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E-procurement adoption in Nigeria: perceptions from the public sector employees

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Abstract

Purpose – This study attempts to examine the factors that influence user intention to adopt e-procurement in the Nigerian public sector.

Design/methodology/approach – A well-structured questionnaire was used to collect primary data from 278 procurement and information technology (IT) departments' officials of key federal government ministries and agencies. The technology acceptance model (TAM) model was adopted and extended with security-related factors, namely perceived trust and perceived security. A partial least squares-structural equation modelling (PLS-SEM) approach was used to test and validate the model.

Findings – The results indicated that perceived usefulness is the best predictor of users' intention to adopt e-procurement, followed by perceived security and perceived trust. In contrast, however, perceived ease of use was found to have a significant negative effect on the intention to adopt e-procurement.

Originality/value – This study is among the first in the Nigerian public sector context to evaluate users' perceptions on e-procurement adoption with the use of a distinctive research model (TAM). The study's findings contribute to a better understanding of the factors influencing the adoption of e-procurement in the Nigerian public sector.

Keywords Nigeria, Public sector, Technology acceptance model (TAM), Public procurement, E-procurement

Paper type Research paper

1. Introduction

E-procurement solutions have improved the efficiency of purchasing functions with regards to cost and time (Bertot & Jaeger, 2010; Gunasekaran & Ngai, 2008; Thong, 1999). It has changed the traditional procurement process into an electronic one through the application of information and communications technology (ICT) (Nandankar & Sachan, 2020). E-procurement is regarded as the process whereby organizations acquire works, goods or services primarily via the use of Internet-based tools (Aduwo *et al.*, 2017; Ibem & Laryea, 2015; Thong, 1999; Waheduzzaman & Rahman, 2020). Several benefits have been identified with e-procurement systems adoption (Ramkumar, 2016; Ramkumar, Schoenherr, Wagner, & Jenamani, 2019). Converting corruption, enhancing transparency; accountability and effectiveness in the system; reduction in operating

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cost; monitoring and improving the quality of service delivery; and better integration with suppliers are some of the frequently cited benefits of e-procurement technologies adoption (Odulana & Oyewobi, 2019; Toroitich, Mburugu, & Waweru, 2017). Acquiring environmentally friendly products through green procurement (Masudin, Umamy, Al-imron, & Palupi, 2022) is another benefit of e-procurement. Organizations that use e-procurement experience transaction cost reductions of over 42% (Davila & Gupta, 2003; Hawking *et al*., 2004). Despite these benefits, studies investigating perceptions of public sector procurement employees towards the adoption of e-procurement in the public sector remain scars.

This research is focused on the public sector procurement in Nigeria. The research is motivated by the fact that procurement in Nigeria is responsible for 80% of government's expenditure at all levels (Adebiyi, Ayo, & Adebiyi, 2010), and that corruption is continuously rising in Nigeria's public procurement processes (Aduwo *et al.*, 2020; Transparency, 2019). Moreover, the country also continues to witness procurement irregularities in many forms, like interference in contract awards and non-compliance with the guidelines of public procurement as contained in the public procurement act of 2007 (Zadawa, Hussin, & Osmadi, 2018). Irregularities in the procurement processes have negatively affected every sector of the Nigerian economy, depriving the country of the much needed infrastructural and economic growth; the country cannot boast of a functional railway service; and the roads are bad, with no substantial efforts to repair or construct new ones. Even where the new ones are built, they hardly last their life span due to severe compromises. The current manual procurement system in Nigeria is characterized by disrespect for public service laws and financial regulations, over-invoicing and inflation in contracts (Oguonu, 2012; Shwarka & Anigbogu, 2012). Other problems include lack of transparency and efficiency, human interface leading to extravagant corruption, lack of competitive tendering, preferential treatment during tender processes and excessive paper works (Abdullahi, Ibrahim, Ibrahim, & Bala, 2019; Musa, Binti, & Raslim, 2020). The adoption of e-procurement is seen as the optimum way to assist governments, especially that of developing countries, to convert corruption, enhance transparency and effectiveness in the system, reduce operating cost and monitor and improve the quality of service delivery (Odulana, & Oyewobi, 2019). Moreover, e-procurement adoption has a great impact on organizational performance (Masudin, Aprilia, Nugraha, & Restuputri, 2021). This has underscored the urgent need for research exploring user perceptions on the intention to adopt e-procurement in the public sector organizations, a gap which this study intends to fill.

