Australian Journal of Business and Management Research
New South Wales Research Centre Australia (NSWRCA)

Volume. 8, Issue. 1, (81-99) ISSN (Online): 1839 - 0846

The Extended Technology Acceptance Model Using Structural Equation Model to Predict E-Procurement Adoption in the Ghanaian Healthcare Sector

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Received: 19 May, 2023
Final Revision: 26 July, 2023
Accepted: 9 August, 2024
Published: 22 August, 2024
10.52283/NSWRCA.AJBMR.20240801A05

Abstract

This paper seeks to examine e-procurement adoption technology, particularly in the Ghanaian public health sector. The adoption of e-procurement is crucial for the health sector due to its significance in enhancing internal efficiency and has a substantial influence on sustainability. Earlier studies have concentrated on how senior procurement managers utilize advanced technologies to attain environmental sustainability in healthcare operations. The Technology Acceptance Model (TAM) has been employed to elucidate the factors influencing the adoption decisions. The study utilized a questionnaire survey to assess respondents' understanding of questions posed by the researcher. The data from the questionnaires were investigated using the Statistical Package for Social Science (SPSS) version 21, the Amos 22, and the SmartPLS v3.2 software to determine the relationship between variables. The results of the study did not support the acceptance of two hypotheses, whilst the other hypotheses were found to support e-procurement adoption. From the findings of this study, recommendations from a management perspective are discussed to improve management awareness in adopting electronic procurement.

Keywords: E-procurement, TAM, Adoption decision and Ghanaian Health Sector

I. Introduction

Procurement refers to the process of acquiring goods and services for a company. Its objective is to secure the necessary resources for operational activities such as planning, purchasing, shipping, inspection, receiving, and storage. Goods procurement involves two main processes: conventional and electronic procurement. The electronic procurement herein could be referred to as eP. The use of e-procurement facilitates transparent, efficient, and equitable procurement practices. According to Thalang, Silpcharu, & Wattanakomol (2023), there are two main advantages of employing e-procurement which are direct benefits, which enhance operational efficiency, data accuracy, and application utility, and indirect benefits, which bolsters customer service. Additionally, e-procurement fosters competitiveness in procurement and strengthens relationships with business partners (Heredia et al., 2022). The successful implementation of e-procurement relies on various factors. Sarpong et al. (2023) emphasize the importance of management commitment to providing financial and technological

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support. Chakraborty (2021) found that organizational relationships and information technology infrastructure are key considerations for enhancing supply chain performance through e-procurement. Additionally, the application of e-procurement in government organizations highlights the significance of internal managerial backing and stakeholder engagement across various supply chains (Mavidis and Folinas, 2022). Innovation is defined as the incorporation of information communication technology for the acquisition of goods and services, which is crucial for successful technology adoption, particularly in developing countries. Information technology goes beyond enhancing overall performance; it also streamlines relationships and transactions among companies by effectively addressing specific issues related to asset and product description. E-procurement leverages innovative developments in information communication technology for procuring goods and services. Prior studies conducted by Dixit, Routroy & Dubey (2019) and Chakraborty (2021) highlighted the impact of web-based approaches and online analytical processing (OLAP) in enhancing supply chain performance. Furthermore, the selection of e-procurement technology platforms involves the use of methodologies such as the analytic hierarchy process (AHP), analytic network process (ANP), and hybrid fuzzy TOPSIS underscores the role of information technology quality in e-procurement adoption (Aljarboa & Miah, 2023). The incorporation of advanced technologies into procurement practices in developing nations has emerged as a managerial concern in the ten regional public and teaching hospitals in Ghana. Sharma et al. (2016) underscore technology infrastructure as one of the three significant hurdles faced by developing economies in implementing e-government initiatives. Conversely, the role of management support in improving infrastructure quality in these countries has been deemed less crucial (Ofori et al., 2023). Prior studies have mainly focused on examining the factors influencing governments' adoption of e-procurement in other sectors of the economy. These studies have largely been focused on top management preparedness and government commitment to eP adoption (Heredia et al., 2022; Thalang et al., 2023; Mavidis and Folinas, 2022). However, these investigations have mainly isolated individual factors and have overlooked the interconnected nature of e-procurement adoption in public and teaching hospitals in Ghana. In the context of Ghana, prior studies have primarily explored the merits and demerits of eP adoption. According to Gunasekaran and Ngai (2008), potential savings can be derived from eP adoption. For instance, General Electric saved US$10 million annually due to the implementation and adoption of eP (Aboelmaged & Gebba, 2013). In addition, Motorola, Nestle, Renault, and Schlumberger are organizations that in times past employed eP to reduce organizational expenses and time in their procurement practices. Top managers' adoption decision on eP is paramount (Jasperson, Carter, & Zmud, 2005; Brandon-Jones and Kauppi, 2018; Jo, 2021; Turel et al., 2011). However, they have not thoroughly identified the key factors contributing to eP adoption (Ofori et al., 2023; Ofori & Fuseini, 2020; Davis, 1989; Sharma et al., 2016; Wu and Chen, 2005). This has created a knowledge gap worth investigating in the Ghanaian healthcare sector. Consequently, the study delves into the eP adoption in the ten regional public and teaching hospitals in Ghana. This study employs a quantitative approach by applying Partial Least Square-Structural Equation Modeling (PLS-SEM) to analyze the variables in the study. According to Sarpong et al. (2018), PLS-SEM serves to validate theories, elucidate variable relationships, and examine constructs formulated with both formative and reflective indicators. This research will contribute to the development of a theoretical framework for eP adoption in Ghana. The results of the study could be employed by purchasing managers to plan and implement effective ways to motivate employees to use eP systems (Du et al., 2020; Buhalis, & O'Connor, 2005; Adjei-Bamfo et al., 2018).

The order of the paper is presented in seven sections. Section one discusses the introduction and identifies the gap between previous studies and the research statement. The second section discusses the overview of the Ghanaian context, conceptual framework, and development of research hypotheses for the study. Scale development processes will be discussed in section three. The fourth section discusses the methods, hypotheses testing, and data analysis. The fifth section deliberates on the results and discussion. The sixth section discusses the implications of the study. Section seven discusses the conclusion and limitations of the study.

II. Literature Review and Development of Hypotheses

Overview of the Ghanaian Context

Public hospitals are complex institutions of professionals who manage patient care. Public hospitals support the administration and medical laboratory diagnostics for better effective healthcare delivery. These state institutions have taken various initiatives to achieve the organization's aims of providing healthcare. However, such efforts are limited to some health purchasing processes (Handayani et al., 2016; Essuman et al., 2020). The integration of healthcare information systems has been an important intervention. Healthcare practitioners are of the view that efficient use of healthcare information systems can improve healthcare management. These advanced technologies help healthcare professionals to secure access to patient information. Furthermore, these will improve access to patient data and how their medications will be administered (Antwi et al., 2014). Although e-procurement systems hold the potential to provide numerous advantages for efficient health service delivery in

Ghanaian public and teaching hospitals, the adoption and utilization of these systems have been challenging. Despite the implementation of similar health technologies in the past, Ghana has not attained the same level of ICT adoption as China (Hoque et al., 2017). The Ministry of Health reports that less than 20% of the regional public hospital operations in Ghana have been rolled onto the hospital information systems, a situation not mirrored in other public district hospitals. In contrast, China has successfully integrated over 69% of its healthcare delivery systems (Rahim et al., 2021). In Ghana's public hospitals, despite the expectation that advanced technologies would replace outdated information methods, reality paints a contrasting picture of unmet expectations. Notwithstanding the promise of this innovation, the integration of modern technological solutions into the healthcare infrastructure has encountered significant barriers, leaving the healthcare system entrenched in old-fashioned methods of doing things. This discrepancy highlights systemic challenges such as limited financial resources, inadequate infrastructure, and a lack of comprehensive strategies for technology adoption and implementation. So, the transformation of the healthcare sector through technological advancements remains elusive as the result of the inefficiencies impeding the sector's ability to provide optimal care to patients (Olulege et al., 2023).

