to respond to the market changes otherwise risk losing business opportunities. Based on the four forces, it can be deduced that the competitive nature of the marketplaces is putting pressures on organisations to undertake personnel reduction that may result in risking their business knowledge. Personnel reduction creates a need to replace tacit knowledge (informal, people intellect)

with explicit knowledge (formal, stored knowledge) otherwise organisations will end up losing a significant amount of their knowledge as most of the organisational knowledge is in the form of informal knowledge. This contributes in formulation of second hypothesis as below:

H2: IT Knowledge Management has a significant positive impact on Organisation Productivity

As IT systems and application packages become increasingly diversified and multi-media based, a key challenge IT managers face today is maintaining an IT infrastructure that is capable of supporting not only what the organisation is doing but also the changing business needs. Very often, IT application projects failed or were significantly delayed because the needed two infrastructures were not in place. This is particularly the case in companies' that strive to deploy electronic business applications. Many organisations found that IT infrastructure today is more often an inhibitor of change than an enabler (Broadbent et al., 1999). As a result, IT infrastructure becomes an increasingly important factor that affects organisation competitiveness (Weill & Broadbent, 1998). The importance of this issue is evidenced by a survey of top information systems (IS) executives who ranked building a responsive IT infrastructure as the most important IS management issue (Brancheau, Janz & Wetherbe, 1996). Many businesses are affected because of IT infrastructure issues (Gorrio, 2000). The most difficult challenge that is faced by IT managers is sustaining an IT infrastructure that is efficient enough to support what the organisation is doing and the evolving business requirements, due to the increased diversification in IT systems and application packages. The required infrastructure being not in place has been the reason for delay and failure in most IT application projects. As a result, IT infrastructure has become the most important aspect by which the organisation competitiveness is affected (Al-Nashmi & Amer, 2014; Weill & Broadbent, 1998). According to McKay and Brockway (1989), the base foundation of information technology future upon which the operation depends is referred to as IT infrastructure. IT infrastructure is the technological configuration that supports the enterprise to fulfil operation and administration needs Earl (1989). So the third hypothesis is formulated as below:

H3: IT Infrastructure has a significant positive impact on Organisation Productivity

From a theoretical perspective, few pieces of research focused on the impact of information technology on productivity, such as Hooi and Ngui (2014), Another research (Alam & Noor, 2009) examines factors of ICT adoption such perceived benefits, perceived cost, ICT knowledge, external pressure and government support. Zain et al. (2005) researched to examine the relationship between information technology acceptance and organisational agility in Malaysia. Until today, among the studies which have been carried out in Malaysia, very little attention has been given on how the adoption and incorporation of modern technology impacts an organisations' productivity. This means that the impact of technology adoption on an organisations' productivity has not received adequate research attention in Malaysia. Thus, there is a significant gap in the relevant literature in Malaysia. As for that, this study is the extension of what has been studied by previous researchers to further narrowing the gap.

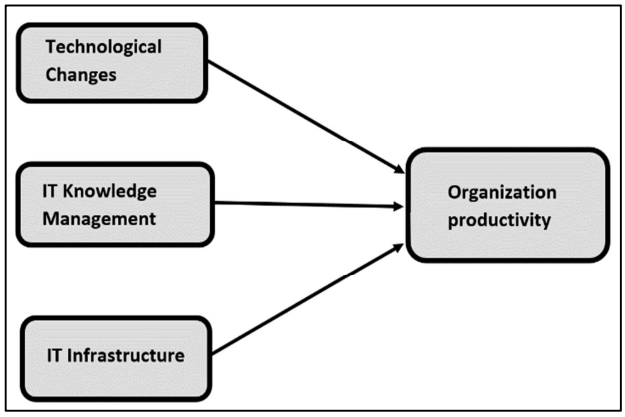

Figure 1: Conceptual Framework

3. Research Methodology

The Positivism research approach, along with the explanatory design, is adopted for this research as the research progress is through hypothesis using quantitative techniques. Primary data is used with the quantitative research method, and the data is collected through a structured survey questionnaire, further tested and analysed statistically (e.g. Oluwafemi & Dastane, 2016).

