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Research Paper

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ABSTRACT

Government reform implementations are often a catalyst for system implementation within public sectors. However, their influence on the information system design process in the public sectors have not been explained extensively in the literature. This study used actor network theory as the lens to examine the interactions of actors during the information systems design process in the reformed public sectors. The main research aims were to extend the understanding of how government reforms influence the information system design processes of local government authorities in Tanzania. The study employed the interpretive approach and the case study strategy when analyzing the phenomena. Qualitative data were collected from 33 interviews with 23 participants who were purposively selected from three local governments in Tanzania. The findings show that the implementations of reforms have triggered the formation of actor-networks during the IS design process. Also, these reforms were found to affect the structural information flow in the organizations, which in turn affects the requirement elicitation process in the local context. The study has made both theoretical and practical contributions that are of value to researchers, policy makers and those involved in the IS implementation process in local governments of Tanzania.

Keywords

Information system design, public sector reforms implementation process, local government authorities, actor network theory

INTRODUCTION

This study investigates the relationship between the information systems (IS) design process and the context of public sector reforms implementation process in African countries. The reform implementations are premised on an organizational functional logic that promotes practices that improve

performance (Kudo, 2010; Park et al., 2021; Pasape & Godson, 2022). An analysis of public sector reforms presupposes that multiple groups or organizations have collaborated in the design of new IS. In the public sector, and particularly in local government, reforms such as public financial management reforms result in an increasingly complex IS design process that often lead to the construction of an IS which fails to comprehensively meet the local users' requirements and expectations (Varajão & Trigo, 2016).

The introduction of IS design to enhance public accountability and communication is a key objective for reforming public administration. However, the information system design (ISD) process, specifically in local government authorities in African countries (Gunawong & Gao, 2017), faces several challenges including weak standards, inadequate laws and regulation, insufficient public participation, and a lack of skills (Choi & Chandler, 2020; Gagliardi et al., 2017; Lee et al., 2017; Pasape & Godson, 2022). Thus, analyses of IS design processes driven by public sector reforms reveal misunderstanding and ambiguities that have emerged during the reform implementation (Kassen, 2019; Nurdin et al., 2022). Previous studies of practice in the public sector have also identified existing relationships between reform and IS implementation processes and show that these are generally focused on the operationalization of the IS (such as their adaptation and use) rather than the IS design process.

Public sector reforms progress from negotiations to iterations of strategic planning and then to technology diffusion in the network (Fenwick, 2011). In public sector organizations, including local government authorities, the process of designing an IS as part of the reform implementation process proceeds in stages through knowledge sharing and new process execution.

This study is grounded on actor network theory (ANT; Law, 2009) and the sociology of public sector reforms and IS development (Papadopoulos & Kanellis, 2012). Previous research related to IS design and analysis has relied on ANT because the IS design process is conceptualized as having both technical and social perspectives. ANT provides a framework that can reflect socio-technical interactions that align technical and social processes in the design outcome (Priyatma, 2013). Moreover, ANT focuses on network heterogeneity, actors' activities and the translation of various events which may occur concurrently (Iyamu, 2018). However, previous research on designing ISs for the public sector using the ANT concept, 'moment of translation', does not directly analyze the impact and influence of government reforms. An understanding of the role of government reforms is important in explaining their relationships and influence on the process of designing ISs in the public sector. Hence, further research is needed.

The rest of the paper is structured as follows. The next section provides a detailed literature review for reforms and the IS implementation process. This is followed by a discussion of the theoretical literature and how it informed the study, the research methodology section and a detailed presentation of the findings, discussions and conclusions of the study.

LITERATURE REVIEW

Public Sector Reforms

In the 1990s the World Bank attempted to establish new systems for the purpose of improving control, accountability and reporting capabilities in countries with emerging economies (Hashim & Piatti, 2018). These government reforms included public financial management reforms, budgeting reforms and public administrative reforms and were categorized as new public management (NPM) reform. NPM stressed the principles of efficiency and effectiveness in management and highlighted planning, accounting, analysis and regulation (Deng et al., 2018, Misuraca & Colombo, 2016; Rennie & Berman, 2018). The

new reforms deliberately introduced changes to the processes and structures of the public sector to objectively improve performance (Deng et al., 2018). The processes and structural changes brought about often require systems redesign, and the introduction of service quality standards (Rennie & Berman, 2018).

Many of the governments of African countries, including Kenya, Egypt, Tanzania, Malawi, Rwanda, Uganda and South Africa, have implemented integrated financial management IS solutions in response to public financial management reforms (Hashim & Piatti, 2018; Hoque, 2021). The public management reform movement imported views and ideas from various parts of the private sector in terms of market orientation, privatization, decentralization and leadership (Rennie & Berman, 2018). Furthermore, the adoption of e-government systems is another remarkable outcome of NPM (Şandor, 2012). In recognizing the importance of e-government systems, the Government of Tanzania embraced associated initiatives to increase effectiveness, efficiency and transparency in managing public resources (Laizer & Suomi, 2016).

IS Implementation in the Reformed Public Sector

The introduction of reforms, particularly public financial management and public administrative reforms, with a view to strengthening the reform objectives of the public sector and local government in particular, required additional technological investment (Hoque, 2021). Contributing to this topic, Kraemer and King (2006) offered a theoretical view as to whether the introduction of ISs was an instrument of administrative reform in the United States. However, these authors were of the view that ISs only facilitate the achievement of existing reform objectives and have never been an instrument of these reforms. The study of Park et al. (2021) posits that the success of implementation of a reform is more likely when organizational tasks and their implementation strategies are amenable to scientific and technological development.

