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Malaysian SME employees accelerating into digital procurement usage during COVID-19 pandemic

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Abstract: The COVID-19 pandemic is a wake-up call to businesses that were slow to adopt digital initiatives. This paper discusses Malaysian SMEs using digital procurement and the challenges posed by the COVID-19 outbreak to the SMEs. This paper examined the way employees behaved in conjunction with the digital procurement environment. Henceforth, this paper also examines how the Malaysian Government and the private sector are working together to address the procurement challenges. Hence, Malaysia is among the few countries that have introduced digital procurement to improve the economic well-being of local small and medium enterprises (SMEs) that have ventured into the digital economy. The benefit of this study is that the digital economy will help support long-term growth and generate jobs for SMEs in developing countries. This paper offers some recommendations to improve the Malaysian procurement system and outline an agenda for future research.

Keywords: digital procurement; digital economy; COVID-19 pandemic.

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1 Introduction

In the COVID-19 pandemic era, lockdown, and movement control (MCO) were implemented in every nation around the world. Prior to the pandemic, the Malaysian Government had laid a solid foundation for accelerating digital procurement to replace

the manual procurement process. The digital procurement platform helps small and medium enterprise (SME) employees to link up with government agencies to boost the digital economy in the country. Hence, digital procurement provides a robust stage for healthy competition to pull in the best suppliers to expand the digital economy in developing countries such as Malaysia.

Thus, considering the potential benefits of digital procurement, it would be interesting to focus on the employee perception of using digital procurement in the SME context. Based on prior studies, the continuous and common concern is the underutilisation of digital procurement in developing countries. The idea of digital procurement was quite new to SME employees at the introduction. At first, digital procurement acceptance was low, but even after some time of usage, there are SME employees inactive using digital procurement. They are slower to accept digital procurement and have an elevated level of resistance to new practices (Jahanmir and Cavadas, 2018). Digital procurement success lies in finding the essential needs of the SME employees and focusing on them.

Digital procurement in Malaysia is a fully end-to-end procurement cycle. Hence, the Malaysian Government considers the manual paper-based procurement process as slow because it takes on average four months to complete the whole procurement process. Therefore, the introduction of digital procurement has improved the service quality and sped up the procurement process. The introduction of digital procurement allows SME employees to search for open tender and send tender online. This promotes transparency as most of the government tenders are disclosed in government websites (Ngatman et al., 2020).

There are efforts from the Malaysian Government to popularise digital economy usage among SME employees. Nonetheless, many SME employees still perceive digital procurement as infeasible although it has been introduced as early as the year 2000. Thus, even though the government has taken various efforts to encourage the use of digital procurement, its practice among Malaysians is still at a disappointing level. This is due to some users being unaware of the advantage (performance expectancy) of using digital procurement as a medium of interaction with public agencies to improve their business process and to expand into the new market (Husin et al., 2019).

Even though Malaysia's Government has implemented various technical aspects to facilitate online transactions, some constraints hinder the use of the digital economy (Minai et al., 2021). Nevertheless, some private companies are not equipped with the basic or pre-requisite aspects to be digital procurement enabled. Thus, the lack of IT infrastructure and skill amongst the users hinder the progress of digital procurement. The Malaysian Government is designing a tender system with a secure network (or secure transaction) to ensure a transparent environment. Besides, the government procurement policy sets up a detailed and transparent mechanism to evaluate and select the best possible tenders (Din and Jamaluddin, 2020).

2 Literature review

The adoption of digital procurement merged into an interesting topic to explore as the study of the digital economy in developing countries is slower as the majority of the past studies in e-government were concentrated in developed countries. The reason is that e-government execution in developing countries was abandoned soon after implantation when major goals were not attained (Singh et al., 2020). Henceforth, Jacob and

Darmawan (2019) revealed that e-government adoption in developing countries is still not satisfactory.

Digital procurement is part of electronic government (e-government) and Malaysia was among the few countries introducing digital procurement through the e-government flagship to thrive in the digital economy (Razak et al., 2017). In digital procurement literature, numerous studies have found that perception affects employee adoption behaviour (Singh et al., 2020; Almukhlifi et al., 2019; Husin et al., 2019; Gascó et al., 2018; Mensah and Mi, 2018; Jacob and Dermawan, 2019; Carter et al., 2011; Parasuraman, 2000). Perception in using digital procurement is setup to discover individual interpretation on understanding the online procurement with their ability to see, hear and become aware of online technology through their senses (Ramkumar et al., 2019).

In addition, the influence of user perception on usage will cause digital procurement to either progress or become stagnant. Being stagnant will cause the digital procurement in Malaysia to remain in the initial stage. The gap in terms of understanding user perception is to understand the SME employees' perception, and not just merely measuring the adoption factor in an electronic environment (Husin et al., 2019). As compared to Singh et al. (2020), negative perception can cause user turn-off of e-government projects. In contrast, Mensah and Mi (2018) indicated the user perception positive toward ICT can encourage employee long-term usage.

To improve the explanatory and predictive power of this framework, several authors (Singh et al., 2020; Dwivedi et al., 2019; Jacob and Darmawan, 2019) combined unified technology acceptance and use of technology (UTAUT) with other acceptance and diffusion theories. This present study merged the UTAUT theory with theories such as DOI (compatible and trialability) and other theories that emphasise human perception such as TRA (social influence). This was deemed the future direction that must be taken by researchers to understand ICT usage. The combination of UTAUT with TAM, DOI, and TRA resulted in the proposed framework with direct measurement of perception (Singh et al., 2020).