In order to study users' main adoption factors in different fields, researchers have extended the technology acceptance model (TAM) by integrating the original TAM variables, perceived usefulness (PU), perceived ease of use (PEOU) and other additional external variables (Teo, Zhou, & Noyes, 2016). This has led to different factors and a significant number of extended TAM models. Additionally, a majority of earlier researches have focused on examining the impact of particular factors on the adoption of new technology. However, due to the scarcity of e-procurement studies in the public sector (Adebayo & David Evans, 2016), this study adopts and extends the TAM model with relevant individual adoption factors through a critical review of literature. These are the variables that were most commonly employed and yielded notable outcomes in the information system (IS) adoption literature in general, and in e-procurement in particular. These factors are grouped into system-related (PU and PEOU) and security-related (perceived trust – PT, perceived security – PS) factors (Alshannag *et al*., 2022; Khalilzadeh, Ozturk, & Bilgihan, 2017; Lwoga & Lwoga, 2017; Pham & Ho, 2015). The choice of these factors was based on the fact that Nigeria is ranked highly in the Transparency International's corruption index. Therefore, the choice of

these factors in a country where security of data and risks associated with online transactions are of great concern to the citizenry, is justifiable.

This study is divided into sections; Section 1 is the introduction which discusses the background of the study. Section 2 explores e-procurement adoption and the efforts made by the Nigerian government towards e-procurement adoption. Section 3 presents the theoretical background and hypotheses of the study. Section 4 discusses the methodology of the research. Section 5 presents the data analysis of the study. The discussion and conclusion are discussed in Sections 6 and 7, respectively.

2. E-procurement adoption

Over the past decades, e-procurement adoption has witnessed tremendous surge in adoption by organizations across the globe. A plethora of studies have outlined numerous factors that either directly or indirectly influence the adoption of e-procurement in various contexts. For instance, according to Soong, Ahmed, and Tan (2020), social influences and performance expectancy had a significant effect on electronic government adoption (Table 1). It is important to note that most of these studies share similar factors with other studies as outlined in Table 1. In Nigeria, a study by Ibem *et al.* (2016) investigated the factors influencing the adoption of e-procurement in the Nigerian building industry. Their findings established the benefits of e-procurement in enhancing efficiency in project delivery; eliminating geographic barriers and effective communication among project team members are the most important factors influencing e-procurement adoption amongst the participants. Ibem, Aduwo, Afolabi, Oluwunmi, Tunji-Olayeni, Ayo-Vaughan, and Uwakonye (2020) investigated the adoption of e-procurement and the experiences of users with it in the Nigerian construction industry. The results of their

S/n	Context	Factors	Author(s)
1	Factors influencing Malaysian small and medium enterprises adoption of electronic government procurement	Effort expectancy, performance expectancy, social influences	Soong *et al.* (2020)
2	Impact of e-procurement adoption on company performance: evidence from Indonesian manufacturing industry	Top management support, information quality, E-procurement implementation	Masudin, Aprilia, Nugraha, and Restuputri (2021)
3	Decisive factors for the adoption of e-procurement in manufacturing firms in India	Employee and transformational leadership to implementation progress, information technology reliability and supplier performance, monitoring the efficiency of e-procurement systems, e-procurement systems customer approval, top management support	Bhadaoria and Karande (2021)
4	Evaluating critical factors for the implementation of e-procurement in Ghana	Availability of Internet, power stability, capacity enhancement of procurement officers, availability of infrastructure	Desmond, Tutu, Kissi, and Osei-Tutu (2019)
5	The factors affecting on e-procurement usage: the moderating role of power	Relative advantage, compatibility, complexity, organization readiness, top management support, competitive pressure	Daoud and Ibrahim (2018)

Source(s): Table by authors

Table 1. Factors influencing e-procurement adoption

findings discovered that the benefits of the technology, operational environment, challenges with change management and the availability, accessibility and interoperability of e-procurement systems had an impact on users' experiences with e-procurement in Nigeria. Furthermore, Afolabi, Ibem, Aduwo, Tunji-Olayeni, and Oluwunmi (2019) evaluated critical success factors for the adoption of e-procurement in Nigeria's construction sector. Aduwo *et al.* (2017) investigated e-procurement use and the extent of its adoption in Nigerian building industry. Their findings indicate that quantity surveyors and construction project managers in consulting firms were the primary e-procurement users. Further, e-mails and websites were the most widely utilized e-procurement technology for soliciting bids, sharing project outlines and specifications, advertising/announcement or receiving invitations to tender, and sourcing materials and equipment. However, a majority of these studies have generally focused their attention on the private sector organizational adoption, and, more specifically, the building and construction sectors, neglecting the all-important public sector.

2.1 Nigerian government's drive towards e-procurement adoption

In a bid to address the numerous challenges of the manual procurement processes, the Nigerian government has embarked on a public procurement reforms which began in 1999, following a World Bank report called the "Country Procurement Assessment Report" (CPAR, 1999), which stated that "before 1999, Nigeria was recording an average losses of $10 billion USD per year to corruption through contract awards" (Odulana & Oyewobi, 2019). The report called for the regulation of procurement activities in the country. This resulted in the passage of the Public Procurement Act 2007 Bill into law, at the instance of the World Bank, which was intended to regulate all public procurement activities to achieve efficiency, professionalism, transparency, accountability, competitiveness, fairness and value for money (Chikwe & Obi, 2016; Oguonu, 2012). Since then, the act has become the law guiding procurement in the country. However, despite the reforms, the issues that were related to the manual nature of the procurement system continue to exist (Odulana & Oyewobi, 2019). Further, there was no subsisting law or guidelines regarding e-procurement adoption.

