Understanding Public Sector Enterprise Resource Planning System Implementation in Developing Countries: A Literature Review

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Abstract. This paper is a literature review of articles on implementation of Enterprise Resource Planning (ERP) in public sector with a focus on developing countries. The aim of the paper is to present an in depth understanding of the implementation of ERP systems in developing countries public sector. It intends to help researchers interested in the topic to have a single source of reference, and to understand the state of ERP implementation in developing countries public sector. A systematic literature review methodology was adopted for an in-depth review of journals, conference proceedings and reviews. The review covered a range from 1998 to 2018; 72 were related to public sector. Developing countries contribute only 5% to the ERP research in public sector. The major themes identified include genesis of ERP, implementing ERP, CSF for implementing ERP, ERP implementing frameworks/methodologies, impact of ERP on Business Processes, ERP market, ERP cost and failure, and ERP trends. Findings on each theme are discussed. Areas are recommended that need to be understood in context of developing countries public sector; external and internal opposing factors, specific CSF/CFF, ERP implementing framework/methodologies, Total Cost of Ownership, ERP integration and ERP framework/architecture to ensure successful implementation of ERP and reduce cost.

Keywords: ERP · Public sector · Developing countries · Enterprise systems · CSF · CFF

1 Introduction

Many organizations have implemented information systems in order to improve efficiency in service delivery. However, information systems specific to given function area create distributed silos of heterogeneous data, inaccessible across the organization. This affects decision making at organizational level due to lack of access to organization wide real time information. Consequently the agility of the organization to promptly respond to business needs is constrained. Large organization in developed economies initiated implementation of enterprise information systems to overcome challenges caused by function-oriented information systems (Rajapakse and Seddon 2005). Among the different types of enterprise information systems, Enterprise Resource Planning (ERP) system is the most popular. ERP design is based on widely accepted best practices in a given industry be it private or public sector. Implementation of ERP system in an organization is intended to integrate business processes across

functional areas to enhance efficiency and effectiveness in service or product delivery in a manner universally accepted in a particular industry (Rajapakse and Seddon 2005).

Liu et al. (2011) argue that ERP implementations are the most difficult projects to undertake because of their complexity, high cost and adaptation risks. The complexity of ERP system originate from inherent business processes to ERP system. Often the recipient organization is required to redesign the organization business processes to fit ERP system. On the other hand customization of the ERP system could be carried out to fit the ERP system in the recipient organization business processes. Though numerous researchers have contributed to the field of ERP systems in regard to Critical Success Factors (CSF), Critical Failure Factors (CFF), and implementing methodologies, most of the research is private sector oriented, and from developed economies. Meaningful interaction with the citizenry and business requires integration of ERP system with other applications. Hence, there is a need to build capabilities to manage and improve relationships with business and citizenry in a seamless Government-to-Business (G2B) and Government-to-Citizenry (G2C) environment. Governments in developing countries promote Public-Private-Partnership (PPP) as strategy to increase efficiency in service delivery. The success of the public sector in developing countries to deliver quality services efficiently, will depend on the ability to integrate the diverse network of stakeholders' relationships.

ERP systems are independent solutions that cannot integrate all interaction processes in public sector environment. An effective service delivery model in public sector organizations require leveraging the functionalities of the ERP system with another enterprise application (Baran 2012).

Hence, an inevitable need arise to improve the interactions with suppliers of services and goods by integrating ERP with applications that provide interface with e-commerce solutions.

ERP systems in public sectors have to be extended to create links with other application like Customer Services Management (CSM) to manage service agreements, Supplier Relationship Management (SRM) to manage suppliers' relationships, and Citizenry Relationship Management (CRM) to manage citizens' interactions. These solutions are stand-alone systems with the aim to support different functions (Beal 2017). Integration of ERP systems with another application that manage front-end processes eliminate duplication of information and reduce IT costs and expenses related to training (Kolisnyk 2018).

ERP systems vendors are penetrating developing countries public sector, in anticipation to provide solutions that deliver efficiency similar to developed countries public sector. However, public sectors in developing countries are characterized by specific laws and government regulations, as well as specific ways of doing business that are different from those in the West (Bitsini 2015). These unique characteristics are likely to cause technology, information and roles misalignments or misfits between the best practices of a Western-designed ERP system and the organizational context in developing countries (Bitsini 2015).