The survey questionnaire was circulated to respondents electronically through internet and traditional hard copy. For electronic distribution, google form is used, and the survey data is stored. All participants' identities are kept confidential in this study. For the survey distribution, the participant information sheet and participant consent form are attached to make known the purpose of the research and to obtain the consent from the participants. The questionnaire consists of 2 parts. Part 1 consists of questions meant to gather information about the profile of

the respondent. This section covers demographic data such as age, gender, education, occupation, and income. Part 2 seeks to measure items that are related to independent variable (IT adoption) with its dimensions. The survey questions were designed base on four variables; technological change, IT knowledge management, IT infrastructure and organisation productivity. All items have been evaluated on a 7-Point Likert. The scale below is an example that shows the measurement used in the designated instrument using a score from 1 to 7 (Sekaran & Roger, 2003). The layout of the Questionnaire: Respondent's profile (5 items), Technological Change (8 items), IT Knowledge Management (8 items), IT Infrastructure (11 items), Organisation Productivity (8 items).

Target population group is selected based on the position of managerial level or above from companies in Malaysia who is Malaysian with age of 18 years old and above (Stated by Direct Sales Act 1993 as the legal age to join) regardless of gender, race, part-time or full-time. This target population group is the correct group as they understand and comprehend the nature and structure of IT organisations and their environment. The survey was targeted towards IT managers or those at a senior executive level and above including the employees from the production team, service team & other teams of an organisation. The sample size of 300 is selected for this research. For the sample size in this research, the rule-of-five technique for sample selection is adopted (36 items multiply with 5) that is a minimum of 180 samples which fit as sampling population. Besides, as the data is to be analysed using IBM SPSS AMOS 22, the minimum sample requirement is 200. The decided sample size exceeds both of these requirements and so will suffice for the analysis. Snowball sampling is a non-probability sampling technique where subjects are selected through networking (Ilker Etikan, Musa & Alkassim, 2016). The relative cost and time required to carry out a snowball sample are small in comparison to probability sampling techniques. This enables the researcher to achieve the sample size required in a relatively fast and inexpensive way.

After data collection, various statistical methods will be used to determine the relationship between variables via the Statistical Package for Social Science (SPSS). The data analysis plan in this research covers descriptive analysis, normality analysis, reliability test utilising SPSS 22. Confirmatory Factory Analysis (CFA) and variance analysis were obtained in the subsequent stage. To determine the overall fit of the measurement model, Structural Equation Model (SEM) was developed using AMOS 22 with maximum likelihood estimation to assess the internal consistency, convergent validity and discriminant validity.

4. Analysis and Findings

4.1. Demographics Analysis

A total of 350 questionnaires was handed out via email; however, 300 responded to the survey. This means that the response rate was 85.71%. This is an impressive response rate given that according to Oliver (2010), a 60% response rate is good enough for a research study. Amongst the 300 correspondents, 65% were male, while 35% were female. This indicates a sufficient gender distribution enabling the researcher to obtain a balanced opinion between male and female respondents. The collected set of data has proven to be practical and valid by going through a series of tests such as normality test, reliability test, CFA and SEM model fit, and the testing of data that emerged with outcome that is in an acceptable range.

4.2. Normality Assessment

The normality of error terms is a basic assumption of the linear regression model. Statistically, two numerical measures of shape – skewness and excess kurtosis – are used to test for normality. For the data collected for this research, overall normality assessment is good where most of the values were within the rule of thumb (-1 to +1) (Bee, 2011; Nornadiah, 2011). However, there are a few questions where the value is above the agreed rules for Skewness and Kurtosis, which can be accepted as further validity assessment tests will be conducted after performing confirmatory factor analysis.

4.3. Reliability Assessment

According to DeVellis (1991), from the viewpoint of data consistency, Cronbach's alpha scoring of 0.7 is regarded as unacceptable, questionable or poor and scoring of 0.9 or above is deemed to be excellent. The questionnaire has a total of 35 questions, including eight items for measuring technology change, eight items for IT knowledge management, 11 items for IT infrastructure and eight items for organisational productivity. Reliability assessment has resulted in Cronbach's alpha value for each variable as 0.928 for technology change, 0.903 for IT knowledge management, 0.921 for IT infrastructure and 0.919 for organisation productivity. All the variables have met the minimum coefficient values, and the overall average for the reliability test is achieved as it averaged up to 0.970 (DeVellis, 1991). From the observation of the overall Cronbach's alpha scoring of 0.970 from the 35, it indicates exceptionally high reliability and internal consistency in reflecting our scale.

4.4. Confirmatory Factor Analysis

CFA relies on several statistical tests to determine the adequacy of model fit to the data. The chi-square test indicates the amount of difference between expected and observed covariance matrices. A chi-square value close to zero indicates little difference between the expected and observed covariance matrices. Besides, the probability level must be greater than 0.05 when chi-square is close to zero. In CFA, several statistical tests are used to determine how well the model fits the data. A good fit between the model and the data does not mean that the model is "correct", or even that it explains a large proportion of the covariance. A "good model fit" only indicates that the model is plausible.

