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# Determinants of E-Payment System Adoption in Public Hospitals: A Study of North Western Nigeria

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## *Abstract*

The objective of this study is to examine the determinant factors of e-payment system adoption in public hospitals with reference to not-west region. The study focused on three categories of federal hospitals (Federal University Teaching Hospitals, Federal Medical Centers and Federal Specialist Hospitals) in northwestern Nigeria. The study adopted cross-sectional survey research design and gathered primary data using questionnaire. The population of the study is 536 e-payment users of the 15 federal hospitals of the states in north-west region where Taro Yamane formula was employed to arrive at 229 sample size. The sampling technique used was Cluster sampling and the collected data was analyzed using Partial Least Square-Structural Equation Modelling (PLS-SEM). It was found that human factors, organizational factors, technological factors and user trust have significant positive effect on e-payment adoption among public hospitals in northwestern Nigeria. On the other hand, environmental factors has insignificant relationship with e-payment adoption of public hospitals in northwestern region. Based on the findings, it was recommended that hospital administration should prioritize continuous training and digital literacy programs for healthcare staff. Secondly, the Federal Ministry of Finance is recommended to develop policies that require all public hospitals to establish dedicated ICT and digital payment units so as to enhance the efficiency of the electronic payment process. Furthermore, there is need for hospitals to invest in robust technological infrastructures by upgrading internet connectivity, power supply and implement cyber-security policies to protect patients and financial transaction data. Finally, government should collaborate with industry stakeholders and healthcare providers to streamline the regulatory requirements and remove any barrier to the payment system adoption among public health institutions.

**Keywords:** Electronic payment; human factors; organizational factors; technological factors; environmental factors; user trust; public hospitals.

# Introduction

The rapid advancement in Information Technology (IT) continue to grow along with human needs who want convenience, speed, and accuracy in obtaining and processing information makes it necessary for them to be agile and improve their advancement in quality and quantity (Putra et al., 2025). Accordingly, hospital environment is a complex, professional, and capital-intensive health care institution because it services involve various service functions, education, and research and include various actions and medical disciplines (Suryana et al., 2022). Thus, for the hospitals to be able to carry out such complex functions, they must have Hence, they need adequate financial and non-financial technology in the health administration because the administration involve frequent movement of cash that is capital in nature and require a high level of accountability, work culture, transparency, coordination between units, system understanding and reduction of administrative costs in the implementation of the organization (Alhaq et al., 2023).

However, the level of implementing electronic means of financial transaction is abysmal among public hospitals in Nigeria. Evidently, the deadline for naira swap given by the Central Bank of Nigeria (CBN) in January 2023 occasioned continuous cash scarcity, which is taking a toll on healthcare services across the country. As a result of that, patients are increasingly denied access to care at health facilities as many of the facilities operate mainly cash-only systems or have poor e-payment systems (Rufai, 2023). These facilities turn down transfers and insisting on cash payments before attending to patients. As a result, many patients die at home or the facilities, or get worse while waiting to get cash to pay and access health care (Omidiji, 2023). It was also reported that, even at health facilities that operate e-payments systems, the absence of the alternative of cash payments due to naira scarcity had led to such long queues and network issues that patients get worse or are denied care all together (Rufai, 2023).

In northwestern Nigeria specifically, a bitter experience was observed in February 2023 where a heavily pregnant woman in Kaduna, lost her life due to the scarcity of cash when her husband could not pay the required hospital deposit because he could not access cash over the bank's counter (Omidiji, 2023). In Kano state also, the cash scarcity makes many patients, including those on admission lost their lives due to difficulties of accessing as most hospitals only collect cash because majority the hospitals operate an analogue system of collecting cash for consultancy and medical bills (Rufai, 2023). Also, the need for e-payment in public sector is amplified in order to discourage corruption and revenue loss due to manual payment method, which intensify revenue leakages in health sector (Abdullahi, 2022). However, patients are still

facing hardship due to scarcity of naira. As a result of worsened situations, some state governments (Eg. Kaduna state) directed all public hospitals to accept electronic transfer for all payments (Omijidi, 2023). This becomes clear evidence on the need for having adequate e-payment system in Nigerian hospitals, specifically in northwestern region.

Accordingly, the low technological adoption like e-payment is argued to be one of the reasons why the Nigerian health sector is in a sorry state, which prompted the dire need of the Nigerian health sector to digitalize hospital operations especially financial sections (Abdullahi, 2022). However, the successful use of an e-payment depends on understanding the adoption factors and the main challenges facing the integration process (Mag'ana & Katundu, 2020). In line with an extended Human-Organizational-Technological (HOT-fit) model, organizational success in adopting innovative systems depends almost disproportionally on the performance of human resources because they are widely acknowledged to be one of the most challenging aspects of modern administration (Alkhwaldi et al., 2022). On technological aspect, the factor gives inference on inter-connectedness of features in the system such as system performance and user interface, which include system quality, information quality and service quality (Prasetyo & Oswari, 2019).

Furthermore, the sluggish of IT adoption process in various organizations is attributable to various technical, managerial, personnel, procedural, and institutional issues encountered by an organization within which such adoption takes place (Xu et al., 2021). However, despite the fact e-payment for goods and services has grown globally, the spread in technology has not lowered the level of perceived risk felt by consumers when paying for products or service online due to the negative factors that co-exist with the benefits of online payment such as trust among other issues (Iriobe, 2018). This issue introduced this study to the issue of trust in the context of e-payment system. Accordingly, the serious challenge facing e-commerce adoption in Africa is distrust because it is confirmed that among traders in Sub-Saharan Africa, specifically Nigeria and Ghana, trust is one important factor that steers day-to-day online transactions (Amofah & Chai, 2022).

