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# A Framework for Cloud ERP System Implementation in Developing Countries: Learning from Lower Local Governments in Uganda

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**Abstract.** Local government entities like municipalities are also challenged to provide services efficiently and effectively and hence increasingly consider ERP systems to support their operations. Successful implementation of an ERP system depends on several factors including having a viable framework to guide the organizational effort. This research aim to examine the nature and content of a possible framework to implement ERP system that could be useful for developing countries. To this end, it adopts an exploratory methodology involving focus groups to understand the activities essential to successful municipality ERP system implementation in a developing country, Uganda. Our finding shows that even when adopting cloud computing model, implementing ERP system in local governments in developing countries should take into account the fact developing countries should take into account the specificity of the developing countries' context. This research offers a unique framework integrating monitoring and evaluation with contextualization, implementation, transition and realization categories of activities to successfully implement a cloud ERP system in a developing country local government. The findings support decision makers and vendors to reduce the total or partial failure rate of ERP implementation in developing country local governments.

**Keywords:** ERP, Implementation framework, Public sector, Cloud computing, Local government

## 1 Introduction

ICT holds potentials for transformation and change. In this paper, we attempt to develop a framework for Cloud ERP implementation from a developing country's perspective. Enterprise Resource Planning (ERP) is a software solution that assimilates business functions and data into a single system that is shared within the business (Dwivedi et al. 2013; Rajeshwar, 2015). According to Matos and Alves (2011) enterprise systems are typically off-the-shelf software solutions that have become popular in private sectors where organizations are aligning information systems with business strategy through elimination of fragmented information sources; replacing legacy information systems with ERP software that cut across functional areas. Enterprise

systems originated from manufacturing industry and later extended to private sector broadly. ERP software solutions are also known as Standardized Business Software Applications (Keller and Meinhardt, 1994). According to Carutasu and Carutasu (2016) ERP is multifunctional software package and extends to the entire enterprise with the same database for the entire company. ERP systems are, generally, characterized by their complexity and wide footprint in the enterprise with regards to scope (Ramburn et al., 2016). Shaul and Tauber (2013) stated that ERP use is widely accepted in developed countries, however, Hawari and Heeks (2010) had observed that the market for ERP systems in developing countries was still in early stages. ERP systems were developed by software houses in developed countries, and initially adopted by large organizations; lately adopted by small and medium enterprises in the West (Rajapakse and Seddon, 2005).

ERP systems were initiated by large organizations in the developed countries (Rajapakse and Seddon, 2005). Nevertheless, implementation of ERP systems in public sectors was ongoing, despite the enormous investments and the risk of failure (Kalemen, 2015). High failure rates in ERP systems still remained a great concern Ram, Corkindale and Wu, (2013), and public sector is characterized by a high rate of failures in ERP projects (Bitsini, 2015; Dwivedi et al. 2015). However, developing countries have also embarked on implementing ERP systems in public sectors, so as to attain efficiency and transparency by adopting the best practices from public sectors in developed countries. Few studies have targeted public sector implementations of ERP systems (Chang et al., 2000; Dwivedi et al., 2015). However, inadequate work has been performed on implementing ERP in public sectors (Narcyz & Renata, 2017; Ziamba and Oblak, 2013). According to Kaunda and Kennedy (2013) developing countries are still far less than developed countries in many areas of ERP systems implementation. Guided by western and developed countries perspectives, current ERP frameworks lack understanding of developing countries contextual conditions. Indeed, implementing ERP systems in lower public sector organizations without a contextualized ERP implementation framework will result in more failures (Hawari and Heeks, 2010). There is a need for in-depth understanding and bottom-up approach to guide the development of ERP implementation framework that seriously take the contextual conditions of developing countries into consideration as the contextual differences between developing and developed countries cannot be overlooked (Soja, 2011). Dwivedi et al., (2014) envisaged the need to extend ERP research focus to include further public sector ERP systems implementation. Huang et al. (2004) listed the top ten risks for ERP system's framework implementation failures. ERP system implementation involves more than changing an organization's software; it involves repositioning the organization and transforming its business operations, processes and practices (Rajeshwar, 2015).

While ERP implementation has been considered important to enhance efficiency, reduce corruption, and improve services, it has been an expensive solution to many developing countries. The rise of the cloud computing has been argued to provide an opportunity for developing countries to catch up technologically and obtain ERP ca-

pability is a fast and less expensive manner. Cloud computing technology is a network based service model that enables on demand network access to a shared pool of configurable resources. It is a model that provides special services over the Internet; this service could be a server, storage, or software (Bahssas et al., 2015). Many ERP vendors have moved to cloud computing platforms that house ERP solutions. Cloud computing technology is capable of hosting an ERP system through the models of Infrastructure as a service (IaaS) and Software as a Service (SaaS) (Lenart, 2011). According to Bahssas et al. (2015) cloud ERP has many advantages that include less staff, mobility, easy expandability and cost reduction.

Traditional ERP systems implementations are on premise using local servers on an organisation's network. In cloud-based ERP environments, a service provider practically provide the resources for hosting and running the application. The benefits that come with cloud computing has made Cloud-based solutions one of the fastest growing segments of IT industry (Popovic, 2010). Enhancement of service delivery, and cutting of operational costs by 25%-50% are achievable at all level of government by adopting cloud computing solutions (Bailey et al., 2011). Hence, cloud computing has become a strategic direction for many government agencies and that it has the capability to be employed in critical areas of the government's IT-infrastructures (Sædberg and Haddara, 2015).

Cloud technology under SaaS model is gaining popularity in private sectors, promising low deployment costs, low price with pay-as-use and considerably reduced time-to-deployment (Carutasu and Carutasu, 2016; Weng and Hung, 2014). Local governments in developing countries could benefit from SaaS; however, a successful deployment requires a comprehensive contextual implementation framework to ensure compliance with local government regulations and unique constraints. Cloud ERP SaaS module will enable multiple local governments to access and share a pool of ERP software services via the Internet.

