ERP Systems in Public Sector Organization: Critical Success Factors in African Developing Countries

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Abstract— **In the wake of budget restriction and increased pressure for transparency and accountability, more and more public sector organizations have opted to implement enterprise resource planning systems. Public sector organizations of developing countries have also followed this trend, pressured not only by the demands of accountability and efficiency from their own citizens but also from the multilateral and bilateral development agencies that fund a majority of the development projects and programs that they deliver. Enterprise resource planning is also seen as a way to foster organizational transformation, though best practices adoption and process harmonization. Yet, success rate of enterprise resource planning systems implementation, adoption, as well as their perceived results are less then optimal. This paper aims to explore the critical success factors in the implementation of an enterprise resource planning system in the context of public service organization in African developing countries. The results aim to guide practitioners and decision-makers with tools to increase the chances of success of these initiatives.**

Keywords- Enterprise Resource Planning – ERP; public sector organizations; Critical Success Factors – CSF; developing countries.

I. INTRODUCTION

An increasing number of public sector organizations (PSO) has opted to implement enterprise resource planning (ERP) systems [1]. This trend is also followed by developing countries, pressured not only by the same demands from their own citizens but also from the multinational and binational bilateral funding development agencies.

ERP system implementation is still in its early stages in developing countries, with Asia-Pacific and Latin America accounting for most of its expansion, and Africa trailing behind [2]. Yet, today it is estimated that developing countries account for 10% of all ERP sales [3].

In North America and Europe, the private sector is the main client of ERP systems. In developing countries, ERP are mainly deployed in large organizations, rather than in SMEs. The public sector being the largest employer in developing countries [4], the main proportion of ERP systems is implemented in PSO. This specificity adds an additional level of complexity to an already complex project, since funding usually comes in part from external single or multiple donors, with their own interests in the project, and their own procurement, management and monitoring processes. Success rate of ERP systems implementation, adoption, as well as their perceived results in PSO in developing countries are less then optimal. Yet, little research has been undertaken to understand the specific Critical Success Factors (CSF) of the implementation process of ERP in PSO in developing countries.

Based on secondary data analysis of CSF collected through four professional workshops with key stakeholders, this paper aims to explore this gap. The paper is structure as followed: Section II presents the main dimensions of an ERP systems and draw some insights specific to PSO in African context. Section III presents the methodology of this paper, while Section IV presents the main results. Section V reviews the discussion, before presenting the conclusion in Section VI.

II. CONTEXT

In this section, we will define the main terms used in this paper such as ERP, PSO and developing countries; describe the reasons why PSO would implement ERP systems; and explore main CSF in ERP systems implementation, both in general and specific to PSO in developing countries.

A. What is an ERP?

An ERP system is an "adaptable and evolutive software system that supports real-time and integrated management of a majority – if not all – processes of an organization" [5, p. 70]. ERP systems are an integrated, modular, customizable and uniform (database, management and interface) software [6][7].

ERP systems are highly complex [8]. Marnewick and Labuschagne [8] postulate that ERP systems can be conceptualize as a combination of four main components: Software (Product), Process Flow (Performance), Change Management (Process) and Customer Mindset (People; Figure 1 below). All four components are implemented through a Methodology, which underlines each ERP life-cycle phases (pre-implementation, implementation and post-implementation phases [9]).

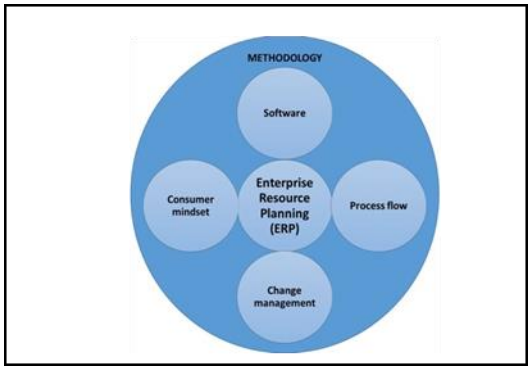

Figure I. Conceptual model for Enterprise Resource Planning (ERP), Marnewick and Labuschagne [8].