Prior to this article, there is no literature review on implementing ERP systems in developing country public sector is identified. Hence, the article contributions to the knowledge of ERP systems implementation with a focus on public sector in developing countries. First, it is the first single source of reference for ERP systems implementation

in developing country public sector. Secondary, the article provides a background for identifying areas that need to be understood to successfully implement ERP systems in developing countries public sector domain.

Objective

The objective of the research was to collect and analyse literature on the implementation of ERP systems in developing countries public sectors. The question the article attempts to answer is; how successful is the implementation of ERP systems in developing countries public administration? It is important to understand ERP systems in context of public sectors in developing countries; ERP systems have transformed private sector organizations and now are gaining acceptance in the public sectors (Kelemen 2014). Secondary, ERP systems were primarily targeted at private companies, though public organizations in developed economies have invested considerable resources in the implementation of these systems Alves and Matos (2011). Still the continued high failure rates with enterprise resource planning (ERP) systems remain a great concern (Ram et al. 2013). Also many ERP systems' failures in developing countries are associated with the misalignment of requirements between ERP systems and implementing organizations (Morton and Hu 2008; Roseann and Weber 2004; Strong and Volkoff 2010).

Overview of the Paper

In this article implementing ERP systems in developing countries public sector is analysed to identify the major themes researched. Secondly, the concept of cloud ERP systems is investigated in context of developing countries. A discussion of the finding is provided, and the article conclude with areas that need to be understood further.

2 Methodology

A systematic literature review (SLR) methodology for conducting a high quality standalone literature review in Information Systems field was adopted as the author of the article didn't collect or analyze any primary data (Okoli 2015). SLR methodology was considered the most appropriate for a rigorous review intended to summarize existing evidence, identify gaps in current research, and provide a basis for research endeavors in ERP systems in developing countries public sectors.

2.1 Sources of Reviewed Papers

Papers reviewed were accessed from 25 International journals indicated in Table 1, four conference/conventional proceedings, and five international reviews listed in Table 2. The research covered articles in the range from 1998 to 2018. A list of search words including Enterprise systems, public sector ERP, Enterprise Resource Planning, developing countries public were used to search the literature using Google scholar.

Selection of papers was based on three key terms; ERP implementation, public sector ERP and ERP in developing countries/economies. Paper were categorized as relevant when the author talked about ERP systems and referred to public sector globally in the text, and. papers selected in this category were 65. A second category

Table 1. Journal sources

Journal title
Journal of Enterprise Information Management
Journal of Business Administration and Management Sciences Research
Journal of the Association for Information Systems
European Journal of Information Systems
International Journal of Human–Computer Interaction
Business Process Management Journal
Information Systems Management
Journal of Enterprise Information Systems
Journal of Public Administration Research and Theory
Journal of Enterprise Resource Planning Studies
Journal of Business Administration and Management Sciences Research
Communications Of The ACM
Journal of Information Technology
Communications of the Association for Information Systems
Journal of Operations Management
Journal of Management Information Systems
The Journal of Systems   and Software
Business & Information Systems Engineering
ACM Computing Surveys
International Journal   of Human Computer Interaction
Communications of the IBIMA
OECD Journal   on Budgeting
Journal of the Faculty of Economic & Administrative Sciences
Interdisciplinary Journal of Information, Knowledge, and Management
Journal of Enterprise Resource Planning Studies

Table 2. Reviews and Conferences

Reviews	Conventions/Conferences
Public Administration Review	International Conference on Information Systems (ICIS) 2004 Proceedings
Harvard Business Review	
American review of public administration	Electronics and Microelectronics (MIPRO), 2014 37th International Convention
Government Information Quarterly	European Conference on Information Systems (2000)
MIS Quarterly	International Conference on System Sciences (2001)

was the contextual category; the article was about ERP systems in the context of a developing country, and the themes discussed are specifically focused on ERP in developing country. This category has 7 papers. A third category was the specific category; article fully dedicated to ERP systems in developing country public sector, and no paper identified in this category.