In contrast, Şandor (2012) asserts that technology is considered to be the most important motivator for public administration reforms by extrapolating from the observation that technology drives change in society. Other studies have revealed existing mutual relationships between policy reforms and the adoption of IS in the public sector (Kraemer & King, 2017).

However, the focus in this study is on examining the influence of IS in government reform implementation. In African countries, practice shows that government reforms trigger the adoption of new technology in the public sector (Laizer & Suomi, 2017). In support of this, Misuraca and Colombo (2016) and Kraemer and King (2017) have shown empirically that reforms (such as public administration reform and financial management reform) are not the consequence of new technology.

Both the prototype and the agile approaches have been reported to be common for systems development when implementing new systems as a way to achieve government reform objectives. The potential benefits of the agile approach have been identified as a lack knowledge about organizational preconditions, enablers, processes and project governance arrangements (Lappi & Aaltonen, 2017). Empirical research has analyzed the intersection of the organizational details of public sector governance and policies with the software development process of government digitization (Janssen & Van Der Voort, 2016). Related to this, researchers concluded that ISs are central to good governance, including increased efficiency, accountability, quality of service, delivery of information and training and marketization (Akanferi et al., 2019; Deng et al., 2018; López et al., 2021; Muhammad & Wickramasighe, 2018; Park et al., 2021; Rennie & Berman, 2018). However, challenges exist regarding the heterogeneity of new ISs to be implemented in the reformed context. This includes working with diverse stakeholders, extensive reporting requirements, inadequate information leading to

misunderstanding of policy by employees, the degree of pressure to achieve reform objectives experienced by politicians and stakeholders, low standards, the need to align with laws and regulation, inadequate public participation, and a shortage of necessary technical skills (Choi & Chandler, 2020; Gagliardi et al., 2017; Lee et al., 2017; Salam et al., 2018).

Therefore, despite the existing relationships, the question of how the implementation of government reforms affects the process of designing ISs in the context of local government remains elusive. To further understand the analysis of the IS design process in reformed public administration, the moments of translation concept of ANT is critical. The translation involves a set of actors who interpret and align their interests towards the IS design problem. Thus, ANT is a pragmatic process of Sociology which focuses on the way heterogeneous actors build and maintain an actors' network (Heeks & Stanforth, 2015). Analyzing government reforms from the ANT perspective implies understanding the connections between the activities of IS design and use as well as understanding the different underlying objectives that organize the IS design process at different levels in the local government.

Actor Network Theory

ANT draws on a socio-technical perspective (Cresswell et al., 2010). The ontological position of ANT considers the existence of networks of actors, both those that are human and those that are not human (Kamp, 2019). In other words, the theory rejects distinctions between human and non-human actors as well as distinctions between those that are technical compared with those that are not technical (Latour, 1987). Rather it focuses on the interactions or relations between actors and the establishment of heterogeneous networks with aligned interests (Sekgweleo & Iyamu, 2022). Thus, both human and non-human actors have equal contribution in the networks. This assemblage of actors brings the constructive negotiations between actors into focus (Latour, 2007). In a social system, the negotiations are evidence of relationships or associations between actors thus creating networks.

In this study, ANT provides a roadmap enabling an understanding of the impact of government reforms on the ISD process in a local government setting. The IS design process in the reformed local government context is a complex activity which needs to be understood in socio-technical research from both the human and technical perspectives. Iyamu (2021) notes that ANT is widely applied in socio-technical research. Moreover, the theory explains that networks between actors may be formed consciously or unconsciously, based on allied interests and a common goal (Sekgweleo & Iyamu, 2022).

Translation is a key tenet of ANT (Mwenya & Brown, 2017). Translation in ANT is a mechanism through which the actor-network is formed; in this process actors are recruited and the alignment of their interests ensures the stability of the network (Kamp, 2019). The sociology of translation supports a detailed understanding of the actors' interactions during the IS design process occurring in a complex local government context. Thus, it is through translation that the relationships between actors are explored, and the resulting network or networks are identified during the analysis of functional requirements; this informs the system design for the reformed local government. Associations between heterogeneous networks may also be highlighted within which actors are identified and interests are aligned (Iyamu, 2018). The translation process is comprised of four moments or stages, namely problematization, interessement, enrolment and mobilization (Callon, 1986).

Problematization is the initial moment of translation in which key actors define the problem so that other actors may recognize it as a problem that they are also confronted with (Iyamu, 2018). A problem can be something that can be improved, an innovation, or issues that could impact the situation negatively. In this process, the actors consciously or unconsciously increase interest in it.

Interessement is the second moment of translation in which additional actors' interests are aligned with the problematized proposal (Rivera & Cox, 2016). During this phase, the roles and identities of each actor are defined, and system alliances are formed. Callon (1986) emphasizes that successful interessement leads to successful enrolment of additional actors.

Enrolment is the third moment of translation; it is the successful outcome of problematization and interessement where additional allies are strongly connected to the network (Callon, 1986); networks are formed consisting of such as a group with common interests. At this stage, actors need to move through obligatory passage points (OPP). The stability of the network alliance depends on negotiations between actors to minimize isolating factors that can threaten the network.