Accordingly, quite numbers of studies were conducted in this area using different models to examine factors that can influence the adoption of technology in an organization. However, most of these studies (such as Alhaq et al., 2023) that considered HOT-fit model different were not able to contribute any social or individual factor to the model. Furthermore, there is evident of conflicting results from different scholars, where some studies (eg. Tawar et al., 2022; Prasetyo & Oswari 2019; Elmayati et al., 2022; Puspitalia & Inayati, 2021) believed some factors are significant in determining technology adoption, while other studies (such as Hendrawan & Maulana, 2022; Suryana et al., 2022) found otherwise. In addition, a plethora of research (such as Alizadeh et al., 2020 in banking sector; Anaam et al., 2020 telecommunication sector; Elmayati et al., 2022 in education sector; Mahama & Dahlan, 2022 in SMEs) considered technology adoption in other sectors of the economy with little emphasis on hospitals, which gives a sectoral gap for the present research.

Moreover, among the few studies conducted on hospitals, most of the studies were conducted in different countries outside Nigeria (e.g Alhaq et al., 2023 in Indonesia; Suryana et al., 2022 in Malaysia; Henaku et al., 2020 in Ghana; Mag'ana & Katundu, 2018 in Tanzania) with little emphasis on Nigerian context. To the best of researcher knowledge, no study investigates the factors that determine the adoption of e-payment in Nigerian context, specifically in northwestern Nigeria. This provides the present research with sectoral, contextual and regional gaps that it intend to fill. For instance, studies like Kabir (2017) consider Nigeria entirely which could limit the peculiar issues of northwest region as focused by the present study. Also, the study was conducted since 2017 which may be overtaking by many events like Covid-19 and Naira redesign thereby prompting empirical validation. In response to this, the current study contributes to TOE and HOT-fit model and extends it with the forth variable, which is trust. Therefore, this study investigates factors that can influence the adoption of e-payment system in public hospitals of northwestern region of Nigeria. Specifically, the study strived to achieve the following objectives:

i. To determine the influence of human factors on e-payment adoption in public hospitals of northwestern region of Nigeria
ii. To determine the influence of organizational factors on e-payment adoption in public hospitals of northwestern region of Nigeria
iii. To determine the influence of technological factors on e-payment adoption in public hospitals of northwestern region of Nigeria
iv. To determine the influence of environmental factors on e-payment adoption in public hospitals of northwestern region of Nigeria
v. To determine the influence of user trust on e-payment adoption in public hospitals of northwestern region of Nigeria

This study provides valuable insights to federal and state government by identifying the major drivers of e-payment adoption in public hospitals which guide them with evidence-based recommendations that target financial inclusion policies in hospitals. This will improve the previous policies that give uniform view of the problem or ah-hoc solutions. Moreover, this study support government objectives of accountability, anti-corruption and fiscal discipline in healthcare sector by minimizing revenue leakages and improving transparency through enhanced e-payment adoption and reduction in cash handling. For hospital management, this study will raise their concern on the need to improve human, organization and technical aspects in their institution before adopting e-payment technology. Moreover, considering that e-payment system deal with financial transactions, the dignity and trust of their employees should be given utmost priority before adopting the technology. From the policymaking perspective, this study also promote policy makers to consider making e-payment mandatory in the sector considering its importance.

**Concept of Electronic Payment System**

Electronic payment system (e-payment) is a way of making transactions or paying for goods and services through an electronic medium, without the use of checks or cash, which is also

referred to electronic payment system or online payment system (Alduais & Alsmadi, 2022). In another view, Mag'ana and Katundu (2018) defined e-payment as a form of inter-organizational information system for monetary exchange, linking many organizations and individual users. Similarly, Alhammadi and Tariq (2020) defined e-payment as a system that involves the operational network governed by laws, rules and standards which connects bank accounts and provides the necessary functionality of monetary exchange using bank deposits. It is the infrastructure comprising of institutions, organizations, instruments, rules, standards, procedures and technical processes established to make possible the transfer of monetary value between different parties discharging agreed obligations (Saif et al., 2022).

**Concept of Human Factors**

Human factors are the first component or an indicator of assessing the terms of system adoption and are those determinants that under the control of the individual, and it includes individual skills, ease of use, personal self-efficacy, and experience in the system (Alhaq et al., 2023). According to Yusuf et al. (2007), the human component assesses information systems in terms of system use on the frequency and breadth of functions and investigations of information systems. Accordingly, human component assesses the information system in terms of system use on the frequency and breadth of information systems' functions and investigations (Triadiarti et al., 2020). Human component also assesses the system from the aspect of user satisfaction (Agustina et al., 2020). User satisfaction is the overall evaluation of user experience in using information systems and the potential impact of information systems. User satisfaction can be associated with the perception of usefulness and user attitudes towards information systems that are influenced by his personal characteristics (Michaela & Lestara, 2020).

**Concept of Organizational Factors**

The organizational factors assess the system from the aspects of the organizational structure and the organizational environment in which the technology system is adopted (Triadiarti et al., 2020). In the same vein, organizational factor is described in terms of resource management provisions, specification of goal, and decision-makers commitments, which eventually influence the adoption of technology (Hadi et al., 2021). Similarly, organizational factor consists of type, culture, politics, hierarchy, planning and control systems, strategy, management, and communication (Farida et al., 2021). According to Prasetyo and Oswari (2019), organizational factor consists of financing sources, government, politics, competition, relationship inter-organizational and communication. This could be achieved through entity's leadership structure, support from top management and support staff as an important part in measuring the success of the system.

