ISSN:1738-6764, eISSN:2093-7504

Empirical Study of Factors Influencing Adoption of Blockchain Technology Converged with E-Government in Nigerian Public Sector

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https://doi.org/10.5392/IJoC.2023.19.1.067

Manuscript Received 09 November 2022; Received 28 March 2023; Accepted 28 March 2023

Abstract: *The transparency of government transactions can increase citizens' trust, employees' productivity, and national economic development. Blockchain technology is a known disruptive technology that can enable the achievement of such transparency. Facilitated by its capabilities and types, blockchain empowers organizations to deploy solutions in accordance with their needs while maintaining the integrity of all records stored in their ledger. It also makes it quite reliable for managing the value-chain of public sector organizations. Similarly, e-Government has been an effective tool for decades for transparent public service delivery and governance cost reduction among other benefits for nations. This study aimed to examine factors that could hinder the success of Blockchain technology and e-Government convergence in Nigerian public sector using both primary and secondary data. To ascertain these factors, the Technology Acceptance Model (TAM) was used, data collected were analyzed using statistical models and hypothesis testing. Findings reveal the willingness of users to adopt and use the technology if it is useful and could solve the problem for which it is designed, if there are regulations guiding their usages, and if it is easy to use. The study ends with specific conclusions and recommendations based on research findings.*

Keywords: Blockchain, E-Government; TAM; Technology Convergence; Value-Chain Management

1. Introduction

The impacts of the Information and Communication Technology (ICT) revolution on any society are numerous, especially with the emergence of different technologies at different time intervals. Societies are becoming more and more connected than ever before in history, this is facilitated by ICTs and the increasing need for interaction between individuals, organizations and societies. To be at par with counterparts, many countries have developed their ICT sector through the enactment and implementation of policies that enable them measure up with global trends and matrices used in evaluating ICT or e-readiness [1,2]. These developments have ranged from the provision of ICT infrastructure to hard/soft wares, capacity building for their human resources and process innovation for organizations [3-5]. Also, the area and scope of impact of ICT is unlimited, it serves across sectors including Agriculture, Health care, logistics, Law, Education, entertainment, Governance and many more; in economies that are either developed or developing. The speed and extent of these impacts however is mostly dependent on the suitability of the adopted technology and extent of use not necessarily the complexity [6, 7].

Fundamentally, ICT is known for its roles in shifting the paradigm of different businesses, organizations and economies by not just improving the process of tasks completion and service delivery but increasing productivity and resultant impact on those businesses and economies and saving manpower as well as time [7]. It is also known to be an inseparable part of the daily lives of most individuals and businesses, as it helps in communication and entertainment as well as wealth creation and automation of complex tasks. The automation

of complex tasks is performed by translating such tasks to simple button clicks, screen swipes, voice commands and gesture detectors, where the tasks are promptly completed with minimal resources. Different ICT tools make this automation seamless, these tools come in various forms, some have the potential of both easing processes while guarding components and keeping them unaltered, a typical feature of tools developed with the blockchain technology.

Subsequently, Blockchain technology is an essential evolution in the history of the computing world and beyond, as it is one of the known disruptive innovations in the history of technology [8, 9]. As highlighted in [10], Blockchain when compared to the internet can simply be described as a truth machine, while the internet is an information machine. This is due to its characteristics, mainly, its decentralized nature that allows multiple nodes on a network to independently interact with records stored on the ledger following agreed consensus and further broadcasting the taken action to the entire network simultaneously, in a transparent manner. Different organizations can deploy a type of blockchain in accordance with their needs, stakeholders and expected outcomes, these deployments can be such that supports the use of the different kinds of Blockchain, which could be either public, private or consortium. The Blockchain safeguards the integrity of records stored in each ledger on it, ensuring that records are not altered, while guaranteeing the confidentiality of the records since only the intended participants in the network can access it. Its capabilities allow the inclusion of all relevant stakeholders in the different decision-making processes of organizations, institutions and businesses, facilitated by its features and types among other functionalities. Just like several other ICT tools, the capabilities of Blockchain technology are quite enormous, and part of its benefits include the improvement of the value chain management of any organizations that deploy it as a tool for business process enhancement and value creation, be it a public or private sector entity. Regardless of the sector of the economy where ICT is integrated, the shift in paradigm has always resulted in the efficiency of service provision, increased productivity and proper management of resources, and these successes have been the same across board for whether public or private sector [11, 12]. The common feature that countries that have transited from developing to developed is the aggression in their policy reforms, strictness of their laws, compliance to their rule of law, not forgetting the strong political will of their political leaders and government to initiate sustainable anti-corruption activities, strength of their media and their applications of the Information and Communication Technologies in ways that promote transparency and citizens participation in activities centered towards national development and economic growth.