The discussion of the past literature related to the models of this present study has revealed that there are gaps in the literature. Prior studies of digital procurement were mainly focused on developed countries. Specifically, 45% of past studies focused on the USA, 11% on the UK, 7% on Singapore, and 37% on the rest of the world in the 2001 to 2007 era (Osman et al., 2019). Husin et al. (2019) have indicated the need to explore further in developing countries like Malaysia as literature on digital procurement in such nations is very limited. In early 2000, the e-government service research was more active in developed nations compared to developing nations because governments in developing countries were still struggling with the immature adoption of other e-government applications such as public digital procurement.

Additionally, in Shuib et al. (2019), it has been indicated that developing countries such as Malaysia have been slower than anticipated in terms of digital procurement adoption compared with developed countries and the adoption in the developing countries greatly depends on public engagement. Another study has examined the change from traditional paper-based administration to online-based practices in Bangladesh and Oman and reported on the success of the change (Jacob and Darmawan, 2019). In a similar study, the focus was on the inspiration and solution that affected the awareness and adoption of e-government practice in Indonesia. The results indicated that extended

UTAUT using privacy and performance expectancy had a significant impact on the perception of using e-government.

2.1 Secure transaction mediate digital procurement

The Malaysia Ministry of Finance had successfully built-up digital procurement to accommodate government agencies and business organisations in the digital economy, but acceptance and usage of digital procurement remain poor. As a result, there is a need to study what holds back the automation of the traditional procurement model to digital procurement; in the paper, it can improve the coordination and all buying exercises using secure transactions as mediators.

Secure transaction refers to 'the procedure to safeguard authenticity, integrity, confidentiality and non-repudiation in transaction' (Din and Jamaluddin, 2020). Technologies such as public key infrastructure (PKI) that are considered as secure transactions are becoming well-known and have made it safer to conduct online business. The authors have indicated that secure transactions are still in their infancy in Malaysia.

Additionally, e-government services are often measured as a component of transparency (Almukhlifi et al., 2019). This is because the development of e-government has allowed the government to provide various stakeholders with relevant information and decision-making procedures. The study has revealed that e-government concerns the use of ICT for improving the availability and accessibility of public information and services to enhance the transparency of government organisations. However, digital procurement is also about secure transactions besides transparency.

A similar study from Din and Jamaluddin (2020) have also tended to focus on not just trusted electronic environments and that physical security is in place; it requires some form of secure transaction to ensure a transaction is not denial-able or what we call it non-repudiation. The findings revealed that a timestamp-based electronic transaction was more accurate. Login identification and password can be easily breached. As a solution, PKI is the latest technology with the capacity to safeguard authenticity, integrity, confidentiality and non-repudiation in transactions.

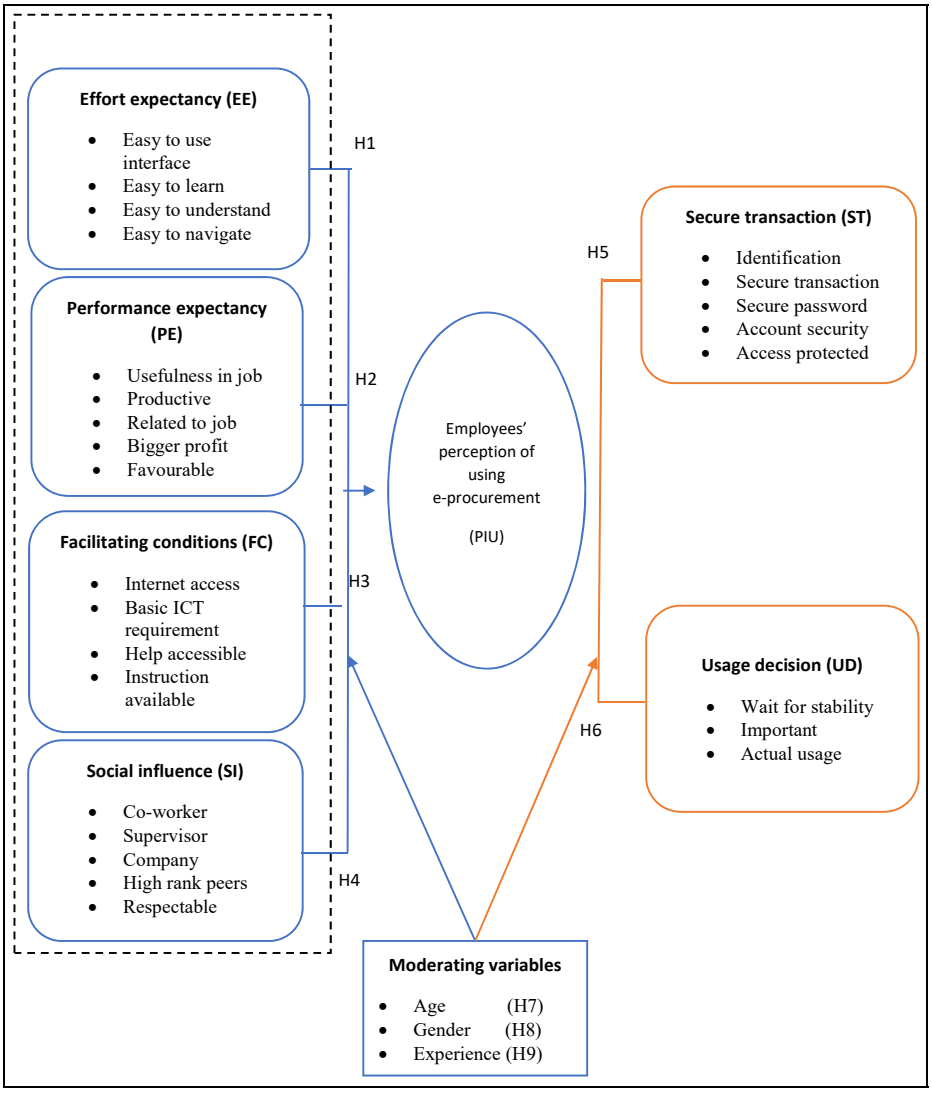
Moreover, secure transactions are also new to other nations embarking on digital procurement. The secure transaction identification cannot be easily faked by other users (Danquah and Kwabena-Adade, 2020). According to the authors, the secure transaction raised the concern of secure transactions among the users. The Malaysian Government is one of the first in the world to seriously start using secure transactions backed with a digital signature that enables undeniable transaction and time stamping for each e-business transaction (Kim, 2019).