Conceptual Framework

In today's era of advanced technologies, the distinction between technology-centric and procedure-based e-procurement has become progressively less evident. Modern technology is now deeply intertwined with procedural methods, making the traditional classification less significant. Previous studies on e-procurement have been done on specific technologies like ERP, EDI, RFID, and e-business applications and, how these technologies facilitate supply chain operations (Bialas et al., 2023; Mousa and Othman, 2020; Bof and Previtali, 2007; Lustrato, 2014; Khazanchi, 2005). This viewpoint underscores the crucial function of technology in facilitating procurement procedures and highlights the importance of examining burgeon technologies for adoption in the healthcare sector. In this paper, procurement practices refer to all technology-driven methods and policies that promote effectiveness in the healthcare sector (Ahmed and Seidu, 2022). To gain deeper insights into the adoption of technologies researchers have introduced technological models such as the technology acceptance model TAM and the technology organization environment (TOE) framework to explain adoption decisions (Al-Maroof et al., 2023). Researchers have integrated TAM with additional models to improve its ability to explain and predict adoption. Alternatively, the TOE model offers a comprehensive perspective by incorporating additional determinants (Hajj et al., 2021). On the other hand, the TAM has been effectively utilized to explain the adoption and diffusion of information (Na et al., 2022; Scherer et al., 2019; Gelsomino et al., 2016). Due to its empirical evidence in exploring technology adoption, the TAM framework presents a robust foundation for analyzing eP adoption (Tiberius et al., 2021). See Figure 1.

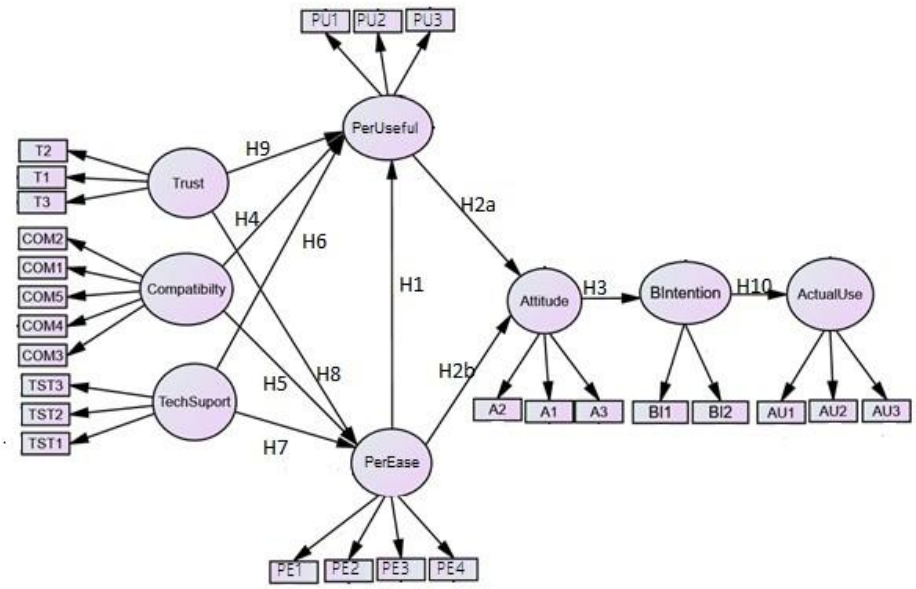

Figure 1. The Hypothesized Model for Assessing User Acceptance Intentions of E-procurement Adoption on Technology Acceptance Model

Hypotheses Formulation

Based on the theory of Technology Acceptance Model

Attitude towards assessing Employee users' acceptance intentions on E-procurement

The Technology Acceptance Model (TAM) is widely known as a framework for understanding the adoption of information technology (Awa et al., 2011; Eze et al., 2013). This model is anchored on economics, psychology, and sociology, and provides a framework for understanding human behavior about adoption decisions. Venkatesh et al. (2012) observed that the TAM framework originated from the theory of reasoned action (TRA), and has been tailored to better understand and predict how users embrace and incorporate information systems and technology in organizational operations. Chau and Hu, (2001) discover that an individual's attitude or perception toward technology significantly influences their intentions to use a system. These findings have underscored the importance of considering individuals' attitudes toward technology when predicting their user intentions. The TAM assesses the degree to which a person believes that using a particular technology will enhance their performance or productivity. It reflects the individual's perception of the technology's use in achieving specific tasks or goals (Lu et al., 2003; Chopdar et al., 2018; Chakraborty & Paul, 2023). The willingness to embrace an innovation reflects its perceived use and the expected benefits that potential users expect to gain from the innovation (Awa et al., 2010; Castricum, 2015). Several studies utilized the extended TAM framework to understand perceived usefulness (PU) in its short-term and long-term benefits for technology adoption. This breakdown enabled the understanding of PU's effect on the immediate and long-term benefits of using the eP system. The PU and the PEOU are the most important variables that influence behavioral intentions for adoption decisions. The PU provides valuable insights into how consumers perceive information technology (Awa et al., 2010; Wang et al., 2013). When a user perceives an IT program as easy to use, they are more likely to feel comfortable adopting it into their daily activities in the workplace (Shroff et al., 2011). PEOU influences users' attitudes and intentions towards IT adoption. When users perceive a technology as easy to use, they are more inclined to have positive attitudes and intentions to use it. This perception of ease of use can lead to user acceptance and adoption of IT programs (Hasan and Ahmed, 2007). The PEOU has a positive effect on PU (Awa et al., 2015; Mazzu et al.,2021; Ramkumar et al., 2019). Alsyouf et al. (2023) underscored the significance of PU and PEOU in the information technology (IT)adoption. The feeling of embracing technology is based on the user's perceptions of its use and the user-friendliness of the eP system (Badi et al., 2021). When users perceive a system as easy to use and see it as beneficial to meet their tasks or goals, they are more likely to develop positive attitudes toward it. Thus, PEOU reduces barriers to eP adoption, whereas PU enhances its value and relevance to users and creates a positive attitude toward eP adoption. Hence, the following hypotheses are proposed:

H1: PEOU will have a positive effect on PU to use an e-procurement system.
H2a: PU will have a positive effect on attitude to use an e-procurement system
H2b: PEOU will have a positive effect on attitude to use an e-procurement system
H3: Attitude will have a positive effect on the user's behavioral intention to the actual use of an e-procurement system