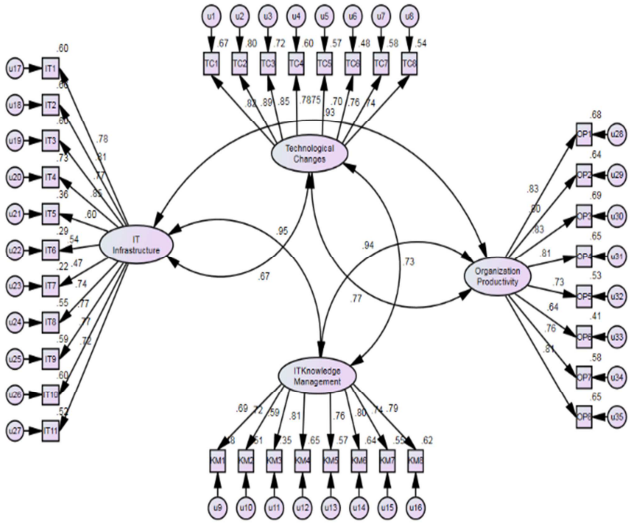

Figure 2: Confirmatory Factor Analysis

Though several varying opinions exist, Kline and Rosenberg (2010) recommends reporting the Chi-squared test, the Root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardised root means square residual (SRMR). For this measurement model, the P-value was recorded as 0.00, which shows that the validity of the research data is fit and confirmed. The comparative Fit Index (CFI) value should be more than 0.90 (Hu & Bentler, 1999) and value returned for this research is not acceptable as it is 0.757. For the Root Mean Square Error of Approximation (RMSEA), the value less than 0.05 is considered good, and value between 0.05 and 0.08 is considered moderate. For this research, the RMSEA value is 0.118, which means the value is not acceptable. To have a good and acceptable Parsimonious fit, the value must be less than 5. For this research, the Chisq/DF outcome is 5.133. This means there are some issues with the validity of data collected. The proposed conceptual model was assessed and done by using the same set of data. According to an argument by Anderson and Gerbing (1998), the confirmation of the multiple-item construct measure's accuracy must be done with CFA before testing the hypothesis. The specification of the observed measure's relations to their posited underlying constructs is done with AMOS 22 as it allows the constructs the freedom of inter-correlation (Chin, 1998). To reflect a more accurate resultant scale accuracy and an acceptable fit, the elimination process was done in the validation of initial specification, items below the recommended 0.5 value were eliminated — the result of modified CFA path diagram as shown in Figure 3.

4.5. Modified Confirmatory Factor Analysis

Due to some issues with the first Confirmatory Factor analysis, researcher re-ran the regression, and upon eliminating the irrelevant data, a modified Confirmatory Factor Analysis was performed. As Horst Müller says, a rule of thumb is to remove item loadings above 0.40 always, and above 0.707 only when it improves the Average Variance Extracted (AVE). If AVE decreases, the item should be maintained. AVE is a measure of the amount of variance that is captured by a construct with the amount of variance due to measurement error. The first round of data regression noticed a few questions that were redundant and with low factor loading. The researcher removed items one at a time, using empirical information (item loading strength, cross-loadings, etc.) and rational decision-making (when out of two items, one is very similarly worded to another item, remove this item first as its wording is redundant). After removing one item, researcher re-runs the analysis on the remaining items as the loadings and other parameters will be different after removing an item. The researcher then tested this model using CFA on the second sample. Upon removing the impacted questions, from the technological change variable (TC1, TC2, TC7, TC8), from the IT knowledge management variable (KM1, KM3, KM5, KM7), from the IT Infrastructure variable (IT1, IT4, IT5, IT6, IT7, IT8, IT10, IT11), and the Organisation productivity variable (OP1, OP2, OP4, OP6), the factor loadings met the rule of thumb which is 0.7 and above (Hair et al., 2014). Upon performing the modification, the loading factors results improved further. Chi-square value over degree of freedom value between 1 and 3 (X^2/df), CFI (Comparative Fit Index), GFI (the Goodness-of-fit Index), IFI (Incremental Fit Index) of 0.9 equivalent or greater, and finally the equivalent value of 0.08 or lesser of the Root Mean Square Error of Approximation (RMSEA) value were used to specify the acceptable model fit. After modification, the Chisq remained 0, RMSEA dropped to 0.081 from 0.118, CFI increased from 0.757 to 0.946 and Chisq/DF