The *mobilization* moment of translation is the stage in which the networks are sustained by empowering actors whose interests are the same as those of the translator. This means that the proposed solutions gained wider acceptance and that the larger network of actors actively supports the created proposed solutions (Rivera & Cox, 2016). Hence, measures to ensure that actions are in line with the network of requirements are formulated and used.

Prior research projects have used the ANT concept of translation to explain issues and challenges related to IS development, implementation and the design process in various contexts, and in healthcare systems in particular (Nyella & Kimaro, 2015). Furthermore, Nyella and Kimaro (2015) used ANT empirical analysis and reported that the implementation of new systems in healthcare in African countries relied on translation processes which are shaped by contextual reality rather than just involving a technology transfer. The application of ANT during the analysis of reform implementation suggests that structures are formed through the establishment and strengthening of relationships between human and non-human actors. Hence, structures change because of the actions of actors as the result of reform implementation.

ANT has been widely employed in IS research to identify and analyze various IS implementation phenomena (Iyamu, 2021); this includes IS together with reform implementations in public sector organizations. For instance, Akanferi et al. (2019) used moments of translation to analyze the role of IT in the public sector reforms involving the driver's vehicle and licensing authority in Ghana. Muhammad and Wickramasinghe (2018) also referred to ANT when they analyzed the quality of education and service delivery service reforms in health systems through the implementation of ISs in the public sector. And in the context of educational reforms, López et al. (2021) employed ANT to show that an assembled network strengthens accountability and reality for quality education.

However, there are fewer studies that have investigated the role played by public administration reforms in the local government context and in the IS design process taking the ANT translation process into account specifically in requirement elicitation and analysis. This study, therefore, considers moments of translations as appropriate, especially when the actors identify common interests, and negotiate and align those interests with the IS design outcome. It is from the associations of networks of actors that the semi-structured data and information can be analyzed in detail within a context.

METHODOLOGY

The study employed the interpretivist approach and the qualitative research method was used. This approach was used as it adopts a subjective ontology that allows the researcher to understand people's perceptions, contexts and social systems in detail. The case study approach was used, as the focus was specifically on the influence of government reforms in the IS design process for effective IS development for local government authorities in Tanzania. The combination described above was necessary for gaining an understanding of the IS design process from multiple perspectives because, in

the case being studied, the IS requirements tasks are socially constructed in the context of digital innovation in the public sector. ANT specifically helps researchers obtain a detailed understanding of systems artefacts in a social context.

The study began with a thorough preliminary literature review of government reforms and the IS implementation process. Moreover, the review was based on the initiatives and current practices of adopting and implementing ISs in the public sector (such as, Kuhn et al., 2021; Akanferi et al., 2019; Choi & Chardler, 2020; Park et al., 2021; Pasape & Godson, 2022; Gunawong & Gao, 2017; Hoque, 2021). The information collected from literature was grouped into themes including the various approaches of systems development in public sectors, the requirement elicitation process, and the nature of participation during the IS designing process. It also used the ANT concept of moments of translations to study how change is institutionalized in the context of a reformed local government.

Although the focus the literature study was on the way government institutionalizes change by implementing reforms and ISs in the context of local government, the research question as to how the government reforms themselves could influence the subsequent IS design process in local government setting was not well explained.

Building on information gathered from the literature, the study purposefully selected participants from three local government authorities and the President Office Regional Administration and Local Government to draw a purposive sample of research participants (Yin, 2018). The local governments visited were Kondoa, Tabora District Council, and Mbozi District Council. Data were collected from 23 participants in two phases.

Table 1

List of Participants

Participants	No: of Participants
- Accountants	10
- Supplies Officers	03
- Economist (Planning Dept)	03
- IT Officers	05
- Systems Analysts	02

The participants' professionalism and basic IS knowledge, experience in using systems such as integrated financial management IS, and participation in systems development were considered to be important attributes that make the detailed information obtained credible as indicated in Table 1. The systems analysts were selected from the President Office Regional Administration and Local Government (Central Government) because local government systems specifically for local government revenue collections systems and financial management are managed centrally.