The attempt in 2019 by the Nigerian's highest legislative chamber – the Senate – to amend the Public Procurement Act of 2007 to accommodate e-procurement did not help the situation. The amendment regarding e-procurement in section 5 (r) only mandated the Bureau for Public Procurement (BPP); the agency mandated by law to regulate all procurement activities and provide relevant training to public personnel involved in procurement, to "*establish a single e-procurement portal that shall, subject to section 16(21) to this Act serve as a primary and definitive source of all information on government procurement containing and displaying all public sector procurement information at all times to the public*". Therefore, the amendment does not mandate any ministry or agencies to migrate from their current manual procurement to adopt e-procurement in their procurement processes, nor does it provide any guidelines to that effect. This has allowed the government agencies to continue using the manual procurement processes to the detriment of e-procurement, which provides effective solutions to the problems of accountability and transparency in public spending.

3. Theoretical background and hypothesis

In the recent decades, theories of human behaviour have been adopted by researchers to investigate technology acceptance (Davis, 1989; Venkatesh, Morris, & Davis, 2003). The resolve to use theory in this research is strengthened by the fact that these theories play a

significant role in defining, establishing and explaining the relationships/interactions between different constructs (Børje, Michael, Moore, Peters, & Bernath, 2007). A theoretical framework directs studies to figure out what variables to measure and what factual ties to look for concerning the issues under review (Kamau Muiruri & Mark Ngari, 2014).

Among the theories, the most widely used theory for analysing user intent to adopt e-procurement is the TAM, which is regarded the most important of all the individual-level acceptance models (Brandon-Jones & Kauppi, 2018). Also, Prince, Samuel, Jack, and Kanu, (2019) argued that TAM possesses the efficiency and effectiveness in predicting and explaining the potential user's actual behavioural intentions regarding new technology adoption. TAM hypothesizes that the adoption of IT comprised of two determinants that influence user adoption, which are "perceived usefulness" (PU) and "perceived ease of use" (PEOU) (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). The technology acceptance model was proposed for this study.

Several researchers have improved the classic TAM by extending it with additional variables such as "perceived trust and compatibility" (Kamarulzaman, Mukherjee, & Zainal Rashid, 2013), "perceived complexity, top management support, trust in technology, technical support and user training" (Ramkumar & Jenamani, 2015), "compatibility, perceived behavioural control and subjective norm" (Gumussoy & Calisir, 2009), "assurance, facilitating conditions, responsiveness, trust, web design quality and perceived risk" (Sambasivan, Wemyss, & Rose, 2010) and "security and design" (Lai, 2017). After the critical literature review, it was established that perceived trust, and, perceived security are the most predominant individual factors influencing e-procurement adoption, and are the most relevant factors associated with the Nigerian phenomenon. Therefore, in an attempt to develop an extensive model capable of measuring e-procurement adoption in the context of public sector, this study aims to expand the TAM model using the most prevalent relevant factors from the literature on e-procurement adoption at the individual level. Hence, this study purports that e-procurement users' intention is influenced by perceived usefulness, perceived ease of use, perceived trust and perceived security. The conceptual model is presented in Figure 1.

3.1 Perceived usefulness

Perceived usefulness refers to the degree to which an individual believes that the use of an e-procurement system can enhance performance of a person (Davis, 1989). Several studies have demonstrated that PU is positively affected by the behavioural intention to adopt e-procurement (Aboelmaged, 2010; Brandon-Jones & Kauppi, 2018). Also, Lean, Zailani, Ramayah & Fernando (2009) in their study established that PU is significant with regards to the citizens' intention to use e-government services in Malaysia. Therefore, with regards to the current study, PU will boost the procurement officials' intentions to adopt e-procurement in the Nigerian public sector. Thus, the study hypothesizes that:

H1. Perceived usefulness positively affects e-procurement users' intention to adopt e-procurement in the Nigerian public sector.

3.2 Perceived ease of use

PEOU has been defined as the degree to which a person believes that using a certain system will be devoid of effort (Davis, 1989). It has been recognized as a determinant to the behavioural intention by numerous studies (Davis, 1989). Contrary to the studies that have established positive relationship between PEOU and intention to adopt, Lee, Kim, and Choi