dropped from 5.133 to 2.947, which means overall the data collected is fit. The conclusion can be drawn that the final overall model fit assessment values are within the statistical recommendation based on the observation of overall data that fits the model within reason (CFA model fit results). All indicators depict an acceptable fit for the dataset of the measurement model. A scoring of 2.947 for Chi-square value over degree-of-freedom, 0.900 (GFI), 0.946 (CFI), 0.946 (IFI), 0.932 (TLI), and 0.079 (RMSEA) are shown in the measurement model. This study proceeds to the testing of the hypothesis as the CFA measurement of model fit values was presumed acceptable.

4.6. Correlation Analysis

Based on the result, the correlation coefficient (r) of each variable is as follows: (FR r = .465 mean Strong positive relationship; PR r = .392 mean Moderate positive relationship; CR r = .580 mean Strong positive relationship; NDR r = .562 mean Strong positive relationship; RPR r = .690 mean Strong positive relationship). On top of the significant value of 0.000 for all variables, the affiliation among the five variables and online shopping behavior is significant. The correlation coefficient of all variables is between the minimum value of +0.392 and the maximum value of +0.690, indicating that the strong point of the affiliation among the independent variable and the dependent variable is from moderate to strong, demonstrating the variables that perceive risk have a positive and significant relationship with online shopping behavior.

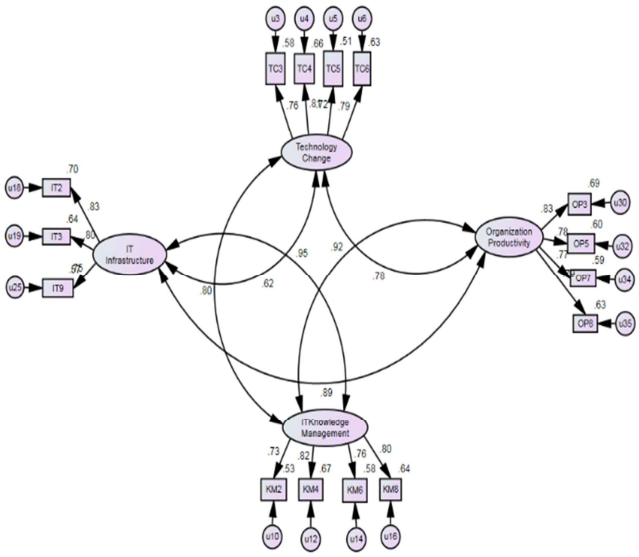

Figure 3: Modified Confirmatory Factor Analysis

4.7. Divergent Validity

Factor loadings of each item are listed in Table1. As all the factor loadings are above 0.5, the measurement model is said to have divergent validity.

Table 1: Divergent Validity

	Technology Change	IT Infrastructure	IT Knowledge Management	Organisation Productivity
TC3	0.764			
TC4	0.813			
TC5	0.715			
TC6	0.794			
IT2		0.755		
IT3		0.803		
IT9		0.835		
KM2			0.801	
KM4			0.762	
KM6			0.818	
KM8			0.730	
OP3				0.829
OP5				0.776
OP7				0.769
OP8				0.791

4.8. Convergent Validity

Table 2 displays factors, items, factor loading, compostire reliability (CR) and Average Variance Extracted (AVE) figures. The convergent validity for the measurement model is achieved when all values of AVE exceed 0.50. The composite reliability is achieved when all CR values exceed 0.60.

Table 2: Convergent Validity

Factors	Item	Factor Loading	CR	AVE
Technological Change	TC3	0.764	0.855	0.596
	TC4	0.813		
	TC5	0.715		
	TC6	0.794		
IT Infrastructure	IT2	0.755	0.840	0.637
	IT3	0.803		
	IT9	0.835		
IT Knowledge Management	KM2	0.801	0.860	0.606
	KM4	0.762		
	KM6	0.818		

	KM8	0.730		
Organizational Productivity	OP3	0.829	0.870	0.626
	OP5	0.776		
	OP7	0.769		
	OP8	0.791		

4.9. Structural Equation Modelling

The test of reliability, convergent validity and discriminant validity were met for the model's measurement quality.