Compatibility

Compatibility refers to the ability to view innovation as aligning with users' current beliefs and preferences and resonates with users' values and expectations. According to Claudy et al. (2015), an innovation will seamlessly integrate with users' existing frameworks and meet their expected needs and desires. Duan, (2019) noted that information technology (IT) and information systems (IS) are explained through the lens of innovation diffusion theory. This theory posits that the adoption and diffusion of innovations within a society or organization can be understood through various factors such as relative advantage, complexity, trialability, compatibility, and observability (Brandon-Jones & Kauppi, 2018; Awa et al., 2011). Moreover, Sahi et al. (2021) observed that the uptake of innovation tends to adhere to other similar forms in the technological space. This suggests that the process of adopting new ideas, technologies, or practices often exhibits similar characteristics regardless of the specific context or domain (Giovanis et al., 2012; Shi et al., 2020). The TAM and Innovation Diffusion Theory/Diffusion of Innovations (IDT/DOI) are closely interconnected. PEOU correlates with compatibility, while PU is linked to relative advantage. The compatibility and PU construct ensures that the new system aligns seamlessly with established workflows and integrates smoothly with existing tools, making it easier for users to understand its benefits and perceive it as valuable (Yan et al., 2021; Mun et al., 2006; Ansong et al., 2017; Roman et al., 2018). Hence, the following hypotheses are proposed:

H4**:** Compatibility will have a positive effect on the PU of an e-procurement system.
H5: Compatibility will have a positive effect on the PEOU of an e-procurement system.

Technical support and training (TST)

Technical support and training are key factors influencing electronic procurement adoption rates. Organizations that invest in comprehensive training programs and provide ongoing technical support to employees do so to help them transition to eP systems (Rubin et al., 2013). Technical support and training can enhance the PU of eP systems by ensuring that users understand the benefits and functionalities of the system. When users receive adequate training and support, they are more likely to perceive the system as valuable in helping them perform their tasks efficiently and effectively. For example, if users are trained on how to use an APP, such as automated workflows or electronic approvals, they are more likely to recognize the system's usefulness in saving time and cost (Baptista & Oliveira, 2015). Technical support and training play a crucial role in improving the perceived ease of use of electronic procurement systems. Training sessions could familiarize users with the interface, navigation, and functionalities of the eP system, thereby making it easier for them to adapt and use the eP system confidently (Badi et al., 2021; Chopdar et al., 2018; Chakraborty & Paul, 2023). Moreover, technical support services could address any user concerns by reducing frustrations thereby enhancing the overall user experience. As users become more comfortable with the eP system through training and support, they are likely to perceive it as easier to use, which can positively influence their attitudes toward adoption (Lebek et al., 2014; Cresswell & Sheikh, 2013; Aceto et al., 2018). Hence, the following hypotheses are proposed:

H6: Technical support and training will have a positive effect on the PU of an electronic procurement system
H7**:** Technical support and training will have a positive effect on the PEOU of an electronic procurement system

Trust

Trust in the context of e-procurement can be defined as the belief that the e-procurement system is reliable, secure, and capable of fulfilling its intended purpose without exposing users to risks such as data breaches, fraud, or transaction errors (Masudin et al., 2021). Trust in the eP system is closely linked to its perceived usefulness. When users trust that the system will facilitate their procurement tasks, they are more likely to perceive it as useful (Brandon-Jones & Kauppi, 2018). Trust is built on factors such as system reliability, security of transactions, and the system's ability to deliver on its promises. For example, if users trust that the system will accurately process orders, maintain data confidentiality, and provide timely support when needed, they are more likely to perceive it as useful in improving their procurement processes (Namahoot & Jantasri, 2023; Nanang et al., 2017). Trust also influences the perceived ease of use of the eP systems. When users trust that the system is secure and reliable, they are more willing to explore its features and functionalities, leading to the ability of the user to use the eP system (Al-Qaysi et al., 2020; Garavand et al., 2022). The trust of using an advanced technology can alleviate concerns about usability issues thereby making users feel more comfortable and confident with the system. As a result, they are likely to perceive the system as very easy to use and adopt the eP system (Awa et al., 2011; Chen & Aklikokou, 2020). Hence, the following hypotheses are proposed:

H8: Trust will have a positive effect on the PU of an electronic procurement system
H9: Trust will have a positive effect on the PEOU of an electronic procurement system

Behavioral intention

Behavioral intention acts as a predictor of actual use. When individuals have a positive intention to adopt eP system, they are more likely to engage in behaviors that lead to its actual use (Cresswell & Sheikh, 2013; Rajan & Baral, 2015; Taherdoost, 2022). For example, if employees show a clear intention to use the eP system based on their beliefs and its perceived ease of use, they are more likely to actively use the system (Para-Lopez et al., 2011; Neumann et al., 2023; Glyptis et al., 2020). Furthermore, Venkatesh et al. (2016), indicated that perceived behavioral intention has a direct effect on a user's attitude to engage in online transactions. Hence, the following hypothesis is proposed:

H10: Behavioral intention will have a positive effect on the actual use of an electronic procurement system.

III. Methodology

Institutional Review Board Statement

Before the data collection was done the study obtained formal authorization from Ghana's Ministry of Health (MOH) Ethical Review Committee, with the reference number MOH-ERC 110/07/22. Subsequently, after securing approval from the ten regional and teaching hospitals' Health Directorate and the Municipal Health Directorates, an official request for ethical clearance was submitted to the Ministry of Health Service Ethics Committee. This submission included a comprehensive outline of the study's protocols, methodology, and questionnaire. At the participant level, we ensured clarity in explaining the procedures, techniques, and approaches in English. Each respondent was provided with a written and signed consent form acknowledging their understanding of the study's benefits and risks, as well as the assurances of confidentiality, privacy, voluntary participation, and the freedom to withdraw at any point before the interview commences. The data collected was kept with strict confidentiality, devoid of any identifiable information about respondents involved in the study's investigation. The data collected were solely used to achieve the study's objectives. We took rigorous measures to safeguard respondents' privacy and explained the precautions taken to secure their data, including coding to render it untraceable or identifiable. Participation was entirely voluntary, and respondents were informed that there were no undisclosed concerns or direct personal benefits associated with their involvement in the survey.

Scale Development Process

The study aims to validate the hypothesized relationship between users' acceptance intentions and eP adoption. Furthermore, the investigation of the relationship requires the use of robust data. The scale development process involves research reviews that help in understanding the variables employed in the study. The study adopted validated scales and was modified based on the items in the study.

Data collection

Our study primarily focused on the ten public and teaching hospitals in Ghana. Four hundred and ninety (490) e-procurement end-users (internal customers) formed the survey population for the study. In line with other scale development, it was not suitable at this stage to survey e-procurement users in a broader range of organizations, until the proposed construct items had been examined in the original research setting (Parasuraman et al.,1988). Given the small population size, and therefore the criticality of a high response rate, all potential respondents were contacted by telephone to encourage cooperation with the study before surveys were sent (Dillman et al., 2010). Initially, hard copies of the cover letters, surveys, and pre-paid return envelopes were posted to potential respondents, with reminder e-mails sent between two and three weeks later. A second hard copy of the questionnaires was sent after four weeks alongside a final phone call to non-respondents. 356 usable questionnaires were returned, representing a high response rate of 73.0%. The absolute sample size exceeds most suggestions found in the literature and compares favorably with other recent e-procurement studies (Mishra et al., 2013; Namahoot & Jantasri, 2023; Neumann et al., 2023).