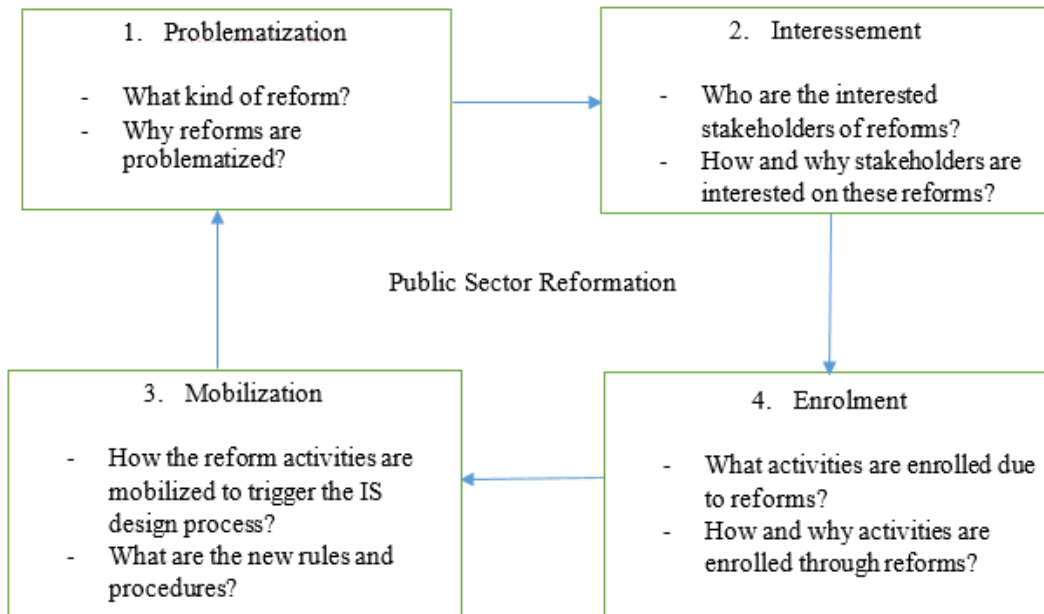
Data Collection

The qualitative data were collected from semi-structured interviews and documentary analysis; the semi-structured interview was the predominant approach. Therefore, guided by the ANT framework, a semi-structured interview guide was constructed. Thirty-three interviews were conducted with 23 participants from local government. A summary of interview responses was compiled from notebooks and transcriptions of audios as a Microsoft word document. As recommended by Guest et al. (2020), each interview was conducted to its point of saturation where researchers found no new ideas emerging with respect to IS design and implementation. The interview data were supported by the analysis of two policy documents pertaining to IS design and implementation in the context of the Government of Tanzania. To ensure anonymity, the participants were assigned numbers (P001 – P023). Their transcriptions each had page numbers and numbered lines. Therefore, cited text from the interview transcripts were presented in the format P004, 06: 012 where P004 is the participant number, 06 is the page number of the transcript, and 012 is the line number of the cited text. The data was arranged and analyzed to achieve the specific objective of this study.

Analysis

The detailed analysis of the data was informed by the ANT theoretical lens (Sekgweleo et al., 2017). The theoretical framework analysis supported the researcher's understanding and highlighted unanswered questions that needed to be put again to participants in the process of theoretical sampling (Morse, 2015). Hence, throughout the research process, data were analyzed and compared to ensure connections were made between the different categories previously identified and newly identified interview codes. More specifically, the ANT framework served as the lens and guideline while shaping problem definition and data collection, and informing the analysis of qualitative data (Walsham, 1995). ANT, as a socio-technical framework, helps the researcher understand the factors that influence the process of designing the ISs used in the local government through the four moments translations (Iyamu & Mgudlwa, 2017).

Figure 1 presents the guide used for the analysis of public sector reform initiatives using moments of translation and indicates how these can trigger the process of designing an IS. Figure 1 also illustrates changes in work practice, procedures and the activities which can elicit primary information reflecting the government reforms and affecting the transformation of an IS. The what, how, and why questions supported the process of collecting and analyzing qualitative data.

Figure 1*Four Moments of Translations and Public Sector Reformation*

Note. Adapted from Iyamu & Mgudlwa, 2017.
IS = information system.

In ensuring the transferability of these qualitative research findings, throughout the research process the study evaluated data by specifically recognizing the context as being that of the public sectors in one of the countries in Africa, namely Tanzania. The principles for interpretive research in Information System IS were adhered to when collecting and analyzing data (Klein & Myers, 1999). Specifically, the study employed the interpretive approach in the analysis so as to understand and examine the way moments of translation can be used to explain the process of designing ISs in a local government setting.

RESULTS

This study did a detailed analysis of the impact of government reforms on the IS implementation process in a local government setting. In achieving this objective, the ANT theoretical framework was employed in the analysis of qualitative data collected from three local government authorities. The analysis began by accepting the ANT assumption that actors are both humans and non-humans (Callon, 1986) and the actors, their roles and responsibilities were identified in the context of local government. The analysis proceeded by identifying the existing networks linking actors, how networks are constructed, as well as how these networks influence the IS design process in a local government setting. The four moments of translations were employed as appropriate to establish a detailed understanding of how the actors' networks are formed, the actors' roles, and how the identities and interests of actors are translated and aligned during the IS design process within the actor-network (see Figure 1). This was carried out through an understanding of the interactions and negotiations that continually occur between different actors in their various associations or groupings within the local government setting (Nakashololo & Iyamu, 2023). In analyzing public sector reforms and their impacts on the process of ISD, we traced back to the 1990s, when the issue of public sector reforms was problematized, and how both human and

non-human actors were identified and involved in government transformation. In the category of non-human actors the World Bank, International Monetary Fund (IMF), and other development institutions were recognized as potential contributors to the reform of public sectors as they stressed the importance of accountability, operational efficiency and effective resource allocation within the government. Therefore, public sector reforms have largely been imposed on the governments of emerging economy countries, and the World Banks and IMF played the role as the major actors in the construction of the reform networks. Other international institutional actors and consultants, such as the Public Sector Systems Strengthening (PS3) project were mobilized into the reform network through their service.

PS3 were enrolled by the concerned governments to assist them first in finding systems solutions appropriate for the public sectors' needs, and later in implementing them, as well as sourcing financial support for the IS development process. Various actors were involved in the process of designing ISs. Figure 2 illustrates both the human actors (including systems analysts, programmers, local users and district executive directors) and non-human actors (such as, reforms, local and central government, World Bank and The United States Agency for International Development (USAID)). Rules and procedures were also among the non-technical actors within the local government context. A non-technical actor supports the analysis of the requirements as these must be aligned with the organization process and reform objective.