According to Bralić et al. (2020), the advantage of digital signature helps to secure the transaction made with preserve of fidelity in every transaction. The password generation using ePXS token is secure as the password is authorised by Malaysia Certificate Authority (CA). According to Park (2019), both the SME employees and public buyer can use their own private key and public key use given by CA to authenticate the identity of both parties during an online transaction. The feature of a secure transaction authenticates the transaction as a legitimate online transaction without face-to-face interactions.

In terms of security purposes, the secure transaction incorporated inside the digital procurement security system will ensure user account security. The user is required to use the security token to log in to the digital procurement to authenticate and authorise the

user. According to Affia et al. (2020), this will minimise security threats to the user that performs electronic transactions and safeguard the SME employee while using digital procurement technology.

Figure 1 The research model and hypotheses (see online version for colours)



2.2 Formulating the research framework

This study's research framework, based on the UTAUT framework, is presented in Figure 1. New constructs, namely secure transaction and usage decisions were tested. These constructs were derived from studies that extended the UTAUT theory (Dwivedi et al., 2019; Jacob and Darmawan, 2019; Batara, 2017) to explain digital procurement usage. Three different theories were used in this study, i.e., the DOI framework (secure

transaction derived from the compatible dimension and usage decision derived from the testability dimension), TRA (social influence derived from the subjective norm dimension), and Davis acceptance model (effort expectancy derived from the perceived ease of use dimension and performance expectancy derived from the perceived usefulness dimension).

3 Theoretical frameworks

The UTAUT model is the most comprehensive theoretical framework at present as it captures all crucial positive and negative indicators of the eight earlier established models. This model covers the gap from earlier technology acceptance models. Hence, this study contributes to the available literature by filling the gap of past studies using the UTAUT framework by adding moderating variables secure transactions in the revised framework and enhancing transparency in digital procurement. It should be noted that UTAUT is considered a robust model in literature that ignores system security as considered in this study framework.

Furthermore, digital procurement in Malaysia is a complete system; however, there exist few constraints with the interface, as some of the SMEs users might be for the first time seeing digital procurement interface when some users do not have any experience with the online system such as online banking. The users might find it hard to understand the system. Hence, it takes time to learn and navigate around it. Apart from that, the users had to understand the benefits brought by the digital procurement to their business that is favourable on their continuous use intention (Yap et al., 2019).

The effort expectancy dimension is related to the struggle users' face when incorporating a technology (Sambasivan et al., 2010). The users' interest to use the system has a role when a company changes the method of enhancing the mental effort of users while interacting with the system. Ibrahim (2018) has revealed that users will not be able to make full use of any e-service if the employees are not aware of the value of digital procurement, as effort expectancy is associated with ease in using ICT.

The first hypothesis was concerned about the difficulties faced by users when using digital procurement technology, as presented in Figure 1. The dimension served as the predictor used to distinguish the perception of the user and additional effort required when using digital procurement. Past studies have shown a link among the two acceptance theories, mainly perceived ease of use in TAM (Davis, 1989) and complexity in the DOI model (Rogers, 2003).

Performance expectancy refers to the degree a user trusts that using digital procurement will enrich his or her job accomplishment (Ibrahim, 2018). It is also how much an individual trust that using digital procurement will improve the use of cloud computing in Malaysia (Ooi et al., 2018). This dimension is a crucial factor in the usage of technology, which includes digital procurement. Ibrahim (2018) has stated that this dimension is pertinent for individuals to adopt ICT innovations such as Web 2.0.

Consequently, performance expectancy will increase an individual's performance (Dwivedi et al., 2019). Thus, this dimension can improve the use of ICT by increasing users' expectations that such technologies will help them to accomplish their tasks more quickly and increase their job performance, like TAM's perceived usefulness construct. This is consistent with the theoretical arguments underlying UTAUT, whereby a direct and positive impact of performance expectancy on the intention to use and accept digital

procurement technology is anticipated as presented in Figure 1. As such, the following hypothesis was formulated.

Facilitating conditions is characterised as "the individual perception regarding the quality of the technology and expectation for a technical set-up to support the use of ICT applications" (Yeop et al., 2019). Therefore, facilitating conditions in the present study signified the SME employees' perception of support of digital procurement technology within the public procurement supply chain. Nevertheless, beyond the literature, facilitating conditions has many explanations, and it refers to the technical infrastructure in supporting digital procurement usage.