**Concept of Technological Factors**

Technological factors consist of inter-connectedness of features in the system such as system performance and user interface, which include system quality, information quality and service

quality (Prasetyo & Oswari, 2019). Equally, technological factor refers to the process of collecting, cleaning, and processing data from various sources making and timely distribution of all needed information to the intended users (Alhaq et al., 2023). In the same vein, technology factor assesses the quality of the system, the quality of information, and the quality of service (Triadiarti et al., 2020). In agreement with the foregoing, Sari et al. (2020) defined technological aspect as the qualitative features of the system, its service and information provision. Furthermore, Agustini et al. (2020) described technology factors as the interrelation of features in the system, which include system performance and user interface, ease of use, ease of learning, response time, usefulness, availability, flexibility and securities.

**Concept of Environmental Factors**

Environmental factors refer to the settings in which an organization conducts its business, which can be related to surrounding conditions of the organization such as industry nature, competitors, regulations, geographical locations, and interactions with the government (Sithole & Ruhode, 2021). In the same view with Albar and Hoque (2019), environmental factor includes the regulatory environment and competitive environment. Furthermore, Alkather et al. (2017) viewed environmental factors to represent the environmental aspects that might affect an organization's intention to adopt cloud technology. In addition, environmental factor is the range in which the organization operates such as industry, competitors, and government (Hamundu et al., 2020). For a business or organization to thrive it has to operate in an environment that encourages it to do so, otherwise, it fails (Atiti, 2021).

**Concept of Trust**

Trust is defined as one's willingness to rely upon another, or as the belief in dependability and honesty (Gong et al., 2019). In the same vein, trust is conceptualized as a situation where one party has confidence in the exchange partner's reliability and integrity (Chengyue et al., 2021). In the context of electronic payment, trust means believing that the bank will keep its promises, follow the procedures, and achieve the objectives it has promised to its customers (Saif et al., 2022). Accordingly, trust is defined as the sense of vulnerability to the actions of another party in the absence of controllability (Kenesei et al., 2022). Amofah and Chai (2022) support this definition and state that trust is defined as the extent to which users willingly become vulnerable when using an innovative technology, which shows that vulnerability is a key factor in the interpretation of trust.

**Empirical Review**

Numerous studies were conducted to investigate factors that determine the adoption of e-payment among other innovative technologies. Notable among them include Abulail et al. (2025) which explored factors the factors influencing AI adoption intention among higher education institutions in Jordan. The study collects data from 367 higher education students, faculty members, and employees and analyzed using CB-SEM. The findings reveal that

compatibility, complexity, user interface, perceived ease of use, user satisfaction, performance expectation, AI introducing new tools, AI strategic alignment, availability of resources, technological support, and facilitating conditions significantly impact AI adoption intentions. However, competitive pressure and government regulations were insignificant. Equally, Putra et al. (2025) examined HOT-fit model factors on Dinda Hospital pharmacy installation. The study primary data from 30 staff and analyzed it using PLS SEM. It was found that there is insignificant influence of information quality on system use, information quality on user satisfaction, service quality on user satisfaction (human factor). Also, Alhaq et al. (2023) investigate the factors that determine the adoption of SIMRS using HOT-fit model. Based on primary data collected from 76 employees consisting of upper, middle, and bottom management, PLS-SEM was used to test the hypotheses. It was found that human factor have significant positive influence on the adoption, while the organization and technological factors of HOT-fit model revealed a significant negative relation with SIMRS adoption, while the information quality and service quality does not have effects at all.

Similarly, Khan et al. (2024) examined the factors that determine the adoption of AI in human resource management in India. Based on 329 valid responses, Smart PLS v.4 software was used to test the hypotheses. The study found that among the TOE constructs, relative advantage and human resource readiness emerge as the most influential and robust predictors of adoption intention. Also, Hendrawan and Maulana (2022) evaluate the determining factors of adopting mail MIS in Brawijaya University of Indonesia using HOT-fit model. Data was collected from 36 respondents which were analyzed using PLS-SEM. The finding of the study shows that only organizational factor was significant determinant of adopting mail MIS, while human and technological factors were insignificant in determining the adoption. In the same vein, Meraji et al. (2022) evaluate the pharmacy IS using the HOT-fit model in selected teaching hospitals at Mashhad University of Medical Sciences, Iran. Primary data through questionnaire was collected from 118 users of the system and analyzed using linear regression test via SPSS, version 21. Results showed that, there is a significant relationship between aspects of human and organizational factors on HIS adoption. However, most elements of technological dimensions have insignificant effect on HIS adoption.

Furthermore, Faiz et al. (2024) investigate the determinants of digital technology adoption in innovative SMEs of Indonesia. Data from 419 SMEs was analyzed using PLS-SEM. The PLS-SEM results show that technological, organizational, and environmental factors directly impact adoption. The study examined SMEs which is a private sector and therefore less likely to be applicable in public sector like hospitals in this context thereby requiring empirical validation. Also, Elmayati et al. (2022) evaluate the success factors for implementing Academic Management System (AMS) using the Hot-Fit Model. The sample of 80 respondents was considered and subjected to validity and reliability test using SPSS. The findings of the study revealed that, human, organizational and technological factors have significant positive relationship with the adoption of AMS. The study was limited to the factors of HOT-fit model only without contributing any variable to the model.