Conceptual model components: The Software component refers to the ERP product itself, such as its main features, choice of interface, and other technical aspects, as well as its development, testing and troubleshooting. The Process flow component refers to the way the different ERP modules flow within and between them. This includes both the processes themselves and the data they store and process.

The Customer mindset component refers to the need for internal stakeholder management at the user, team and organizational levels. Then, the change management component covers all factors pertaining to the planning, managing and controlling of changes. Change management is divided in four subcomponents, namely: user attitudes changes, project changes, business process changes, and system changes. Lastly, Methodology refers to the "systematic approach to implement an ERP system" [8, p.153]. All together, these components help better approach ERP system's complexity.

B. *Why would PSO want to implement an ERP system?*

PSO consists of "governments and all publicly controlled or publicly funded agencies, enterprises, and other entities that deliver public programs, goods, or services", and exists at any level – international, national/federal, regional or local) [4].

Public and private sectors have "different goals and motives and are governed by somewhat different principles, with unique groups overseeing their actions and procedures" [10]. Organizations in the private sector have "more freedom to operate, while public organizations are governed by laws, rules, traditions, and structural bureaucratic checks and balances" [10].

Although very different, benefits sought during ERP system implementation seem consistent among public- and private-sector organizations [11]. These benefits include improvements in:

- **Financial performance:** improves financial management, creates value, maximizes investments, and reduces costs;
- **Functional performance:** increases productivity, quality of services, and functional efficiency, improves management of resources, enables automation of operational procedures, eliminates redundant data and operations, and reduces cycle times;
- **Organizational performance**: increases organizational performance, enables the centralization and delocalization of maintenance services, increases adaptability, facilitates harmonization around best practices, enhances support to organizational activities, and changes nature of work in various units and departments;
- **Communication management:** centralizes and harmonizes information, improves management and organization of internal and external information flux, and improves security and information access management;
- **Internal audit, monitoring and control:** improves controls and institutional accountability, enhances organizations regulatory compliance, achieves accuracy in management information system, enables real-time access to performance information, which in turn fosters better strategic analysis and decision [6] [12] [13].

Furthermore, a study on the impact of ERP systems in small and midsized PSO suggests that implementing an ERP system helped PSO improve services to customers and suppliers while enhancing knowledge of primary users and increasing shareholders confidence in organization [13]. With all those potential benefits, we have to ask: why are not more PSO implementing ERP systems?

C. *Is ERP implementation in PSO sucessful?*

As discussed above, ERP system implementation can enhance benefits for PSO. Nevertheless, ERP system implementation can be cost and time consuming [14]. As example, the cost of ERP implementation in the United Nations (UN) organizations is estimated at 712 million United States Dollar (USD). This does not include recurring maintenance costs (at least 66 million USD per year), nor the off-budget associated costs (between 86 and 110 million USD per year).

Furthermore, failure rate, both in private and public organization, is high. The 2016 ERP Report [15] states that less that 10% of all ERP projects sampled in 2015 were implemented on time, within budget and in respect to the planned scope. More than a third (35%) was stopped or (indefinitely) differed. The remaining 55% were completed with an average of 178% cost and 230% schedule overruns. In fact, ERP implementation projects lasted 1 to 3 years, with an average of 21 months, while most projects had been planned around an 8-14 months' timetable.

Although data on the subject is scarce, ERP systems implementation failure rate in PSO in developing countries is believed to be even higher. In his study of ERP implementation in Egyptian organizations, Abdelghaffar [16] argued that 75% of ERP implementation attempts can be classified as failures. Another study found schedule overruns in 67% and cost overruns in 33% of all ERP implementation projects in United Nations organizations

[12]. Reasons frequently mentioned to explain these schedule overruns were: changes in project scope; delays in personalization of software; users' resistance to change, delays in data conversion, changes in initial project strategy, and redefinition of operating procedures. As for cost overruns, they were attributable mainly to unplanned personalization costs; inadequate definition of functional needs; unforeseen delays in the implementation process, and unrealistic cost estimation planning. No data was found on ERP implementation success in African developing countries, even if failure rates are thought to be higher than in developed countries [6].