A sophisticated ICT infrastructure is a crucial factor in implementing ICT innovation. Basri et al. (2011) have implied that companies heavily relied on their IT facilities to do well in their e-commerce transactions. Private companies must hire staff, for developing the digital procurement portal and resolve technical issues. Besides, Basri et al. (2011) have revealed that company-implemented digital procurement in Malaysia relies less on facilitating conditions as all the third-party vendors have acted as the support for the digital procurement technology. Thus, good IT infrastructures are significantly contributing to digital procurement implementation.

In addition, Ibrahim's (2018) study has revealed that social influence significantly influenced use behaviour. This is because a co-worker suggesting the usage of ICT innovation could bring recognition among his or her peers. It is likely to influence the individual to accept acknowledgement from another person with a higher rank. Nonetheless, some users do not believe in the use of digital procurement, which is mostly because of their perception towards technology, for instance, due to lack of information and lack of peer recognition to use e-government (Khalil, 2011; Boyer-Wright and Kottemann, 2009; Kiiski and Pohjola, 2002).

Secure transaction denotes the excessive security for digital procurement transactions that can protect both the buyer and seller's interest and moderate the usage of procurement systems (Mohungoo et al., 2020). In other words, it refers to the security procedure that prevents an individual from denying that he or she has performed a specific online task (Cristobal et al., 2007). Technologies, such as digital signatures, are becoming well-known and making it safer to conduct online transactions. A digital signature is compatible with the existing digital procurement technology (Leong et al., 2020). The technology comprises a computerised mark for time-stamping and marking electronic records, and this record gives online authentication to buyers and sellers (Din and Jamaluddin, 2020).

Rathore and Panwar (2019) have shown that a secure transaction can prevent any user from denying his or her role in any electronic transaction. The digital signature feature ensures that the user cannot deny making a transaction or sending a message. Moreover, this security feature safeguards the acceptance of online government services. Following Lean et al.'s (2009) suggestion and support from past literature, digital signatures can encourage Malaysian citizens to use e-government technology.

This study intended to examine the mediating effects and moderating effect of gender on the relationships between four exogenous variables (effort expectancy, performance expectancy, social influence, facilitating conditions) and the endogenous variable (employees' perception of using digital procurement).

Many past studies have supported that gender moderates the UTUAT constructs (Ibrahim, 2018; Mensah and Mi, 2018; Mansi and Pandey, 2016; Venkatesh et al., 2014;

Alawadhi and Morris, 2008). For example, Mensah and Mi (2018) have shown that gender could affect the perception of users towards the usage of ICT due to the difference in the social-cultural roles of both sexes. In a similar study, Ibrahim (2018) has indicated that gender difference is promoted by cognitive factors linked to societal gender roles. In addition, Mansi and Pandey (2016) have confirmed that female procurement professionals possess more proactive behaviour in ICT usage.

3.1 Validation of instrument

The instrument for the constructs was developed based on past studies and was examined by experts to identify and fix any possible issue that may mislead the respondents and cause bias. According to Zikmund et al. (2012), a standard pre-test instrument such as face validity is required to ensure the correct wording is used. The purpose of performing face validity is to confirm that the content of the measure appears to reflect the content to be measured. Face validity is a simple determination test to quantify what it is expected to measure (Sekaran and Bougie, 2016).

The purpose of conducting face validity with academicians from different faculties and industry experts was to examine the questionnaire items. Besides, this also helped to detect possible grammatical errors, weaknesses, and flaws within the questions. According to Sekaran and Bougie (2016), face validity is the direct method to capture content validity. The academicians and field experts gave on average a positive level of satisfaction with the questionnaire, with a few suggestions to enhance the clarity of the questions.

3.2 Sampling procedures

The process of selecting the right audience from the entire population is known as sampling. In this study, sampling was performed because collecting data from every SME in Malaysia was not possible (Sekaran and Bougie, 2016). Sekaran and Bougie (2016) have suggested a research sample size of more than 30 (to meet the central limit theorem) and less than 500 as desirable for quantitative research. The authors have reported that a sample size of more than 500 will tend to have a type II error. Besides, Hair et al. (2017) have shown that an increase in specimen quantity will reduce the sampling error and cause an increase in statistical power. It is the same for smaller sample sizes, for example, a sample size of 50 or fewer than 30 will significantly cause a departure from normality. Hence, an ideal sample size should be more than 200 and below 500 respondents.

The target area for this study was Klang Valley, Malaysia. This area was selected due to the area's rapid expansion as a metropolis in Malaysia. This area is the commercial heart of the country renowned for having the largest pool of knowledge workers and learning specialists with a great number of higher education institutions. The state of Selangor has the highest number of registered digital procurement suppliers with experience in using digital procurement technology (32.16%), followed by Kuala Lumpur (13.40%) and Putrajaya (0.25%).

The selection of sampling areas in this study was attributed to SMEs that acted as the sellers of the digital economy in Malaysia. This represented 98.5% of the total business establishments, in which the remaining 1.5% (13,559 establishments) were large firms (DOSM, 2016). The majority of SMEs were from the service sector, i.e., 87.9%.

In short, the service sector accounts for most of the SMEs in Malaysia and discovering the factors involving the usage of digital procurement is essential for the nation's economic growth. Furthermore, statistics showed that the number of SMEs in Malaysia increased from 97.3% in 2012 to 98.5% in 2016. Therefore, this justified SMEs as the target sample population.

This research used the systematic sampling method. The chosen method is a proper procedure for selecting the subjects from a population. This sampling method involves drawing every n^{th} element in the population starting with a randomly chosen element.

