Socioetechnical Factors that Shape E-Government Payment Portal Development in Ghana

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Abstract. The purpose of this study is to understand how sociotechnical factors shape the development of electronic government payment portal in developing countries. E-Government research on payment has focused more on post development phases such as adoption, implementation and use. As a result, little is known about the development phases. To address this research gap, this study focuses on the design and development of an electronic government payment portal in a developing economy. The study employs dialectic process theory as an analytical lens and qualitative interpretive case study as methodology. Findings show that social challenges such as a contradictory requirements of stakeholders, frequent interferences with the development process and technical challenges such as lack of consensus on development tools, lack of relevant ICT skills in the public sector and the use of a rigid software development methodology influenced the development process. The conclusion offers implication for research, practice and policy as well as recommendations for future research.

Keywords: E-Government · E-Payment portal · Developing economies · Dialetic process theory

1 Introduction

The purpose of this study is to understand the social and technical factors that influence the design and development of e-government payment portals in a developing economy and how they are addressed or not. E-Government refers to the interaction and delivery of information and services to citizens as well as other relevant stakeholders through the use of information and communication technologies [1]. E-payment refers to all the automated processes in the exchange and transmission of monetary values over the information and communication technology networks among various stakeholders (for example, government-to- citizens and government-to business) in a business transaction [2]. A portal is a web-based application which generally provides its users the benefit of personalization, single sign-on to all applications, improved content management

ability from different sources [3]. Traditional online payment systems have been adapted to the virtual environment and new payment systems have been developed to meet electronic transactions requirement needs [4]. All these payment systems have led to making electronic transactions easier and fully automated.

In general, developed country e-government payment research has focused more on adoption and post-adoption issues with less emphasis on the design and development of the portal. Other studies [2, 5] on e-payment have focused more on business-to-consumer (B2C) and business-to-business (B2B) platforms where the payment is embedded in the transaction. However, in relation to government, there could be several payment transactions which involve different stakeholders from different public institutions and therefore, being more complex.

The research question motivating this study is: How do sociotechnical factors influence the development of e-government payment portals in a developing economy and how are such challenges addressed or not. To address this question, the study uses the interpretive case study approach as methodology [6, 7] and the dialectic process theory [4] as a theoretical lens to understand a Ghana's experience in the development of e-government portal for payment, the challenges encountered and attempts to address such challenges. This study is novel due to the fact that it is the first paper to discuss significantly government e-payment portal in Ghana and it also seeks to bring out the peculiar challenges developing economies face and their solutions thereof. No significant study has been done to understand the sociotechnical factors with the development of the government e-payment portal given its numerous sociopolitical and technical issues.

The rest of the study is structured as follows. Section 2 reviews the literature on e-payment in the public sector and developing countries. Section 3 explains the dialectic process theory as the analytical lens for the study. The research setting and methodology are discussed in Sect. 4. This is followed by Sect. 5 which presents the case study and findings followed by analysis and discussion of the findings in the Sects. 6 and 7. Final, Sect. 8 concludes the paper, outlines its contribution, implications and suggestions for further research.

2   E-Payment and Developing Economies

E-Payment systems ensure speed and accuracy of transactions [8, 61]. E-Payments between governments and other stakeholders are seen to be the logical consequence in the growth of Internet payment systems. Common examples of e-payment systems cited in the literature are the payment cards (debit and credit) [9]; point of sales (POS), automated clearing house (ACH), direct debit/deposit, real time gross settlement (RTGS) systems [10] and mobile payments [11, 60]. Pousttchi [12] describes mobile payment as the use of communication techniques with mobile devices for initiation, authorization or completion of payment. With the ubiquitous features of mobile devices [11], Kushchu and Kuscu [13] suggests that most developing economy governments will adopt mobile payment options. However, 13 years after, most governments in developing countries are still struggling with the introduction of e-payment platforms as part of their broader e-government initiatives. While literature [11, 14, 15] on e-government payment have generally focused more on the adoption and post adoption issues (for