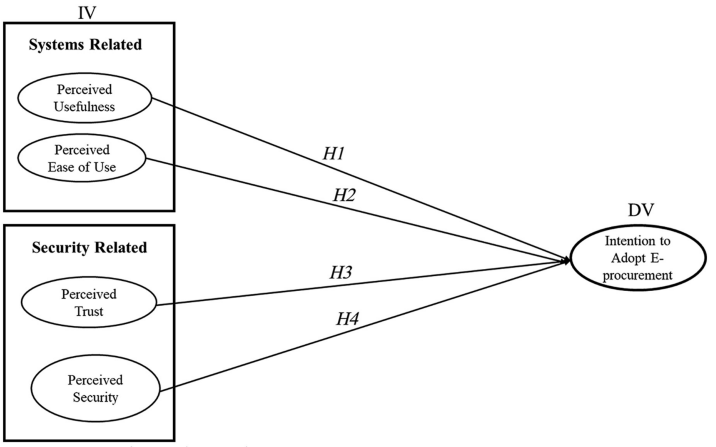


Figure 1.
Conceptual model of the study

Source(s): Figure by authors

(2019) argued for a negative effect. Given the technical barriers in using e-procurement, PEOU becomes an important driver of adopting e-procurement (Brandon-Jones & Kauppi, 2018). This suggests that if the users believe that a given technology is less difficult to utilize, then the technology will be adopted (Autry *et al.*, 2010). As noted by Davis (1989), potential users are more likely to accept and adopt innovations that are thought to be simpler to use and less complicated. Conversely, if the procurement officials found that the e-procurement technologies are easy to operate, they will adopt it. Therefore, the study hypothesizes:

H2. Perceived ease of use positively affects e-procurement users' intention to adopt e-procurement in the Nigerian public sector.

3.3 Perceived trust

Trust refers to a customer's positive expectation of a service provider. (Mayer, Roger, James, & Schoorman, 1995). Trust is a subjective experience that a firm would meet their obligations, and it is especially crucial in risky monetary operations where users are at risk of losing money (Dutot, 2015). Therefore, the ability of a customer to accept Internet risks based on his or her optimistic assumptions about the service provider's intentions and behaviours can be described as trust (Matemba & Li, 2018). Studies have established a positive bond between trust and the intention to adopt e-procurement behaviour (Kusuma & Pramunita, 2011). Also, Muñoz-Leiva, Climent-Climent, and Liébana-Cabanillas (2017) established a positive correlation between trust and online shopping. Further, perceived trust is a best forecaster of users' intent to use M-payment (Al-Saedi, Al-Emran, Ramayah, & Abusham, 2020). Providing a good impression of trust between the government and the public within the e-procurement scenario will favour the supporting of trust and intention to use e-procurement technologies. Consequently, Gefen and Elena Karahanna (2003) averred that higher levels of trust are similarly linked to higher levels of intended use. Accordingly, this study posits that:

H3. Perceived trust positively affects e-procurement users' intention to adopt e-procurement in the Nigerian public sector.

3.4 Perceived security

One of the biggest barriers to online use is users' perceptions of inadequate Internet security. Perceived security is the subjective likelihood that sensitive information (commercial or personal) will not be accessed, stored or modified by unauthorized parties during work sessions in a manner consistent with their confidence expectations (Luo, Gurung, & Shim, 2010). Referring to the context of e-procurement, employees' perceptions of the trustworthiness of the communication route and data transmission and storage procedures are referred to as security. Experts have explained that customers are concerned about their personal financial information becoming available to others via the Internet and being used for fraudulent purposes due to the use of an open network (Dutot, 2015). From the perspective of e-procurement, perceived security refers to the degree to which e-procurement users consider the system to be secure and safe to adopt. Previous studies have confirmed perceived security as a critical factor that positively influences the adoption of e-procurement (Eadie, Perera, & Heaney, 2010). Kheng and Al-Hawamdeh (2002) in their study examined e-procurement adoption in Singapore and discovered security to be a key barrier. However, Githinji and Were (2018) revealed a positive correlation between security of data and implementation of e-procurement. Hence, we hypothesize as follows:

H4. Perceived security positively affects e-procurement users' intention to adopt e-procurement in the Nigerian public sector.

4. Methodology

4.1 Instrument development

An online questionnaire through Google Form was used to collect data for the study. The first section of the questionnaire was designed to collect respondents' profile information. The second section was designed to solicit information on user's perception of e-procurement adoption regarding their experience with such technology by considering PU, PEOU, PT and perceived security, using a seven-point Likert scale. The third section described the possible factors for assessing and measuring the employees' intention to adopt e-procurement (INT) in the public sector in Nigeria, using a five-point Likert scale. The reason for the varied scales is to avoid the issue of single-source bias since all the endogenous and exogenous data were gathered from the same respondents. This is a procedural remedy, which was suggested by Podsakoff, MacKenzie, Lee, and Podsakoff (2003), for reducing or eliminating common method bias. The questionnaire items were adapted from five authors and modified to e-procurement context as follows:

1. Perceived Usefulness (Brandon-Jones & Kauppi, 2018)

I find e-procurement technology useful to do my job.
E-procurement technology enables me to accomplish my ordering activities in time.
Using e-procurement technology increases my productivity.
Using e-procurement technology makes it easier for me to do my job.

2. Perceived Ease of Use (Dutot, 2015)

E-procurement technology is easy for me to learn.
Using e-procurement technology is clear and understandable.
I consider that e-procurement technology is too technical to be used every day.
It is easy to become skilful at using e-procurement technology.
Overall, e-procurement technology is easy to use.