Socio-Demographic Background of Respondents

Descriptive statistics were used to analyze the demographics of the respondents, see Table 1. The majority of respondents were male, with nearly 40% falling within the 21-30 age range. The next age group represented almost 30% of the sample, were aged between 31 and 40 respectively. The interviews predominantly included individuals who were under 30 years of age due to their familiarity with IT advancements in the ten regional public and teaching hospitals in Ghana. The composition of employees in public hospitals included individuals with undergraduate(bachelor) and postgraduate degrees, accounting for 60.4% who possess the highest level of education. This educational background is likely to impact their willingness to adopt e-procurement. Among end users/employees, they make up 45.2% of the workforce, while supply chain managers represent 32.3% of the entire workforce. This distribution may reflect their familiarity with procurement practices within public hospitals. It emphasizes the active involvement of end users/employees and supply chain managers in procurement operations. In terms of experience, 30.6% of respondents have less than three years of experience in procurement, and 37.9% have been in their current position for 3 to 5 years, whereas 31.5% have been in their position for over 5 years.

Table 1: Profile of the respondents

Gender	Frequency	%	Level of Education	Frequency	%
Male	210	59.0	Secondary	75	21.1
Female	146	41.0	Undergraduate	99	27.8
Total	356	100.0	College Diploma	66	18.5
Age	Frequency	%	Postgraduate	116	32.6
18-20	35	9.8	**Total**	356	100
21-30	142	39.9	Position Held	Frequency	**%**
31-40	106	29.8	Supply Chain Manager	115	32.3
41-50	73	20.5	Procurement Officer	80	22.5
Total	356	100.0	User/Employees	161	45.2
			Total	356	100
HOW LONG HAVE YOU BEEN IN THIS POSITION				Frequency	%
Less than 3 years				109	30.6
Between 3 and 5 years				135	37.9
More than 5 years				112	31.5
Total				356	100

Theory of Technology Acceptance Model

The variables used in the model to investigate the study factors were mainly derived from relevant studies, with minor modifications in wording to fit the requirements of the study. The items measuring the Perceived Usefulness (PU) variable include PU1: I find the e-procurement system useful to improve my work and life in general. PU2: Using an e-procurement system will allow the user to easily acquire the necessary information they need. PU3: I would find the e-procurement application very useful. The Perceived Ease of Use has the following items; EOU1: Learning to use the e-procurement system would be easy for me. EOU2: Interaction with the e-procurement would be clearer and more understandable. EOU3: It will be easier for me to become skillful when using an e-procurement system. EOU 4: The e-procurement system would be easy for me to use (Lien et al., 2021). The items measuring Behavioral intention are BEHINUS 1: Using an e-procurement system for handling my procurement task is what I would prefer to have. BEHINUS 2: I would see myself using e-procurement to take care of my procurement activities (Granic, 2023). The Actual Use construct was measured by these items ACTUS 1: People who are important to me think that I should use the e-procurement system. ACTUS 2: People who inspire me would think that I should use the e-procurement system. ACTUS 3: People whose opinions I value would prefer that I should use the e-procurement system. All items were adapted from (Panigrahi et al., 2018; Mahzan & Lyme, 2014). The study adopted a 5-point Likert scale with options ranging from "strongly disagree" (1), "disagree" (2), "neutral" (3), "agree" (4), to "strongly agree" (5) for respondents to rate their responses. The items for Attitude A1: Using the e-procurement system saves time. A2: Using the e-procurement system would be a good idea. A3: Using the e-procurement system would be good for my work. All items were adapted from (Alalwan et al., 2018). The Compatibility construct was measured by the following items. COM1: Using the e-procurement system fits well with the user's work. COM2: Using the e-procurement system fits the firm style and culture. COM 3: The e-procurement system would be relevant to our work. COM4: Using the e-procurement system would be compatible with all aspects of the user's work. COM5: Using e-procurement would help to improve user's capability was obtained from (Aboelmaged & Gebba, 2013; Mose et al., 2013). All items were evaluated on a 5-point Likert-scale as explained above. The test indicators measuring the Trust construct were T1: I feel apprehensive about using the e-procurement system application in my work. T2: Using an e-procurement system would not reveal the firm's information. T3: I find the e-procurement system application will be safe to use and was also adapted from (Glyptis et al., 2020; Richard et al., 2007). The Technical Support and Training (TST) construct has the following measuring items TST 1: A specific person will always be there to offer help with the e-procurement system. TST 2: I will be given instructions and education on e-procurement software. TST3: Health authorities will provide training programs to us were sourced from (Alalwan et al., 2018). The authors investigated e-government adoption in the public institutions of developing countries using the TAM. They also adapted a 5-point Likert scale (1-strongly disagree, 2-disagree, 3-indifferent, 4-agree, and 5-strongly agree) to assess questionnaire items. The questionnaire was divided into eight sections. In the first section, the Attitude construct was assessed by a mean of three items with a higher score showing a more positive attitude. In the second section, the Compatibility construct was measured by a mean of five items with an advanced score showing a more positive consistency with users' current values. In the third section, the PEOU construct was assessed by mean of four

items with a higher score indicating a more favorable use and adoption. In the fourth section, the PU construct was tested using a mean of three items with a higher score showing a greater tendency to use the e-procurement system. In the fifth section, the technical support and training construct were measured by a mean of three items with a higher score showing a more positive internal support for programs by top managers. A higher score indicated a more positive prediction of users' adoption of the e-procurement system in the sixth section, which tested the Trust construct with a mean of three items. The Behavioral intention to use construct was measured by the mean of two items, with a higher score indicating a more positive desire to use in the seventh section. Finally, in the eighth section, the Actual use construct was evaluated by a mean of three items. All constructs demonstrated Cronbach's alpha values above the threshold cut-off of 0.70, which shows the scales were all within acceptable levels of reliability. To ensure balance and unpredictability, certain items were excluded. Subsequently, all the items were randomly distributed to avoid the possibility of a ceiling effect (or floor effect), which might cause repetitive responses to items assessing the same idea.