example implementation, use, benefits) little is known about the pre-adoption issues (design and development). Specifically, there is less focus on the e-government payment portal development with single sign-on capabilities. Furthermore, current research on e-government payment has centered around e-tax (online tax) payments [15]–[18] to the neglect of all other government transactions. Expanding government e-payment transactions to the registration of businesses, licenses, building permits payment of fine fees of transactions and much more will require major rethinking [6]. However, studies on e-government payment have concentrated on specific payment platforms, therefore, neglecting the complex sociotechnical interactions involved with the pre-adoption stages. In an attempt to address this challenge, Csáki et al. [14] discussed how the behavior of citizens and other stakeholders are influenced by the governmental use of payment methods and related policies. However, this research fails to look holistically at all governmental services.

A number of reasons for adoption of e-payment systems of governments are cited in literature. For example, it is noted that e-government payment systems are adopted due to the speed and accuracy of electronic transactions [8]; to avoid the unnecessary media breaks [11]; to empower and provide web-based [19] public services to all citizens as well as other stakeholders through the use of information technology and the presence of a network [20, 21] which could either be wired or wireless [22]. On the part of citizens, use of websites in carrying out financial transactions with government is dependent on issues such as efficiency, security, cost and usability [23]; frictionless use which is impacted by past experience and trust in security [14]; multi-channel payment services, a common archive for all services obtained to specifically keep track of transactions independently and the ability to begin a complex transaction in a channel and complete it in another channel [24], the possibility to interact with an authority to provide clear instructions as well as the availability of clear and unambiguous information in the channel. However, these goals have not been achieved by developing economy governments due to the complex socio-technical challenges faced by most countries. Information on how to go about payments on some government websites are scanty and do not provide much directions to users. Reaching out to authorities concerned in most cases could be a daunting task and almost impossible. Perceived usefulness, ease of use, perceived risk, trust, compatibility, external and interpersonal influences, self-efficacy and facilitation condition [25] are reasons why citizens adopt online tax filing and payment systems.

Literature on e-government payment systems therefore, show that whereas adoption and post- adoption issues [11, 19, 24, 26] have been discussed, there is less focus on the design and development of such applications. Specifically, most discussions on e-government payment view the phenomena as a logical continuation of e-government but not from the viewpoint of a portal.

3   The Dialetic Process Theory

The theoretical foundation for this study is the dialectic process theory [4]. The Dialectic Process Theory developed by Van de Ven and Poole uses the assumption that complex social interactions create confrontations leading to conflicts that bring about change in an organization [27]. The theory is made up of the following concepts: thesis, antithesis

and synthesis. Thesis is the original intention of an idea to be achieved by an individual, group or an institution. It could be referred to as the expected outcome of an event. In this study, thesis is the original intention for the development of e-government payment portal. An antithesis is an opposition to the thesis leading to a conflict. These are forces, vents or values that prevent the realization of the thesis. The antithesis of this study refer to all the factors that led to the non-achievement of the thesis. The synthesis is the combination of the best portions of the thesis and antithesis [28]. It refers to the actual outcome. In this study, the synthesis refers to the outcome of the development of the e-payment portal. Figure 1 below presents a diagrammatic view of the theory.
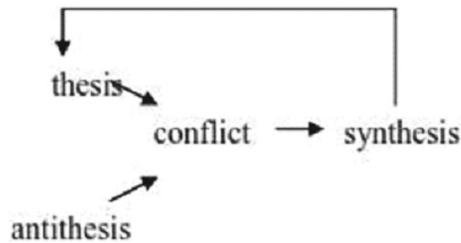

Fig. 1. The concept of dialectics. Source [4]

The theory is based on three principles: Pluralism, Confrontation and Conflict. Pluralism suggests that a phenomenon exists in a world which is made up of either internal or external contradictory forces and colliding events that are always competing for domination and control.