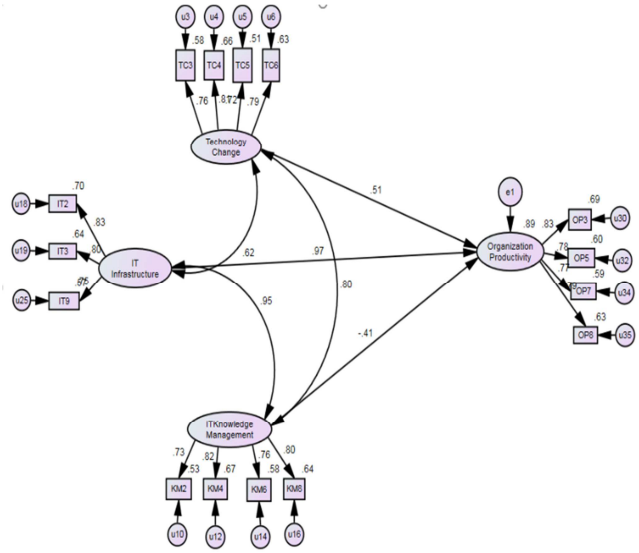

Figure 4: Structural Equation Modelling

The conduct of this study indicates that the measurement model suffices to test the path coefficients in determining the developed relationship of the model (Gerbing & Anderson, 1992). The figure 4 was developed with AMOS version 22 in the research testing and calculation of the structural model. The structural model testing of this research was done by AMOS version 22 in Figure 4. The model is deemed to be in the acceptable range of goodness-of-fit with the model fit results. The following results of CMIN/DF value <3; RMSEA value ≤0.080; GFI, TLI and CFI value≥0.90 indicates that the model fit is acceptable. CMIN/DF (2.947), GFI (0.900), CFI (0.946), IFI (0.946), TLI (0.932) and RMSEA (0.079) were the test result of the study. The achievement of the threshold is suggested with the results being in the acceptable range (Bentler, 1990), it implies that the model is well converged and the SEM model is in an acceptable level fitting to the data and data structure that is collected and gathered in a Malaysian setting. The investigation of the construct exhibits the direct effects amongst the constructs as can be seen in the parameter estimates of the structural model. Significant relationships among the latent constructs are shown based on the significant coefficients from the output revealed above

4.10. Hypotheses Testing

H1: Technological Change has a significant positive impact on Organisation Productivity

There is a significant relationship between technological change and organisation productivity (refer to Table 3). The value of the Pearson correlation coefficient (r) is 0.51 (p-value ≤ 0.001), which renders the relationship to be a moderate positive correlation. This explains that if the level of information technology innovation in organisations is high, the organisation productivity will be positively enhanced and improved. The management is aware that the core of IT adoption is information technology innovation, which leads to improving organisation productivity. These findings are in parallel with the research conducted by Manual (2005), who defines innovation to be an activity that produces new or notably improved goods (products or services), processes, marketing methods or business organisation. In this framework, according to the Frascati Manual, technological innovations comprise new or significantly modified technological products and processes, where technological novelty emerges from their performance characteristics. According to Dibrell, Davis and Craig, (2008) the present businesses environments are integrated with the concept of IT innovation. Information technology concepts should be associated with innovation so that investments in innovation activities can be optimised. Camison-Zomoza, Lapiedra-Alcami and Boronat-Navarro (2004) argues product innovation reflects the change in the product or service offered by the organisation, whereas process IT innovation represents changes in the way organisations manufacture their products or services. Information technology has been regarded as a sophisticated and competitive tool for gaining competitive advantage in the present business environment.

H2: IT Knowledge Management has a significant positive impact on Organisation Productivity

There is a significant relationship between knowledge management and organisation productivity (refer to Table 3). The value of the Pearson correlation coefficient (r) is -0.41 (p-value ≤ 0.001), which renders the relationship to be a negative correlation. This explains that if the level of IT knowledge management applied in Malaysian organisations is high, the productivity of these organisations will be

decreased. IT knowledge management is related to both strategies and practices used in an organisation to identify and enable the adoption of IT. Nowadays, there is a lot of issues with knowledge management in several different organisations and one of the main issues is the lack of expert human resources. Explicit knowledge is derived from tacit knowledge captured by experts and so knowledge management is more of a people-centric. In addition, departments are resistant to dealing with complex systems frequently. The majority of respondents said that the lack of connection of departmental systems between the different departments within the organisation is a major issue. A good portion of respondents affirmed that departmental system interaction could mitigate those issues if not eliminate them; thus, it can improve inter-departmental decision-making process significantly. The lack of documentation of some of the business processes within departments may also add to the issues and there is a lack of knowledge in some specialisation areas within departments. Probably, the worse issue of all is the fact that the concept of knowledge management is unknown to many organisations especially the SMEs (Bougrain & Haudeville, 2003). All those factors may add up to cause inconsistency in decision-making quality within organisations. These conclusions are not in line with the research conducted by Chang and Gurbaxani (2012), who have examined the impact of IT outsourcing on the productivity of firms that choose this mode of services delivery, focusing on the role of IT-related knowledge. He demonstrates that IT outsourcing does lead to productivity gains for firms that select this mode of service delivery. In the same context, López, Peonfound that IT competency has a direct effect on the processes of knowledge management.