Theory of Technology Acceptance Model Scale

The principal component analysis, or PCA, is a statistical technique that permits one to summarize the information content in large data sets by employing a smaller set of summary indices that can easily be pictured and studied. The reason for principal components analysis is for retention and interpretation of the items in the study. The varimax rotation technique was used to convert the components into factors for easy understanding (Ge et al., 2017). Generally, only the primary components having eigenvalues exceeding one were retained. The assessment of the twenty-four (24) test items in the study was conducted by principal component analysis (PCA). The suitability of the data for factor analysis was considered. The likelihood of factoring the matrix can be evaluated by Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy. Factorability is achieved when the KMO exceeds 0.6 and Bartlett's test of sphericity is also significant. When assessing the suitability of factor analysis, a single indicator comes into play i.e. the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy. Factor analysis is considered based on KMO values 0.5 to 1.0. The Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Sphericity (BTS) were employed to validate the suitability of principal component analysis. The p-value for significance was 0.000, and the Kaiser-Meyer-Olkin measure of sample adequacy yielded a value of 0.764. These values were higher than the cut-off value of 0.6, implying there were enough items for each factor (Andati et al., 2022). Also, the factor loadings demonstrate the strength of the association between the measuring items and the constructs. The scale items with factor loadings below 0.5 (.50) were removed (Neuendorf, 2017). The item statements such as “usage of an e-procurement system is relevant” and “using e-procurement system allows users to easily acquire the necessary information they need” experienced a low factor loading to a single factor (<.50) were also eliminated. Finally, a total of 22 items in all, were kept for the analysis. In the study sample, the PCA extracted eight constructs of the TAM factors with Eigenvalues greater than 1.0, explaining 19.14%, 9.92%, 7.58%, 7.23, %, 6.49%, 6.26%, 4.31%, and 3.89% or a cumulative value of 64.83% see table 2**.** The employment of varimax rotation facilitated a more precise explanation and interpretation of the eight constructs examined in the study. The rotated component matrix showed that each construct exhibited stronger loadings on a single construct. Cronbach's alpha is a coefficient that measures the extent to which items in a test are correlated with one another. It ranges from 0 to 1, where higher values indicate greater internal consistency (Tavakol & Sandars, 2014). The Cronbach’s alpha (α) coefficient of internal consistency occurs when all scale items are standardized with values higher than 0.70(see Table 2).

Table 2: Exploratory factor analysis of TAM Scale

Factor and Measurable Items	Factor Loading	% of Variance	Cronbach’s alpha	Factor Mean
Trust		19.14	0.829	3.83
I feel apprehensive about using the e-procurement system application in my work.	.711			
Using an e-procurement system would not reveal the firm’s information.	.827			
I find the e-procurement system application would be safe to use	.750			
Compatibility		9.92	.780	3.46
Using the e-procurement system fits well with the user's work.	.723			

Using the e-procurement system fits the firm's style and culture.	.741			
The e-procurement system would be relevant to our work	.974			
Using the e-procurement system would be compatible with all aspects of the user's work.	.619			
Using e-procurement would help to improve user's capability.	.734			
Technical Support and Training		7.58	0.858	3.75
A specific person will always be there to offer help with the e-procurement system.	.795			
I would be given instruction and education on e-procurement software.	.812			
Health authorities will provide training programs on e-procurement system	.921			
Perceived Usefulness		7.23	0.906	3.52
I find the e-procurement system useful to improve my work and life in general.	.806			
Using an e-procurement system will allow the user to easily acquire the necessary information they need.	.757			
I would find the e-procurement application very useful.	.844			
Perceived Ease of Use		6.49	0.745	3.83
Learning to use the e-procurement system would be easy for me.	.735			
Interaction with the e-procurement would be clearer and more understandable.	.777			
It will be easier for me to become skillful when using an e-procurement system.	.909			
The e-procurement system would be easy for me to use.	.825			
Attitude		6.29	0.742	3.81
Using the e-procurement system saves time.	.722			
Using the e-procurement system would be a good idea.	.857			
Using the e-procurement system would be good for my work.	.834			
Behavioral intention to use		4.31	0.786	3.88
Using an e-procurement system for handling my procurement task is what I would prefer to have.	.936			

I would see myself using an e-procurement to take care of my procurement activities.	.695			
Actual Use		3.89	0.799	4.07
People who are important to me think that I should use the e-procurement system.	.867			
People who inspire me would think that I should use the e-procurement system.	.787			
People whose opinions I value would prefer that I should use the e-procurement system.	.763			

IV. Data Analysis

Structural Equation Modeling (SEM)

Structural Equation Modeling (SEM) is a statistical technique used to test and validate complex theoretical models that depict relationships between observed and latent variables. In SEM, researchers can examine both the measurement model (the relationships between observed variables and their underlying constructs) and the structural model (the relationships between latent variables themselves). SEM allows for the estimation of direct and indirect effects among variables, providing insights into the underlying mechanisms driving observed phenomena. It is widely used in various fields such as psychology, sociology, economics, and marketing to assess complex relationships among variables and theoretical models (Agi & Jha, 2022; Ahmad et al., 2020; Yu et al., 2015). Confirmatory factor analysis (CFA) is a statistical method used to assess the validity of measurement instruments by examining the relationships between observed variables (indicators) and their underlying constructs (factors). In confirmatory factor analysis, the researcher begins by formulating hypotheses regarding the underlying factors believed to influence the measures being analyzed. These hypotheses guide the construction of the model, with constraints imposed to ensure alignment with theoretical expectations. Model fit measures are subsequently utilized to evaluate the extent to which the proposed model accurately represents the relationships among all the items. If the constraints imposed by the researcher do not align with the observed data, statistical tests of model fit will indicate a lack of compatibility, leading to the rejection of the model. Poor fit may suggest discrepancies in certain items or measurements which may lead to further investigation (Sánchez-Rodríguez et al., 2020).

Assessing Model Fit

Once the model is specified and the data entered correctly, it is necessary to evaluate how well the data fits the proposed model. Model fit indices provide quantitative measures to evaluate the degree of correspondence between the hypothesized model and the observed data. The degree to which the model adequately explained the observed and measured variables was evaluated using some text items. According to Becker et al. (2023), a model structure is often developed after the measurement model has been established. The overall measurement model fit is calculated. The confirmatory factor analysis and the maximum-likelihood estimation method for model acceptability were done using Amos 22.

Goodness of fit indices

The goodness of fit indices serves as crucial metrics in structural equation modeling (SEM), offering quantitative insights into how well a proposed model aligns with observed data. In the context of ep adoption, where organizations transition to digital platforms for procurement processes, these indices play a vital role in assessing the suitability of theoretical models and understanding the dynamics of adoption (Adjei-Bamfo et al., 2019). The confirmatory factor analysis employed the chi-square goodness-of-fit test. A non-significant chi-square value indicates that the proposed model fits the data. The chi-square value for hypothesized models should also be close to the degree of freedom. Another helpful measurement, the relative chi-square value is obtained by dividing the chi-square statistic by the degrees of freedom. For a suitable fit, the theoretical model and the sample data set ratio should be either 2:1 or 3:1. The standardized root mean square residual (SRMR), comparative fit index (CFI), root mean square error of approximation (RMSEA) and predicted close fit are other accepted measures of fit in SEM (PClose). CFI should be equal to or greater than 0.95 for a satisfactory fit, whereas, SRMR values fall between

0.08 and 0.10 and values greater than 0.10 indicate a poor fit. SRMR values range from 0 to 1, with lower values indicating better fit. Typically, an SRMR value less than 0.08 is considered a good fit. The result for RMSEA should range between 0.04 and 0.07, while values less than 0.05 indicate a close fit value between 0.05 and 0.08 suggest a good fit, and values above 0.1 indicate a poor fit (Perry et al., 2015).