2.2 Themes Identified

This section provides a critical review of the common themes discussed in various articles on ERP. Common themes identified in articles reviewed include the genesis of ERP systems, critical success factors for implementing ERP, ERP implementation cost and failure, ERP implementing frameworks/methodologies, ERP market and Trends in ERP systems. ERP themes that have no article related to developing countries are identified in Table 3.

Table 3. Themes published about ERP by category

Theme	Author
ERP generally (one article related to public sector, but not in developing country context)	Sprecher (1999), Kumar and Van Hillegersberg (2000), Periseraset and Tarabanis (2000), Allen et al. (2002), Sally and Arnold (2002), Huang et al. (2004), Wagner and Antonucci (2004), Alshawi et al. (2004), Robert and Weston (2007), Tregear and Jenkins (2007), Liu et al. (2011), Nazami et al. (2012) and Bailey et al. (2015)
Implementing ERP (three articles related to public sector and two of which refer to developing countries)	Klaus et al. (2000), Ahituv et al. (2002), Addo-Tenkorang and Helo (2011), Abdelghaffar (2012), Sommer (2011), Abdelghaffar (2012), Ziemba and Oblak (2013), Columbus (2014) and Kelemen (2014)
ERP implementation Critical Success Factors (two article related to public sector in developing country context)	Esteves and Bohorques (2007), Frimpon (2012), Njihia and Mwirigi (2014), Kalema et al. (2014) and Simone et al. (2018)
ERP cost and failure rate (Three article related to developing country public sector context)	Bancroft et al. (1998), Govindaraju (2012), Kamhawi (2008), Soja and Paliwoda-Pekosz (2009), Seddon et al. (2010), Hawari and Heeks (2010), Lutovac and Manojlov (2012), Rouhania and Ravasan (2012), Ram et al. (2013), Harb and Twak (2015) and Bitsini (2015)
ERP Market (one article which mention developing country but not specifically public sector)	Dezdar and Ainin (2011), Shaul and Tauber (2013)

Table 3. (*continued*)

Theme	Author
ERP implementing frameworks/methodology (One article related to public sector, but not in developing country context)	DiMaggio and Powell (1983), Levinson (1988), Govindaraju (2012), Parr and Shanks (2000), Shanks et al. (2000), Markus and Tanis (2000), Ross and Vitale's Model (2000), Somers and Nelson (2004), Benders et al. (2006), Bjørn-Andersen and Johansson (2007), Baxter (2010), Dantes and Hasibuan (2011), Sommer (2011), Govindaraju (2012) and Ziemba and Oblak (2013)
ERP trends (One article mentioning developing countries, but not specifically public sector domain)	Bailey et al. (2010), Bernd and Arne (2012), Saini (2011) and Tripti (2013)

3 Literature Review

3.1 Genesis of ERP Systems

Enterprise Resource Planning (ERP) was coined in the early 1990 by Gartner Group (Robert and Weston 2007). In private sectors both ERP software vendors and users understand technical, human resource, and financial resources requirements for ERP systems implementation. According to Columbus (2014) a successful ERP systems implementation requires strategic, innovative implementation and deployment approaches that incorporate business process management. ERP systems provide real-time access to information from various business processes integrating different functions (Nah et al. 2001; Al-Mashari 2003; Alsene 2007). Introduction of ERP systems in developing countries can be traced way back in 1990s. Since mid-1990's, many public sector organizations have followed the private sector to implement pre-packaged commercial ERP solutions in favor of a proprietary systems (Sommer 2011).

3.2 Implementing ERP System

Literature reveals an increasing demand for quality services in both public and private sectors. Periseras et al. (2000) and Liu and Lai (2004) observed that citizens in many countries expect public administration to provide quality services at the lowest cost. The need exists to implement technology that can increase efficiency, enhance process transparency and communication within public administration. Thus, in developing countries, enterprise systems are increasingly gaining popularity in public administration. However, according to Seddon et al. (2010) traditional implementation of ERP systems often cost millions or even hundreds of millions of dollars. Ziemba and Oblak (2013) state that information system implementation is a complex exercise in technology innovation. Organizational change management is also difficult in enterprises (Kumar et al. 2002; Markus and Tanis 2000).