3.3 Development of the research hypotheses

3.3.1 Development of the individual constructs

The items and scale that formed the constructs of this study were adapted from previous studies (Din and Jamaluddin, 2020; Leong et al., 2020; Mohungoo et al., 2020; Alomar and De Visscher, 2019; Dwivedi et al., 2019; Husin et al., 2019; Rathore and Panwar, 2019; Truong, 2019; Ibrahim, 2018; Ooi et al., 2018; Rehouma and Hofmann, 2018; Shuib et al., 2019; Yeop et al., 2019; Razak et al., 2017; Wani and Ali, 2015; Venkatesh et al., 2012).

3.3.2 Effort expectancy

Effort expectancy is based on employees' perception of barriers and obstructions faced when using digital procurement technology. In this study, effort expectancy served as the predictor to test out the effort in using digital procurement technology. This construct was adapted from Venkatesh et al. (2012) and Ooi et al. (2018) who examined the usage of mobile internet and cloud computing technology, respectively.

A four-item scale measuring individuals' effort expectancy of mobile internet used to measure effort expectancy SME employees were asked to answer the items in the effort expectancy is based on whether the items provided for mobile internet usage were enough for individuals to form a view about the overall effort associated with the acceptance and use of technology.

3.3.3 Performance expectancy

In this study, performance expectancy referred to employees' perception of evaluating the advantages of using digital procurement technology. Performance expectancy is the predictor to assess the benefits experienced in performing certain activities. This construct was adapted from the study of Venkatesh et al. (2012) on using mobile internet. This predictor has some similarities to TAM's perceived usefulness.

A four-item scale measuring individuals' performance expectancy of mobile internet was adopted from Venkatesh et al. (2012). SME employees were asked to answer these items based on whether the items were enough for individuals to form views about the overall performance associated with the acceptance and use of technology.

3.3.4 Facilitating conditions

This is characterised by how much an employee reacts to the existence of infrastructure and assistance within the organisation associated with digital procurement usage. The

facilitating conditions have also been proven to have a direct effect on technology adoption than that predicted by behavioural intentions (Ibrahim, 2018).

SME employees were asked to answer these items based on whether the items were enough for individuals to form views about the overall support and resources within the organisation associated with the acceptance and use of technology.

3.3.5 Social influence

This is considered a proxy of subjective norm, social factor and peer pressure (Fishbein and Ajzen, 1977). Besides, social influence is related to social impacts in the perception of employees on the usage of ICT (Ibrahim, 2018).

SME employees were asked to answer these items based on whether they were enough for individuals to form a view about the overall social influence associated with the acceptance and use of technology.

3.3.6 Secure transaction

The items to measure secure transactions were adapted from Leong et al. (2020). The four secure transaction items were originally from Schierz et al. (2010), which were revised to be used for the mobile payment services study. A secure transaction needs proof of the transaction, whereby the receipt is retrievable (Din and Jamaluddin, 2020). Thus, the user cannot deny his or her online transactions.

A four-item scale measuring secure transactions of mobile payments was adopted from Leong et al. (2020). Respondents were asked to evaluate the items based on whether the items were enough for individuals to form views about the secure transaction associated with the acceptance and use of technology.

3.4 Moderator assessment

A path model shows that exogenous variables directly affect the endogenous variable without the presence of a moderating variable. In general, this is the main effect that represents the cause-and-effect relationships in PLS-SEM. Thus, the presence of a third variable known as the moderator variable will affect the relationship between the exogenous variables and the endogenous variable. In many situations, the moderator variable can be continuous (for example, temperature or blood pressure) or categorical (for example, genders like male or female group) (Hair et al., 2016).

Furthermore, the moderator has usually termed a contingent variable that refers to a specific factor that may or may not cause an interaction between two variables. The interaction can be positive or negative and sometimes there can be no interaction at all. In SmartPLS 3.3.2 software, the simple slope analysis does not provide the full information regarding the moderator interaction, whereby it only provides information on the relationship between exogenous and endogenous variables. Hence, an additional step is required to use the simple slope analysis results to illustrate the interaction effect between the endogenous variable and the moderator.

4 Data analysis

4.1 Demographic information

In this section, all the questions were simplified to make them easier to be understood by most of the respondents. The questions included their gender, age, race, internet experience, highest education level, and job position. (see Table 1) tabulates the categories of each demographic.

Table 1 Respondents' profile (N = 390)

Variable	*Frequency*	*Percentage (%)*
Age		
Below 30 years' old	54	13.8
30–39 years' old	164	42.1
40–49 years' old	115	29.5
Above 50 years' old	57	14.6
Gender		
Male	177	91.5
Female	213	8.5
Past internet experience		
Yes	357	91
No	33	9
Ethnic/race		
Malay	331	84.9
Chinese	43	11.0
Indian	10	2.6
Others	6	1.5
Education level		
Secondary school	90	23.1
Diploma	120	30.8
Bachelor's degree	157	40.3
Master's degree	19	4.9
Doctorate degree	4	1.0
Industry		
Sales and services	297	76.2
Manufacturing	34	8.7
Construction	55	14.1
Agriculture	3	0.8
Mining	1	0.3

Note: Sample size = 390.

Table 1 Respondents' profile (N = 390) (continued)

Variable	*Frequency*	*Percentage (%)*
Job position		
Non-executive	43	11
Executive	94	24.1
Manager	94	24.1
Top management	52	13.3
Owner	107	27.4
Duration in company		
Less than 5 years	104	26.7
5–9 years	128	32.8
10–19 years	118	30.3
More than 20 years	40	10.3

Note: Sample size = 390.