Measurement Model

The measurement model involves the testing of the model constructs, and their measuring items (see figure 2). This test evaluated the internal consistency, convergent, and discriminant validities. All loadings in the measurement model exceeded 0.7 except, the Compatibility and the Behavioral intention variables, which registered loadings lower than 0.6 (refer to Table 3). Nevertheless, the loadings for the measurement model remained acceptable. Furthermore, all composite reliabilities tests exceeded the 0.70 threshold, indicating a high level of internal consistency and reliability (see Table 3). In addition, the average variance extracted (AVE) values for each variable exceeded 0.5 for convergent validity (Chin, 2010).

Discriminant validity evaluation

Discriminant validity indicates the degree to which a construct is practically different from other constructs. Creating discriminant validity therefore necessitates that a construct be distinctive and captures phenomena that are not reflected by other constructs in the model. The heterotrait-monotrait ratio, Fornell-Lacker criterion, and cross-loadings were used to examine the discriminant validity evaluation. The HTMT explained the average value of the item correlations across constructs relative to the geometric mean of the average correlations for the items measuring the same construct. Higher values of HTMT values and, the minimum threshold value of 0.85 indicated discriminant validity problems (Henseler et al., 2015; Hair et al., 2019). The highest value of HTMT was 0.630 < 0.85 recommended minimum value (Table 3). The Fornell-Larcker Criterion compared the square root of the AVE values with the latent variables' correlations. The threshold was that the square root of each construct AVE was larger than its maximum correlation with any other construct. The square roots of the AVEs for the constructs met the threshold of discriminant validity (Table 3). Cross-loadings were produced by correlating the indicator scores of constructs with all other items. If the loadings of each indication were greater for its allocated build than for any other construct, and if the loadings of each construct were highest with their assigned indicators. The loadings of the indicators associated with the respective constructs loaded highest on their individual constructs than loadings on other constructs (Table 4).

Table 3: Rotated components matrix, discriminant and convergent validity results

Constructs items	Mean	Std	Outer loading	CR	AVE
Trust				0.829	0.662
I feel apprehensive about using the e-procurement system application in my work.	3.24	1.30	.711		
Using an e-procurement system would not reveal the firm's information.	3.08	1.59	.827		
I find the e-procurement system application would be safe to use.	3.18	1.16	.750		
Compatibility				0.780	0.694
Using the e-procurement system fits well with the user's work.	3.30	1.29	.723		
Using the e-procurement system fits the firm's style and culture.	3.29	1.22	.741		
The e-procurement system would be relevant to our work.	3.12	1.15	.974		
Using the e-procurement system would be compatible with all aspects of the user's work.	3.47	1.25	.619		
Using e-procurement would help to improve user's capability.	2.97	1.08	.734		
Technical Support and Training				0.858	0.572

A specific person will always be there to offer help with the e-procurement system.	3.04	1.03	.795		
I would be given instruction and education on e-procurement software.	3.07	1.30	.812		
Experts or programs on training would be made available.	2.13	1.06	. 921		
Perceived Usefulness				0.906	0.645
I find the e-procurement system useful to improve my work and life in general.	3.28	1.13	.806		
Using an e-procurement system permits the user to easily acquire the necessary information they need.	3.26	1.08	.757		
I would find the e-procurement application very useful.	2.93	1.02	.844		
Perceived Ease of Use				0.745	0.639
Learning to use the e-procurement system would be easy for me.	3.82	1.87	.735		
Interaction with the e-procurement would be clearer and more understandable.	3.42	1.15	.777		
It will be easier for me to become skillful when using an e-procurement system.	4.07	1.71	.909		
The e-procurement system would be easy for me to use.	4.01	1.88	.825		
Attitude				0.742	0.522
Using the e-procurement system saves time.	3.76	1.16	.722		
Using the e-procurement system would be a good idea.	3.89	1.05	.857		
Using the e-procurement system would be good for my work.	3.79	1.17	.834		
Behavioral intention to use				.786	0.594
Using an e-procurement system for handling my procurement task is what I would prefer to have.	3.99	1.68	.936		
I would see myself using an e-procurement to take care of my procurement activities.	3.78	1.01	.695		
Actual Use				0.799	0.579
People who are important to me think that I should use the e-procurement system.	4.04	1.00	.867		
People who inspire me would think that I should use the e-procurement system.	3.96	1.22	.787		
People whose opinions I value would prefer that I should use the e-procurement system.	4.21	1.88	.763		

The acceptable discriminant validity test, the square roots of the AVE's of the following variables such as the Compatibility, the PEOU, the Actual Use, the Attitude, the Technical Support and Training, the Trust, and the PU were greater than the correlations across the variables (see table 3). Finally, the multicollinearity test of all groups with more than one predictor was evaluated. The model performance results for the variance inflation factor (VIF) for all predictors were less than 5. The square root of the AVE's should be greater than all correlations with the other latent variables for a suitable discriminant validity. Each of the constructs in the model satisfies these conditions (Cheung and Wang, 2017).

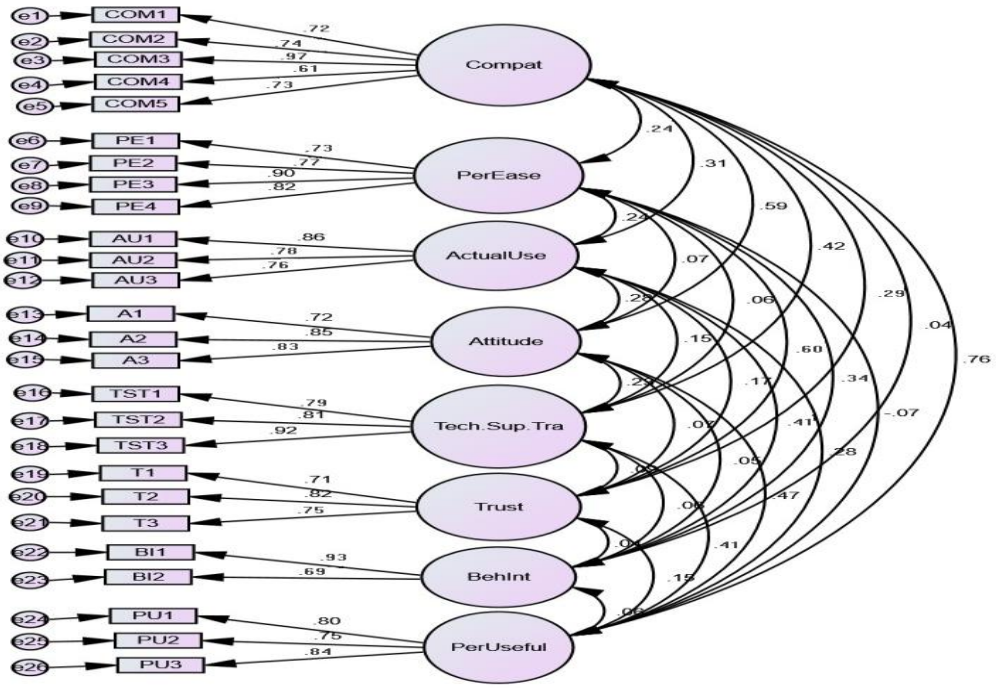

Figure 2 Measurement model

The confidence intervals for the correlation between the constructs are all below unity and varied from -0.070 to 0.76. This allows for the discriminant validity to be established (see Figure 2).