Successful implementation of enterprise system may not easily be completed in short term. Hence, it requires top-level political will as any change in the existing

public sector practices requires a review of legal framework. Most government agencies utilize experiences from private sectors to implement enterprise systems (Watson et al. 2003). As a result, public sectors often adopt generalized private sector ERP implementation approaches. In developed countries, the public sector administration and business processes are reformed to reflect those in the private sectors; hence, it is appropriate to adopt private sector ERP implementing approaches developing country environment. The public sector environment in developing countries is characterized by unique cultural, structural, political, and economic complexities.

Management of information systems in public sector organizations vary significantly from those of the private organizations (Bozeman and Bretschneider 1986; Bretschneider 1990). According to Bretschneider (1990) and Cats-Barilet al. (1995) variations of public sectors from private sectors can be attributed to a number of characteristics. These include interdependencies across the organizational boundaries, higher levels of red-tape, different evaluation criteria for purchasing software, extra organizational linkages, and top-level implementation management officials. In many developing countries, public sector management activities experience strong external forces. The significant forces that influence public administration functions include legislations and regulations, international funding agencies and political interference. Hence, the public sector environment in many developing countries is different from the public and private sectors in developed countries.

Bozeman and Bretschneider (1986) suggested four "models of publicness" that distinguish between public and private sector information systems. In the functioning of public administration, economic authority model play a secondary role. In private sector the emphasis is on productivity, bureaucratic regulations in public sector and political authority model, the emphasis is on political influence and monitoring mechanisms.

Bingi et al. (1999) and Davenport (1998) state that ERP system implementations generally involve massive organizational changes. The changes are a result of the shift from existing business processes to best practices inherent in ERP systems. Organizational changes required to implement ERP system include strategic areas to eliminate data silos, technology infrastructure, organization culture, management systems, human resources skills and structures (Al-Mashari 2003). These changes have widespread impacts on various departments or agencies of the organization. The strong interdependence of government entities pose a high risk failure to ERP system implementation. Successful ERP system implementations require top management commitment. (Huang et al. 2004; Somers et al. 2001; Grossman and Walsh 2004; Umble et al. 2002).

Documented models of ERP systems implementation comprise of different stages. Some researchers suggest a three-stage model (Parr and Shanks 2000; Ahituv et al. 2002). Markus and Tanis (2000) proposed a four-stage model. Most of the proposed models categorize activities into: before the project, the project stage and post-project undertakings. ERP implementation studies are commonly conducted in two approaches. The variance approach is focused on critical success factors for successful implementation of an ERP system. The process approach focuses on the change management process by identifying the dialectic forces that cause change during the ERP implementation process (Robey et al. 2002). The process approach highlights the difficulties in business process mapping, infrastructure problems, lack of technical knowledge of the key-users, difficulties in procurement of hardware, codification of master data, difficulties in collection of data, and change of implementation partners (Madhavi 2008).

According to Akkermans and Helden (2002) ERP implementations are usually large and complex projects. Faced with many unforeseen developments and resources, and involve big groups of people work under considerable time pressure. Not surprisingly, many of these implementations turn out to be less successful than originally intended (Davenport 1998; Avnet 1999; Buckhout et al. 1999).

Integrated information flows can support government processes in numerous ways to improve service delivery, accountability, and managing for results. Unfortunately, most of the literature on ERP implementation is limited to the private sector, and as such neglects a substantial uniqueness of the public sector constraint. Gulledge and Sommer (2003) argue that there is nothing special about public sector business processes that insulate them from modern private sector management methods. However, it should be noted that this argument is made in context of developed economies, where the public sector undertook the initiative to adopt private sector management structure. This is not the same experience in developing economies where skills, financing, political influences, and entrenched bureaucracy, are critical constraints in public administration.

The hierarchical organizational structure in the public sector is quite different from organizational structure in private sector. Majchrzak and Wang (1996) state that it is extremely difficult to implement process management in hierarchically managed organizations. Sommer (2011) argue that public administration has characteristics including; cultural, political, and organizational factors that negatively influence successful ERP implementation in local government administration. Tregear and Jenkins (2007) presents a list of nine key differences between the public sector and private sector. The differences include public interest, accountability, political sensitivity, whole-of-government ecosystem, budget cycle complexity, information exchange, regulating society, machinery of government changes, and culture. These differences should be considered when developing approaches to process-based management and ERP implementation in a developing country public sector organization.