This paper consists of seven sections. Following the introduction, section two provides research background discussing the context of Uganda as a developing country. Section three presents implementation frameworks/methodologies and their limitation. The following section explains the methodology used to collect data for the research. Findings and a framework of major activities for implementing cloud ERP system at local governments are presented and discussed in subsequent sections.

## **2 Research Background**

Uganda is a landlocked country with 21% of the 34.6 million population living in urban centers, and GDP per capita of US\$ 642 (Uganda bureau of statistics abstracts [UBOS], 2017). Urban administrative centers include 1 City, 41 Municipalities, 122 Municipal councils and 357 Town councils. In 2017, municipal local government had a total program budget of US\$ 160 million. International Development Agencies

funded 93.75% of the budget (World Bank report, 2017), which indicates that most of big development projects are heavily donor funded. Adoption of cloud computing at local governments is still very low due to high costs, lack of experts and access problems (National IT report, 2017/18, p 104). The most popular Cloud computing service is email, followed by storage and Software as a Service. The lack of investment and budgetary constraints are the key internal barrier to wider implementation of e-government services. On average 0.9% of public sector total institutional expenditure is the budget for Information Technology. The Internet bandwidth average market cost of 1Mbs/per month is US\$ 237, which is very high for local government. However, the penetration of computing devices in public sectors is high, and fixed broadband fiber cable is the most popular internet connectivity followed by 3G and 4G mobile broadband. In 2016, Uganda was estimated to be 36% e-Government ready, which is lower than the World's average of 49.2%. The United Nations e-Government Development Index (EGDI) ranked Uganda at 128, comparing with neighboring Kenya at 119, South Africa at 76, and Ghana at 120 (National IT report, 2018 p 38). Municipalities are lower local government public sectors that provide services to local communities and businesses. Their structure consist of cells, the lowest unit, wards and divisions. Municipalities are designated to provide broadly three services: planning, garbage management and provision of social services. Increased demand for effectiveness in service delivery has made the implementation of information systems and access to real time information no longer a requirement unique to private and public sectors; it is also a critical requirement for local governments like municipalities. However, there are many substantial challenges faced by local governments and information systems developers. For instance, some municipal governments in developing countries are: scattered geographically, lack sufficient technological infrastructure, highly constrained by requirements to comply with government regulations, and deficient in funds and technical IT skills. Software vendors and managers have to address these issues to successfully deploy information systems that meet the requirements of local governments.

Since 2003, Uganda government embarked on implementing an Enterprise Information System (EIS) to improve efficiency in budget preparation, execution and financial reporting at ministry, agencies and local governments. The EIS is based on a centralised architecture, managed at ministry level, and provide a web browser interface for users' access (Semakula and Muwanga, 2012). In Uganda, adoption of Cloud solutions and services in public sector organizations is still low, though indicators show a positive trend. (National Information Technology Authority [NITA], 2018).

A clearly defined framework to guide the implementation process is required to successfully implement an enterprise information system for municipalities. Failures in information system implementation are not necessarily the product of software design. The failures could be caused by solution-organization misfits that are contextually unique to a particular organization (Hawari and Heeks, 2010).

The paper provides a framework for implementing a cloud-based ERP systems at local governments in a developing country from the local experience. It asks what is: a suitable framework for cloud ERP implementation in developing countries, and in particular government and public sectors? It answers this question through focusing on municipalities in Uganda as a typical example of public sector in a developing country.

### **3 ERP Implementation Frameworks and their limitations**

#### **3.1 Existing ERP implementation frameworks**

This section provides a discussion of the most popular ERP systems implementation frameworks, covering articles from 1983 to 2015. The discussion is focused on ERP systems implementation approaches, frameworks, and methodologies adopted in various organizations. Literature on this subject is sparse; they predominantly focus on Critical Success Factors (CSFs) and developed country private sectors. Furthermore, research from developing countries on ERP implementation in public sectors is very scarce (Matos and Alves, 2011). There is a need to understand the maturity level of business processes in public sectors in developing countries. Hasibuan and Dantes (2012), suggested an impact of 42.20% weight of business process reengineering on the priority key success factor of ERP implementation cycle.

Govindaraju (2012) suggested an organization perspective framework for implementing Enterprise Systems (ES). It consists of two stages: the project and post project stages. It has been recommended that the analysis of ES implementation effectiveness should be performed in short and long terms (Govindaraju, 2012). The short-term implementation effectiveness is related to the outcome of the project stage. The long-term implementation effectiveness is related to the outcome of the post-project stage. This framework is generic and does not specifically highlight the critical factors for consideration at each stage.

Dantes and Hasibuan (2011) proposed an ERP implementing conceptual framework considering two dimensions; ERP implementation process having five stages: project preparation, technology selection, project formulation, implementation and post-implementation. Somers and Nelson (2004) identified six stages of ERP implementation process: initiation, adoption, adaptation, acceptance, routinization, and infusion.

Ahituv (2002) developed a generic hybrid ERP implementation methodology combining three structured approaches: Structured Development Life Cycle (SDLC), Prototyping and application package model. He contend that the uniqueness of ERP system renders any of the three models inadequate to be adopted solely in implementation of ERP system. Implementation of ERP system touches the core process of the business. Hence, adoption of a hybrid methodology universally is likely to result into unexpected failure due to cultural, organizational and political influences experienced in environments that are characteristically different.

Helo et al. (2008) stated that the major impediments to successful ERP implementations are not technologically related issues such as compatibility, technological complexity, and standardization, but most are organization and human related issues including as resistance to change, organizational culture and business processes. These challenges could be dealt with by using a well contextualized framework appropriate. Universality adoption of implementing frameworks overlook organizational culture, behavior, and change management impact on ERP implementation failure.

Huang et al. (2004) listed the top ten risks that cause ERP implementation failures, which are related to implementing framework. ERP implementation involves more than changing an organization's software; it involves repositioning the organization and transforming its business operations, processes and practices (Rajeshwar, 2015).