Table 4: Test of goodness-of-fit

	Threshold		Recommended
Measure	Terrible	Acceptable	Excellent
CMIN/DF	>5	>3	>1
CFI	< 0.90	< 0.95	>0.95
SRMR	>0.10	>0.08	< 0.08
RMSEA	>0.08	>0.06	<0.06
P Close	<0.01	>0.05	>0.05
Significance and Strength of individual paths of User Acceptance intentions of procurement antecedents			
Paths	Hypothesis	Path Coefficients	Acceptance Level
		Estimate P-Values	
Per Useful <---- Per Ease	H1	0.62 0.023	Accepted
Attitude <---- Per Useful	H2a	0.57 0.021	Accepted
Attitude <---- Per Ease	H2b	-0.27 0.705	Not Accepted
Beh Int <----Attitude	H3	0.61 < 0.01	Accepted
Per Useful <----Compat	H4	0.79 0.002	Accepted
Per Ease <---- Compat	H5	0.39 0.013	Accepted
Per Useful<----Tech Supp&Tr	H6	0.42 0.033	Accepted
Per Ease <---- Tech Supp&Tr	H7	-0.92 0.064	Not Accepted
Per Ease <----Trust	H8	0.22 < 0.01	Accepted

Per Useful <----Trust	H9	0.31	< 0.01	Accepted
Actual <---- Beh Int	H10	0.38	0.023	Accepted

(T: Trust; Compat: Compatibility; Tech Supp&Tr: Technical Support and Training; PU: Perceived usefulness; PEOU: Perceived ease of use; Attitude: Attitude; BehInt: Behavioral intention; Actus: Actual use) *p <0.05; **p<0.01 ***p<0.001. The cutoff point for the fit indices in covariance structure Analysis is conventional Criteria Versus New Alternatives (Hu, & Bentler, 1999).Assessing the adequacy of the measurement model fit involves the use of a wide range of metrics, such as the ratio of chi-square and degrees of freedom(χ^2/df) = 271.00, CMIN/DF = 1.314, Comparative Fit Index (CFI) = 0.969, Standardized Root Mean Square Residual (SRMR) = 0.047, Root Mean Square Error of Approximation (RMSEA) = 0.030, and PClose = 1.000. All the goodness-of-fit measurements exceeded the acceptance thresholds. Hence, the model is fit for the data (Gaskin & Lim, 2016).

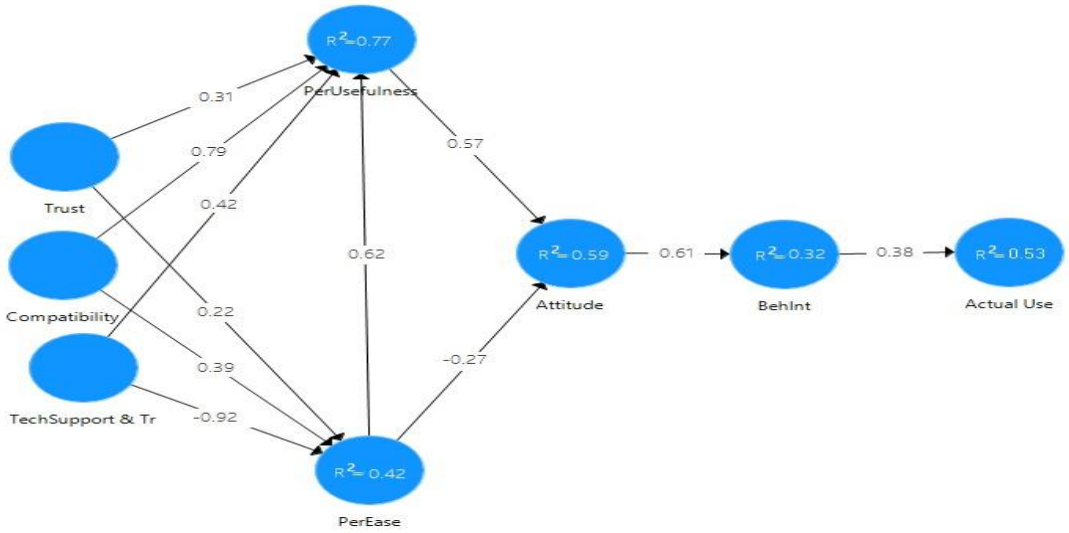

Figure 3: SEM (PLS Model Test)

In the second stage of the analysis, a bootstrap resampling technique (Smart PLS version 3.2) is used to test the paths in the structural model (see table 4). The covariance-based structural equation modeling (CB-SEM) is a statistical method for estimating structural equation models. The CB-SEM uses a statistical model to estimate and test correlations between dependent and independent variables and the hidden structures in between them. CB-SEM assumes that the constructs are common factors and estimates the model. The smartPLS supports graphical model building and CB-SEM model estimation using the maximum likelihood (ML) approach. The results allow testing of whether the hypotheses assumed for the model are consistent with the given variables. This aspect positions CB-SEM as a structure-testing multivariate procedure with confirmatory character (Henseler, Ringle & Sinkovics 2009; Venkatesh et al., 2003). The results of R^2 values can be used to measure a PLS model's quality. The model describes the result of the paths (see figure 3). Moreover, the data supported nine (9) out of the eleven hypotheses that influenced e-procurement adoption. The PU and PEOU constructs are directly correlated (H1 was supported). This was in line with the extended TAM theory which provides that the PU and PEOU are key factors that determine technology adoption (Ugwuanyi et al., 2022). PU is linked to the Attitude construct (H2a was supported). However, the PEOU is not directly associated with the Attitude construct, therefore (H2b was not supported). Attitude construct was a significant determinant of Behavioral Intention (H3 was supported). This path coefficient test corresponds to the findings of Davis (1989) who indicated that users hold the belief that using a specific system will lead to improvements in their overall job performance. The user intention of compatibility is positively related to both PU (H4 was supported) and PEOU (H5 was supported). Furthermore, this shows that employees will be willing to embrace an e-procurement system which will be in line with the user's current opinion (Al-Rawashdeh et al., 2022). Technical support and training construct was found to be a substantial factor of PU (H6 was supported) however, the TST was not related to PEOU (H7 was not supported). This means that users can be trained to become better equipped to adopt e-procurement technology. The User intentions and Trust construct were positively related to both PU (H8 was supported) and PEOU (H9 was supported). The relationship between Behavioral intention and Actual use constructs was also significant (H10 was supported). Our study model explains 53% of the variance in Actual usage, 32% of the variance in Behavioral intentions of the user, 59% of the variance in user attitudes, 77% of the variance in PU, and 42% of the variance in PEOU. These predictive powers of the R^2 corroborate with the findings (Kauppi et al., 2013).