There are inadequacies that are revealed by questioning certain views of the thesis, which eventually lead to confrontations. Conflicts are generated as a result of the confrontations to finally shape the actual outcome of the event. The dialectic process theory has been used to explain enterprise resource planning conflicts [29, 30], in various private organizations as well as knowledge management paradoxes [31]. Other studies used the dialectic process theory to study organizational consequences [15] and to examine the dynamic actions involved with systems development and implementation [32, 33]. For the purposes of this study, the theory helps us to explain the sociotechnical challenges with the e-government payment portal development and how they were addressed or not.

4 Research Setting and Methodology

This study forms part of a broader research into challenges with design and development of e- government portals in a developing economy context and how they are addressed or not.

4.1 Research Setting

This study was conducted in Ghana, a developing economy found on the west coast of Africa and bounded by the Atlantic ocean. Ghana is a developing economy with about

30 million citizens. It recently attained a lower middle income status. According to the International Telecommunication Union (ITU), the percentage of individual using the internet grew from 0.15 in the early 2000's to 23.48% by 2015. This suggests that in recent years, internet penetration is on the increase. In terms of technology infrastructure, Ghana has according to the ITU 2015 report, 4.0 fixed telephone subscriptions, 87.1 mobile-cellular telephone subscriptions, 2.4 fixed broadband subscription (all per 100 people), with 17% and 18.3% of households with a computer and internet access respectively. Hence there is still much to be desired. With a large part of its population (61%) in the rural areas where there are general difficulties such as lack of electricity, difficulty in getting mobile phone reception to make a call let alone assess the internet, payments have generally been through face-to-face cash payments. This requires the physical presence of the individual or business to make payments either through the bank or physically. In recent times, electronic payments have been on the rise. This started from the ATM cards, eZwich card, VISA and MasterCard and currently various mobile payments. With this in mind, the government has changed its way of payments to its citizens and other stakeholders and vice versa. The introduction of the government of Ghana's e-payment portal allows all stakeholders to pay their taxes, make general payments and even allow other businesses to use that same portal for their private businesses.

This portal integrates with the other systems in order to provide a complete transaction. Through this, Ghana is striving to reach the transactional stage [34] for e-government implementation.

4.2 Methodology

The qualitative interpretive case study approach [6, 14, 35] was used to explain the sociotechnical factors that influenced the development of the e-government payment portal. The Case study approach, which provides empirical evidence [36] was used to understand and describe the sociotechnical factors influencing the development of the e-government payment portal in Ghana. The qualitative case study research was chosen to help gather rich data on the phenomenon as well as provide context sensitive insights [16].

This study uses interpretive paradigm [17] as its Philosophical stance and therefore describes its ontology and epistemology from the perspective that both the research phenomenon and the resultant knowledge are socially constructed between the researcher and the participants [17, 18]. Therefore, rather than seeking objectivity, as in the case of a positivist research, this case study seeks to understand how sense is made out of the real-life context within which the e-government payment portal exists [37].

4.3 Data Gathering and Analysis

Data was collected from the National Information Technology Agency (NITA). NITA is responsible for the development and design of e-government portals, therefore, making them directly responsible and involved with the e-government payment portal development process. Fieldwork for data collection occurred between September 2015 and April 2016. We gained access to NITA through our personal contacts and gathered data

through multiple sources, including interviews, informal discussions, document and arti-
fact analysis as suggested by Myers [38]. Semi-structured interviews were conducted
with 18 participants, including directors and employees from application and business
divisions of NITA. The participants for the interviews were selected through purposeful
and snowball sampling [39] by identifying employees who participated in the devel-
opment and/or had knowledge about the e-government payment portal development.
The average time for each interview was 58 min. Depending on the consent of the par-
ticipants, we recorded most of the interviews and later transcribed while others were
based solely on note taking. Informal discussions and clarifications through personal
visits provided additional data. Further data were gathered through documents analy-
sis which were either through physical (minutes of meetings, reports from developers,
technical documentations, manuals, brochures, flyers) or electronic means (the internet,
institutional website).