The actors in the department (including the system analysts and programmers) need to collaborate with personnel from the planning, accounts and procurement departments. This network between departments helps them to jointly align with the reform objectives and to focus on the local government goal. One of the participants said, "Sometimes we call the meeting with operational officers such as accountants and planners from different local governments."

The IS development team also uses government documentations when gathering the requirements. These documents lead the development teams to adopt a methodology and process that is suitable for carrying out the activities defined for the reformation process. This reinforces the view that the process was defined by the central government, which determines the operation of the local government during the reform implementation and must be adhered to. For instance, during the development of Facility Financial Accounting Reporting Systems, one of the participants explained,

we had to follow new operational changes and now design the system that must allow fund to be sent directly to the facility level (such as health centers, schools, etc.) and the control must be ensured directly from the facility center.

This means that the analysts and designer had to rely on government documentation and reform objectives and align and analyze the requirements to fit the local government setting. ANT holds that human and non-human actors are not superior to each other (Sekgweleo & Iyamu, 2022).

Actor-Networks

In the process of ISD in the local government setting, networks were consciously formed. The design process underwent various rigorous stages using the agile project management approach. The systems analyst invited input from experienced accountants, planners, treasures and procurement employees so as to benefit from their perceptions. Thus, networks were formed and included the domain experts and the IS development teams. In this case, the analyst could understand local government requirements in terms of the reform objectives at the local level. A participant explained, "... despite limited time and resources, we have tried to identify some experienced (champions) users and invite them for important discussion."

Moreover, other networks were formed unconsciously, based on the fact that the government introduced and implemented changes without prior information and that had to be captured in the design. As the result of the reform, there was implementation, such as local government revenue collection, with the aim of controlling and raising collections. One of the participants explained, “During the process of IS designing, we experienced various changes and sometimes we received directives from the central government.” Here networks emerged between the government authority and reform objectives.

This larger network also aligns with the secondary network that included the IT department and a supporting donor (such as PS3). The smaller network was established so that the analyst, who was the project manager, could include functions to cater for the donor’s priorities (interests) so as to obtain funding from them. Regarding this, one of the participants explained: “There are new defined strategic objectives which result into new strategic goals in terms of the availability of funds or support from donors.” These donors worked with the government of Tanzania to institutionalize the public sector systems so as to provide essential, quality, public services at the local level. These systems were institutionalized as a result of the direct health facility financing reforms and education program. This led to dramatic changes in the facility landscape, such as facilities that could manage their own resources to better meet the local requirements.

Moreover, heterogeneous networks were evident with additional actors linking up with the IS development team. In relation to this, one of the participants told us, “... during the requirement analysis and specifications, we also invite technical engineers such as the graphical engineers, content and media professionals who help us in interpreting some technical issues that we have to comply with.” Here interdisciplinary networks arise since IS design creates a process as a way of producing additional connections; this involves a variety of actors who form different groupings and bring together a diversity of ideas. This indicates that public sector reform is a credible factor that influences the group formation and enrolment in the network of actors during IS design process. The study participants shared the experience saying that, “We have various reforms adopted that have basically simplified our work in here. For instance, we adopted various financial systems specifically in financial management and collection of revenue from various internal sources.”

Moments of Translation: Problematization

Governments in emerging economies focus on IS implementation as a goal of the good governance agenda and in order to improve accountability and efficiency. Thus, this is a core component of public sector reform programs. For instance, the government relies on local government IS for collecting and managing public funds. For this reason, the systems developed within the local government need to be aligned with the reforms’ objectives. This creates the need for requirements engineering to manage the changes to processes in the local setting and the IS design team must use approved reform objectives as a basis for requirements analysis. In the case studied, the IS design team included system analysts, local users, business analysts, and content and media engineers. These actors were responsible for rigorously designing systems that could be deployed for use in local government process management. For instance, an analyst explained that the government had been implementing a system and noted that changes were introduced, “... during the process of IS designing, we experience various changes and sometimes we receive directives from the central governments.” Moreover, participants said that the government had existing standard procedures to comply.

However, there were certain activities that had to be accomplished to ensure the alignment of procedures and this often drove changes of information flow. Regular meetings were conducted with donors, such as PS3, to revise the requirements to reflect the new information process flow. These meetings focused

primarily on the decision to support the project based on the availability of funds. Also, the meetings were meant to strengthen the relationship between the IS development team and the donors and hence to ensure that the two groups had compatible understandings of the reform objectives in the local government setting. Regarding this, the participants explained, "... we discuss and analyze the changes introduced and the priorities of these objectives to establish detailed information about the process and also establish a link with donors such as PS3." It was noted that the priorities were made clear to the development partners and were used as the terms of reference at the point of analysis.

Moments of Translation: Interessement

The changes introduced through reforms, such as amended policy and information flows, were seen to attract the attention of actors. The District Executive Director, District Treasurer, local users and IS development team all had roles and responsibilities to ensure the successful implementation of the new system. Interests were developed and shared among actors as a way to ensure compliance with the reform objectives; this might be obligatory or voluntary compliance. In support of this, one of the participants said, "... we send our requirements to our director and send the official covering letter to the system analysts or the development team to central government." This creates reliable links to ensure that the requirements analysis and specifications enjoy a common understanding within the development team. Also, the donors (such as PS3) had a link with the IS development team because they were partly providing funding based on the approved requirements for both local and central governments of Tanzania.