V. Discussion and Conclusion

The goal of this study was to investigate the extended technology acceptance model by incorporating trust, compatibility, technical support, and training to predict the adoption of e-procurement in Ghana's ten regional public and teaching hospitals. The key determinants of the study were included in the TAM and considered. The expected effects of the trust, compatibility, technical support, and training were all in higher-order (Venkatesh, & Davis, 1996; Alshurideh et al., 2021; Granić, 2022). The R^2 of these explanatory variables were considered as PU (0.77) and PEOU (0.42) respectively explaining the relevance of factors in predicting employee's e-procurement adoption. Li (2020) emphasized that the inclusion of these elements into the model was crucial for technological advancement and adoption. Our study revealed theoretical benefits for public healthcare organizations for adopting e-procurement by examining user-perceived variables as antecedents to the TAM framework. The following hypotheses were confirmed by the findings of the study (H1, H2a, H3, H4, H5, H6, H8, H9, and H10). The path coefficients between PEOU and Attitude (H2b), PEOU and Technical Support and Training (H7) were not supported. The results also showed that the constructs explained a substantial amount of variance in PU and PEOU. According to Philippi et al., (2021) and Attie & Meyer-Waarden, (2022) the most important factors influencing the e-procurement adoption were compatibility and trust construct. This is not surprising because, in previous adoption studies, the Compatibility construct has been shown to have the strongest correlation with user intentions. This highlights the earlier appeals for senior managers to prioritize the adoption of emerging technologies. These findings aligned with prior studies on online ordering and electronic shopping (Miao et al., 2022). The technical support and training construct was not found to be significant with PEOU (H7). The result however, aligns with the view presented by Al Mashalah et al. (2022), which asserts that a system's characteristics significantly influence users' perceptions of e-procurement adoption. Nevertheless, the result aligns with Collignon (2016), who argued that a system's characteristics are crucial in shaping users' perceptions of technology adoption. However, the findings differ somewhat from other research in that technical support and training are vital for guiding employees' adoption of e-procurement in public and teaching hospitals (Hafsa et al., 2021). The results indicate that technical support and training may be hampered by users' inability to effectively utilize the system due to insufficient in-service training from e-procurement experts, ultimately impacting overall adoption rates. To encourage the use of the e-procurement system, top managers should create awareness of technical support and training to boost employees' knowledge and skills through specialized training. Furthermore, to encourage e-procurement adoption, it is important to address other user-related issues such as resource allocation, and power supply, and ensure that these resources are accessible to both public and teaching hospitals in Ghana. (Zhou, Gul, & Tufail, 2022). This finding aligns with previous organizational-level studies which indicated that employee resistance and lack of commitment can impede the acceptance of new technologies (Sligo et al., 2017). The research primarily explored the factors influencing institutional adoption of e-procurement and users' behavioral intentions. To improve e-procurement acceptance, elements such as trust, compatibility, technical support, and training were incorporated into the TAM framework. This aligns with earlier findings by Al-Nuaimi et al. (2021) which suggested that enabling conditions significantly influence individual usage patterns. It also reaffirms the importance of technical support and training (TST) as it plays a critical role in promoting e-procurement acceptability. Despite the TST factors examined in this study, senior managers often rely on external guidance for their decisions. It is essential to emphasize that top management involvement remains vital for the successful implementation of IT initiatives. For instance, top management support is recognized as a key predictor for the successful adoption of e-procurement (Hallikas, Immonen, & Brax, 2021). From a managerial perspective, firms adopt e-procurement to transition from paper-based processes to more efficient, paperless technology that offers benefits such as cost reduction and faster processing times (Salahshour et al., 2018). The willingness of users to embrace e-procurement was influenced by compatibility and trust constructs. According to Du et al. (2020) improving order lead time and user-friendly interface will enhance the organization's IT infrastructure, and e-catalogs accessibility for vendors. Trust plays a crucial role as a confidence-building factor that business partners develop after a service delivery. Conversely, the degree of trust experienced can diminish due to a lack of commitment from other business parties. Lack of trust can influence employees' willingness to adopt e-procurement in public healthcare institutions.

Implications of the study

This section contains the findings of the analysis and the practical implications for e-procurement adoption in the public healthcare sector. The managerial implications tend to formulate strategies for the success of managerial operations. The analysis of the various factor loadings aims to identify the factors influencing the implementation of e-procurement adoption in the ten public regional and teaching hospitals. This study found that providing technical support and training improves healthcare performance, such as conducting training sessions or job-specific training for e-procurement personnel. Muangmee et al. (2021) observe that one of the factors influencing the utilization of an e-procurement system is employee skills. Additionally, Bryngemark et al. (2023) and Fan et al. (2022) found out that staff training is key for e-procurement implementation. Therefore, top managers should

provide budget allocation for capacity training for employees. For public healthcare institutions adopting new technology or platforms for e-procurement, it is strongly advised that management ensures adequate staff training (Dimand, 2023; Akhtar et al., 2023). The second recommendation should be the choice of appropriate software that will be compatible with the internal and external IT systems of the organization. This software plays an important role in adoption and implementation (Manoharan et al., 2022). The third recommendation regarding the trust construct is that the choice of e-procurement platforms must be tailored to the specific needs of the ten public and teaching hospitals. The willingness of employees and customers to use e-procurement technology can be assessed using the technology readiness index. It is key to convince non-adopters that e-procurement technology will provide security and privacy standards for public entities and suppliers in the conduct of procurement activities.

Limitations

An investigation of the extended technology acceptance model using SEM to predict e-procurement adoption in the Ghanaian healthcare sector was conducted. This study shows that the construct of trust, compatibility, technical support, and training influenced e-procurement adoption. The results indicated that all variables involved in the model, such as trust, compatibility, and technical support and training significantly affect the e-procurement adoption. Firstly, the model's testing was restricted to a single context, the ten public and teaching hospitals in Ghana. Consequently, to enhance the generalizability of the findings, it is crucial to replicate the research in other contexts in the future. To gain further insights in future studies, it would be beneficial to explore the effect of trust and compatibility on trading partners and other public organizations. The investigation of these factors could provide valuable contributions for future studies. The study focused on examining only five antecedents of e-procurement adoption, using the technology acceptance model to maintain model simplicity and to help in the data collection exercise. However, it is important to recognize that other variables might influence a firm's decision to adopt an e-procurement system. Moreover, e-procurement adoption in the health sector has a significant effect on a firm's performance. The findings of this study should be considered by policymakers in managerial decision-making. Some managerial policies such as the involvement of top managers in strengthening electronic adoption decisions, and employee's readiness to adopt new technologies could be implemented. Future studies could explore electronic technologies such as the Internet of Things, electronic data interchange (EDI), radio-frequency identification (RFID), and blockchain may be examined for their effect on enhancing public health performance in the healthcare sector.

Declaration of Conflict of Interests

No potential conflicts of interest were made known.

Author (s) Contribution Statement

Patrick Boateng Sarpong: Conceptualization, Methodology, Formal Analysis Writing-Original draft, Data curation. Prosper Agbanu: Editing and writing- review. Michael Addai: Writing review and editing, Data curation, visualization.

Funding statement

The authors were not given any financial support for the study

Informed Consent of authors

We authorize Patrick Boateng Sarpong, the corresponding author, to act on our behalf in all matters relating to the publication of this manuscript, including responding to reviewers' comments and providing any necessary revisions.

Ethical Approval Statement

The study in this manuscript was conducted in accordance with ethical standards and received approval from the appropriate ethics committee(s). This study was approved by Ghana's Ministry of Health (MOH) Ethical Review Committee, with the reference number MOH-ERC 110/07/22.

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