The data collection and analysis were done concurrently [20, 40, 41] as this is in
line with interpretive case study principles. The aim of the analysis was to identify the
sociotechnical factors that led to the final outcome of the e-payment portal development
process. We drew on concepts of the dialectic process theory as the analytical lens and
followed the interpretive mode of analysis [18]. This was done inductively by continu-
ously reading the data and reviewing documents on issues relating to thesis (what they
wanted to do), antithesis (what were the challenges) and synthesis (what was the final
outcome). We individually analyzed the data separately, but frequently met to discuss
emerging issues and findings until an agreement was established. There were follow-up
interviews in cases where necessary for further insight. Feedback from these sessions
was used to improve the analysis and findings.

5 Case Description

Payment of public services in Ghana could be a daunting task. Previously, there were
multiple offices, each of which one had to go through for government payments. This
led to frustrations such as spending the whole day outside the office for workers and
not meeting those to offer the services because they were not around. However, the
current e-government payment portal serves as a one stop point for all payments leading
to convenience for both citizens and government workers. The idea of the e-payment
portal came to being when an e-payment steering team visited Canada to have a first-
hand information on how the e-government portal is working. With that in mind, the
decision was taken to develop an e-payment portal for government operations, which
allows citizens and other stakeholders to conveniently pay their taxes, fees, tangible
goods and other services online. The public sector in Ghana does not have persons
with the relevant IT skills to develop these applications. To solve this, the government
decided to collaborate with the private sector, which has many skilled IT staff as well
as a permanent consultant to develop and oversee to the e-government payment portal.
Finally, one company was selected through a bidding process. Therefore, as stated by an
officer of the National Information Technology Agency (NITA): "the bidding process
was competitive, but in the end, we had the company with all the needed skills and
resources."

The aim of the Ghana E-Government Payment Platform (GEPP) is to broaden the scope of payment options, streamline payment processes and improve efficiency specifically relating to payments and generally in the service provisioning for all Government Ministries, Departments and Agencies (MDAs). "We had various interest groups who had different interests and expectations. Choosing the options of one over the other opened up for more controversies" a Director said. The application development tool used for the payment portal was Magento. Magento is an Open Source e-commerce application development platform which comes in many versions. MySQL was the database and the web server was Apache all of which are Open Source platforms. All these are Open Source software development tools. The selection of the development platforms was based on three reasons: 1) the evidence provided by the contracted company on how secured the platform was, 2) the procurement issues involved with acquiring such development tools and 3) the conviction of the government institution that this platform was good. The systems development methodology used was the waterfall model. With the waterfall model all data required for the development was completed before the actual portal development. "This methodology was used because most of the payment processes were not streamlined" an Officer said. The contracted company went through lots of pain gathering the needed data from all stakeholders (e.g. Controller and Accountant General, Bank of Ghana and Ministry of Finance and Economic Planning) and went through the business requirements analysis process. According to an officer, "the various interest groups had entrenched positions on what to expect. Once they were neglected, communication stalled, it was difficult coordinating all these processes and groups, especially because of their different shared interest". Based on the requirements gathered from stakeholders, Magento was used to design the features of the e-government payment portal.

The portal was built to integrate with the public e-services portals as well as other portals and payment gateways from stakeholders such as Ghana Revenue Authority (GRA), VISA, MasterCard Payall (cash and cheque), MTN and Airtel Mobile Money Transfers, the various Bank Transfers and eTranzact. This was done through the installation of an Application Programming Interface (API) on the e-payment portal which was supposed to link to the other payment gateways. "In the end, we had to use an unconventional approach which had been suggested not to be helpful to complete the development. This was because, we had to force our way through to agree on the outcomes of the various functional processes. Upon achieving these, we didn't want the situation whereby another group comes to compel us to change the decision. We, therefore, had to make it difficult for this to happen, hence the use of the waterfall model. This worked best to our amazement. Even though the project delayed, we realized that without that approach, we may not have completed by now" a developer narrated. One major challenge faced was that most of these organizations were initially a bit skeptical about the open source development platform used in developing the portal. Hence lots of security concerns were raised by the stakeholders. To address this, the government subscribed to the enterprise edition of Magento which came with extra features and support as well as licensing features that made it more trustworthy and secure. Aside this, the platform was customized to suit the Ghanaian environment.