One of the major changes at different levels of government is the attempt to implement best practices modeled after those of the private sector (Caudle 1996). The private or public sectors' best practices from developed countries imbedded in the ERP systems are far different from developing countries environment. Raymond et al. (2005) argue that each sector is confronted with specific environmental constraints, the transfer of IT practices from the private to the public sector would not occur automatically. Ziemba and Oblak (2013) indicated that processes in public administration have completely different characteristics compared to private organizations. Contrary to public sector, private sector processes can be improved almost anytime as organization's need emerge (Schäfermeyer et al. 2012). ERP systems are generally designed for private sector and do not meet specific public administration requirements (Ziemba and Oblak 2013).

3.3   ERP Implementing Framework/Methodologies

Govindaraju (2012) suggested an organizational perspective framework for implementing ES; focusing on two stages in ES implementation process including project stage and post project stage. Further recommend that enterprise system implementation effectiveness need to be analyzed at two levels: short term implementation effectiveness, related to the outcome of the project stage, and the long-term implementation effectiveness, related to the outcome of the post-project stage.

Dantes and Hasibuan (2011) proposed an ERP implementing conceptual framework considering two dimensions. The ERP implementation process that have 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 et al. (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.

Most ERP vendors propose frameworks specific to their ERP solution to simplify the implementation process. Some of the major 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 et al. 2006). Vendor specific frameworks coerce client organizations to compromise their core business processes for the sake of conforming to the vendor's prescribed implementing framework; a concept of isomorphism, DiMaggio and Powell (1983).

3.4   ERP Market

Despite the wide adoption of ERP systems, the biggest share is in developed economies, and the adoption rate in developing countries is very low more so in Africa. Shaul and Tauber (2013) indicated that ERP market was occupied 66% by North America; Europe had 22%, whereas the whole of Asia was at 9%, Africa share an estimate of only 3%.

3.5   Impact of ERP on Business Processes

Literature cite Bozeman (1993) arguing that one of the main characteristics of the public sector is the large number of formal processes that appear to be essential to ensure that the public sector functions. Successful Information System implementation requires sufficient attention to policy, processes, structure, laws, and regulations (Rose and Grant 2010). ERP systems provide an environment for business process alignment and management, and seamless flow of data and information across silo function areas. Gulledge and Sommer (2003) noted that process management is a prerequisite for successful implementation of business process-oriented enterprise systems. Localized implementations of process management have been prevalent for years (Grass 1956).

Technology adaptation in public or private sector, should be considered only to provide capabilities to support business processes deliver efficiency and effectiveness to service delivery, and deliver value to the customer (Davenport and Short 1990). Hence, the public sector should consider the primary benefits of process management to ensure alignment of cross-functional processes prior to implementation of a technology solution to support enterprise functions (Gulledge and Sommer 2002). Columbus (2014) observed that successful ERP systems implementation requires strategic, innovative implementation and deployment approaches that incorporate business process management.

According to Gulledge and Sommer (2002) business process management has received much attention in the private sector management literature, and its benefits are well known; much less has been written in the public sector management literature, and what has been written has been very general.

3.6   Trends in ERP System

Hawari and Heeks (2010) argued that the designer of the ERP software package assumed the existence of a strong local area network, servers, personal computers and broadband internet connections. Many developing countries, more so the public sectors are not yet at the level of developed countries when it comes to technology and related infrastructure. According to Saini et al. (2011) cloud computing is a new paradigm in which computing resources such as processing, memory, and storage are not physically present at the user's location. Instead, a service provider owns and manages these resources, and users access them via the Internet. The greatest challenge of ERPs is the costs related to these systems implementation which includes investing to acquire software, hardware, consultant fees, in-house staff (in charge of the installation process), staff operating on the system and the user training (Trimi et al. 2005). Armbrust et al. (2010) stated that these ERP systems can be provided in an easier and more attractive way by their provision over the cloud. Lechesa et al. (2012) stated that ERP systems are also delivered as SaaS (Software as a Service), and is increasingly adopted in the global market.