Alshahrani (2021) investigate the predictors and consequences of adopting cloud computing among SMEs in Saudi Arabia based on the TOE framework. The survey was conducted on SMEs of Riyadh the capital of Saudi Arabia because it has the highest number of SMEs. Sample technique was random sampling technique. Analysis was done using structural equation model. The finding revealed that cloud computing adoption was positive influenced by technology, organization and environmental factors. In the same vein, Gui et al. (2021) investigate the effect of cloud computing adoption by describing the TAM-TOE model on the factors that affect cloud computing to improve company performance. The sample used in this study were 127 respondents from the study area. The analytical method, in this case, used multiple linear regression analysis using SPSS version 26 statistical software. The results showed that technological context, environmental context, perceived usefulness and attitude affected the technology adoptions as well as company performance, but OC and PE did not affect.

Xu et al. (2024) examined the influence of technological self-efficacy, perceived trust, security, and electronic word of mouth on ICT usage in the education sector of China. Data is collected from 382 business students at Chinese universities. The collected data was analyzed using PLS-SEM approach to test the hypotheses. The results revealed that perceived trust mediates the relationship between self-efficacy and the actual use of ICT tools, intention to use ICT tools for information, and intention to use ICT tools for interaction. Further, perceived security and eWOM significantly moderate the relationship between TSE and perceived trust.

Saif et al. (2022) investigate determinants of adopting digital-only Banks in Malaysia. Primary data was collected from 216 respondent and analyzed using structural equation modeling by performing CFA and SEM path analysis in AMOS version 26. The results showed that convenience, economic efficiency, number of services, trust, perceived value, and environmental concern all have positive significant influence on digital-only banking adoption.

**Technology-Organization-Environment (TOE) Model Theory**

The technology-organization-environment (TOE) is an organization-level theory and multi-perspective framework that was developed by Tornatzky and Fleischer in the year 1990. Based on TOE framework, the adoption process of a technology innovation is influenced by technological, organizational and environmental dimensions of an organization's context (Atiti, 2021). The inclusion of technological, organizational and environmental factors has made TOE advantageous over other adoption models in studying technology adoption, use and value creation from technology (Premarathne et al., 2021). In addition, TOE framework is free from industry and firm-size restrictions (Atiti, 2021). Furthermore, the framework is one of the most widely used adoption theories, operating at the organization level as it holistically explains how the three major contexts: technology, organization, and environment influence innovation adoption and implementation (Premarathne et al., 2021). Accordingly,

prior technology adoption literature indicates that the TOE framework can provide a suitable basis for examining the topic (e.g., Atiti, 2021).

This study underpins TOE framework for some of the variables of the study (technological, organizational and environmental factors). Regarding technological factors, the framework helps hospital to assess the technological readiness of the e-payment system in their context based on its features in terms of ease of use, security, interoperability with existing hospital system and compatibility with various payment methods. This will help the hospitals to identify the barriers of facilitators on their capability. Regarding the organizational aspect, the TOE framework allow hospitals to evaluate their readiness for e-payment system by examining how the organizational factors such as leadership support, organizational culture, employee skills and attitude align with the requirement of implementing the e-payment system. Furthermore, the framework allows hospitals to consider external environmental factors surrounding the hospital that can affect the e-payment implementation, which include regulatory requirement, industry standards, consumer preference among others. Notwithstanding, the framework was criticized by ignoring the human aspect despite being the users of the technology, which are among the key determinants to its integration. As such, the present research include HOT-fit model to support the human aspect of the e-payment adoption.

**Human-Organization-Technology (HOT-Fit) Model**

**HOT-Fit is an evaluation model theory developed to ensure effective adoption and positively impact implementing the information system (Yusof et al., 2007). Earlier i**n 1992, DeLone and McLean developed a model that can be used to evaluate the qualitative characteristics that lead to technology adoption, namely the "DeLone and McLean IS Success Model (ISSM)" or the D&M model. According to Delone and McLean, there are six dimensions that determine the information system quality: system quality; information quality; use, user satisfaction; individual impact and organizational impact (Tornatzky & Fleischer, 1990). In 2003, Delone and McLean improved that model by adding service quality and replace individual impact and organizational with the net benefits (Delone & Mclean, 2003). Meanwhile, the MIT90s is a well-known IT-organizational fit model. This framework describes that success in managing the deployment of information technology in the organization depends on the balance in the following six factors: external environment; organization strategy; individuals and roles; organization structure; technology and management processes (Delone & Mclean, 2003).

This study used HOT-fit model to support TOE model because the human aspect discussed in the model are the IT and accounting professionals in the hospitals. The professionals have specialized skills and knowledge, they need to communicate, coordinate, and collaborate with other professionals, and they are classified by specialized area and position ranking to ensure hitch-free adoption and sustenance of electronic payment system in the hospitals. The process requires various specialized professionals (IT and accounting) to partner, collaborate,

coordinate, and communicate efficiently towards the same goal. Therefore, every professional in the process is highly dependent on other professionals because all the tasks they executed are highly interrelated. Hence, human aspect is one of the major aspects to consider in technology adoption, which is why this study considered it significant in e-payment system adoption in Nigerian hospitals.

## METHODOLOGY

In terms of methodology, the research design of this paper is cross-sectional survey research design. It is a survey because it entails going to the field for data collection, while it is cross-sectional because it involves one time data collection. Accordingly, the population of this study comprised of five hundred and thirty-six (536) finance related staff of 15 Federal Hospitals in northwestern Nigeria. The hospitals were categorized into federal university teaching hospitals, federal medical centers and federal specialist hospitals. The sample size of the study was two hundred and twenty-nine (229) staff of the hospitals determined using Taro Yamane formula, which were selected using cluster sampling technique. Also, the method of data collection was primary method using questionnaire, while the inferential analysis was done using Partial Least Square-Structural Equation Modelling (PLS-SEM) which was used to test the hypotheses.