Markus and Tannis (2000) prescribed a four phased framework for implementing ERP system. The phase include; chartering phase, which comprises decisions leading up to the funding of an enterprise system; the project phase, which comprises activities intended to get the system up and running in one or more organizational units; shakedown phase, when the organization comes to grips with the enterprise system. The phase, which is said to end when "normal operations" have been achieved (or the organization gives up, dis-installing the system. The onward and upward phase, which continues from normal operation until the system is replaced with an upgrade or a different system, a stage during which the organization is finally able to ascertain the benefits (if any) of its investment.

### **3.2 Limitations of Existing Frameworks**

ERP system implementation frameworks identified were generated from private sector organisations. In private sectors, top management make decisions independently unlike in public sectors; decisions are highly influenced politically and constrained by government legislations. Hence, the critical success factors identified in the private sectors do not translate directly into the public sectors. Some existing ERP system implementation frameworks suggest what should be done at a particular stage, however the unique variations in different domains are not considered. Characteristic variations between private sector and public sector significantly influence the way ERP systems implementation is carried out. Sommer (2011) argued that public administration has unique cultural, political, and organizational factors that negatively influence successful ERP system implementation in public administration. Implementation of ERP systems in developing countries public sectors should also take into account the fact that developing countries have limited resources. Hence, ERP systems implementation process in developing country public sectors should be administered differently as suggested by Addo-Tenkorang and Helo (2011).

Implementation of ERP systems is based on assumption of best practices, which is likely to be the major source of misfit between ERP systems and recipient organization's business processes. Universality of best practices masks the need to recognize the variation in business processes among organizations, be it private or public, and developed or developing countries. Klaus et al. (2000) stated that the transferability of ERP best practices on a global scale might be limited due to every country's specific requirements relating to fundamental processes. Maditinos et al. (2011) argued that most of ERP failures are not caused by ERP software. The complexity and massive changes caused by ERP systems in an organization cause the failures. The major impediments to successful ERP systems implementation are not technologically related issues such as compatibility, technological complexity, and standardization; most of them are organization and human related issues including resistance to change, organizational culture and business processes (Helo et al., 2008). Hence, adopting an ERP system implementation framework based on universal best practices overlooks the impact of organizational culture, behavior, and change management.

Most ERP system vendors propose frameworks specific to their ERP solutions to simplify the implementation process. Some of the popular vendor specific frameworks include: Accelerated SAP (ASAP) by SAP, Application Implementation Method (AIM) by Oracle, Direct Path by PeopleSoft and Dynamic Enterprise Modeler by BAAN (Benders, Batenburg & Van der Blonk, 2006). These ERP implementation frameworks require conformity to prescribed approach, which compromise recipient organisation core business processes. This confirm the isomorphism concept promoted by DiMaggio and Powell (1983).

#### **4 Research Methodology**

Data for the research was obtained from different sources following the Design Science Research Methodology (DSRM) (Peppers et al., 2008). The research used a qualitative approach that involved three focus groups discussion, review of reports and other relevant documents. The nature of developing country local government complexities are reflected mostly from: business processes, organizational structure, IT acquisition and maintenance process, data storage and security regulations, staffing levels and funding and resources mobilisation mechanisms. These public sector contextual complexities were also observed by Sædberg and Haddara (2016). Further to this, entrenched practices, requirements to learn new skills and the fear of layoffs among staff, reinforce public sector complexity (Semakula and Muwanga, 2012). Nevertheless, little is known about the implementation of cloud-based ERP systems in developing country local government's contextual complexity. On the ground of this research gap, this study attempted to understand the activities essential to successful implementation of cloud-based ERP system at developing country local government. The study reviewed literature to explore previous research on the implementation of ERP systems at public sectors in developing countries.



The focus group method suggested by (Krueger and Casey, 2000) was adopted, to obtain quality data from multiple participants. The study engaged three focus groups, two of them each consisted of five municipality employees, who were department heads, and one focus group of IT experts . This number of five participants in each focus group is appropriate based on the recommendation by Morgan (1997) and Baumgartner, Strong, and Hensley (2002).

The focus group method in the Design Science Research Methodology was considered the appropriate method to collect data build the artifact in a complex local government environment. Participants also had varying experiences acquired from different local governments from where they were transferred. In-depth understand of the context required a group discussion to generate a consensus rather than considering individual participant views. Three focus groups, exploratory (EFG), verification (VFG), and Technical (TFG) were used to collect data required to develop the framework artifact iteratively rather than linear approach (Kuechler and Vaishnavi, 2008; Tremblay et al., 2010). Data collection started with EFG. VFG was need to verify data collected from EFG. EFG and VFG consisted five participants each, who were all head of departments. All participants had experience of more than 3 years, and were conversant with regulations, information systems and business processes at local government. The IT experts Focus Group (TFG) was used to verify the essential activities from a technical perspective. Participants in VFG were information Technology professions from different government department who were familiar with implementation of hosted enterprise information system in government. Though the size of TFG is lower than the recommended lower boundary of four (Morgan, 1997), it was considered appropriate due to the difficulty of identifying experts who understand the technical complexity of Organisation – Technology – Fit in developing country public sector.

Emergent-systematic focus group design was adopted for exploratory and verification investigations. Participants were purposefully selected to tap the opinions of information system experts. Each focus group discussion session lasted approximately 1 hour 20 minutes. The objective was to gain an in-depth understanding of information systems and business processes in municipalities, which impacted by implementation of ERP system rather than the behaviors, opinions and attitudes of employees towards municipality information systems. Hence, interactions among focus group participants were not measured as recommended by Myers (2006) and Onwuegbuzie et al. (2009).

The key questioning route below was used to guide the exploratory focus group discussion coordinated by the moderator and assistant moderator, while the assistant moderator type the notes.

What type of information systems implemented in your organisation? What should be done to ensure a successful implementation of a computer based information system that cut across all departments in the organisation? To ensure a successful implementation of an enterprise information system, how should the enterprise information

system implementing process be managed? What where the noticeable phases of the implementation process? What activities would be considered crucial at each stage? How do you compare the benefits and challenges of a computer solution implemented on a computer within the organization and the one hosted by a third party? How can the stakeholders ascertain a successful implementation of an enterprise information system?