Another aim, which was integration with other payment gateways was achieved when the Application Programming Interfaces (APIs) of these payment gateways were installed on the e-government payment portal. This was to provide connections to their payment portals to enhance smooth transaction. The e-government payment portal was developed to keep only the addresses of individuals or businesses for shipment or courier purposes. All other details such as the card details, and transaction details are kept on the payment platforms of the other stakeholders. Hence, the e-payment portal serves as a link to these other platforms by bringing the different gateways together on the same platform. As described by one of the developers: "there were various contradictions with user requirement leading to a general delay in the project." There were frequent interruptions due to changes in government workers as well as disagreements on the part of developers and stakeholders. Finally, the GEPP portal was developed. Testing has been done and platform is currently being used by many stakeholders.

6 Analysis of Findings

This section focuses on the analysis of the case study based on the thesis, antithesis and synthesis of the dialectic theory.

6.1 Thesis

The thesis for the e-government payment portal was to serve as a payment platform for paying taxes, fees, bills and other government transactions. Hence, transactions made through this portal were supposed to be saved in a database for a while until the transaction was fully backed-up. There were, however, various issues for and against this which led to the development of the current portal.

6.2 Antithesis

The antitheses were some sociotechnical challenges which created confrontations and finally led to conflicts. These antitheses affected the final outcome of the e-government payment portal.

6.2.1 Social Antithesis

First, there were contradictory requirements from various stakeholders. Over the years, different individuals and groups had processes which were not standardized, however, such processes made their work easier. Although not illegal and not streamlined, these procedures and processes appeared to work well for such MDAs. These norms had become the accepted behavior. Over the years, other workers who joined the institutions applied them in their work. As a result, such practices had become engraved in the work practices of the various MDAs. The difficulty here was that, the various stakeholders upheld their practices so much that they wanted them maintained. Choosing one procedure over the other was not easy since stakeholders did not want to compromise. Gathering data from these institutions was a daunting task.

Second, there were frequent interferences in the development process. There were too many interferences from stakeholders during the design and development. The company at a point in time was asked to hold on with the development because the various stakeholders had to iron out certain differences. All these delayed the completion time. One major interruption to the development process was the frequent changes made to the officials of NITA. In most cases, individuals who were supposed to interact with the third party were transferred. During this period, development process had to be halted. This is because in most situations, these people were the key contacts in the development process and their absence led to a halt in the process. The new people who took over had to be abreast with the current activities before development could continue. This led to the delay of delivery of the finished product.

6.3   Technical Antithesis

Lack of Relevant ICT Skills in the Public Sector led to human resource challenges. The public agencies in Ghana lack qualified and highly skilled IT personnel who could have developed this application. This is due to the unattractive nature of the remunerations and the work environment. Quite a number of them also lack systems analysis techniques, programming skills, database development techniques and many more. In other words, most of the IT employees in the public sector lacked the analysis and design skills of the particular tools used for the e-payment portal development. To address this challenge, the government used the highly skilled IT staff in the private sector to achieve its aim of developing the e-government payment portal. Here, a third party company was contracted and provided with all the funds to develop the portal. Hence, a partnership with the private sector made the government succeed in the development of the e-government payment portal.

The use of a rigid software development methodology was an approach to handle multiple change requests. Challenges arising from the entrenched positions of the various stakeholders led to the usage of the waterfall model. The developers did not want frequent changes even after there had been an agreement. Developers believed using this methodology will make them complete on time. Developers also took the decision to use this rigid methodology in order not to allow the frequent leadership changes of NITA to affect design decisions which had already been made.