Moreover, the interests were also developed considering the point of view of management and accountability. It was found that it was the responsibility of the directors, treasurers, and heads of units to manage public funds in their respective local governments. For this reason, they had to be sure that their requirements were correctly stated and accurately reflected in specifications so that the system would make routine processes easy to complete. Speaking on this, the participants explained, "... the changes nowadays require the funds to be sent directly to the facility and the accounting officers are responsible for disbursing and managing them at their respective local centers such as health centers."

Moments of Translation: Enrolment

In the local government setting local users and management team were invited in the meetings with the IS development team to negotiate regarding functionalities and procedures. In addition, the local government operational manuals were used as terms of references so that participants had similar understanding of the requirements and system. The heterogeneous skills available were critical in the sense that they were expected to contribute by drawing up comprehensive requirements and finally producing a quality design outcome. The management (described as directors and treasurers) facilitated the project by funding other employees so that they could attend the meetings and participate in aspects of the negotiation. Hence, the management team accepted their role as an essential part of the design process. One of the participants explained this as follows, "... we are given an opportunity to attend the meeting where we give our requirements based on our experience but this depends on the availability of funds from the local governments."

The systems analyst said, "we normally choose the experienced and champions in their field of work because we believe they have a lot to share about the new system requirement engineering". In other words, the analyst indicated that the competence and commitment of individual employees was important to achieve a sustainable system that could be implemented in local government.

It was important for the designers and analysts to gain a detailed understanding of the local context and that this could be aligned with defined procedures. One of the participants explained, "... different ideas and contributions from various stakeholders within the local government are important during the analysis of the new system." Because of the complexity of the local government setting, the value of information offered in the negotiation meetings had to be analyzed by having experienced and skilled personnel who would accept and play their roles.

Moments of Translation: Mobilization

The local context and structural setting of the reform implementation needed to be considered when the changes in information flow were negotiated, and the rules and diverse roles of the actors made this possible. In general, reform objectives require the implementation of new flow and work practices, and in this case this involved the management and collection of the local revenues and health services. Various stakeholders (donors, development team, directors and treasurers) paid attention to the design of the system to make sure that it would support and facilitate local government activities. Thus, the structure and modes of information flow (for example, financial control, starting immediately from the primary facility level) strengthened the inclusion of other committed human actors (employees) in the network. A participant said, "... the central government, in collaboration with donor (World Bank), financed the implementation and strengthened the systems."

The collaboration and sponsorship of the reform implementation mobilized the management team at the local government level and others were then persuaded to align with the network. For instance, the IS development team had to convene a meeting with selected stakeholders including local users from several local governments authorities in the country to analyze and prioritize their requirements. However, one member from the IT section revealed that, "Sometimes we had to develop the working prototype ... to help users to easily understand and provide what they exactly want from their side without losing the reform focus."

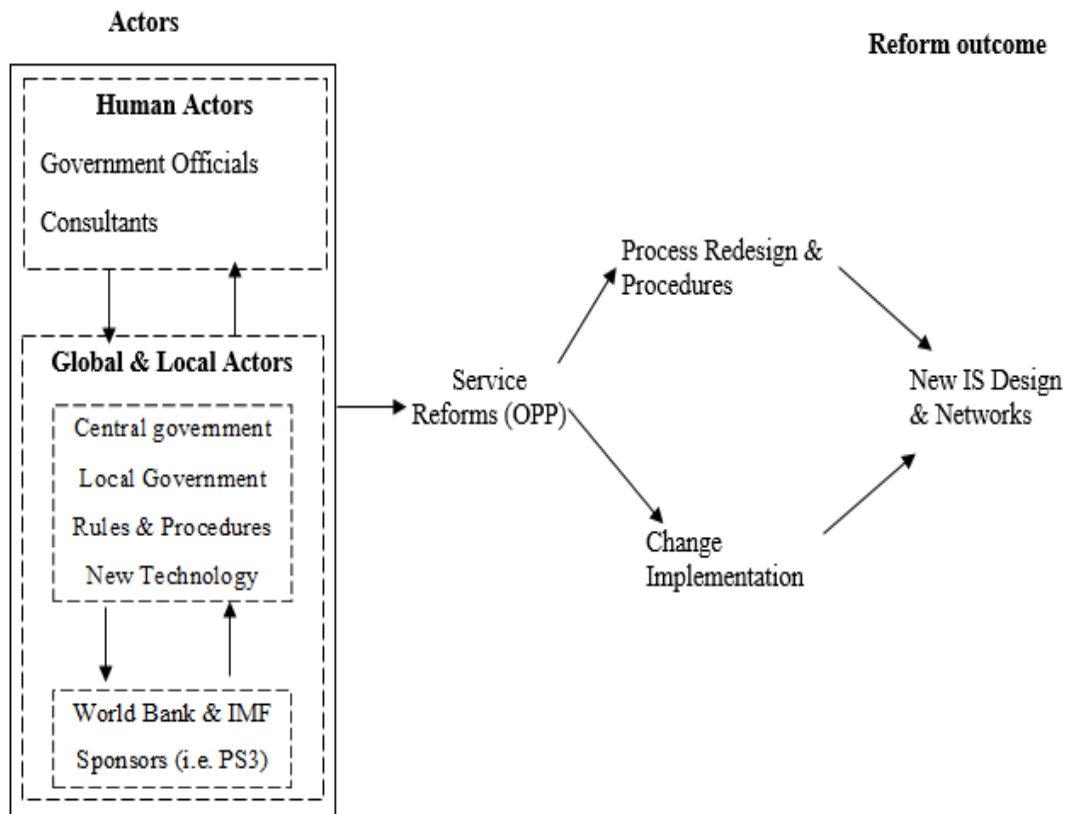
Moreover, mobilization needed to accept that the design must always follow the government procedures and accommodate the newly institutionalized changes. Therefore, although the users were expected to provide their own requirements, these could only be incorporated when possible. The systems analyst and development team become the focal actors as they has the responsibility to implement the various functions in the system. One of the participants explained, "At the beginning we interpreted the new rules and procedures that govern work practices in the local government. This includes the analysis of the working strategies that focus on the new objective." The newly institutionalized procedures are according to the defined problem right from the initial stage.