Despite the known impact of the adoption of ICT, some organizations especially in the public sector of Developing countries are usually slow in adopting new technologies, while developed countries and private sector organizations are usually amongst the first to try out new and emerging technologies, it is mostly in the course of incorporating such new technologies that different discoveries and improvement modalities are effected on their systems or services following observations and research outcomes [13, 14]. This accounts for the reason most private sector organizations have over time recorded huge successes in their business process management, optimal products and efficient service delivery. Although the public sector in every country is saddled with the responsibility of manning the affairs of the country, it is usually the last to adopt ICTs, this trend is more prevalent in developing countries, further hampering their rapid development, economies that innovate grows rapidly, knowing that the major enabler of innovation is ICT adoption. [14] highlights that inadequate resource allocation can hinder developmental and regulatory progress, thereby limiting the ability of developing countries to adopt new technology in the public sector. Other factors highlighted in that research included the willingness of the users to use the adopted technology and this can hamper development associated with ICT adoption, even though huge budgets are expended on the acquisition of new technologies by an organizations or government.

The purpose of this paper is to highlight the factors that can hinder the effective and efficient use of blockchain technology converged with EGovernment in the Nigerian public sector and to suggest useful recommendations which can serve as guide to policy makers. This paper emphasizes that ICT is just a tool, with potentials and capabilities that can only be unleashed when being put to effective use. Noting that the major problem associated with Digital Transformation in developing countries' public sector most time is not because they withhold resources from their public offices/officers, but that even when a lot of funds are being quoted in their annual budgets and spent on the provision of ICT infrastructure, the resultant impact and productivity remains very low. This usually happens because most of the available ICT infrastructure provided are not always utilized as expected, thus, the expected results are difficult to achieve. In this research, the factors that hinder the full adoption and effective use of ICTs in developing countries (especially the public sector) were analyzed and the results were used to draw the conclusion that users are willing to adopt and use a system that

deploys blockchain converged with EGovernment if it will increase transparency, easy to use and is regulated by institutionalized policies. Also, recommendations suitable for improving the adoption and use of ICTs, specifically blockchain technology in public offices to improve value chain and service delivery were proffered.

The paper is structured in five sections, first is the introduction followed by materials and methods, results, discussion and conclusion. The paper concludes that technology users in the public sector in Nigeria will use a technology if the technology is useful, easy to use and is guided by regulatory policies and conducive work environment.

2. Materials and Methods

2.1 Value Chain and Value Chain Management

In businesses, different activities are carried out to ensure that products and services are delivered to customers and end users from the origin or production phase of the process. Imagine if public sector could deploy a similar model in the Business Process Management (BPM) and process flow. In this sense, BPM is beyond just completing tasks, but ensuring that the desired goal is achieved at every stage of the workflow. In general, value Chain implies the series of business operations in which utility is added to the goods and services offered by the firm so as to enhance customer value [15]. Value chain and its management can be compared with BPM helps organizations and businesses to improve internal capabilities, performance and manage outcomes [16]. Value chain is a modification of the supply chain, supply chain is a function that enables any businesses to own and manage the general logistics and relationship between their products and customers [17]. Value chain management as it applies to this research refers to the process of completing the different processes involved in the delivery of quality public services, from internal processes involving employees within the same organization to other organizations and the citizens in general.

Previous literatures have studied value chain in terms freight management and how to improve the improve logistics in businesses especially in the different areas including ecommerce and Agriculture [16], [18–20]; also, in terms of E-Government and quality public service delivery [4], [21-23]. This study, however, considers value chain management for public service delivery by integrating different technologies, i.e. blockchain and E-Government, with focus on ways that the use of the technology by public officers can be achieved.

2.2 Technology Convergence and Technology Adoption

In several literatures, Technology Convergence - also referred to as Digital Convergence is explained in different ways using different illustration, however, the central idea in all the literature is that the phrase is generally used to describe the combination of different technologies to perform tasks, provide solutions and create value. This integration is facilitated by the use of high-speed internet connections and other tools in forms of hardware/ software in ways that bring about innovation. Technologies convergence usually birth tools and solutions that are both disruptive and transformative in nature leading to exponential growth and innovations in organizations or economies that deploy them [24,25]. In this domain of technology convergence, the convergence of different technologies like IoT, AI, Blockchain, Telecommunication Technologies have been adopted and deployed to provide lasting solutions to global challenges.

2.3 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was first used in this study to evaluate the likelihood for the adoption of the proposed integration of Blockchain technology with EGovernment in Nigeria. The Technology Acceptance Model originated from the Theory of Reasoned Action based on the beliefs, attitudes, intention, and behaviors for Modelling the acceptance of Information Systems by users [26, 27]. The theory of Reasoned Behavior as adopted by [28], is a social psychology model that examines the main determinant factors of intended behaviors. The model describes the behavior and behavioral intention of a person to be determined by his behavioral intention to perform the behavior, and behavioral intention is in turn determined by several factors including subjective norms and external factors. There are many other theories that have been developed to help understand the factors that influence the decision of users about what technology applications to use, these theories provide tools to make decision makers understand the causes of success or failure in implementing processes of new IT applications. The theories mostly used in IT research include: Innovation Diffusion theory

(IDT), by [29, 30] Theory of Planned Behavior (TPB), by [31]; the Unified Theory of Acceptance and Use of Technology (UTAUT), by [32], the FITT framework [33] and of course the Technology Acceptance Model (TAM), by [26, 34], which is used in this research. The original TAM is illustrated in *figure 1* below.