3. Perceived Trust (Ramkumar & Jenamani, 2015)

E-procurement technology has the ability to establish good relationships with suppliers.
E-procurement technology proactively offers useful information related to our suppliers.
The product specifications from e-procurement technology live up to our expectations.
The quality of products from e-procurement technology met our expectations.

4. Perceived Security (Johnson, Kiser, Washington, & Torres, 2018)

Confidential government information is secured while using e-procurement systems.
The provider ensures adequate data security on the Internet.
The communication channel between government and business within e-procurement is reliable.
The mechanism of data transmission and storage is secured within e-procurement adoption.
I feel safe using e-procurement systems during my procurement tasks.

5. Intention to adopt E-procurement (Aboelmaged, 2010)

I would use e-procurement technology for my procurement needs.
Using e-procurement technology for handling my procurement tasks is something I would do.
I could see myself using e-procurement technology for handling my procurement tasks.

4.2 Sampling technique

A survey through quantitative research was employed, and the questionnaire was distributed to e-procurement users (procurement and IT officials) of some selected federal ministries and their agencies of the Federal Government of Nigeria, who have undergone e-procurement training through purposive sampling technique. The study employs a probability sampling, especially the simple random sampling design, to select the ministries. Each ministry stands a chance of being selected because they all have their respective procurement and IT departments. Federal Ministries of Works, Housing, Communication and Digital Economy, Transport, Education, Health and Federal Capital Territory (FCT) were selected. G*Power analysis was used for the determination of minimum sample size of the study. This approach was chosen because the application is entirely interactive and menu-driven that calculates statistical power analyses with high precision for the most regularly used statistical tests in behavioural research (Faul, Erdfelder, Lang, & Buchner, 2007). It is also the most recommended method in the PLS-SEM literature (Hair, Hollingsworth *et al.*, 2017; Hair, Sarstedt *et al.*, 2017).

The current study model has four independent variables. By using G-power with 4 predictors, an effect size of 0.15, alpha value of 0.05 and power of 0.8, the minimum sample size needed for this study was 85. However, 350 questionnaires were distributed, and 278 useful responses were utilized. This represents a response rate of 79%.

5. Data analysis and results

The partial least squares-structural equation modelling (PLS-SEM) was used in validating the extended TAM model of the study by using the SmartPLS 3 software (Ringle, Wende, & Becker, 2015). The SmartPLS 3 (Hair, Risher, Sarstedt, & Ringle, 2019) was utilized to perform the data analysis for the purpose of (1) measurement analysis and (2) path analysis. The SmartPLS has been used extensively in empirical research in a variety of domains (Ali Memon, Cheah, Ramayah, & Chuah, 2018; Kock & Hadaya, 2018).

5.1 Demographic profile of respondents

The profile of the respondents indicated that males made up over half of the respondents (71.1%), while females constitute 20.9% of the respondents. Majority of the respondents (38.4%) were above 41 years, followed by those between the ages 31-35 (29.1%) and 36-40 (20.3%). This demonstrates that majority of the respondents were matured employees who can make their independent mental judgement. Majority of the respondents (38.4%) were holders of bachelor's degree, followed by master's (33.1%) and postgraduate diploma holders (18%). Professionally, most of the respondents were engineers (25%) and procurement officers (17.4). Architects and quantity surveyors form (8.1%) of the respondents, respectively. Business administrators and economists constituted 10.5% and 7.6% of the respondents, respectively, while IT specialists, lawyers and accountants formed 13.9% of the respondents. The results also show that the respondents are well educated, and this provides a reliable ground when answering the questionnaire.

5.2 Measurement model assessment

Measurement model assessment was conducted by examining the composite reliability (CR) and Cronbach's alpha, and the validity through convergent and discriminant validity, comprising factor loadings, average variance extracted (AVE), and heterotrait-monotrait (HTMT). Only items whose Cronbach's alpha and composite reliability exceeded 0.7 were retained, as suggested by (Hair, 2017). Further, items whose factor loadings were below 0.60 were deleted from the model based on the recommendations of Hair, Hollingsworth *et al.* (2017) and Hair, Sarstedt *et al.* (2017). The threshold value for average variance extracted (AVE) was also recommended to be 0.50 (Hair, Sarstedt, Rngle, *et al.*, 2017). In view of this, two items from PU and one item from PEOU were deleted due to a low factor loading of less than 0.50. The results in Figure 2 indicate that all the values of the items of Cronbach's alpha and composite reliability and the AVE have satisfied their respective recommended threshold values. As a result, the proposed model exhibits adequate reliability.