H3: IT Infrastructure has a significant positive impact on Organisation Productivity

The results of this section indicate that there is a significant relationship between IT infrastructure and organisation productivity (refer to Table 3). The value of the Pearson correlation coefficient (r) is 0.97, (p-value $\leq$ 0.001), which renders the relationship to be a moderate positive correlation. This explains that if IT Infrastructure in an organisation is high, employee productivity will be positively enhanced and improved. This explains that the results gathered from analysing the responses of respondents for this section support the fact that IT infrastructure plays a vital role in enhancing employee productivity in organisations. This conclusion is similar to the findings of the research conducted by Jenkins (2006) when he concludes that success comes when employees are empowered to improve their workflow and. The social change that was introduced by the new IT infrastructure has a dual effect of greater efficiency and cost reductions. In general, based on the overall hypothesis testing and findings, out of the three proposed hypothesis, the exceptional one is the IT Knowledge management which indicates a negative impact on Organisation productivity. Other two hypothesis are supported namely Technological change and IT Infrastructure, which produce significant positive impacts on Organisation productivity.

Table 3: Hypotheses Testing Result

Hypotheses				Estimate	P	Decision
H1	Organisation Productivity	<---	Technological Changes	0.51	***	Accepted
H2	Organisation Productivity	<---	IT Knowledge Management	- 0.41	***	Rejected
H3	Organisation Productivity	<---	IT Infrastructure	0.97	***	Accepted

5. Conclusion

The study concludes that all three selected factors of technological change, i.e. technological change, IT infrastructure, and IT knowledge management impacts significantly on organisational productivity. Among the three, the first two factors of technological change, IT infrastructure impacts positively on organisation productivity. As both of these factors has a strong impact on organisational productivity, the later has the strongest impact on all three. IT knowledge management displayed negative impact on organisational productivity; however, the impact is not as strong as the other two. Based on the above findings, the following recommendations are apparent. It is suggested that companies should keep IT infrastructure up to date in order to achieve good productivity. Technological change is also instrumental and do companies should not shy away from bringing changes whenever required. In terms of knowledge management, further research is suggested in future on its negative impact on organisational productivity.

Theoretically, the study fills up a research gap by providing measurement and structural model of the impact of technology adoption on organizational productivity. The study also highlights the extent to which such impact exists. In terms of managerial implications, the study contributes in several ways. Managers can relate the organizational productivity related issues to the adoption of technology and such issues can be resolved by analyzing organizations IT infrastructure and knowledge management. It also has implications on the decision making related to investment on upgradation of IT infrastructure in the organization.

Nevertheless, the study has several limitations like any other study. Firstly, the study is conducted in limited region of Malaysia by using snowball sampling and these results in limiting the study from generalizing it to entire Malaysia or other countries for that matter. Secondly, organizational productivity is the outcome of several factors and so the when it comes the research framework, one has to agree that there can be few control variables resulting in possibilities of different conclusions. For example, different conclusions can be drawn based on company history and industry. Hence, modelling the impact on organizational productivity cannot be just based on selected three factors of technological adoption. Lastly, the research has limitations in terms of measuring productivity based on employees 'observation as well as perception.

For future research, it is suggested to measure productivity based on realistic data from project managers such as project completion time, workforce utilization etc. it is suggested to add in mediating variables or more variables which might influence the organization productivity of companies in Malaysia, with further analysis on industrial composition, capital-labor ratio, research and development spending, employee productivity and other managerial, personal, and administrative factors. Most companies tend to invest in IT for increasing the share of capital investment. It is important to understand how these investments generate more revenues, and this can happen by stimulating employee productivity. In addition, for future research the researcher proposes to adopt a qualitative method which may bring about new outcomes (See. Dastane & Lee, 2016). Extending the study's population in order to embrace more entities, future studies can also include profit and non-profit organizations. The reason behind this extension is to improve the significance of the research's conclusions and to compare the impact IT adoption could contribute on the organization productivity in different sectors.

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