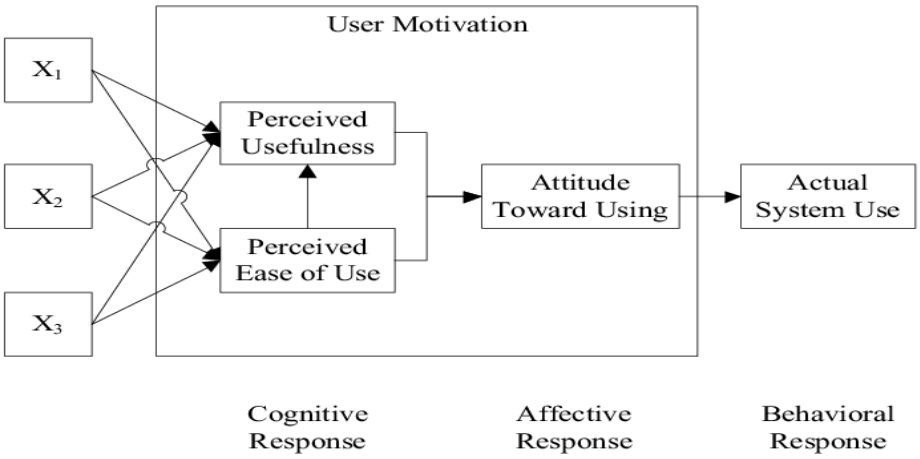

Figure 2. Original Technology Acceptance Model (Davis, 1986) in [35]

2.4 E-Government concept and E-Government in Nigeria

EGovernment is the process whereby public services are provided using Information and communication technology and applications [36–38]. The term electronic government (or electronic government) is a term that has only been around for a while and there is no standard definition, as a complete understanding of the concept is still evolving. Basically, electronic government involves the use of Government communication technology (ICT) agencies for the exchange of information, promoting services and ensuring further efficiency in public service delivery. Its advantages are numerous. They include improved general efficiency, cost reduction, increase in revenue, and effective administrative processes. The essence of EGovernment is for enhanced value for stakeholders through transformation. However, as opined by [39], the conventional delivery systems continue to be important especially in developing countries since their internet coverage area is limited, the spread of education is restricted, as well as the gross inadequacy in infrastructures like power, good roads, hospitals, schools and many more.

In Nigeria, EGovernment has been used to improve public service delivery at the Federal, State and Local government in ways that promote openness and transparency. Efforts made to ensure the successful implementation of EGovernment in Nigeria include the creation of the .gov.ng domain where all the government Ministries, Agencies and Departments have their individual Uniform Resource Locator (URL) and portal names. Also, different services have been automated and fully available to citizens, businesses and /or organizations from the comfort of their locations online (1Gov.ng). These services are provided in the forms of Government-to-Citizen (G2C), Government-to-Business (G2B) Government-to-Employee (G2E) Government-to-Government (G2G), the general aim of the service is to share information and provide efficient services [39, 40].

2.5 Blockchain Technology

The blockchain is basically a technology that facilitates agreement between participants embarking on a transaction, such that whether they know each other or not they do not require any intermediary to ensure trust. In this regard, blockchain is a basis for decentralized governance, promotes social contracts based on consensus, while maintaining balance of common interest to users and the entire network. When it comes to the authenticity of transactions on a blockchain network, the governance structure enables all stake holders to participate in decision making following agreed consensus, thus, all transactions are carried out accordingly [41, 42].

Blockchain has different types which and the choice of use depends on the organization, area of use and the kind of Distributed Application that is to be developed. It can be Public (also called Permissionless or Unpermissioned) blockchain, where participants can be any body registered in the network regardless of proximity or interest and can carry out transactions resulting in block creation as the blockchain serves as a trust

machine. There is also the Private (also called Permissioned) Blockchain, where the participants in a particular network are known and usually have common interests and restricted activities and can also carry out activities that result in new block creation. It is the type used by many organizations and government for building their solutions, applications and use cases, be it education, agriculture, fintech, healthcare, among others [42–50]. The Consortium Blockchain is the third form and has features of both Public and Private blockchains, thus, functions as a hybrid of both. In all the types of Blockchain, transactions are said to be completed after all the relevant participants have validated them following the agreed consensus and new blocks created [10][41], [50, 51].

Algorithmically, Integrity is encoded into every step of the process and distributed, not vested in any single member. Participants can exchange value directly with the expectation that the other party will act with integrity. Each block must refer to the preceding block to be valid and the first block is known as the Genesis block. Every other block in a blockchain network references the hash of the previous block, as such no transaction is carried out in silo, this characteristic further ensures the authenticity of transactions carried out in a blockchain network in addition to its time stamp features. In a blockchain network which uses a Distributed Ledger Technology (DLT) no one can hide a transaction, and that makes transaction more traceable than in any other kinds of Databases [51]. The properties of a DLT are what makes blockchain technology an efficient tool for different sectors, the major properties are highlighted in figure 3 below