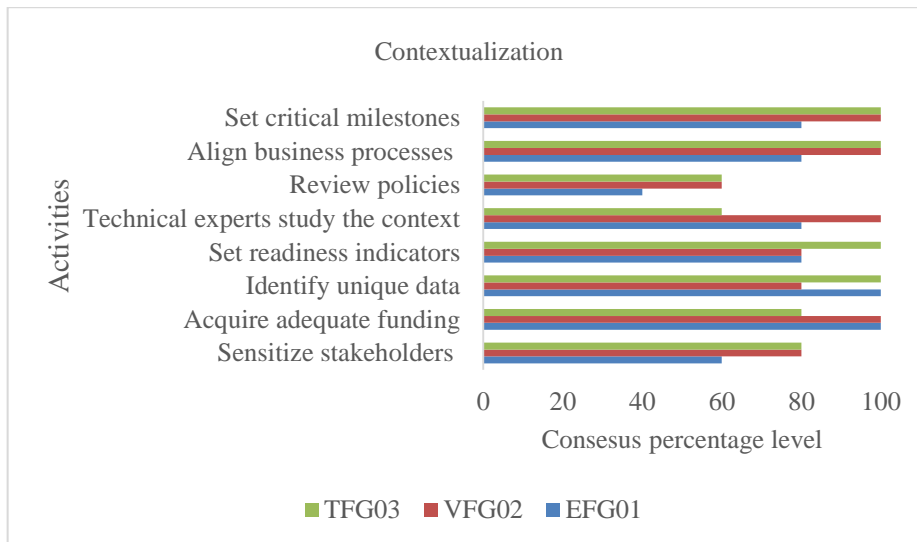
Classical content analysis method was used to code and count the responses from the focus group discussions. Two elements from Morgan (1997) three-element coding framework were adopted to identify the codes used by each participant and each group. The response codes were analyzed to generate the consensus statements for the participants. Specifically, the percentage of agreement for each statement was computed to explore the reliability of the data. This data analysis is in agreement with the degree of consensus and dissent proposition of argumentative-interactions (Kitzinger, 1994; Onwuegbuzie et al., 2009; Sim, 1998). Reducing and transforming data in qualitative research can be achieved in different ways including; “...*through selection, through summary or paraphrase, through being subsumed in larger pattern*” (Miles and Huberman, 1994). The municipalities involved in the research had implemented a hosted enterprise system with human resource and financial management modules 2 years prior to this study.

## **5 Findings: Implementation phases**

This section present the findings from the three focus. The framework of essential activities for successful implementation of cloud ERP system in a lower local government in a developing country is presented. The activities have been grouped according to categories created from the interpretation of focus group discussion. Activities were formulated from the codes generated from individual participant and re-echoed in another focus groups.

### **5.1 Contextualization phase**

In this study, Contextualization is the stage where key stakeholders study the case to understand its unique characteristics. Findings show that in a municipality case, activities indicated in Figure1 should be carried out prior to the implementation of the cloud-based ERP system.



TFG = Technical Focus Group; VFG = Verification Focus Group; EFG = Exploratory Focus Group

**Fig. 1. Essential Contextualization Activities**

In regard to contextualization phase, setting critical mile stones and alignment of business processes received 100% consensus levels from both technical and verification groups (TFG and VFG). These activities were considered crucial to the understanding of how the local government organizations function. Operations of municipality could be challenging to understand due to political and technical competing powers. This was reflected in statements such as:

*“in most cases what we do and how we do it is highly influenced by political gains” (VFG)*

*“unless milestones are clearly defined, political influences will surely shape the project direction and objective” (TFG)*

Though business process alignment was considered essential in local government as it is in private sectors, however, unique complexities in public sector business processes were highlighted as also observed by Sædberg and Haddara (2016).

*“though alignment of processes is required, changing processes in local government environment is extremely difficult, ... we operate within stringent compliance requirement stipulated from various ACTS” (EFG, VFG)*

Unlike the private sector where the executive decide on business processes within the confines of internal policies, public sector operations are externally regulated by different Acts of government. This explains why the review of policies attained low

consensus percentage levels from all focus groups. Review of policies was considered to be a tedious long process that may involve change in legislation as a participant in the verification focus group discussion echoed:

*“public sector policy formulation and reviews are initiated from top authorities, ... they have to have interest in a policy to be reviewed”*

The activity to study the context of the local government by experts received a 100% consensus from the VFG. This was attributed to the complexities caused by frictions between the two arms that govern the functions of a municipality, the technical staff and elected political teams. These two teams are expected to work hand in hand, however, they often exhibit competing interests. This explains the low consensus percentage level from the TFG as reflected in the following statement.

*“experts involved in implementation of computer systems will always find it very difficult to understand operations in a context where political gains override technical principles”*

Identification of readiness indicators seems to be a unique activity to local governments. Understanding of the readiness of an organization to implement ERP system, specifically Cloud-based ERP is not mentioned in private sector ERP systems implementation framework. Semakula and Muwanga (2012) affirm that readiness to address emerging challenges is essential to ensure success in implementing enterprise information systems. Due to its complex nature, challenges will emerge throughout the implementation process (Semakula and Muwanga, 2012). This is supported by a statement from the TFG:

*“most of these administrative units lack basic IT infrastructures and resources, required computer skills and highly constrained by meager conditional remittances from central government.... IT solutions implementation will always face readiness consequences”*

Local governments are expected to raise funds from local tax revenues. However, in most cases local tax revenue stream does not bring in adequate funds. Consequently, central government funds almost over 80% of the local government budget. Most of local government large ERP system implementation projects are funded by donations. Unfortunately, such project usually overrun initial budgets (Helo et al., 2008). This highlights the advantage of implementing Cloud ERP systems that requires low initial investment. Nevertheless, it is essential to ensure availability of adequate funds to sustain the ERP system implementation life cycle. The donor funding mechanism could result in a project failure. This activity seems to be characteristic to the public sector in developing countries.