### Model Specification

$$EPA = \beta_0 + \beta_1 HF_i + \beta_2 OF_i + \beta_3 TF_i + \beta_4 EF_i + \beta_5 UT_i + \varepsilon$$

Where: EPA = E-Payment Adoption; HF = Human Factors; OF = Organizational Factors; TF = Technological Factors; EF = Environmental Factors; UT = User Trust; $\varepsilon$ = Stochastic Error term; $i$ = the individual respondents.

### Presentation of Results

This study employed PLS-SEM analytical tool to analyze the collected data and to test the hypotheses. Accordingly, there are two different stages of PLS-SEM which include structural model and measurement model. The Measurement Model (MM) is the first stage where the connections among the exogenous latent constructs and their indicators or items is defined and is also known as outer model. On the other hand, whereas the second one is the measurement of inner or Structural Model (SM) which defines the relation among endogenous and exogenous latent constructs (Hair et al., 2016). The measurement model was assessed using five criteria: 1) indicator reliability, 2) internal consistency reliability, 3) convergent validity, 4) discriminant validity, and 5) model fit evaluation, while the structural model was used for hypotheses testing.

**Indicator Reliability, Internal Consistency Reliability and Convergent Validity**

The outer loadings of each latent construct are used to assess the reliability, which should be greater than 0.70 (Hair et al., 2016). Hence, out of the 39 items of the study's instrument and the study retained the entire 34 items by deleting 5 items that the loading below the specified threshold outlined by Hair et al. (2013). Also, internal consistency was assessed using composite reliability in PLS based on the criteria that it should be 0.70 or more (Hair et al., 2013). Furthermore, convergent validity, which measures the extent of agreement among multiple items measuring a particular concept and the most commonly used measure of convergence validity is the Average Variance Extracted (AVE), with a minimum threshold of 0.5. Accordingly, Table 1 presents the results of indicator, internal consistency reliability and convergent validity.

**Table 1:** Indicator Loadings, Composite Reliability, and AVE of Latent Constructs

| Latent construct | Items | Item Loading | Composite Reliability | AVE |
|---|---|---|---|---|
| **E-payment Adoption** | EPA1 | 0.954 | 0.974 | 0.854 |
| | EPA2 | 0.945 | | |
| | EPA3 | 0.946 | | |
| | EPA4 | 0.945 | | |
| | EPA5 | 0.833 | | |
| | EPA6 | 0.934 | | |
| | EPA7 | 0.904 | | |
| **Human Factor** | HF1 | 0.973 | 0.978 | 0.919 |
| | HF2 | 0.977 | | |
| | HF3 | 0.969 | | |
| | HF4 | 0.949 | | |
| | HF5 | 0.923 | | |
| **Organizational Factors** | OG1 | 0.917 | 0.980 | 0.904 |
| | OG2 | 0.969 | | |
| | OG3 | 0.944 | | |
| | OG4 | 0.966 | | |
| | OG5 | 0.977 | | |
| | OG6 | 0.932 | | |
| **Technological Factors** | TF1 | 0.967 | 0.982 | 0.919 |
| | TF2 | 0.954 | | |
| | TF3 | 0.972 | | |
| | TF4 | 0.932 | | |
| | TF5 | 0.968 | | |
| **Environmental Factors** | EF1 | 0.974 | 0.988 | 0.919 |
| | EF2 | 0.978 | | |
| | EF3 | 0.964 | | |

| Latent construct | Items | Item Loading | Composite Reliability | AVE |
|---|---|---|---|---|
| | EF4 | 0.964 | | |
| | EF5 | 0.913 | | |
| **User Trust** | UT1 | 0.953 | 0.979 | 0.897 |
| | UT2 | 0.949 | | |
| | UT3 | 0.883 | | |
| | UT4 | 0.959 | | |
| | UT5 | 0.968 | | |
| | UT6 | 0.969 | | |

*Source: Researcher's compilation with PLS-SEM 4.0*

The indicator reliability of all the usable items in this study ranges from minimum of 0.833 (for EPA5) to a maximum 0.977 (for HF2), which are all within the threshold of 0.7 opined by Hair et al. (2016). Furthermore, for the composite reliability of all the latent constructs is displayed in Table 1 ranged from 0.974 to 0.988, which exceeded the minimum threshold of 0.60 for exploratory research. Equally, an average variance extracted values ranged from 0.854 to 0.919, which were also above the minimum threshold of 0.50, indicating that the variables had strong convergence validity.

**Discriminant Validity**

Discriminant validity is the extent to which a particular latent construct differentiates itself from other constructs and it is computed to ensure that the scale used to measure a different construct is certainly measuring a distinct one (Saderst et al., 2021). Therefore, using Fornell-Larcker criterion, the discriminant validity of the variables was established through a comparison of the square roots of AVEs and the inter construct correlations between constructs. The outcome demonstrates that the measurement model of this study has achieved good discriminant validity.