Baxter (2010) indicated that there does not appear to be one best model for the implementation of ERP system, and suggest that applying traditional methods to an ERP development project does not work. Navaneethakrishnan (2013) suggest that cloud computing gives organization all the services of computing, networking and data storage from a distinct location. Public authorities or government could benefit from these advantages by adopting cloud computing (Bernd and Arne 2012). The analysis of Alford (2009) as cited by Bernd and Arne (2012) implies that over a 13-years lifecycle the implementation costs for cloud computing would be more than 60% lower than setting up a traditional data center. Bernd and Arne (2012) argued that these advantages make cloud computing also very interesting to be adopted in the public sector and e-Government.

One of the benefits of Cloud technology to public administration is to eliminate the necessity of setting up an own IT infrastructure, hence, decreasing investment and administrative expenditures (Bernd and Arne 2012). More benefits of cloud computing for government are listed by Bhisikar (2011) including increased flexibility, access everywhere, elastic scalability and pay-as-you-go, easy implementation, service quality, sharing documents and group collaboration, data recovery, distributed data centers and availability of software updates. Maliza et al. (2012) cites Mozammel-Bin-Motalab and Shohag (2011) who argued that cloud enterprise systems is simple to deploy, and it represents the latest, greatest, and most influential IT change in years.

Vendors of Cloud ERP Systems manage, maintain and deploy IT infrastructure. Consequently, reduce the IT complexity that users face when implementing an enterprise system (Maliza et al. 2012). In the same line, Beaubouef (2011) argued that no further IT investment is required in terms of infrastructure, software and support resources upgrading. According to Bailey et al. (2010) local government administration should move aggressively to cloud computing in order to achieve service improvements and cost efficiencies.

3.7   CSF for Implementing ES

Enterprise systems CSFs in the public sector domain are grouped into: procurement procedure, government processes management, project team competence, and project

management process (Ziemba and Oblak 2013; Hasibuan and Dantes 2012). Wang et al. (2008) further considered the importance of: top management support, vender's support, consultant's competence, users' support, IT capability, and project management leadership; to mitigate the costly failure of ERP system implementation. Ustasüleyman and Percin (2010) considers project management, consultant planning activities and internal audit to be significant in predicting the ERP implementation success. Many developing countries still experience severe constraints in these dimensions.

During the implementation of enterprise systems, often the business must be modified to fit the system (Davenport 1998). This means the organizations' business processes need to be reengineered to fit the best practices that comprise the system. This considerably add to the expense and risk of introducing enterprise systems (Kumar and Van Hillegersberg 2000; Markus and Tanis 2000). Moreover, vendors try to structure the systems to reflect best practices, but it is the vendor, not the costumer who define what "best" means (Davenport 1998). Hence, the adopting organization is dependent on the vendor for updates of the package (Markus and Tanis 2000).

Abdelghaffar (2012) identified ten factors which had impact on ERP implementation in Egypt. Authors identified different CSFs, and also categorized them differently: Kelemen (2014) proposed 37; Frimpon (2012) identified 28, all obtained from literature review, and Frimpon (2012) identified 5 from SMEs in Kenya. However, ERP system design assumes a set of organizational processes that match the best practice in the industry (Strong and Volkoff 2010). Hence, the importance of a factor may differ from one context to another (Momoh and Shehab 2010).

3.8   ERP Implementation Cost and Failure

Implementation of ERP systems in the public sector is considered to be challenging and require enormous investment and still with risk of failure (Kelemen 2014). According to Bjørn-Andersen and Johansson (2007) the implementation of ERP project itself is far more expensive than the costs of the software licenses. Organizations leaders usually were unsatisfied with ERP implementation timelines, regularly exceeding two years (Bozaa et al. 2015). Exceeding timelines is caused by: inadequate preparation, lack of knowledge and experience, inability to predict and find an appropriate solution. According to Rouhania and Ravasan (2012) these projects are on average 178% over budget, take 2.5 times longer than intended, and deliver only 30% of the promised benefit. Harb and Twak (2015) further cite Lutovac and Manojlov (2012) that more than 80% of companies in Indonesia failed to implement ERP and 50% of companies in the world failed to obtain the optimal return value. Wu et al. (2008) and Kwahk and Ahn (2010) and Salmeron and Lopez (2010) list a number of failed ERP systems implementations with magnitude of financial losses; resulted from not properly implementing ERP systems. Most developing countries public sector administration often rely on borrowed or donor funds. Hence, ERP systems implementation projects require extra caution to mitigate ES implementation failure.