DISCUSSION OF THE RESULTS

From the reformed public administration perspective, the alignment of the actors' interests during IS development is dominated by the public sector reform demand. The IS design process in the public sector depends largely on the reform agenda derived from the New Public Management reforms initiative in the local governments in African countries (Islam, 2015; Turyasingura, and Nabaho, 2021). This is because actors have a great potential for shaping and reshaping reform objectives in local governments. Thus actors, through public sector reform objectives, make decisions early that strongly influence the introduction of new systems in an organizations at first place. These reform-oriented initiatives are indicated as the change in the process for good governance and the procedure and process redesign (see Figure 2).

Figure 2

The Influence of Actors in Reform Implementations and New IS Design Process as Informed by ANT



Note. OPP = obligatory point of passage; IS = information system; IMF = International Monetary Fund; PS3 = public sector system strengthening.

Service Reforms

The organization’s performance and quality of service delivery becomes the focal point for local government authorities. Thus, the government initiates and supports projects promising quality innovations that could enhance the accountability, efficiency and effectiveness of their service delivery (Salam et al., 2018). The new IS projects are, therefore, the outcome of the reform objectives which determine the OPP that actors must go through to pursue their own interests. For instance, in the case studied the government and donors initiated the public expenditure financial reform as the OPP to ensure openness and accountability. This influenced other local actors by making themselves key to the local networks when institutionalizing changes and redefine process to motivate the new systems implementation in the context of local government.

Process Redesign

Within an organization an IS is constructed purposefully to satisfy a defined set of objectives and provide functionality. The ISD process includes a set of systems processes, data and people. IS design process management involves the systems and business analysts, development team, policies and

procedures. Process redesign is iterative and is intended to satisfy the newly defined objectives. For instance, in the government reform implementation, process redesign was recognized as a way to achieve both the management objectives and technical aspect of the project. The technical aspect includes the transformation of operational requirements into systems specifications and these specifications become the ‘working tool’ and are the input document for the design and management of the implementation process.

Governments implement actions in order to change process management at the local level through reforms, and these efforts tend to change the paradigms on which the governance is based (Näslund & Norrman, 2022; Fragoso, 2015). In this situation, aligning business strategies with people at local level, process and technology is critical as it influences the IS business alignment (Padayachee & Shano, 2019). For instance, according to the findings of the research reported on here, as part of the design process, the requirement analysis and specifications were based on the system hierarchy and strategic objectives for achieving the reform objectives. This is because the hierarchy normally describes the functional area and processes at the local level.

Change Implementation

Implementing changes requires redesign of the appropriate processes (Kuhn et al., 2021). The redesign of policies, systems and organizational structures supports the IS’s processes to optimize the redesigned workflows starting from the local level. The findings reported above illustrate the link between the implementation strategies and policies, and the IS design process at the local government level (Figure 1 illustrates this). Sekgweleo and Iyamu (2022) propose that the adoption and use of the new software needs to be carefully managed if the newly developed system is to achieve its expected goals. The government needs to achieve the new performance goals by executing a series of operations envisioned by the proposed reforms.

The prospects for successful change are considerably enhanced by donors who have achieved a position and approach regarding the reform process that is coordinated with that of the government. The decision to implement changes in the local context is, therefore, informed by sufficient coordination between governments, donors and the IS development team in accordance with the reform proposal tailored to the specific need of the local government. According to Chignell (2017), the establishment and improvement of the systems and processes include donor coordination, cooperation and liaison, improved processes and procedures. In the context of this study, donors (such as PS3) and the systems analyst are obligatory actors who collaborate in advance to implement the joint decision and ongoing coordination as per the reform objectives. This finding confirms that the IS design and governance is enforced by the reform objectives which is a key target for improving the management of the resources (i.e., revenue collection and expenditure) at local levels. Hashim and Piatti (2018) found that the changes that were initiated as the result of the reform implementation included the implementation of a centralized account (Treasury Single Account) instead of silos of accounts in local governments, as well as itemized budget execution systems with improved baseline data quality for budget preparation.