**Table 2:** Discriminant Validity

| | EF | EPA | HF | OF | TF | UT |
|---|---|---|---|---|---|---|
| EF | **0.959** | | | | | |
| EPA | 0.069 | **0.924** | | | | |
| HF | 0.003 | 0.406 | **0.958** | | | |
| OF | 0.014 | 0.435 | 0.023 | **0.951** | | |
| TF | 0.090 | 0.275 | 0.003 | 0.046 | **0.959** | |
| UT | 0.028 | 0.394 | 0.094 | 0.088 | 0.004 | **0.947** |

**Source:** researcher's compilation in PLS-SEM 4.0

Looking at the values obtained in Table 4.5, the first value of the environmental factors' square root extracted variance is 0.959, which is greater than all the values of the shared variance

between environmental factors and e-payment adoption, human factors, organizational factors, technological factors and user trust with 0.069, 0.003, 0.014, 0.090 and 0.028 respectively. For the e-payment adoption, the square root extracted variance was 0.924, which is relatively higher than the values obtained on its relationship of other constructs of the study (0.069, 0.406, 0.435, 0.275 and 0.394). Moreover, the structure's extracted variance square root of human factor was 0.958, which is greatly higher than all values obtained from its relationship with other variables in the validity test (0.003, 0.406, 0.023, 0.003 and 0.094). In addition, the structure's variance on organizational factor was 0.951, which is higher than all values associated with other variables in the model (0.014, 0.435, 0.023, 0.003 and 0.088). Moreover, the structure's variance on technological factor was 0.959, which is comparatively greater than all values associated with other variables in the model (0.090, 0.275, 0.003, 0.046 and 0.004). Lastly, the extracted structure of the user trust was 0.947, which was obtained to be greater than the values in relation to other latent constructs (0.028, 0.394, 0.094, 0.088 and 0.004). The above explained figures are therefore confirming the discriminant validity of the model in this study.

**PLS-SEM Results of the Significance of Path Coefficients**

The significance and relevance of PLS-SEM structural model were evaluated based on the t-statistics and p-values obtained using 5,000 bootstrapped samples in Smart PLS-4.

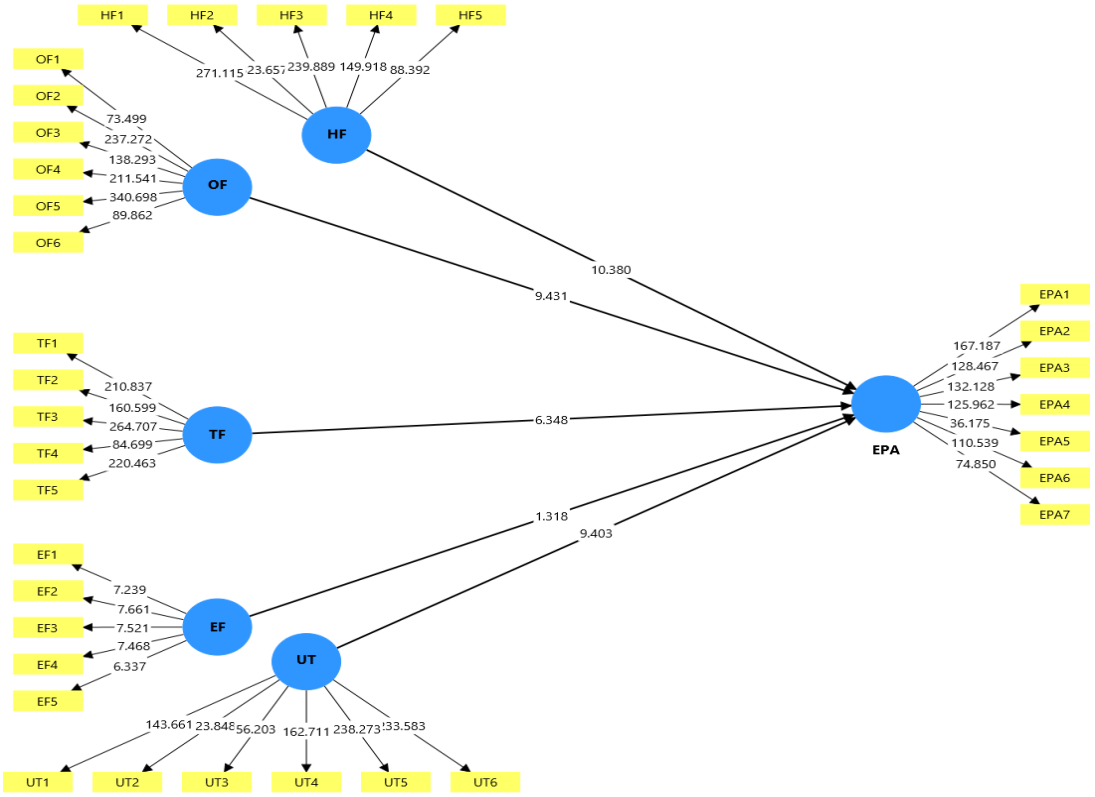



Figure 1: PLS-SEM Structural Model

As depicted in Figure 1, it has shown that this study have five independent variables including human factors, organizational factors, technological factors, environmental factors and perceived trust which were tested against e-payment adoption. The result showed a significant positive effect of four independent variables on the adoption intention. Additionally, the $R^2$ value for this study's model is 0.593 which implies that the independent variables of this study (human factors, organizational factors, technological factors, environmental factors and users' trust) have 59.3% variation on the e-payment adoption among public hospitals in Nigeria. Meanwhile, the adjusted R-square revealed that the independent variables explained 58.4% of the dependent variable. Precisely, the independent variables explained 59.3% of the variance in e-payment adoption in the study area, while other factors not included in the model explained the remaining 40.7%. Looking at this value, the model is satisfactory and substantial based on Hair et al. (2019). Therefore, this study considered the $R^2$ value of 0.593 and the adjusted R-square of 0.584 adequate for this study.

**Table 3:** Structural Estimates

| Hypotheses | Relationship | β | T statistics | P values | Decision |
|---|---|---|---|---|---|
| H1 | **HF -> EPA** | 0.435 | 10.380 | 0.000 | Accepted |
| H2 | **OG-> EPA** | 0.404 | 9.431 | 0.000 | Accepted |
| H3 | **TF -> EPA** | 0.288 | 6.348 | 0.000 | Accepted |
| H4 | **EF -> EPA** | 0.059 | 1.318 | 0.188 | Rejected |
| H5 | **UT -> EPA** | 0.400 | 9.403 | 0.000 | Accepted |

**Source***:* PLS-SEM output 2026.

**Discussion of Findings and Hypotheses Testing**

The following subsections present the discussion of the results obtained in this study and use the findings of the previous study that supported the result.