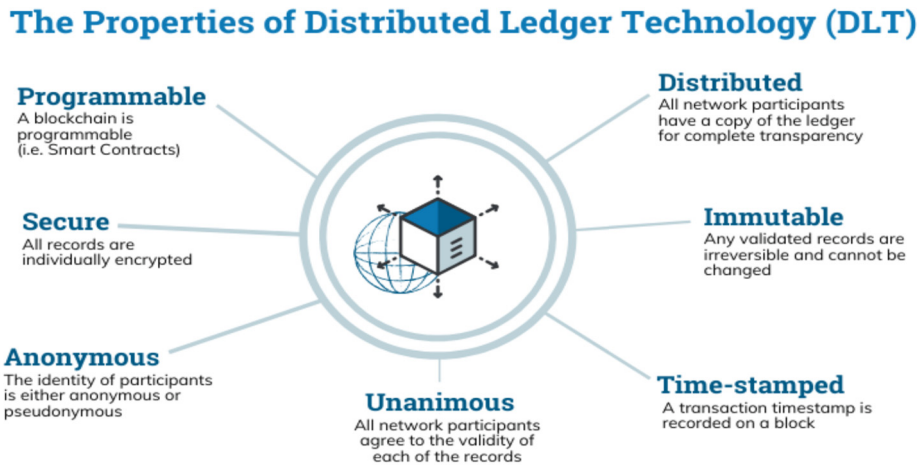

Figure 4. Properties of a blockchain [52]

Transactions carried out in a blockchain system are connected to each other through their "hash"; the hash of the previous block and that of the next block are connected to the current block. It is only the genesis block, which is the initial block that is connected to only its hash and that of the next block. This connection allows transparency, timestamps every transaction, ensures transaction validation based on consensus, verification of every transaction and subsequent formation of new block to occur seamlessly. The conceptualization of a new block as illustrated by [53] is shown figure *5* below.

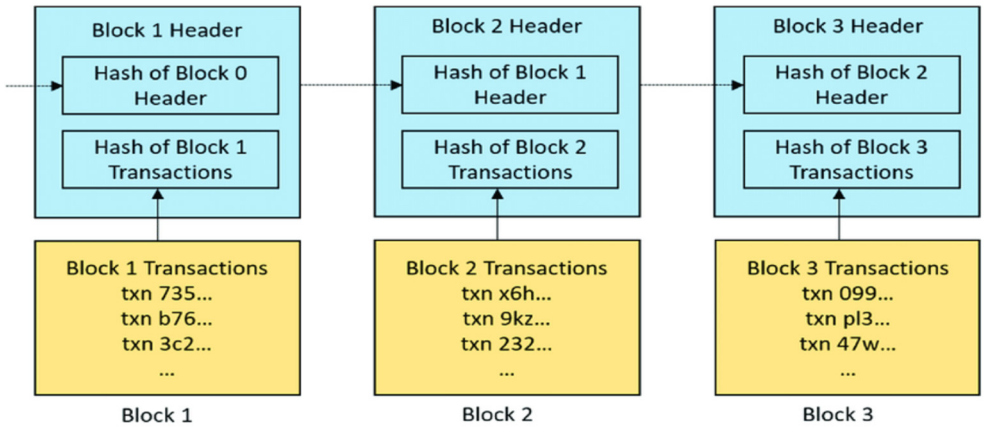

Figure 6. Conceptualization for new block formation [53]

Furthermore, within each transaction process, once a transaction is initiated, the request is broadcast on the Peer-to-peer (P2P) network, where each activity is being verified. Once the transaction has been validated and confirmed by the participants in the network (based on their hierarchy and privileges), the completed transaction forms a block which indicates a completed transaction and stores it with the respective keys. The strengths of this system are numerous, the cost of information security systems and change management which is the case with the current system can be eliminated and channeled into capacity building and to setup the relevant infrastructures/ components required to set up the system, as the system comes with those features embedded. Also, corruption will be eliminated as data and processes which are confirmed to be completed cannot be modified, thus, system administrators can also be held responsible for their actions, since there are timestamp and identity tagged to every transaction. Using the consortium blockchain is suitable for these kinds of usages and it requires less time to carry out transactions as compared to the public blockchain, as only predefined nodes can participate in a transaction. *Figure 7* below shows the steps involved in every transaction within a blockchain.

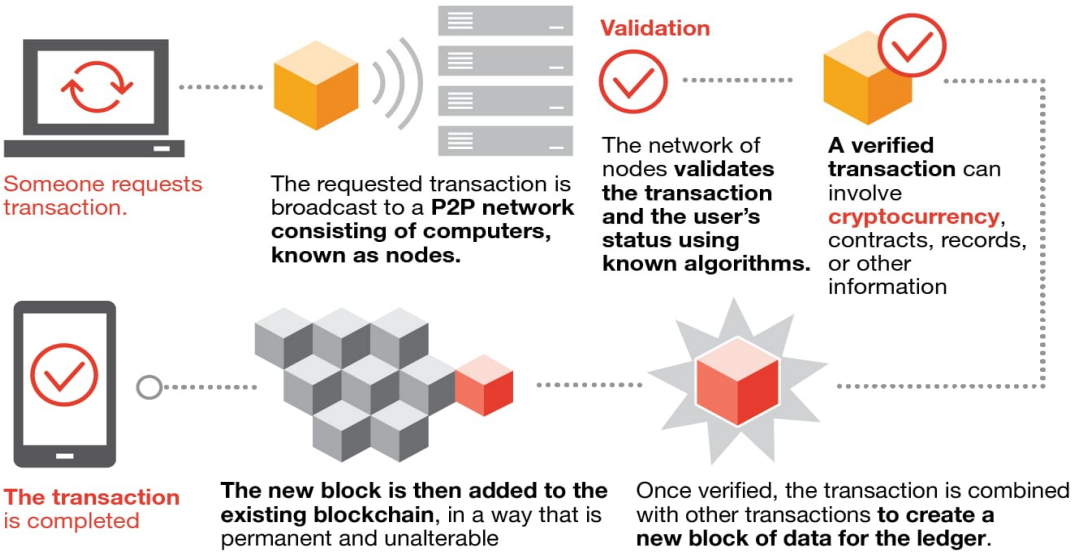

Figure 8. Processes for each blockchain transaction [54]