The extent to which indicators represent a construct and how they differ from other constructs is measured by discriminant validity (Hair *et al.*, 2014). Henseler, Ringle, and Sarstedt (2015) offered a new method for examining discriminant validity called HTMT. The method is a simple estimation of construct correlations, in which the ratio of correlations between two constructs should be less than 0.85 (Henseler *et al.*, 2015). Based on the recommendation of Sarstedt, Hair, Ringle, Thiele, and Gudergan (2016), this study adopts the HTMT criterion in order to assess discriminant validity. Table 2 shows that all constructs exhibited correlation values below the 0.90 threshold, and hence discriminant validity was established (Hair, Sarstedt, Rngle, *et al.*, 2017).

5.3 Structural model assessment

The structural model assessment was conducted by examining the coefficient of determination (R^2), effect size (f^2), path coefficient (β) and the statistical *t*-value. Bootstrapping procedure was employed to test the hypothesis using 5000 re-sample (Hair, Sarstedt, Rngle, *et al.*, 2017). Path coefficients could be regarded as the hypothesized correlations between constructs which have standard values between −1 and +1. (Chin, 1998). According to Chin (1998), *t*-values are calculated using the bootstrapping process with resamples that should be larger than the sample size. High *t*-values imply statistically significant correlations. Based on the *p* value, a cut-off *t*-value is chosen. For $p < 0.05$, the crucial *t* value is usually 1.645. As suggested by Hair, Sarstedt, Rngle, and Gudergan (2017), if the *t*-values are greater than 1.645, the hypotheses are supported. The hypotheses are rejected if the *t*-values are less than 1.645. According to Cohen (1992), f^2 values greater than 0.35 indicate a strong influence, f^2 values between 0.15 and 0.35 indicate a medium effect and f^2

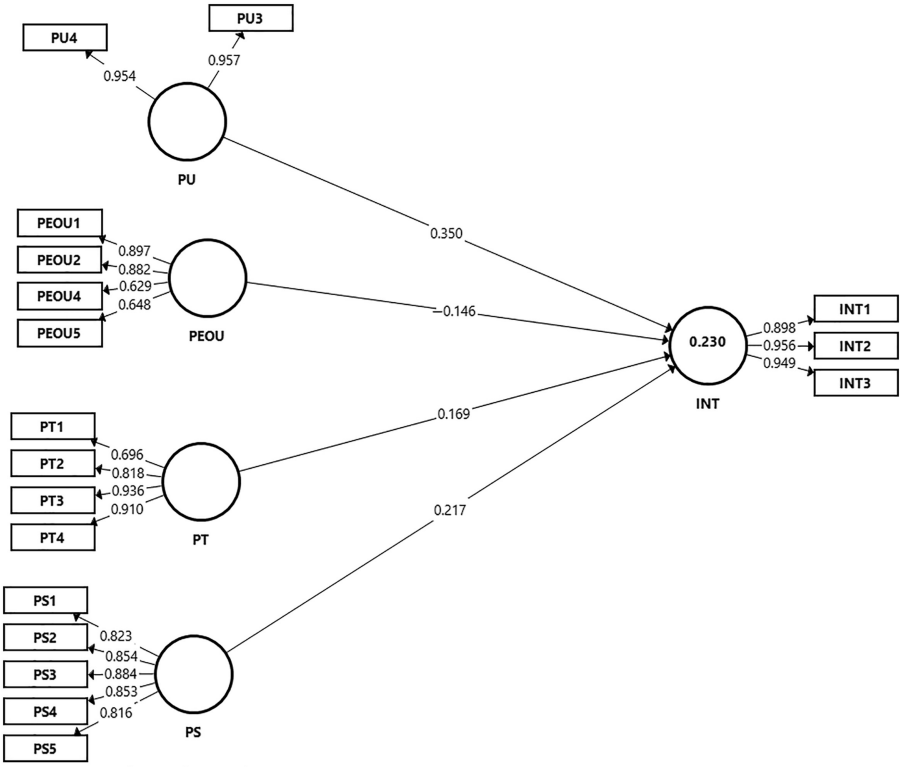


Figure 2.
Measurement model results

Source(s): Figure by authors

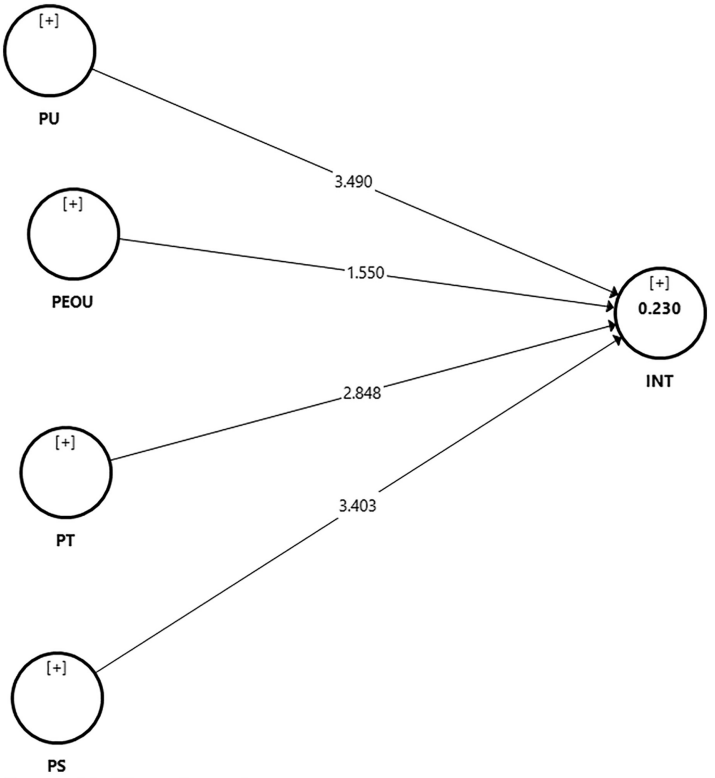
	INT	PEOU	PS	PT	PU
INT					
PEOU	0.319				
PS	0.410	0.667			
PT	0.367	0.419	0.570		
PU	0.416	0.828	0.474	0.304	