There are 390 respondents who took part in this study shown in Table 1. There are 45.4% of male and 54.6% female respondents. 13.8% of the respondents are under 30 years old, 42.1% were between 30–39 years old, 29.5% were between 40–49 and 14.6% were above 50 years old. In terms of past internet experience, 91.5% of respondents have past internet experiences such as internet banking and online bill payment with only 8.5% of respondents without internet experience.

4.2 Measurement model

The measurement model (MM) is to ensure the reliability and validity of a path analysis before proceeding to the structural model (SM). According to Hair et al. (2019), there are three certain criteria's needs to be performed for a reflective MM. Firstly, the convergent validity. The outer loading measure range within 0.708 to 0.944 is shown in Table 2 and all the indicators' value exceeds 0.708 except for the following indicators FC1= 0.646, FC2 = 0.653 and SI4 = 0.675. All three indicators are removed from the MM.

Secondly, in terms of convergent validity, there are two metrics used to measure the items of its convergent construct. The first metric is the outer loadings, which is used to evaluate reliability. According to Hair et al. (2019), the outer loading value must be above 0.708 or higher to serve the purpose to evaluate if the set of manifest items is consistent with its intended same latent construct. The outer loading measure range within 0.708 to 0.944 is shown in Table 2 and all the indicators' value exceeds 0.708 except for the following indicators FC1= 0.646, FC2 = 0.653 and SI4 = 0.675. All three indicators are removed from the MM.

Finally, the discriminant validity and it is used to measure the distinct from one construct with other constructs in the path model. Previously, there were two criteria used to assess the discriminant validity. For example, the cross-loading, this measurement shows that each of the indicators is the highest for their designated construct (see Table 3). The same goes with Fornell and Larcker (1981) who proposed the square root of a construct should be larger than the correlation between the construct with other constructs (see Table 4).

Table 2 Measurement model

	Items	*Factor loading*	*Composite reliability*	*AVE*
Effort expectancy	EE1	0.915	0.948	0.821
	EE2	0.881		
	EE3	0.935		
	EE4	0.892		
Facilitating conditions	FC3	0.894	0.928	0.812
	FC4	0.907		
	FC5	0.902		
Performance expectancy	PE1	0.906	0.943	0.768
	PE2	0.916		
	PE3	0.897		
	PE4	0.735		
	PE5	0.914		
Perception in using EP	PIU1	0.901	0.943	0.768
	PIU2	0.870		
	PIU3	0.872		
	PIU4	0.898		
	PIU5	0.839		
Social influences	SI1	0.916	0.937	0.789
	SI2	0.938		
	SI3	0.922		
	SI5	0.767		
Secure transaction	ST1	0.824	0.947	0.783
	ST2	0.913		
	ST3	0.913		
	ST4	0.930		
	ST5	0.837		
Usage decision	UD1	0.708	0.882	0.716
	UD2	0.944		
	UD3	0.870		

Note: Outer loading > 0.7, CR > 0.7 and AVE > 0.5.

Source: Hair et al. (2017)

4.3 Structural model

After all the test criteria for the MM is fulfilled, the PLS-SEM analysis proceeds to SM evaluation to examine how exogenous variables relate with the endogenous variable. In general, the SM formalised the path diagram in a series of regression equations. In addition, the SM shows how strong the latent exogenous variables are related to the endogenous variable (Hair et al., 2019). There are six criteria needed to be fulfilled in the structural MM.

Table 3 Cross-loading

	EE	*FC*	*PE*	*PIU*	*SI*	*ST*	*UD*
EE1	*0.915*	0.665	0.683	0.586	0.526	0.551	0.184
EE2	*0.881*	0.603	0.537	0.521	0.428	0.467	0.107
EE3	*0.935*	0.682	0.649	0.582	0.489	0.541	0.166
EE4	*0.892*	0.654	0.608	0.512	0.467	0.509	0.136
FC3	0.563	*0.894*	0.526	0.468	0.517	0.490	0.114
FC4	0.743	*0.907*	0.652	0.565	0.558	0.579	0.147
FC5	0.623	*0.902*	0.622	0.552	0.586	0.598	0.138
PE1	0.630	0.631	*0.906*	0.611	0.604	0.585	0.229
PE2	0.618	0.605	*0.916*	0.609	0.619	0.566	0.173
PE3	0.604	0.588	*0.897*	0.576	0.598	0.572	0.227
PE4	0.461	0.445	*0.735*	0.469	0.546	0.488	0.063
PE5	0.669	0.646	*0.914*	0.656	0.638	0.621	0.245
PIU1	0.549	0.535	0.589	*0.901*	0.596	0.597	0.144
PIU2	0.482	0.467	0.520	*0.870*	0.514	0.509	0.142
PIU3	0.558	0.506	0.603	*0.872*	0.585	0.499	0.186
PIU4	0.586	0.591	0.679	*0.898*	0.619	0.636	0.200
PIU5	0.480	0.470	0.531	*0.839*	0.537	0.490	0.145
SI1	0.430	0.550	0.575	0.549	*0.916*	0.518	0.044
SI2	0.478	0.556	0.624	0.568	*0.938*	0.539	0.056
SI3	0.513	0.563	0.634	0.620	*0.922*	0.592	0.116
SI5	0.446	0.516	0.596	0.574	*0.767*	0.544	0.131
ST1	0.446	0.497	0.513	0.493	0.519	*0.824*	0.132
ST2	0.511	0.559	0.603	0.582	0.566	*0.913*	0.194
ST3	0.503	0.554	0.595	0.580	0.570	*0.913*	0.166
ST4	0.562	0.591	0.636	0.592	0.599	*0.930*	0.185
ST5	0.501	0.540	0.511	0.521	0.483	*0.837*	0.188
UD1	0.051	0.062	0.050	0.058	–0.001	0.034	*0.707*
UD2	0.153	0.131	0.243	0.218	0.107	0.205	*0.944*
UD3	0.179	0.164	0.181	0.129	0.096	0.185	*0.870*

Note: Diagonal (in italic) represents the squared root of average variance extracted while other entries represent.