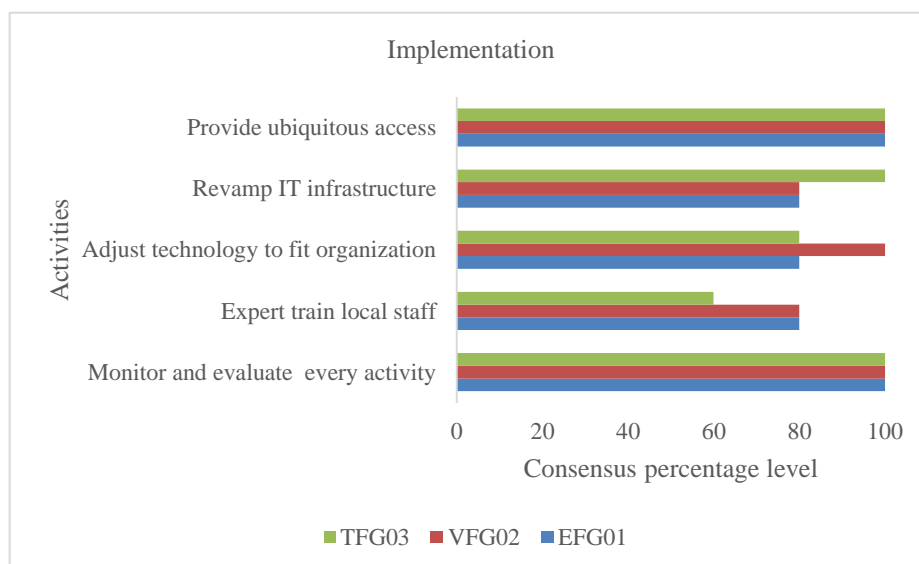
Surprisingly, sensitization of stakeholders was strongly emphasized by all groups, though it received a low consensus percentage level. This is attributed to the existence

of a wide range of stakeholders with limited influence on local government functions. The following statement from the VFG is in support of the sensitization consensus.

*“we interact with many stakeholders....sensitization is majorly required for political correctness.....when staff know what to do, and resources are available, internal projects will be successful”*

## 5.2 Implementation phase

In this paper, implementation means the deployment process of the ERP system, rather than the construction of the system as it is understood in software engineering field. A set of essential activities constituting the implementation phase is shown in figure 2.



TFG = Technical Focus Group; VFG = Verification Focus Group; EFG = Exploratory Focus Group

**Fig. 2.** Essential Implementation Activities

Providing ubiquitous access to local government data received 100% consensus from all groups. Local government staff are often engaged in activities out of office. Hence, access to information resources anywhere any time is crucial to the utility of any local government information system. This confirms the need to implement a Cloud ERP systems in local government domain.

Participants had 2 to 3 years' experience using a hosted ERP system, hence they were aware of the challenges faced during enterprise information systems implementation. That experience was the basis for the high consensus levels of the activities in the implementation phase. Successful Cloud ERP systems implementation in lower local can be achieved when a monitoring and evaluation Action-Research model is adopted, focusing on continuous planning, action and reflection. Markus et al. (2000) also argued that success of ERP systems implementation depends on when it is measured, and success at one point in time may only be loosely related to success at another point in time. Monitoring and evaluation should be activity based throughout the project life. Larsen and Myers (1997) affirm that an ERP experience could be an early success and a later failure. Monitoring and evaluation is not only necessary to ensure compliance to regulations, also to assess activities progress, and timely identification of success or failure indicators. Other aspects of monitoring and evaluation should include identifying factors that account for the progress or constrain to the progress of activities, and measure of responses and reactions to implementation activities. These measures help to plan an effective change management program. The high consensus percentage on revamping IT infrastructure, reflect the state of IT infrastructure in the cases where the study was conducted; characterised by lack IT infrastructure. Implementation of Cloud ERP system enables local governments to overcome IT infrastructure challenges. The TFG stated that:

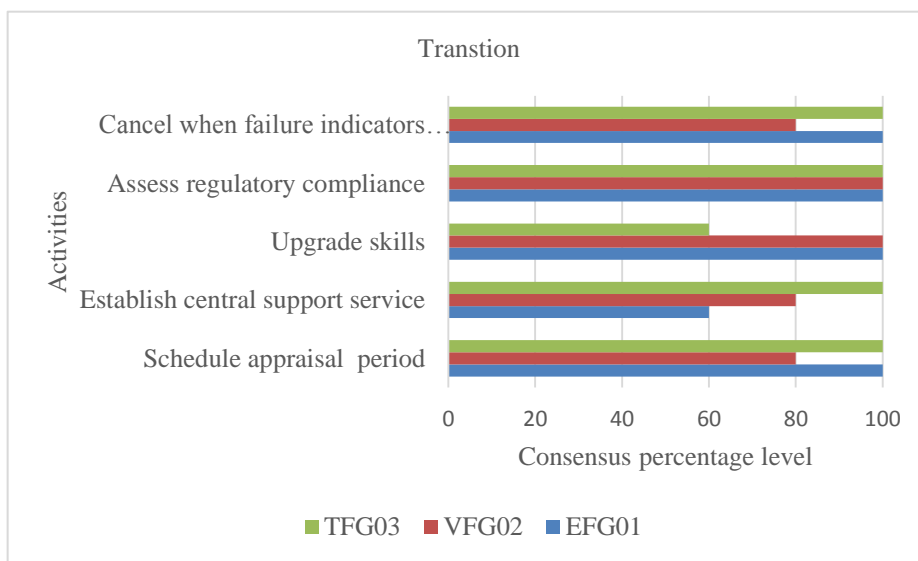
*“it is not feasible to install IT infrastructure and also recruit IT experts required to implement and maintain complex systems like ERP in each and very local government unit across the country.....new units will always be created, resource will never be available”*

*“ ..... there has to be another approach to e-government deployment in local governments”*

However, public sector organisations' functions and operations differ depending on the sector, and the regulations that guide the business processes in a given sector also vary. Hence, it is not suitable for all public sector organisations to deploy the same cloud computing services model (Metha and Panda, 2018). Software as a Service (SaaS) model promise better benefits to local governments. The functions and business processes of a given local government category are similar. SaaS model supports Cloud ERP multi-tenancy architecture, where multiple local governments in the same cluster share a single ERP system instance (AlJahdali et al., 2014; Saraswathi and Bhuvanewari, 2013). The SaaS cloud model will alleviate most constrains related to IT infrastructural and human resources capabilities reflected in implementation phase activities. Further to this, local government budgets preferably support operating expenditure rather than capital expenditure. Hence, the SaaS Cloud ERP model is a suitable solution in this regard.