2.6 Methodolog

followed by administration of questionnaires for data collection and analysis. The primary data used for this research were collected as general surveys and experts' interviews, using google forms questionnaires and phone calls, while secondary data were obtained from desk research and literature reviews. The questionnaires comprised of four sections, with each considering questions addressing different factors. The first section comprised of questions on demographic data, the second was on corruption awareness, the third on ICT evaluation and the fourth on Blockchain Technology Acceptance. The questionnaires were administered in two ways: as a general survey and as expert interview.

Target respondents to the general survey were as follows: of the two hundred and thirty questionnaires that were received, 10 were from experts and 220 from the general survey completed by Nigerians across different employment sectors and locations in the country, 12 of the questionnaires were discarded due to incomplete information leaving 208 for analysis and conclusion.

Also, the expert interview survey questions also had different sections with many questions and different sections as well and the target experts were renowned Information Technology sector professionals, public sector officials, entrepreneurs and some policymakers with at least 5 years of experience in their respective fields and residing in Nigeria as at the time of the research, some of whom also resided in other countries some years prior to the research and have relative ideas and experiences about the subject of this research. The questions used during phone interviews were more advanced and required more details than those of the general survey.

To ascertain the factors that would influence the adoption and use of the blockchain, the Technology Acceptance model (TAM) was used. The TAM is commonly used to evaluate the factors that motivate a user to actually use a new technology, those factors comprise of their perception about the usefulness of the new technology (PU), which defined the degree to which an individual believes that using a certain system or technology will enhance his performance; their perception about whether that technology is easy to use, (PEOU) i.e. the extent to which an individual believes that using a particular system or technology would liberate him from physical and mental effort; the and attitude towards (AT) using the technology which imply the general impression of the user towards the technology. According to TAM 3 which is a modification of the original TAM, PU and PEOU can easily be influenced by external features which can include ICT skills, job relevance, social norms, etc. In this research, TAM 3 model is used and the external factors considered are summarized as Perception about regulations and environmental influence (PR). PR include all the external factors like regulations guiding the use of the technology, ICT skills, similarity with previous systems, social impact, etc. In this research which focuses on how public service value chain can be efficiently managed through the convergence of Blockchain Technology and EGovernment, the TAM 3 model was used and several literatures were reviewed to back the decision, the opinion of target users of the proposed blockchain system were also sorted. PU, PEOU, PR, AT and BI were critically examined using a statistical model for evaluation, followed by conclusions and recommendations based on research findings.

3. Results

3.1 The concept of Technology Acceptance Model (TAM) as used in this research

The Technology Acceptance Model TAM by [26,34] is the most frequently used among all the other theories to explain the factors that influence users' decision to adopt a new ICT. Davis created TAM to explain the behavior of individuals towards the use of computers and computer technologies, as described in his model in the figure above. The basic principle of TAM is that when users are willing to accept a new system, they are most likely to be willing to make changes in their practices by using their time and effort in using the system or technology. In other words, TAM is essential for determining the user acceptance of any technology using Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as determinant factors. As further explained in [55], the perceptions about ease of use and usefulness are key indicators about users' intention and effort to adopt a new technology.

The term Perceived usefulness describes the tendency to use or not use a technology, it is the degree to which an individual believes that using a certain system or technology will enhance his performance. Similarly, PEOU is the degree to which a person believes a system to be free of effort, i.e., the extent to which an individual believes that using a particular system or technology would liberate him from physical and mental effort [26,34,56]. In [57,58], different works of literature on TAM were reviewed beginning from the [34], to ascertain the validity of the model, their findings were indications that TAM is very suitable for research aimed at analyzing factors that influence user willingness towards adopting a new Information Technology and Information systems.

According to the original TAM, user motivation for the actual use of a technology comprises of their PU of that technology, PEOU and Attitude Towards (AT) using a technology. These factors can easily be influenced by external features. In this research which focuses on how public service value chain can be efficiently managed through the convergence of Blockchain Technology and EGovernment. Several literatures were reviewed, after which data were gathered through surveys and expert interviews to verify user perceptions about the proposed blockchain system. PU, and PEOU were critically examined using a statistical model for evaluation. The Model adopted for this system is a modification of the TAM 3 model by [32] and shown in the figure 9 below.