Nazemi et al. (2012) found out that the total cost including: hardware, software, professional services, training, and internal staff costs could range between $300 and $400 million with an average of $15 million. This average cost is close to the US $ 30 to US$70 stated by (Rodin-Brown 2008). As a consequence some developing countries continue to run enterprise systems not successfully implemented that constrain the ES efficiency (Rodin-Brown 2008).

The continued high failure rates with enterprise resource planning (ERP) systems remain a great concern (Ram et al. 2013). Most of ERP systems' failures in developing countries are attributed to misalignment of requirements between ERP systems and implementing organizations (Morton and Hu 2008; Rosemann et al. 2004; Strong and Volkoff 2010). Misalignment originate from mismatches in different contexts where ERP system is developed. Dezdar and Ainin (2011) argued that when organizations implement an ERP system that was developed in a different social context, they are more likely to experience misalignment or misfit embedded within software packages with business models designers believe represent the best practice in certain contexts (Rosemann et al. 2004). Software packages are subjected to institutional procedures, processes and forces that set rules of rationality (Gosain 2004). The standard practice in many ERP implementations force a match between client business processes and ERP system design through business process reengineering (BPR) resulting into massive changes and ultimately lead to failure (Hawari and Heeks 2010).

Nevertheless, Information Technology (IT) governance and Total Cost of Ownership (TCO) could be another source of ERP system implementation failure. IT governance has two aspects, information technology resource management and performance measurement, that impact the alignment of the organization and the IT solutions. These IT governance components have significant positive impact on alignment of IT with business strategies (Mohammad 2012). IT governance provides a description of the deployment of information technology in an organization. The IT governance also provides the leadership, organizational structure and processes to ensure that the implemented IT sustain and support organization's strategy (Broadbent et al. 2002). During the implementation of ERP system, IT governance team assess the IT infrastructure, and implement a framework to calculate the ERP system TCO. TCO is a comprehensive system approach that enable management make better decisions in regard to direct and indirect costs associated with IT resources. Any organization attempting to implement ERP system need a TCO framework to enable better decision making in regard to ERP implementation project. Though in many cases the TCO is consider under the purchasing cost, underestimating hidden costs of technology solutions can result into implementation failure. A comprehensive TCO framework captures ERP implementation cost from the onset to post implementation of the project. Literature on ERP system TCO is sparse, hence, lack of clear understanding of ERP TCO is likely to be one of the major causes of budget overrun.

4   Findings and Discussion

Research on ERP in public sector is still low more so in developing countries. Out of 112 article relevant to ERP that were reviewed, 72 were related to public sector. Developing countries contribute only 5% to the ERP research in public sector. Though there is an increase in ERP adoption in the public sector, in many aspects developing countries are far less than developed countries; caused by differences in technological advancements and supporting infrastructure. The growth of ERP implementation in developing countries is not supported by literature indicating reduction in failure rate. Factors associated with lack of skills and technology, absence of good quality data, lack of money, user resistance and cultural issues identified by Hawari and Heeks (2010), Kamhawi (2008), Soja and Paliwoda-Pekosz (2009) and are still prevailing. The ERP

design – reality gap identified by Hawari and Heeks (2010) is still one of the key causes of ERP implementation failures in developing countries due to adoption of developed country perspective solutions. The challenges are even more pronounced in developing countries public domain, where business processes are highly hieratical; culture and business practices reinforced by poor motivation. The practice of reengineering business process to fit the recipient organization into ERP best practice framework reinforce the challenge. Hawari and Heeks (2010) argue that Standard practice in many ERP implementations has been to force a match between client business processes and ERP system design through business process reengineering (BPR) which results in too much change and ultimately leads to failure. Understanding the critical success factors or rather critical failure factors for implementing ERP systems in developing countries public sector in critical to reduce the design- reality gap. Understanding ERP system has to be contextualized because of the conflicting ideas that emanate from the fact that there are no universal best practices that fit different industries and environments, and particularly developing countries (Bitsini 2015).