There was also a difficulty of Integration with Third Party Applications. There were instances where it was difficult to integrate with other platforms. Compatibility issues, security and privacy issues as well as many more were raised. In the end, it was decided that the e-government payment portal was not going to keep records of transaction details except for the shipping address. However, integration with the e-services portal was easier because the API's were already available.

Lack of Consensus on Development Tools was another technical challenge. It was discovered that most public sector workers, as well as other stakeholders, were a bit skeptical about the use of open source applications due to security reasons. Aside security issues, the compatibility of Magento with other platforms was raised. Another concern stems from the fact that there is no one to call or ask when you have issues with the use or development of the application. To settle this, developers had to go in for the enterprise edition of Magento which could be supported in times of need.

Finally, use of Open Source development platforms to promote Open Governments encouraged interoperability. Open source platforms were used as this will provide collaboration and interoperability among various countries especially among member states of the West African region and to a larger extent, the African Union.

6.3.1 Synthesis-E-Payment Portal

The collision of the thesis to various antithesis led to confrontations, conflicts and finally a synthesis. The first thesis was to develop a payment portal which could eventually keep records of transactions of the various government institutions as this will curb corruption and instant information generation. This was not achieved because the portal only keeps records of the billing or shipping address. Ghana does not have any policies governing the use of open source application tools and how well to protect such users. The solution was therefore to develop a portal which was supposed to serve as a means to communicate with the other payment gateways. Hence, no payment transactions are kept on the e-payment portal.

The synthesis was therefore an e-government payment portal which integrates with the government e-services portal and other payment gateways but keeps only the billing and shipping address of the user.

7 Discussion of Findings

This study groups the antithesis into two categories. The social and technical challenges. This is because the researchers view information technology as the ensemble of equipment, techniques, applications and people that define a social context which includes infrastructure for development and use and the social relations that make up the context [42]. This study, therefore, discusses the antithesis in light of these two groups. The following issues emerged while attempting to address the research question which was to understand the sociotechnical challenges that influence the development of e-government payment portals and how they are addressed or not.

7.1 Social Challenges

Social challenges led to conflicts and finally frequent interferences with the development process. The research findings show that there was difficulty in gathering all the requirements needed for the development of the e-government payment portal. Generally, requirements gathering process which is one of the first activities in software development [43, 61] appears to be a major challenge in the design and development of information systems [7, 44]. There are three processes involved: 1) discovering how an information system should behave and address the problems it intends to within a context, 2) serving as a guide on how the software should be built by describing these findings in a way that can be understood by software developers and 3) managing frequent changes from stakeholders [45]. These processes are critical for success in the software development process [29]. One of the difficulties stems from the fact that there are a large number of participants involved, which extend the length of time for the whole process

to be done [30]. This is buttressed by Ross & Schoman Jr [46] who suggest that the results of paying less attention to requirements gathering at the early stages of software development are extremely high costs, leading to missed deadlines, wastages, duplications, disgruntled end users and a repeated cycle of changes. These projects, mostly have so much data to the extent that they lead to difficulty in objectively determining causes for the observed trends in data [30]. These difficulties are broadly grouped into individual cognitive, interpersonal processes and complex challenges [7]. Individual cognitive refers to the inability of stakeholders to explicitly express their needs, imagine beyond the current environmental needs and be able to picture how information technology solves their challenges. Interpersonal processes such as business-IT relationship issues, managing expectations, conflict resolution and negotiation as well as communication skills are some of the social issues with the requirements gathering. Complexity challenges involve prioritization, managing the diversity of inputs, defining interaction and assessing outcomes among others. A solution to these challenges by Damian et al., [47] suggest that stakeholders should be separated from each other and collocated with a system analyst in order to get the best outcome. However, this solution was meant for a small business, therefore, does not solve the challenges faced with large user participants in the design and development of e-government portals. The findings from this study show that contradictory requirements were a major hindrance to the successful design and development of the e-government payment portal. This generally led to the frequent changes in the development process.