Table 4 Discriminant validity using Fornell and Larcker condition

		1	*2*	*3*	*4*	*5*	*6*	*7*
1	Effort expectancy	*0.906*						
2	Facilitating conditions	0.719	*0.901*					
3	Performance expectancy	0.686	0.671	*0.876*				
4	Perception in using EP	0.609	0.59	0.671	*0.876*			
5	Social influences	0.528	0.617	0.686	0.653	*0.888*		
6	Secure transaction	0.572	0.62	0.648	0.627	0.62	*0.885*	
7	Usage decision	0.166	0.149	0.22	0.188	0.099	0.196	*0.846*

Source: Fornell and Larcker (1981)

Before assessing the SM, the lateral collinearity must be examined to prevent bias in the regression result. In other words, this metric is a quick test to confirm there are no hypothesised variables to be causally related and measure the same constructs, All the inner VIF values for the exogenous variables (effort expectancy, facilitating conditions, performance expectancy, social influence, secure transaction and usage decision) are less than 3.3 and 5.0 as shown in Table 5.

Table 5 Lateral collinearity assessment

Inner VIF	
Constructs	*PIU (VIF)*
Perception in using EP	
Effort expectancy	2.480
Facilitating conditions	2.646
Performance expectancy	2.881
Social influence	2.223
Secure transaction	2.097
Usage decision	1.068

Note: VIF ≤ 5.

Source: Hair et al. (2017)

The purpose of R^2 is to examine the value of the endogenous construct. The R^2 value measures the variance, which is explained by each of the exogenous variables, and it serves the purpose of measuring the explanatory power of the model. The R^2 usually ranges from 0 to 1 and according to Hair et al. (2019), values of 0.25, 0.50 and 0.75 can be considered as weak, moderate and substantial.

Table 6 Coefficient of determination (R^2) results

	R square	*R square adjusted*
Perception in using e-procurement	0.575	0.568

Note: Coefficient of determination: R^2 0.25 (weak), 0.50 (moderate) and 0.75 (substantial).

Source: Hair et al. (2017)

Looking at the R^2 of for the perception in using digital procurement, the result indicated 0.575 (see Table 6). The R^2 result is considered as the model's predictive of accuracy and it is calculated as the square correlation between this study's endogenous variable actual and predictive value. In general, the R^2 is a function of the number of predictors, the greater the number of predictors, the higher the value of R^2. In other words, the value of R^2 necessarily needs to be high. According to Hair et al. (2019), measuring a model that is inherently predictable, the R^2 value of higher than substantial might be plausible and likely indicate overfit.

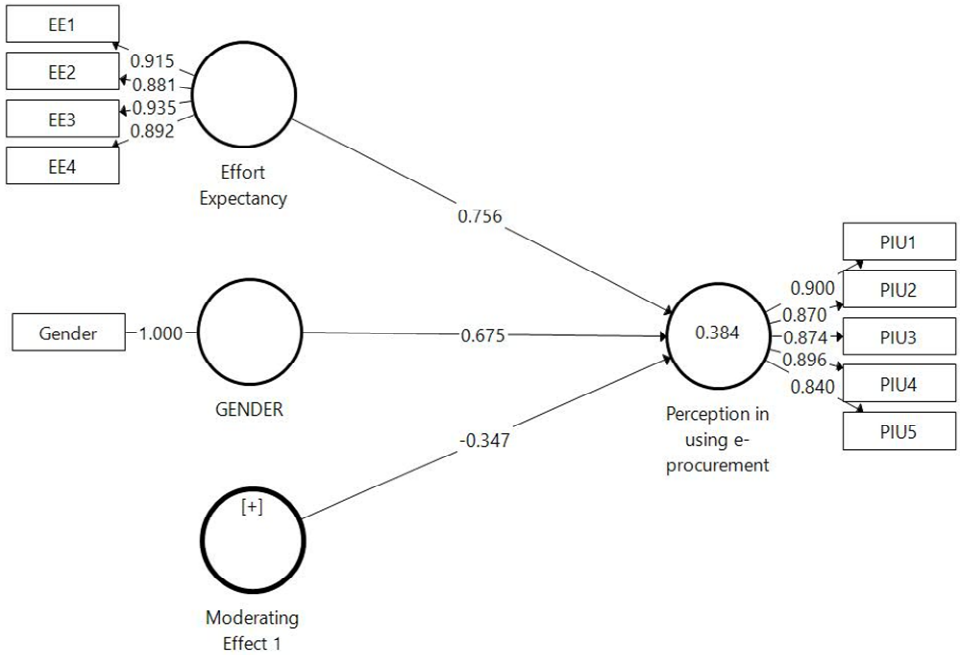
4.4 Exogenous variables moderated by gender

In this section, the variables in effort expectancy (EE1 to EE4), facilitating conditions (FC3 to FC5), performance expectancy (PE1 to PE5), social influences (SI1, SI2, SI3 and

SI5), secure transaction (ST1 to ST5) and usage decision (UD1 to UD3) are acted as reflective exogenous variables and perception in using digital procurement (PIU1 to PIU5) will be endogenous variables (reflective measurement). Next, gender (male = 0 and female group = 1) plays a major role in the moderator effect (categorical variable).