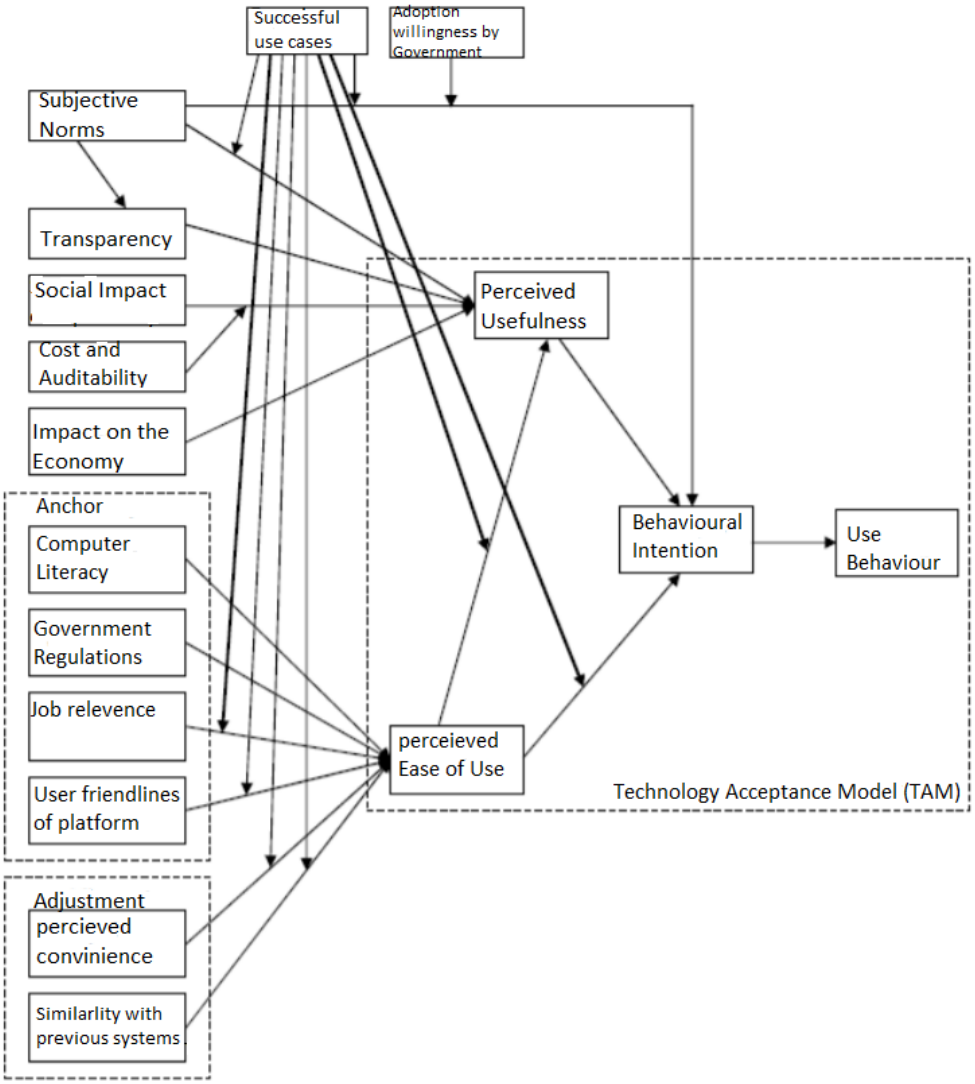

Figure 10. Modified TAM 3 [32] as it applies to this research.

Consequently in this research, of the two hundred and thirty questionnaires that were received, ten were from experts and two hundred and twenty from the general survey completed by Nigerians across different employment sectors and locations in the country, twelve of the two hundred and twenty responses were discarded due to incomplete information leaving two hundred and eight for analysis.

From the two hundred and eight results obtained, forty-one Private Sector employees responded, with forty saying they can adopt a new technology IF IT IS USEFUL and can only adopt IF HE CAN USE IT. Ninety out of the one hundred and two public sector Employees said they would adopt a new technology IF IT IS USEFUL, while twelve said they would only adopt a new technology IF THEY CAN USE IT. Also, forty of the forty-three self- employed respondents would adopt a new technology IF IT IS USEFUL while three said they would adopt IF IT IS EASY TO USE, while ten people said they would adopt IT IF THEY CAN USE IT. Twenty-two unemployed individuals responded, fifteen said they would adopt a new technology for Anti-corruption IF IT IS ACTUALLY USEFUL for the purpose it was created while seven said they would adopt IF THEY CAN USE IT

3.2 Statistical model for results and test of the hypothesis

To make an inference about the possibility of the adoption of a Blockchain based database system integrated with the current EGovernment system to improve processes in a way that will increase transparency in Nigeria and other developing countries; linear regression analysis was conducted. This was also used to determine the correlation between the different factors in the Technology Acceptance Model (TAM) adopted

for this research. The hypothesis was also tested the ascertain the ow close the findings in the research were to the TAM in determining the factors that will influence the adoption of the proposed technology. Collected data were analyzed using SPSS 22 software, where the Cronbach alpha and other test statistic parameters were used to find results and draw conclusions. Summaries of the statistical model and hypothesis testing are presented in the figures and tables below. In *figure 11* below, the TAM model for this research is represented, indication how they are connected to each other, i.e., how PR related to PU and PEOU, AT and BI, more detail will be provided alongside the statistical model.