Though the impact of ERP system on business processes and job environments are not among the identified themes discussed in the context of public sector, they prominently future in private sector. ERP fundamentally impact on the business processes and the work practices. In public sector environment more so in developing countries where political, legislative, and financial constraint are high, a successful implementation of ERP in such environment require an attention on public sector business processes. Columbus (2014) observed that successful ERP systems implementation requires strategic, innovative implementation and deployment approaches that incorporate business process management. Bailey et al. (2017) found that ERP systems affect the quality of work life, in a study from African countries. This is likely to be caused by business process improvement, which result into the demand of new set of skills and different work practices.

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. Existing frameworks/methodologies are private sector based and focus on what should be done at a particular stage with no consideration of variations in different domains. Characteristic variations between private sector and public sector significantly impact on the way activities are carried out in a given environment. ERP implementation in developing countries should also take into account the fact that developing countries have limited resources unlike the developed countries. Hence, ERP systems implementation process should be administered differently as suggested by Addo-Tenkorang and Helo (2011). Sommer (2011) state that public administration has characteristics including: cultural, political, and organizational factors that negatively influence successful ERP implementation in local government administration.

Research Implication

Shaul and Tauber (2013) findings indicated that ERP market was occupied 66% by North America; Europe had 22%, whereas the whole of Asia was at 9%, Africa share an estimate of only 3%; this gives an indication on why ERP issues in developing countries are not well researched, hence, not well understood. Dwivedi et al. (2014) envisaged the need to extend ERP research focus to include further public sector ERP

systems implementation. The market percentage also don't separate the private from public sectors. However, from a business perspective this gives an indication on the ERP market trend being focused towards developing countries as they provide unsaturated market. Hence, developing countries have become a major target for ERP vendors (Dezdar and Ainin 2011). The academic perspective, a percentage of only 5.04 research work done on ERP subject in developing countries, is an indicator of inadequate understanding of the subject in various aspects. Developing countries are still highly constrained with Information Technology infrastructure required to implement ERP systems. However, the proliferation of cloud computing technology promise ERP systems provisioning opportunities. It is important to understanding how cloud facility with "pay-as-use" and SaaS provisioning present opportunities of implementing ERP in developing countries public sector at far lower infrastructure costs and skills requirements despite other underlying issues. Though literature promote cloud computing benefits to be adopted in the public sector and e-Government (Bernd and Arne 2012).

5   Conclusion

In this paper reviewed 112 articles and identified 74 articles with relevance to public sector. Out of which only 5% of these articles were related to ERP in developing countries. However, the major themes identified include; genesis of ERP, CSF/CFF, ERP implementation cost and failure, ERP implementation frameworks/ Methodologies, ERP market and trends. A critical analysis of these themes is carried out to highlight the available knowledge and gaps on ERP in public sectors in developing countries.

Limitations and Feature Research
The search didn't reveal substantial literature on developing country public sector issues. Identified literature does not also clearly distinguish public sector organisations, like agencies or authorities, from public sector administrations like local governments. Policies, regulations, business processes and mandates of public sector institutions differ from those of public administration. Most of the identified research on developing country public sectors focus on non-administrative public sectors (Simone et al. 2018). Successful implementation of ERP systems in developing countries public sectors requires understanding of: the policy and regulatory frameworks relevant to developing country unique challenges; impacts caused by external influences like donor funding and vendor's highly inscribed designs; comprehensive CSF/CFF specific to developing country public sectors, Total Cost of Ownership framework, ERP integration with other application, and contextualized ERP implementation frameworks. An ERP architecture grounded on local business processes rather that considering universal best practices is critical to successful implementation of ERP system. A study on an alternative architecture that can harness capabilities of other technologies like Multi-Agent Systems and SOA could help to develop ERP systems that minimize on business process improvement, which is highly disruptive in developing countries public sectors. This could reduce the ERP system implementation cost and failure rate. The listed research dimensions contribute to the fact that despite the wide adoption of ERP systems, the biggest share is in developed economies; the adoption rate in developing countries is still very low more so in Africa. Hence, the

studies are recommended to create knowledge on implementation of ERP systems in developing country public sectors.

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