7.1.1 Interaction and Coordination Bottlenecks Due to Entrenched User-Group Positions

Findings suggest that there were interaction and coordination challenges that led to the final outcome of the portal. While some of these were external to the case organizations, others were internal. Some studies [48, 49] suggest that situations, where employees communicate and relate to complete tasks is one way of achieving the desired results. In other words, workers combine resources for the purposes of achieving a task in most cases when they perceive external threats. To this end, even though stakeholders may not be friendly to each other, they are bonded by the common tasks they set out to achieve. This is effective within a small group. The difficulty arises, however within and between large varying groups with different interests and expectations [50, 61]. This leads to entrenched user group positions in some situations. Therefore, as a result of different interpretations, the selection of one group's development approach over the other leads to entrenched positions.

7.1.2 Impact of Sociopolitical Values

Development processes are shaped by sociopolitical values [51]. As a result, there are both external and internal controversies leading to various degrees of conflicts and making the process uncertain. The development process is therefore not autonomous. In other words, the process cannot be taken as rational [51]. The development process was characterized by such sociopolitical issues, leading to the final outcome. Frequent change in

leadership of the case institutions; lack of autonomy in taking and implementing decisions; perceived power issues due to political affiliation and many more sociopolitical challenges led to the development challenges and the final outcome.

7.2 Technical Challenges

Lack of consensus on development tools leading to integration difficulties and resistance. Various governments across the globe have either adopted or are in the process of adopting open source applications because of the convergence to open standards [32]. Open source software is a term used to describe applications/platforms which are developed, made available to the public including the source codes and open for contributions through the modification of such software [33]. This is due to the following reasons: 1) the success of such products in gaining shares in their markets, 2) the uneasy calm about proprietary software and 3) the general opinion that the old ways of software development are failing to answer questions regarding the demand for effective and efficient software applications [34]. Interest groups involve a community of large users who promote these platforms, increase in the number of organizations using open source platforms and the increasing interest by governments, especially in Europe to use open source software for e-government purposes. Whereas most developed country governments are either using or adapting open source applications [34], it appears that developing economy governments still prefer proprietary software [33]. However, developing economy governments are increasingly using open source platforms as web servers. For example, various ATMs in Ghana use the Linux operating system as against the windows platform. Open source platforms have benefits such as increasing interoperability, reducing the challenges that come with vendor lock-in, providing more flexibility, reducing costs involved with the development of software [32]. Open source is viewed as a new way and innovative approach to developing government software which is flexible, democratic, creative and involves a large number of people as well as more reliable due to the extreme scrutiny by the open source community [34].

Therefore, it is suggested that dwelling on the strengths of open source platforms allows governments to open up its closed-ended processes to a broader input and innovation [52]. However, the research findings suggested that most of the third party institutions were skeptical in connecting to an open source application which led to the current e-government payment platform. Whereas research, in general, is discussing the possibility of open source platforms in developing e-government portals, developing economy literature has focused less on this phenomenon. In general, the findings thus show that the thesis of being able to store transactions was not achieved due to security concerns of the open platform.

7.2.1 Lack of Relevant ICT Skills in the Public Sector

Findings show that developing economy public sector lacks personnel with the needed skill in programming and databases to develop the portal. In an attempt to address this situation, the development of the e-government payment portal was outsourced to a third party private company. Debates on outsourcing issues and problems arose in the public sector at the latter part of the 90's [36] due to the increasing trend with

government agencies outsourcing their IT needs [53]. Recent studies have revealed that outsourcing within the public sector has become an increasing trend and is becoming a widely accepted management practice within governments [35]. According to Chen & Perry [54], outsourcing could be a way by which governments get access to skilled IT staff with another benefit such as the economy of scale in order to provide quality e-government applications. On the other hand, outsourcing could also have some major disadvantages such as loss of managerial control over outsourced projects, threat to security and confidentiality, quality problems, hidden costs and reallocation of existing teams [55]. Whereas lack of staffing could be a major hindrance to the development of the e-government portal the findings thus show that lack of relevant ICT skills in the public sector of a developing economy should not be a hindrance to the development of an e-government portal.