D. Are all PSO the same? or How do PSO from developing countries differ from PSO from African developed countries?

United Nations divides countries into two categories: developed and developing countries. This classification is mainly based on economic indicators and indices such as Gross Domestic Product (GDP), Gross National Product (GNP), per capita income, unemployment rates, industrialization and standard of living [17]. The developing countries categories include both developing and least developed countries, most of which are in Africa.

Contrary to developed countries, most PSO in African developing countries are funded (partly of entirely) by external funding. Funds come mainly from multi donors/multilateral aid agencies in the context of national strategy to capacity building. In exchange for grants or concessional loans, beneficiary countries are expected to report their results, and be accountable. In this respect, all funded initiatives, whether in the form of technical assistance or capacity building projects, in all sectors, including governance, are required to be designed, executed and evaluated under a results-based management approach. It is indeed under the auspices of these major capacity building programs for public administrations that ERP projects have often been imposed as a way to increase transparency and guarantee accountability [6]. In this vein, local participation in the project has been a key message to increase ownership of public bodies in developing countries. For years, the participation of beneficiaries in the process and the management of the funds allocated to them has been part of participatory approaches, which stipulates that local participation in donor-funded initiatives becomes an essential ingredient in ownership.

However, considering the important costs – both financial, social and political – associated to ERP implementation failures in PSO in African developing countries, it is important to understand the CSF that could hinder or facilitate this process.

E. What are the CSF in ERP systems implementation in PSO in African developing countries?

In order to support organizations in their implementation efforts, practitioners and researchers have come up with CSF that facilitate or hinder implementation. CSF are defined as "factors needed to ensure a successful ERP project" [18]. This includes both factors that facilitate and hinder the implementation of an ERP system. These factors vary according to the nature and environment of the organization [19]. Yet most research on ERP success factors have been done in developing countries, in the context of private-sector organizations.

Through their literature review of CSF in ten different countries/regions, Ngai, Law and Wat [19] identified eighteen CSF, with more than 80 subfactors for the successful implementation of an ERP. The CSF are: appropriate business and IT legacy system; business plan/vision/goals/justification; business process reengineering; change management, communication; data accuracy; ERP strategy and implementation; ERP project team; ERP vendor; monitoring and evaluation performance; organizational characteristics; project champion; project management; software development, testing, and troubleshooting; top management support; fit between ERP and business/process; national culture; and country-related functional requirements [19]. This typology has been used by other scholars to guide their analysis of the influence of CSF in phases of an ERP implementation process [20] [21].

In the last years, few studies have tried to identify CSF specific to ERP implementation in PSO of developing countries.

In its assessment of ERP implementation projects in its organizations, the United Nations identified eleven CSF, namely: project planning and software selection; governance of the project, risk management, change management, project team, end users training and assistance; ERP system hosting and infrastructure; data conversion and systems integration, ERP upgrade, and project audit [12].

Another study from the World Bank identified eight CSF from its experience implementing ERP systems, namely: capacity building and training, close supervision and control from the donor agency, favorable political context and leadership; pre-existing favorable environment (IT, HR, Accounting); adequate preparation and clear conception; good project management and coordination, and external environment factors [22]. It also identified main failure factors, which were: inappropriate training/education of project teams; institutional/organizational resistance; inadequate project preparation and planning; complex conception/high number of procurements; organizational structure adapted to integration efforts; inadequate IT infrastructure; absence of leadership/engagement and ambiguous attitude of authorities regarding implementation; inappropriate technology; inadequate project coordination; and external factors (political troubles, natural disasters). These failure factors are consistent with other studies on ERP implement issues in developing countries [14] [23] [24].

These studies offer some insight on perceived CSF in ERP implementation from the point of view of donor agencies. Yet, these highlight the need to further explore the Critical Success Factors (CSF) in the implementation of an ERP system in PSO in African developing countries, in hope to give practitioners and decision-makers tools to increase

the chances of success of these initiatives. This paper will try to address this gap.