### 5.3 Transition Phase

Findings revealed five major activities that need to be carried out after deployment of enterprise information systems to include schedule appraisal period, establish a central support service, upgrade skills, and assess regulatory compliance, which are shown in figure 3. An action “Cancel when failure indicators increase” was raised as a measure to avoid consequential huge failure costs after deployment of enterprise information system.



TFG = Technical Focus Group; VFG = Verification Focus Group; EFG = Exploratory Focus Group

**Fig. 3.** Essential Transition Activities

In this study, the transition phase start before the closure of implementation phase, and ends when key stakeholders confirm that the ERP system stabilized or failed to stabilize. In local governments the success of Cloud ERP system implementation shouldn't be considered as a deployment activity only; should be measured also against the degree of compliance to existing policies, procedure and regulations. This phase does not future in existing ERP systems implementation frameworks. Developing advanced computer skills at lower local government level raised mixed reactions. Apart from being costly, retention of skilled staff is a big challenge. This is not only in regard to remuneration issues, also the transfers of public sector employees and recruitment in rural areas continuously create skills gaps. The following statement explains the low consensus level from the TFG to develop advanced IT skills at local government.

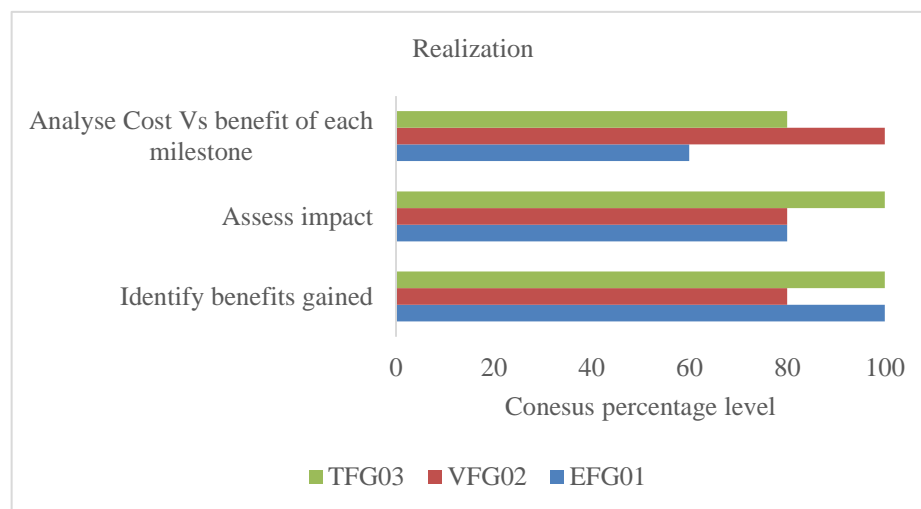
*“it is not cost effective to employ IT skilled personnel at every local government unit, they can be deployed from a central government center to work on specific tasks”*

Establishing a central support service center that provide technical services to all local governments received 100% consensus. Local governments operate under common regulations and characterized similar challenges including lack of advanced IT skills, and inadequate budgets to fund IT activities. Hence, it is appropriate to establish a central support center for the Cloud ERP systems implementation. However, deployment of an appropriate cloud computing serve model could eliminate the need for

Scheduling appraisals is considered as a mechanism to mitigate transmission of failure from one activity to another. The high consensus received to this activity depict the need to ensure that the implementation project achieve the intended objectives. Implementation of Cloud E RP system require a conscious approach, given the local government complexity, the various perceptions surrounding cloud computing technology, and other constraints due to limited resources.

#### 5.4 Realization Phase

Three activities were found to be essential in realization phase indicated in figure 4.



TFG = Technical Focus Group; VFG = Verification Focus Group; EFG = Exploratory Focus Group

**Fig. 4.** Essential Realization Activities



In this study, *Realization phase* is a stage where the local government is certain of achievement of intended objective. Local governments provide public service for public good rather than return on investment, however, administrators are concern with value for money for every intended objectives. This explain the high consensus percentage from administrators in regard to cost – benefit analysis. Though from local government perspective, funding the implementation of ERP system is an investment where return on investment is considered not important, understanding the value acquired out of the expenditure, provide insight on justification for the expenditure. What matters in local governments is improvement in performance, though political gain could be another motivation for implementation of such systems. The consensus levels obtained from “*assess impact*” and “*identify benefits gained*” activities are confirmed by Markus et al. (2000). It was found important to analyse the gained benefits in relation to cost, and assess the overall impacts on the local government functions. Impacts of ERP on public sector organization show mixed findings (Fernandez et al., 2016; NITA, 2018). The following statement from the verification group highlight another importance of impact assessment; to help in the development of policies that will guide future information systems implementation, and the management of knowledge in regard to implementation of Cloud solutions.