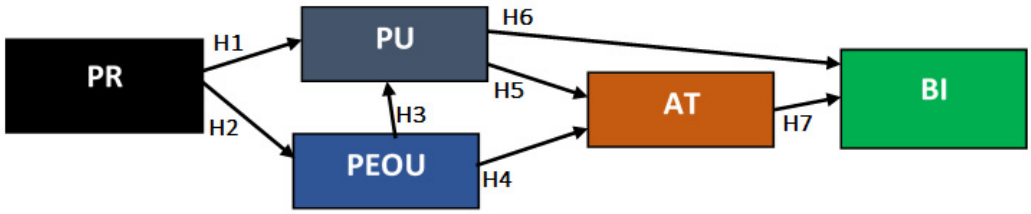

Figure 12. TAM for ICT4Transparency

3.2.1 Statistical Model analysis

3.2.1a. Reliability Check**:**

A reliability analysis was conducted to check the internal validity and consistency of the data collected for each factor responsible for the acceptance of new technologies. As shown in *Table 13* below, results of the Cronbach's alpha for all the factors was above 0.7, indicating that the factors are reliable and measures up to be considered for the adoption of the proposed system for value chain management through the integration of blockchain and E-Government.

Table 14. Reliability statistics of 5 factors

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.788	0.793	5

3.2.1b. Correlation Check:

Once the reliability of the factors was ascertained the five factors in Table 15, their correlation coefficients were examined to measure the strength of the relationships between the five factors which were used for the hypothesis as shown in Table 1 below. The values of the correlation coefficients indicates that there is a strong positive relationship between PU and PEOU (0.831), PEOU and AT (0.765) as well as PU and AT (0.619) as the values are very close to 1.

Table 2. Correlation statistics of 5 factors

	PR	PU	BI	PEOU	AT
PR	1.000	0.218	1.000	0.138	0.205
PU	0.218	1.000	0.218	0.831	0.619
BI	1.000	0.218	1.000	0.138	0.205
PEOU	0.138	0.831	0.138	1.000	0.765
AT	0.205	0.619	0.205	0.765	1000

3.2.1c. Test of Hypothesis:

A Linear Regression analysis was conducted to ascertain the finding and to test the hypothesis as well. The relationship between the independent and dependent variables was checked using the significance of 0.05. Thus, if the significance value ≥0.05, the hypothesis is accepted and rejected if otherwise. The different results are as shown in *Table 3* below:

Table 4. Hypothesis summary

SUMMARIZED TEST OF HYPOTHESIS AND RESULTS		
Hypothesis	**Conditions**	**Results**
H0	There is no relationship between users' Perception about Regulatory and Environmental Influence (PR), Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude towards (AT), behavioral intention (BI) of a new technology and the actual use of the new technology.	Reject
H1	Perception of users about regulatory and environmental influence (PR) will positively and significantly influence user's Perceived Usefulness (PU) of ICT4Transparency.	Accepted ($\beta = 0.239$ and $p > 0.01$)
H2	Perception of users about regulatory and environmental influence (PR) will positively and significantly influence the user's Perceived Ease of Use (PEOU) of ICT4Transparency.	Accepted ($\beta = 0.170$ and $p > 0.05$)
H3	Perceived Ease of Use (PEOU) will positively and significantly influence user's Perceived Usefulness (PU) of ICT4Transparency.	Accepted ($\beta = 0.831$ and $p > 0.01$)
H4	Perceived Ease of Use (PEOU) will positively but not significantly influence user's Attitude towards use (AT) of ICT4Transparency.	Rejected ($\beta = 0.052$ and $p < 0.05$)
H5	Perceived Ease of Use (PEOU) will positively and significantly influence user's Attitude towards use (AT) of ICT4Transparency.	Accepted ($\beta = 0.827$ and $p > 0.01$)
H6	Perceived Usefulness (PU) will positively and significantly influence user's Behavioral Intention (BI) to use ICT4Transparency.	Accepted ($\beta = 0.012$ and $p > 0.05$)
H7	Attitude towards use (AT) will positively and significantly influence user's Behavioral Intention (BI) to use ICT4Transparency.	Accepted ($\beta = 0.210$ and $p > 0.05$)

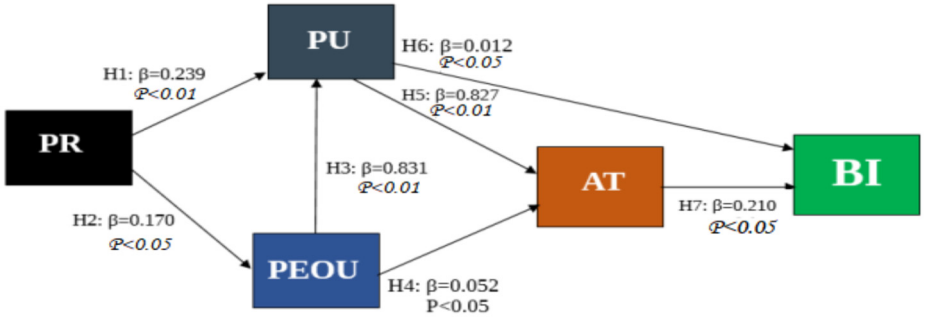

Figure 16. Linear Regression Model Result for ICT4Transparency TAM

Summarizing the results obtained from the linear regression, six of the seven hypothesis earlier drawn were accepted and one was rejected because the p-value was above 0.05, making it statistically insignificant. Also, Perceived Ease of Use has a huge impact on Perceived Usefulness which in turn has a high positive impact on the Behavioral Intention of users to use the ICT4Transparency system. Perceived Usefulness (PU) does not directly have a high impact on Behavioral Intention (BI), but on Attitude towards the use (AT) of the system and Perceived Ease of Use (PEOU) does not have a high impact on Attitude towards the use (AT) of the system but on Perceived Usefulness (PU). Findings from this research concludes that the five factors if considered individually does not have as much impact on the actual use of the system, but collectively can have a positive significant impact on the Behavioral Intention (BI) to use the proposed system which leads to the actual use of the system.