Table 2.
Results of discriminant validity – HTMT

Source(s): Table by authors

values between 0.02 and 0.15 indicate small effect. However, Sullivan and Feinn (2012) suggested using both the effect size f^2 and the *p*-value while reporting the results. Both are reported in this study. Figure 3 presents the structural model results after the bootstrapping procedure was run, while Table 3 presents the results of hypotheses testing.

The results of the structural model indicate that perceived usefulness, perceived trust and perceived security all have a significant positive relationship with intention to adopt e-procurement. Thus, hypotheses H1 ($\beta = 0.350$, $t = 3.490$), H3 ($\beta = 0.169$, $t = 2.848$) and H4 ($\beta = 0.217$, $t = 3.403$) are supported. The results, however, indicated that perceived ease of use has a significant negative relationship with intention to adopt e-procurement. Therefore, hypothesis H2 ($\beta = -0.146$, $t = 1.550$) is rejected.



Source(s): Figure by authors

Figure 3.
Structural model results

Hypothesis	Relationships	Std. beta	Std. dev	*t*-value	*p*-value	BCI LL	BCI UL	f^2	Decision
H1	PU → INT	0.350	0.100	3.490	0.000	0.199	0.528	0.072	Supported
H2	PEOU → INT	−0.146	0.094	1.550	0.061	−0.312	−0.006	0.011	Not supported
H3	PT → INT	0.169	0.059	2.848	0.002	0.071	0.266	0.027	Supported
H4	PS → INT	0.217	0.064	3.403	0.000	0.116	0.324	0.035	Supported

Source(s): Table by authors

Table 3.
Results of hypotheses testing

6. Discussion

This study examined factors influencing users' intention to adopt e-procurement in the Nigerian public sector, using a model based on TAM as the grounded theory. The results indicate that the model being proposed is appropriate and valid for measuring users' intention regarding the adoption of e-procurement. The predictive power of the structural model was assessed through the evaluation of the significance of relevance (R^2). It demonstrates how well the endogenous variables are explained by the exogenous variables. According to Cohen (1988), R^2 value of 0.02 is considered weak, 0.13 is

considered moderate and 0.26 is considered substantial. However, Hair *et al.* (2014) suggested that a value of 0.2 is sufficient for R^2 in behavioural research. Additionally, Falk and Miller (1992) advised that an R^2 value of 0.1 is considered sufficient for a specific dependent variable. The value of R^2 established for the current study (Figure 2) is 0.23. Since this value is higher than the recommended threshold values, the model possesses adequate explanatory power.

The first hypothesis of this study hypothesized that perceived usefulness has a positive influence on e-procurement adoption in the Nigerian public sector. The findings of this study backed up this hypothesis, indicating that perceived usefulness had a major impact on users' acceptance of e-procurement in the Nigerian public sector. A significant number of studies have demonstrated that perceived usefulness is positively associated with behavioural intention to accept e-procurement (Brandon-Jones & Kauppi, 2018; Kademaunga & Phiri, 2019; Kusuma & Pramunita, 2011; Ramkumar & Jenamani, 2015) and other new technology adoption areas like Internet banking (Astuti, Musadieq, & Utami, 2021), tourism (Hasni, Farah, & Adeel, 2021) and e-learning (Abdullah & Ward, 2016. The results from the current study revealed that users' perception of e-procurement technology is an important factor that determines its effective adoption.

One of the characteristics that substantially decides perceived usefulness in e-procurement is the speed of operations and efficiency due to reduction in paper works and personal contacts. The more the users perceived that the procurement cycle is shorter and more efficient than the manual paper-based processes, and the more useful the technology is to them, the more likely they are to adopt it. This will reduce the bottlenecks and corruption that characterized the already existing manual procurement system of the country. This finding is in conformity with the existing studies of e-procurement adoption in Nigeria (Adedeji, Dele, Rapheal, Opeyemi, & Damilola, 2017; Aduwo *et al.*, 2020; Ibem, Aduwo, Tunji-Olayemi, & Patience Oluwunmi, 2020). The demographic background of the respondents showed that the majority of the respondents are educated, with bachelor's and postgraduate qualifications, and hence are able to perceive the usefulness of e-procurement technologies and are ready to accept it for effective adoption.