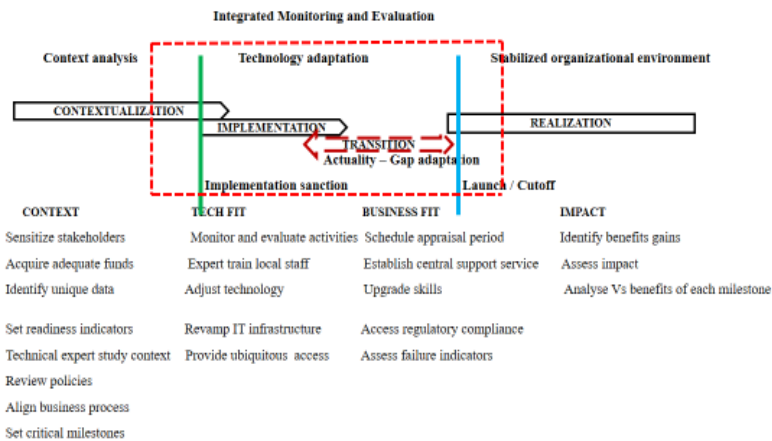
*“Understanding the impacts and gains support policy formulation and knowledge creation in regard to IT implementation in local governments”*

## 6 Discussion: Proposed Framework

Bitsini (2015) states that the continued growth of adopting ERP systems in developing countries is accompanied by high failure rates, attributed to the complexity of ERP system and misalignment based on inbuilt best practices. However, a methodology adopted to implement an information system may also result in information system failure (Bitsini, 2015).

A framework that captures the unique activities essential to successful implementation of cloud ERP system at local government in a developing country is presented in figure 5. It includes a transition phase between implementation and post implementation phases which is not included in previous private sector based frameworks. The transition phase is characterized by forward and backward activities, and helps to ensure stability of the implemented cloud ERP system and evaluate compliance to regulations. Lack of adequate resources, both financial and technological in developing countries, makes this phase crucial to allow the stabilization of users’ environment; behavior, cultural and skill acquisition. The implementation of cloud ERP system leads to two paradigm shifts; from functional-silo environment to a process–customer centric orientation; and from on-premise to remote access to information resources. Hence, the transition phase is critical for stabilization of organization and individuals’ cultures. External forces that result from interfaces of various stakeholders also need to be stabilized. At this stage the local government organization and various stakeholders struggle to strike an equilibrium of change caused by process

change, policy reviews, new skills demands, budget reallocations, new roles and responsibilities.



**Fig. 5.** Framework for Cloud ERP system implementation

This newly-developed framework provides new features including activities unique to local governments in developing countries, activity based monitoring and evaluation, and a transition phase, which do not exist in the most popular framework from Markus et al. (2000). Differences in this framework and the existing frameworks, could be a result of differences in study context and domain. This study was conducted in a developing country local government. Markus et al. (2000) framework was generated from private sector companies in a developed country. Existing frameworks also do not consider what activities should be done within the organization to understand the organization before the project phase of ERP life cycle.

## 7 CONCLUSION

This paper presents focus group findings from a developing country municipality context in relation to implementation of a Cloud ERP system. The paper briefly presented existing frameworks adopted to implement ERP systems. Limitation of existing frameworks unveiled include: vendor specificity, private sector focus, universality of best practices, and lack of consideration of developing countries uniqueness. On the basis of the research findings, a new framework for cloud ERP system implementation in lower local government in a developing country was developed. The framework prescribes identified essential activities required in contextualization, implementation, transition, and realization phases to guide the implementation of Cloud ERP

system. The continuous activity-based monitoring and evaluation mechanism is prescribed. The paper contributes to ERP systems implementation literature. ERP system vendors, academicians and practitioners with interest in developing countries public sector will benefit from the paper. The paper is beneficial also to local government decision makers and ERP system implementers. It provides a comprehensive contextualized framework that can help to mitigate partial or total failure of ERP system implementations in developing countries local governments. In terms of future research, understanding the suitable cloud ERP architecture; appropriate policies, regulation and theory related to cloud solutions implementation; usage, security and privacy of cloud-based solutions, and effective IT governance framework in context of developing country public sector is required.

Regarding the limitations of the study, the implementation of Cloud ERP system in developing country local government is still in infancy stage. Rigorous verification of the framework would be achieved using a Delphi techniques (Giannarou and Zervas, 2014; Okoli and Pawlowski, 2004). However, experts were difficult to find as expressed by Tremblay et al. (2010). Hence, a confirmatory field test is required to confirm the utility and efficacy of the framework a developing country local government environment.

## References

1. AlJahdali, H., Albatli, A., Garraghan, P., Townend, P., Lau, L, Xu, J.: Multi-Tenancy in Cloud Computing. Proceedings of the 8th IEEE International Symposium on Service-Oriented System Engineering. Oxford, UK. (2014).
2. Al-Mashari, M., Al-Mudimigh, A.: ERP Implementation: Lessons From A Case Study. *Information Technology & People*, Vol. 16(1), pp. 21-34. (2003).
3. Alves, M. G., Matos, A. S.: An Investigation into the Use of ERP Systems in the Public Sector. *Journal of Enterprise Resource Planning Studies*, (2011).
4. Bahssas, D. M., AlBar, A. M., Hoque, R.: The International Technology Management Review, Vol. 5(2), pp. 72-81. (2015).
5. Bailey, M., Katz, B., West, D.: *Building a Long-Term Strategy for Growth through Innovation*: Brookings Institution. (2011).
6. Baumgartner, T. A., Strong, C. H., Hensley, L. D.: *Conducting and reading research in health and human performance*. 3rd edn. New York: McGraw-Hill. (2002).
7. Bitsini, N.: Investigating ERP Misalignment between ERP Systems and Implementing Organizations in Developing Countries. *Journal of Enterprise Resource Planning Studies* <http://www.ibimapublishing.com/journals/JERPS/jerps.html> Vol. 2015. (2015). Article ID 570821, DOI: 10.5171/2015.570821
8. Carutasu, N., Carutasu, G.: Cloud ERP implementation, *Business & Management Journal*, A quarterly review, vol. 4(1). (2016).
9. Chandiwana, T., and Pather, S.: A Citizen Benefit Perspective of Municipal Enterprise Resource Planning Systems. *The Electronic Journal Information Systems Evaluation* Vol.19 (2), p. 85-98. (2016). online at [www.ejise.com](http://www.ejise.com)