IS Design as a Translation Process

This study analyzed the actions of heterogeneous actors who had allied their interest with the local networks to design ISs that could address the local context as recommended by Law and Callon (1992). The findings revealed that, during the IS implementation, networks had been built that included actors such as local and central government, and donors (World Bank, USAID and Danish International Development Agency). These actors shaped the change process and institutionalization of the revenue collection process and expenditure in the local actor-network as an OPP. It emerged that one of the

problems that had previously faced the government was the collection and management of public funds from the local government. At this stage, investment in the new systems, including the creation of software design documents and reports, was proposed as a way to address the problem; this occurred in the problematization stage and this proposal clearly articulated how the new system would address these problems. It is accepted that investments may result in a system that does not match actual requirements, which would fundamentally undermine its relevance and effectiveness (Hashim & Piatti, 2018). The analysis of Stanforth (2006) points out that government reforms resulted in e-government implementations and have shaped both global and local networks. In such implementations, partner institutions (such as the World Bank and the central government) were the key policy makers who initiated reforms in the government ministries and local governments and adopted various ISs for the future information management.

As Nyella and Kimaro (2015) argue, when multiple implementing actors are involved, coordination is critical. The findings of the research reported here give examples of this. The role of coordinators, such as systems analysts in the local government, was to ensure that negotiations and persuasive arguments took place among heterogeneous actors to establish mutual understanding of the IS design process at the local level. The negotiations were strengthened through the development of policy and strategies. An example is the introduction of decentralization programs in which facilities at local level are required to collect revenue through the collection devices (Point of Sale) in the public market and health centers. As a result, the government established an e-Government Authority responsible for supporting IS implementation initiatives.

The actors' interests towards IS implementation initiatives, as well as the actors' relationships, were identified through interactions, associations and communications. The negotiations of the actors' interests were influenced by various actors including the main actors (the central government and the World Bank). The negotiations were enhanced by defining and developing rules, policies and procedures to ensure that actors align with each other's interests. Policies and operational procedures were also modified with respect to the reform objectives as stated by the main actors. This process takes place during the intersement moment of the translation (Shim & Shin, 2016). The IS design process at local government level was subject to the negotiations that led to the change in the organizational information flow to fit the local structure.

At the enrolment stage, the organizational information flow signified that the network alliance had been successfully facilitated by the negotiations and had resulted in clearly defined rules and roles of the actors. This organizational information flow includes knowledge and information sharing within the network. However, the findings revealed that there was assumed transmission of the feedback from the local users to systems developers or designers. As argued by Mgudlwa and Iyamu (2021), communication based on assumptions of this sort cannot enable translations of the activities as they carry inaccurate information regarding the user's perceptions. The design process is therefore impacted as it needs multiple subsequent discussions with different actors in the network to improve information sharing and policy implementation.

The policy documents and strategic implementation, as a reflection of the objective of the reform, are premised on a functional logic of the implementation of the IS. The IS is directed towards changing the process, procedures and structures in a way that will enhance the functioning system's outcome. This observation has answered the question: How do different actors in local government respond to the ISD process? The outcome was defined in the case of the reform implementation process as the sequence of iterations of strategic planning to achieve epistemological diffusion of systems in the public sectors

through the different social processes, including knowledge sharing and persuasion during the design process.

In the mobilization stage, the main actors set out to convince other actors to form alliances and stabilize their interests in the networks. For example, following the government approval of the public financial management reforms, the interests of some actors (such as local users) developed in the course of IS implementations. For example, these local users made it their own responsibility to avoid communication barriers and achieved this by making regular phone calls to other interested parties to ensure that their requirements were clearly understood. In this case, spokespersons were established, for instance, analysts and development partners like PS3 (which is responsible for strengthening systems that enhance public service delivery in the local government). This strategy was influenced by the relationship established between the government of Tanzania and USAID and worked in the provision of education and identified interventions. This impacted multiple functions such as IS development and data use, finance and quality service improvements (Sarauw, 2016).

Policy Implication

The rate of IS implementation in local government has increased significantly due to the introduction of changes in the reformed public administration. This was achieved by introducing ways to study how the implementation of government reforms shaped the process of designing ISs in the local government setting. Although there are other social factors that can contribute to the success of the implementation of new systems in the government context, the implementation of several reforms has simplified and facilitated the introduction and establishment of new systems in the government sectors. However, it should be said here that they should not focus only on the technology determinism school of thought when it comes to the process of designing ISs in the context of public sectors. The actors (the government and other development partners) need to provide full support to reforms and increase collaborations among heterogeneous stakeholder networks when implementing new systems in the local government.

This study, therefore, made practical and theoretical contributions in the domain of IS development process in local government settings. Theoretically, the study extends the concept of the IS design process as a translation process guided by ANT, and this enables the identification of a design's actuality gaps. These gaps are *not* due to fact that implementation of reforms in the public sectors cannot redefine or populate the requirements to meet organizational and users' need in local government setting. It is because the process of designing ISs in local government is a complex social systems with several components, and multiple stakeholders who have different preferences, and because the operational environment is unique. Practically, the findings are useful for other researchers, practitioners and policy makers, who have the intention of having an understanding in social determinants of the process of designing ISs, and as a way to identify an appropriate, socially aware IS design framework in local government settings.

CONCLUSION

This paper has highlighted that ISs design and implementation in the public sector are driven by the implementation of the government reforms. The finding explains that systems design and implementation strategies have been shaped by government intervention in favor of reforms objectives in the local setting. In practice, by recognizing that policies and strategies are the result of reforms implementation, practitioners gain a better understanding of and build interest in operational and strategic activities during the IS designing process. This shows the role and the impact of the

government reforms in the initial preparations and design of ISs in local government in African countries and Tanzania in particular.

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