The second hypothesis was that perceived ease of use has a positive influence on e-procurement adoption in the Nigerian public sector. The results of the hypotheses testing showed that PEOU is statistically non-significant, defying the research expectations. This result is in contrast to previous studies including Brandon-Jones and Kauppi (2018), Kusuma and Pramunita (2011), Singh and Punia (2011) and similar other studies like Alami and Idrissi (2022). This could be explained by the fact that users perceived PEOU as an essential characteristic of technology adoption, suggesting users may not always have a favourable attitude towards e-procurement even if they anticipate it to be simple. The result of the hypothesis also suggests that e-procurement users in the Nigeria's public sector are not affected by the perception of difficulty or ease of use of e-procurement systems, even as majority of the respondents (38.4%) were holders of bachelor's degree, followed by master's (33.1%) and postgraduate diploma holders (18%), and with e-procurement training. The result contradicts the findings of previous studies like Brandon-Jones and Kauppi (2018) and Autry *et al.* (2010), but conforms with the findings of Lee *et al.* (2019) for the adoption of virtual reality devices.

The third hypothesis of the study hypothesized that perceived trust has a positive influence on e-procurement adoption in the Nigerian public sector. This study has investigated the role of perceived trust in technology as a driver of users' acceptance of e-procurement technology. The findings of the study demonstrated that procurement users' trust in technology is significantly influenced by their behavioural intention to adopt e-procurement technology. This finding confirms the belief that a customer's perception of the mobile service infrastructure's environmental uncertainty is a key factor in influencing their acceptance and use, since trust

forms the foundation for technology adoption. As a result, mobile service providers should devise new techniques for improving trust in technology in order to increase users' intention to adopt the technology. This result is consistent with similar studies within the ICT literature including (Dutot, 2015; Matemba & Li, 2018).

The fourth hypothesis of the study hypothesized that perceived security has a positive influence on users' intention to adopt e-procurement. However, the majority of security perceptions indicated that it has an impact on user intention in e-procurement, indicating a strong link between the two and implying that e-procurement acceptance decisions are primarily based on securing confidential information against security breaches like hacking and exploiting vulnerabilities for collusion, and taking undue advantages over other competitors.

Furthermore, it was believed that unauthorized data access control and provision of real-time transaction security are some of the security measures that could reduce perceived dangers and boost user acceptance of e-procurement technology. The findings of this study conform to those obtained in a real-world setting, especially in developing countries like Nigeria. This finding is in conformity with several results in the previous studies (Githinji & Were, 2018; Johnson *et al.*, 2018).

7. Conclusions

This study analysed the impacts of factors influencing users' intention to adopt e-procurement in the public sector in Nigeria. The study proposes a model based on the TAM Model and incorporates security-related factors alongside TAM's system-related factors that affect users' intention to adopt e-procurement, and an empirical test was carried out to validate it.

The findings of the study indicate that users' intention to adopt e-procurement is positively and significantly influenced by perceived usefulness, perceived trust and perceived security. Perceived ease of use has a significant negative effect on users' intention to adopt e-procurement. The results implied that perceived usefulness, perceived trust and perceived security are the main factors influencing Nigerian public sector procurement officials' intention to adopt e-procurement. However, perceived ease of use was found to have a negative significant effect on their intention to adopt e-procurement.

8. Theoretical contribution

The TAM model has been effectively extended and implemented in a new domain, namely e-procurement, in the Nigerian public sector. The extension of the model has added a very important dimension; security factors which the model lacked but which are an important consideration in Nigeria when adopting Internet and online services like e-procurement. The research also supports and refutes some of the findings of Brandon-Jones and Kauppi (2018), Autry *et al.* (2010) and Alami and Idrissi (2022). Unlike their findings which suggest that the TAM attributes yield positive relationship with intension to adopt, this study demonstrates that their effects can either be positive, negative or insignificant regarding the intention to adopt e-procurement.

9. Practical contribution

This study is among the first that examined the system-related and security related factors influencing users' intention to adopt e-procurement in the Nigerian public sector. The findings of this study will help the policymakers in government with valuable input on how to tackle the challenges of e-procurement adoption by paying attention to the identified factors.

Secondly, e-procurement adoption is influenced by the employees' perception of system-related and security-related factors on their behavioural intention (Brandon-Jones & Kauppi, 2018). Therefore, the results will help service providers and software vendors understand users' perception in decision-making so as to design and develop appropriate products and services that facilitate productivity, inspire trust (Ramkumar & Jenamani, 2015), provide security (Johnson *et al*., 2018) and improve the usefulness of the technology (Brandon-Jones & Kauppi, 2018). They should also focus on developing products that are easy to understand and simple to handle. The modified model could be further tested in future studies using moderating factors like training and organizational culture.

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