7.2.2   Use of Rigid Software Development Methodologies to Achieve Development Goals

The research findings showed that a rigid software methodology, the waterfall model was used for the development of the e-government payment portal. An appropriate lifecycle selection is crucial to success in the development of software [56]. Various studies [57–59] identify the features of the software development process as crucial to the success or failure of software developments. In a situation where many processes were not streamlined, where it was difficult to gather user requirement and there were opposing views on the use of open source platforms, this methodology was not the best approach to use. However, to defy all odds, this approach was deliberately used to force the users to objectively go beyond their differences so that the development could take place. Thus the findings from this study show that even though studies support iterative methods, certain instances such as where processes are not streamlined and individuals deliberately frustrating the process could call for a combination of flexible and rigid methodologies leading to success and development within the time.

7.2.3   The Involvement of a Skilled and Permanent Consultant Who Served as an Intermediary Between and Within the Stakeholders

One major contribution to the development of the e-government payment portal was the employment of a permanent and skilled IT personnel who once worked in the private sector as a consultant on the project. This consultant was employed and paid an equivalent rate of what pertains in the private sector with other benefits. There was, therefore, a thorough scrutiny of the system whenever deliverables were made to ascertain whether they met international standards or not. Serving as the project coordinator, the consultant provided direction to the development. This took away the perennial challenge where third party private organizations who won bids to develop systems for governments did not undergo proper scrutiny from government through an independent consultant.

8   Conclusion

The study used a case study of e-government payment portal development to answer the research question that sought to identify the sociotechnical challenges that influence

the development of e-government web portals in developing countries and how they are addressed or not. We identified that one of the challenges which was common is the lack of consensus on a common development platform. Other social challenges such as contradictory user requirements from stakeholders and frequent interruptions with the portal development due to the interferences hindered the general development of the e-government payment portal.

Technical issues that were identified were the use of rigid software development techniques such as the waterfall model in a society where most of the processes were not streamlined with different users giving different narratives of the same processes, the lack of relevant ICT skills in the public sector also led to outsourcing the project to a third party. The study is the second attempt by the authors to investigate challenges with the development of e-government web portals (e-payment) in a developing economy context and how they are addressed. By this, the paper extends the existing e-government literature on developing economy on web-portal development. The originality of the paper, therefore, stems from its application of the dialectic process theory to investigate the sociotechnical challenges influencing e-government portal development in a developing economy context.

In terms of implications for research, the paper demonstrates the applicability of the dialectic process theory to the domain of e-government portal development. With regards to practice, this study provides a clear understanding about the sociotechnical challenges faced during the development of e-government portals in developing countries. It is suggested that developing countries which have similar situations such as lack of relevant ICT skills in the public sector will use the Public Private-Partnership model. In addition, the use of rigid or iterative models should depend on the terrain and which is most pragmatic and not just discard the concept of the waterfall model due to its general weaknesses. Furthermore, to promote open governments, which will allow collaboration and interoperability among various countries, open standards which promote open source applications should be explored. This will help provide flexibility, security, interoperability and cost reduction among e-government portals. In relation to policy, it is suggested that governments enact policies which will educate and promote the use of open standards and open source applications, streamline government processes and encourage interoperability amongst e-government portals at various levels and from different government institutions. Therefore, there is the need for future studies to discuss how open standards and open source platforms could be used by developing economy governments to reduce the rate of failure in the development of e-government web portals. There is also the need to develop theories that are context-based sensitive to determine the individual sociotechnical challenges of a country that influence e-government web portal development. Also, other studies may compare findings from developing economy to those in developed country context to identify and address the unique challenges.

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