10. Constantin, H., Peter Fettke, P., Loos, P.: Empirical research in business process management – analysis of an emerging field of research", *Business Process Management Journal*, Vol.16 (4), pp.619-661. (2010) <https://doi.org/10.1108/14637151011065946>
11. Dwivedi, Y. K., Wastell, D., Laumer, S., Henriksen, H. Z., Myers, M., Bunker, D., Srivastava, S. C.: Research on Information Systems Failures and Successes: Status Update and Future Directions. *Information Systems Frontiers*, 17(1), 143-157. (2015).
12. Dwivedi, Y. K., Ramdani, B., Williams, M. D., Mitra, A., Sukumar, R., & Williams, J. (2013). Factors contributing to successful ERP implementation in locally-owned and multinational firms in India. *International Journal of Indian Culture and Business Management*, 6(4), 458-476.
13. Fernandez, D., Zainol, Z., Ahmad, H.: The impacts of ERP systems on public sector organizations. 8th International Conference on Advances in Information Technology. IAIT, 19-22. (2016).
14. Giannarou, L., Zervas. E.: Using Delphi technique to build consensus in practice. *Int. Journal of Business Science and Applied Management*, Vol. 9(2) (2014).
15. Haddara, M., Fagerstrøm, A., & Mæland, B. Cloud ERP Systems: Anatomy of Adoption Factors & Attitudes. *Journal of Enterprise Resource Planning Studies (JERPS)*, 22. (2015).
16. Hawari, A., Heeks, R.: Explaining ERP failure in a Developing Country: a Jordanian Case Study. *Journal of Enterprise Information Management*, 23(2), 135–160, (2010).
17. Helo, P., Anussornnitisarn, P., Phusavat, K.: Expectation and reality in ERP implementation: consultant and solution provider perspective. *Industrial Management & Data Systems*, 108(8), 1045-1059. (2008).
18. Huang, S. M., Chang, I. C., Li, S. H., Lin, M. T.: Assessing risk in ERP projects: identify and prioritize the factors. *Industrial management & data systems*, 104(8), 681-688. (2004).
19. Krueger, R. A., Casey, M. A.: Focus groups: A practical guide for applied researchers . 3rd edn. Thousand Oaks, CA: Sage. (2000).
20. Maditinos, D., Chatzoudes, D., Tsairidis, C.: Factors affecting ERP system implementation effectiveness. *Journal of Enterprise information management*, 25(1), 60 -78. (2011).
21. Markus, M. L., Tanis, C.: The enterprise systems experience – from adoption success. In *Framing the Domains of IT Research: Glimpsing the Future Through the Past*, Zmud, R.W. (ed.) (Pinna ex Educational Resources, Cincinnati, OH), 173–207. (2000).
22. Markus, M. L., Axline, S., Petrie, D., Tanis, C.: Learning From Adopters' Experiences with ERP: Problems Encountered and Success Achieved. *Journal of Information Technology*, 15(4), 245–265. (2000).
23. Mehta, A., S.N. Panda, S. N.: Design of Infrastructure as a Service (IAAS) Framework with Report Generation Mechanism. *International Journal of Applied Engineering Research*, Vol. 13 (2), pp. 942-946. (2018).
24. Miles, M. B. and Huberman, A. M.: *Qualitative data analysis: an expanded sourcebook*. Sage Publications. (1994).
25. Morgan, D. L.: Focus groups as qualitative research. 2nd edn. Thousand Oaks, CA: Sage. (1997).
26. Myers, G.: Where are you from? Identifying place. *Journal of Sociolinguistics*, 10, 320–343. (2006).
27. National Information Technology Authority. NATIONAL IT SURVEY REPORT, pp 75 – 78. (2018).

28. Okoli, C., Pawlowski, S., D.: The Delphi Method as a Research Tool: An Example, Design Considerations and Applications, *Information & Management*, Vol. 42(1), pp 15–29. (2004).
29. Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., Zoran, A. G.: A Qualitative Framework for Collecting and Analyzing Data in Focus Group Research. *International Journal of Qualitative Methods*, 8(3). (2009).
30. Rajeshwar, V.: ERP Implementation Challenges & Critical Organizational Success Factors, *International Journal of Current Engineering and Technology*, Vol.5 (4). (2015).
31. Ramburn, G., Mwalemba, A., Gwamaka, M., Lisa, S.: Organizational & knowledge challenges faced during an ERP implementation: The case of a large public sector organization. *CONF-IRM Proceedings* 29, (2016). <http://aisel.aisnet.org/confirm2016/29>
32. Saraswathi, M., Bhuvanawari, T.: Multitenancy in Cloud Software as a Service Application *International Journal of Advanced Research in Computer Science and Software Engineering*. Vol. 3 (11). (2013).
33. Sædberg, A., Haddara, M.: An Exploration Of Adoption Factors For Cloud- Based ERP Systems, The Public Sector Paper presented at NOKOBIT 2016, Bergen, 28-30 Nov. *NOKOBIT*, vol.24(1). 1, Bibsys Open Journal Systems. (2016).
34. Semakula, L., Muwanga, R.: Uganda: implementing an Integrated Financial Management System and the automation of the budget process, *COUNTRY LEARNING NOTE*. Odi. (2012).
35. Shaul, L., Tauber, D.: Critical Success Factors in Enterprise Resource Planning Systems: Review of the Last Decade. *ACM Computing Surveys*, 45(4), 1–39. (2013).
36. Soja, P.: Determinants of Enterprise System Adoption across the System Lifecycle: Insights from a Transition Economy, *AMCIS 2012 Proceedings*. Paper 4. <http://aisel.aisnet.org/amcis2012/proceedings/ICTinGlobalDev/4>. (2012).
37. Tremblay, M. C., Hevner, A. R., Berndt, D. J.: Focus Groups for Artifact Refinement and Evaluation in Design Research. *CAIS* Vol. 26(27), pp. 599-618. (2010).
38. Weng, F., Hung, M.: Competition and Challenge on Adopting Cloud ERP. *International Journal of Innovation, Management and Technology*, Vol. 5(4). (2014).