Figure 2 shows the results of the moderating effect of the age between exogenous (effort expectancy) and endogenous (PIU). The total effect and path coefficient for effort expectancy = 0.756, gender = 0.675, effort expectancy ∗ gender = –0.347, and the R^2 result = 0.384. The result indicates that gender moderates the relationship between effort expectancy and PIU (β = –0.347, t = 2.242, p = 0.013).

Figure 2 Structural figure of moderating effect (gender) into EE and PIU



5 Results and discussion

This section discusses the main findings based on the hypotheses results as shown in Table 7. The hypotheses result of perception of using digital procurement have indicated that H1 (effort expectancy), H2 (performance expectancy), H4 (social influence), and H5 (secure transaction) are supported, whereas H3 (facilitating conditions) is not supported. Furthermore, the moderator's results were statistically significant using the one-tailed test for some (H7b, H7c, H7f, H8a and H9d). However, 13 hypotheses (H7a, H7d, H7e, H8b, H8c, H8d, H8e, H8f, H9a, H9b, H9c, H9e and H9f) are not supported.

This study's objective was to modify and empirically test the factors in UTAUT with additional factors (secure transaction and usage decision) to directly measure the user perception of using digital procurement technology.

Table 7 Summary of hypotheses results

Hypothesis	*Relationship*	*t-value*	*Decision*
H1	Effort expectancy → PIU	3.076	Supported
H2	Performance expectancy → PIU	3.150	Supported
H3	Facilitating conditions → PIU	0.278	Not supported
H4	Social influence → PIU	5.272	Supported
H5	Secure transaction → PIU	3.675	Supported
H6	Usage decision → PIU	1.226	Not supported
H7a	Effort expectancy * Age → PIU	1.161	Not supported
H7b	Performance expectancy * Age → PIU	1.903	Supported
H7c	Facilitating conditions * Age → PIU	2.405	Supported
H7d	Social influence * Age → PIU	1.344	Not supported
H7e	Secure transaction * Age → PIU	1.421	Not supported
H7f	Usage decision * Age → PIU	2.235	Supported
H8a	Effort expectancy * Gender → PIU	2.242	Supported
H8b	Performance expectancy * Gender→ PIU	1.260	Not supported
H8c	Facilitating conditions * Gender → PIU	0.983	Not supported
H8d	Social influence * Gender → PIU	0.047	Not supported
H8e	Secure transaction * Gender → PIU	1.175	Not supported
H8f	Usage decision * Gender → PIU	0.931	Not supported
H9a	Effort expectancy * Experience → PIU	1.231	Not supported
H9b	Performance expectancy * Experience → PIU	1.046	Not supported
H9c	Facilitating conditions * Experience → PIU	2.112	Supported
H9d	Social influence * Experience → PIU	0.001	Not supported
H9e	Secure transaction * Experience → PIU	1.027	Not supported
H9f	Usage decision * Experience → PIU	1.058	Not supported

Note: PIU – perception of using e-procurement, t-statistic (one-tailed) ≥ 2.333 ($p < 0.01$), ≥ 1.645 ($p < 0.05$).

Source: Hair et al. (2017)

There were several significant findings. The results explained the significant relationships between these variables. As presented in Table 7, perception of using digital procurement was affected by effort expectancy, performance expectancy, social influence and secure transaction. Table 8 lists the research questions and objectives.

Lastly, future studies can be extended by replicating this study in other developing countries to determine similar findings. Studies that compare secure transaction and usage decisions between two or more different country settings can also be conducted. This study augmented the explanation of the factors affecting the perception of using digital procurement, and at the same time, it addressed the interaction of moderators.

This research has put forth a modified UTAUT framework for the causal relation among SME employees' perception of using digital procurement in Malaysia. The study

extended this theory by adding two contemporary factors related to digital procurement usage. The two constructs were secure transaction and usage decisions. Technological assessment and internet access are not enough to engage digital procurement, and thus, there are more to be explored in this area. Digital procurement issues are like what other online products endure, i.e., it is not merely concerning technical issues, and instead, are influenced by the social, political, cultural, and economic environment This concludes that the way businesses operate after the COVID-19 outbreak is over will be the new normal with greater adoption of digitalisation.

Table 8 Summary of research questions and objectives

Research question (RQ)		*Research objective (RO)*		*Discussion section*
RQ1	What are the effects of performance expectancy, effort expectancy, social influence, and facilitating conditions on the employees' perception of using e-procurement?	RO1	To examine the effects of performance expectancy, effort expectancy, social influence, and facilitating conditions affect the employees' perception of using e-procurement.	5.4.1
RQ2	Does secure transaction affect the employees' perception of using e-procurement?	RO2	To determine whether secure transaction affects the employees' perception of using e-procurement.	5.4.2
RQ3	Does usage decision affect the employees' perception of using e-procurement in the post-introduction phase?	RO3	To investigate the usage decision affects the employees' perception of using e-procurement in the post-introduction phase.	5.4.3
RQ4	Is there any moderating effect of employees' demographic characteristics on e-procurement usage?	RO4	To inspect the moderating effect of employees' demographic characteristics on e-procurement usage.	5.4.4

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