**Influence of Human Factors on E-payment Adoption**

The first objective of this study examined the influence of human factors on e-payment adoption in public hospitals within the northwestern region of Nigeria. In view of that, the study hypothesized that there is significant relationship between human factors and e-payment adoption. The PLS result supports the first hypothesis because it shows a significant positive relationship, which is evident from coefficient value, t-value and p-value of 0.435, 10.380 and 0.000 respectively. The result is consistent with the findings of Alhaq et al. (2023), which investigate the factors that determine the adoption of Hospital Management Information Systems (SIMRS) using HOT-fit model. The PLS result of the study shows a significant positive effect of human factors on the SIMRS adoption. In addition, this result corroborates with Tawar et al. (2022), which also found a significant positive association between human elements of the technology and its adoption by using the HOT-Fit model to test the Application Readiness Level (ARL) of AKKU Mobile in Indonesia. The likely reason for this result may

be because, most hospitals in Nigeria have established comprehensive training programs and ongoing support plans to the staff regarding the efficient use of emerging technologies not only the e-payment system within their domain. These increase their confidence and willingness to promote the intention to use the e-payment system because well-trained staffs can address concerns and troubleshoot issues, which ultimately drive adoption rates.

**Influence of Organizational Factors on E-payment Adoption**

The second objective of the study investigated the influence of organizational factors on e-payment adoption in public hospitals of northwestern region of Nigeria. In view of that, the study hypothesized that organizational factors have significant positive relationship with e-payment adoption. As expected, this study found a significant positive impact of organizational factors on e-payment adoption by hospitals evident from 0.404, 9.431 and 0.000 for coefficient, t-value and p-value respectively. Impliedly, the increase in the effectiveness of organizational factors will lead to greater adoption intention by hospitals in the study area and vice-versa. The finding is consistent with the result of Hendrawan and Maulana (2022) which examine the determining factors of adopting mail management information system in Brawijaya University of Indonesia using HOT-fit model. The study found a significant positive effect of organizational factors on mail information system. Similarly, in Iran, Meraji et al. (2022) evaluate the pharmacy information system using the HOT-fit model in selected teaching hospitals at Mashhad University of Medical Sciences. The study found a significant positive effect of organizational factors on the adoption rates. The likely reason of this result could be due to the strong leadership support and commitment to digital transformation among Nigerian hospitals, which makes it more likely for them to prioritize and invest in e-payment adoption. This is because, leadership endorsement signals the importance of e-payment to the organization's strategic goals, encouraging staff and patients to embrace the payment system. It may also be due to the hospitals' culture which promotes openness to change and continuous improvement, which in turn fosters a supportive environment for implementing new technologies and practice such as the e-payment.

**Influence of Technological Factors on E-payment Adoption**

Additionally, the third objective of the study evaluates the influence of technological factors on e-payment adoption of public hospitals of northwestern Nigeria. Based that, the study hypothesized that technological factors will have a significant positive relationship with e-payment adoption. As expected, this study found a significant positive impact of technological factors on e-payment adoption evident from 0.288, 6.348 and 0.000 for coefficient, t-value and p-value respectively. Impliedly, the increase in the effectiveness of technological drivers will lead to greater adoption chances of e-payment by hospitals in the study area and vice-versa. This finding is consistent with the findings of Farida et al. (2021), which examine the critical success factors for the adoption of Electronic Consignment, Franchising, Organizational Networks (e-KOlab) using the HOT-Fit approach for SMEs in Bali. The study

found significant effect of technological factors on e-Kolab adoption. Also, the finding was supported by Hendrawan and Maulana (2022), which examine the determining factors of adopting mail management information system in Brawijaya University of Indonesia using HOT-fit model and found a significant effect of technological factors on the adoption of mail management system. Based on the foregoing, the possible reason for this result might be due to hospital staffs' resistance to adopting new technologies such as e-payment system due to the concerns about disrupting established workflows, staff training requirements and perceived risk associated with the implementation. It may also likely be due to the complexity of implementing e-payment in the hospitals due to its effect on compliance with health regulations and ensuring security and privacy of patients' data, which may deter hospitals from adopting the e-payment solutions.

**Influence of Environmental Factors on E-payment Adoption**

Furthermore, the fourth objective of this study assessed the influence of environmental factors on e-payment adoption among public hospitals. To accomplish this objective, the third hypothesis $H_3$ was postulated as: environmental factors have significant influence on e-payment adoption. The result from PLS-SEM analysis was not able to reject null hypothesis by having an insignificant relationship between environmental factors and e-payment adoption evident from p-value of 0.188. Thus, the null hypothesis cannot be rejected and therefore assumed. It implies that the increase in environmental factors regarding e-payment will not lead to any notable change in the adoption intention. This result is in line with some past studies like Modisane and Jokonya (2021), which investigate factors that determine SMEs' adoption of cloud-computing in northwestern province of South-Africa. The regression analysis of the study shows an insignificant effect of environmental factors on cloud computing adoption among SMEs in South-Africa. However, the larger parts of empirical studies were not in agreement with the present research regarding the effect of environmental factors on the adoption. For instance, the study of Gui et al. (2021); Alizadeh et al. (2020); Albar and Hoque (2019) affirmed the positive effect of environmental factors on the technology adoption in different context. The likely reason for the insignificant relationship could be due to regulatory barriers and bureaucratic process in usually public sector that can impede the adoption of e-payment solutions in public hospitals. As such, compliance with government regulations, procurement policy and data security may deter and delay the implementation process. Also, it may be due to public hospitals' having lower technological readiness compare to private healthcare institutions, which resulted to limited capabilities to adopt and integrate the e-payment system in their financial transactions. Hence, the staff may lack necessary digital skills to use the e-payment system effectively.