4. Discussion

The research results formed the basis for this study, knowing that EGovernment with Blockchain technology can improve the current status of Nigeria in terms of transparent processes and improved productivity anti-corruption and that people were ready to adopt it if it will solve the problem of corruption. To further shape the decision, ten experts were interviewed; Experts from the areas of Information Security, Database Management, Federal Ministry of Communications (which handles the current EGovernment infrastructure in Nigeria), Policymakers with the Federal Government, Cloud service experts and Blockchain enthusiasts. This aligns with the opinion of EGovernment and blockchain researchers like [59], [60] across the academia

From the expert interview and surveys, it was gathered that although Blockchain technology has a lot of potentials due to its capabilities, it is only a tool that can be made important by the purpose for which it is applied, as such it may not be able to solve the problem of corruption in Nigeria unless it is applied appropriately. Other findings were that the youth should be encouraged to participate in adopting emerging technologies for solving the corruption problems and other prevalent problems in the different sectors of the Nigerian economy, as this sense of responsibility will encourage them to ensure the smooth running and implementation of a new project.

Criteria such as relevance, workability, practicality, simplicity, cost-effectiveness and sustainability are critical to the success of any new technology intended for national development. Findings also indicate that Nigeria has the relevant infrastructure to leverage the blockchain but may be faced with issues such as credible management and processes to ensure widespread trust and acceptance of the technology. The experts also mentioned their observation on the possibility of the Nigerian government adopting the blockchain technology since it will empower the authentication and integrity of blocks of data as they move through the various networks and systems. Bringing about the implementation of processes which will bring about more advantaged to the government both within Nigeria and globally.

4.1 Limitation of study and generalizability

This research can be generalized in similar situations especially in the public sector of developing countries as the findings can be applied whenever a new technology is being introduced to the organization, this solution can be vital in managing the value chain of the public sector organizations. However, due to the limitation of

the sample size which was very small and cannot represent the entire population of Nigeria, the conduct of further studies with a bigger sample size is highly recommended before generalizing findings. Also, respondents to the survey used in this research were only contacted via online social media platforms and email, thus, some target respondents who were not using their emails or social media at the time of the survey were unable to participate, as such, the results may have been influenced to a large extent by those who responded. This study provides preliminary results that can serve as a foundation to future research work which seeks to study the factors that can influence the adoption of a system using blockchain technology converged with EGovernment for value chain management and improved service delivery.

5. Conclusions

Findings from this research revealed the willingness of users to adopt the proposed system through the convergence of blockchain and EGovernment, if it can lead to the elimination of corruption from any society by increasing the transparency of government transactions. Thus, adopting it can also create avenues for rapid growth, economic development among many known benefits, including the ability to match-up with other countries in terms of socio-economic development.

The study explores how government processes can be enhanced through the use of converged technologies. This is an approach to improving service delivery to citizens and it incorporates the aspects of technology convergence, government business as well as user's perception as factors that can increase transparency of government transactions, subsequently leading to an improved economy. The concepts of value chain and its management are more applicable in areas like logistics and supply chain, have resulted in the growth of many businesses in that sector, thus, this paper recommend public sector organizations to deploy some known business concepts which have enhanced numerous businesses over time to improve the current government practices. As realized during this research, integrating new technologies (with extant working ones) can lead to an increase in the possibility of users' actual usage of a new system, due to their perception of that the system is easy to use, which can in turn influence their decision to actually use the system. Also, the TAM methodology used in this research is to further enlighten readers and users on the impact that their decision to either use or not use the system can have on the general outcome and productivity of any organization regardless of the amount of time and resources spent in setting up the solution. Furthermore, the TAM used here is also meant to inform and guide the government, organization heads and decision makers on a procedure that should be critically considered and evaluated when deploying a new technology in a workplace to ensure user willingness to use and actual use of the technology when deployed.

Blockchain converged with EGovernment can lead to an increase in the transparency level of government transactions and public service delivery only when the system is being put to used, because it is only a tool not the solution to everything.

The following recommendations were proffered from this research:

i. Future research should focus on addressing specifically Business Process Management (BPM) issues as it applies to the public sector and government organizations. Also, other methodologies that will further enlighten readers on the impact of blockchain convergence with EGovernment on increasing the transparency level of government transactions and public service delivery should be used.
ii. The conduct of further research as a continuation of this paper to develop and validate the technical aspects of the said system in addition to the user acceptability through a theoretical model development.
iii. The adoption of this system in organizations and businesses especially in developing countries for optimal resource utilization and subsequent increase in productivity.
iv. Government of developing countries should fund blockchain research to enable the development of bespoke solutions for their respective needs and environment, because when applied properly, blockchain is a powerful tool that can be used in solving multiple problems.

Conflicts of Interest: The authors declare no conflict of interest.

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