**Influence of User Trust on E-payment Adoption**

Lastly, the final objective examined the influence of user trust on e-payment adoption in public hospitals in northwestern region of Nigeria. Based on that, the study hypothesized that there

is significant relationship between user trust and e-payment adoption. The PLS result supports the fifth hypothesis because it shows a significant positive relationship, which is evident from coefficient value, t-value and p-value of 0.400, 9.403, and 0.000 respectively. This result aligns with Saif et al. (2022), which examine the determinants of adopting digital-only Banks in Malaysia. The study found a significant positive relationship between environmental factors and digital-only banks adoption. Similarly, the result corroborates with Alhadid et al. (2022) which investigate the predictors for e-government adoption of SANAD App services by integrating user trust on UTAUT. The SEM result shows a significant positive effect of user trust on SANAD adoption in the study area. Also, the result is in line with Chengyue et al. (2021), which investigate factors affecting the adoption of blockchain technology in the complex industrial system and found user trust as one of the significant determinants of the adoption. The likely reason for this result may be because, perceived confidence and trust of e-payment users that the payment system in the hospitals is assured of the security measures in place to protect and safeguard their sensitive information thereby fostering their acceptance intention. Precisely, the strong encryption of the payment system with secured authentication method and data protection regulation instills confidence in the potential users that personal and financial data will be safeguarded from unauthorized access or misuse.

**Conclusions**

In light of the obtained result discussed earlier, this study concludes that digital competence of hospital staff is one of the major drivers of e-payment system adoption in the hospitals of northwestern Nigeria. It is further asserted that the hospitals have well-trained and motivated personnel who are well equipped to ensure the success of digital initiatives in the hospitals. Also, it is asserted that organizational readiness is among the major drivers of innovation especially in tertiary public hospitals where bureaucratic procedures often limit innovation chances. Therefore, leadership and management commitment matter a lot in successfully integrating e-payment system for the public tertiary hospitals in northwestern Nigeria. Additionally, public hospitals in northwestern Nigeria are more likely to adopt e-payment system when it is reliable, efficient and user-friendly. As such, poor designed systems discourage the adoption intent regardless of the political willingness. Further, external pressure like patients' demand and competitive pressure do not drive e-payment adoption by hospitals in northwestern Nigeria. It is therefore concludes that innovations like e-payment adoption by public hospitals is primarily an internally driven process which is influenced more by technological and organizational readiness. Lastly, the study concludes that user trust is central to adoption intention as it boosts the confidence of the users in reliability of the e-payment system, without which even the technically capable systems with strong organizational support will face resistance by the hospital employees.

**Recommendations**

In line with results and conclusions presented in this study, the following recommendations were made to various stakeholders for policy application:

- This study recommends that hospital administration to ensure that the proposed payment system is design with user-friendly interfaces that are intuitive and easy to navigate for users with varying levels of digital literacy. This can be achieved by incorporating the users in the process of developing and implementing the payment system in order to cover the peculiarities of hospital operations and address the lingering challenges.
- Secondly, there is need for government to develop, implement and enforce supportive policies and regulatory frameworks that encourage the adoption and use of e-payment system in Nigerian hospitals. This is by establishing clear guidelines for data security, privacy protection standard and electronic transaction process to ensure consistency and compliance across all healthcare facilities.
- Furthermore, there is need for user-centered design of e-payment system in hospitals by engaging healthcare providers, administrators and patients in the design process to ensure that the system features and services aligned with their preferences, needs and workflows.
- Moreover, Nigerian public hospitals should launch public awareness campaigns and educational initiatives to educate health service consumers, patients and other stakeholders about the benefits of e-payment adoption in the healthcare system. This can be achieved through organized seminars, banners, fliers among other means of public awareness to highlight the advantages of the payment system such as convenience, security and transparency.
- Lastly, government should focus more on improving digital infrastructures such as reliable internet connectivity and stable power supply as well as enhancing access to technical support and digital literacy for SMEs owners. For instance, the issue or power outage should be firmly addressed in markets like ‘phone villages’ and ‘computer villages’ whose activities heavily rely on electricity.

Notwithstanding the contribution, the study suffers some limitations that can be extended by future studies. Accordingly, the study has a sector specific focus by considering only public tertiary hospitals which could limit generalization to private hospitals and/or primary and secondary health institutions because the innovation and technology adoption pattern might differ between different categories of hospitals. Furthermore, the determinants used in this study indicate a possibility of omitting other relevant factors like cybersecurity strength, government support and vendor reliability which are vital to e-payment adoption in hospitals. Moreover, the study assessed direct relationships only without examining a moderating or mediating effects which could influence the strength of the observed relationship.

In view of the foregoing limitations, this study recommends future researchers to expand the geographical coverage of the study by including other geographical zones in Nigeria so as to enable regional comparison and improve national relevance of the result. Similarly, future studies should include other levels and type of health institutions by examining private

hospitals, primary and secondary healthcare institutions among others. Also, researchers should integrate other important factors like cyber-security strength, government support and vendor reliability so as to enhance the comprehensiveness and relevance of the study. Finally, future researchers should examine whether government funding or organizational size moderate the relationship between the observed variables.

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