III. METHODOLOGY

This work uses secondary data collected through professional workshops with key stakeholders that have direct experience either in the planning, managing or implementing of an ERP in PSO in developing countries. A description of the initial data collection process and methods, as well as an overview of the data analysis techniques and conceptual model used for secondary data analysis follows.

A. Data collection – primary data

Primary data was collected through four 1 ½- 2 hours professional workshops on successful ERP implementation. In total, 140 participants took part in the workshops. The workshops took place in Abidjan (Ivory Coast), Rabat (Morocco) and Marrakech (Morocco). Participants from workshops 1 and 3 were all locals, while participants from workshop 2 were mostly locals, and all participants except two from workshop 4 were from outside of the country, namely from other West African countries. In total, 104 participants gave out their information contacts to organizers, for a 74% answer rate. Out of these, 62.5% of participants came from Ivory Coast, 20.5% from Morocco, 4% from Guinea, 3% from Burkina Faso, 3% from Benin, 2% from Mauritania, 2% from Senegal and 1% from Mali.

The following subsection offers an overview of the composition of each of the workshop groups.

- **Workshop no. 1:** 15 participants from a multilateral development bank institution working as Task team Leaders, Procurement and Monitoring and Evaluation. Specialists, and Managers. Languages: English and French.
- **Workshop no. 2:** 85 participants from public and parapublic organizations. Participants worked as directors, project or program managers, procurement or monitoring and evaluation sectors on bilateral or multilateral initiatives. Two came from the academia. Language: French.
- **Workshop no. 3:** 26 participants from public organization sector or project and programs funded through bilateral or multilateral development aid. Languages: French and Arabic.
- **Workshop no. 4:** 14 participants from West Africa working as either project or program managers or Monitoring and Evaluation Specialists on bilateral donors or multilateral projects or programs. Language: French**.**

The diversity within the different groups was one of the main difficulty / challenges encountered by the workshop facilitators (English/French/Arabic languages, professional status, type of organizations, and number of participants per session). To increase participation, reduce cultural barriers, provide a safe climate to exchange and create cohesion between participants of the workshops, facilitators used World Café as a data collection method.

World café is a collaborative approach that aims "to engage [participants] in constructive dialogue around critical questions, to build personal relationships, and to foster collaborative learning [25, p.28]", and helping creative new ways to address problems emerge from the initiative. Simple and flexible, the approach can be used both in small and large heterogeneous groups to foster open dialogue and collaboration [26].

World café follows seven integrated design principles, namely:

- □ Set the context;
- □ Create a hospitable space;
- □ Explore questions that matter;
- □ Encourage everyone's contribution;
- □ Connect diverse perspectives;
- □ Listen together for patterns and insights;
- □ Share collective discoveries [22].

At the end of each of the workshops, participants drafted a list of factors that facilitated and hindered the implementation of an ERP. All entries of the four lists were then combined by the facilitators. This final compilation was sent to participants in the conference proceedings by the workshops organizers. These conference proceedings are the basis of our analysis.

B. Data analysis

All entries of the conference proceedings were analyzed and combined through thematic analysis [27]. To facilitate understanding, subthemes were then organized using a modified version of Marnewick and Labuschagne [8]'s ERP Conceptual Model. This modified version includes all four main components (Software, Process Flow, Change Management, Costumer Mindset), Methodology, and adds a last component - external environment. This component was added to consider the influence of national culture [19] and other macroeconomic factors pertaining to the implementation of ERP systems in African developing countries. The ERP project financing also falls under this category, as it has a major impact on ERP implementation in developing countries [12].

IV. RESULTS

The following section presents our results, namely the CSF identified and categorized, using the adapted conceptual model. To facilitate understanding, results are presented per components, namely: Software, Process flow, Customer mindset, Change management, Methodology, and External environment. In total, forty-one CSF were identified through this process (see Table I in the appendix).

A. Software

In total, five CSF were identified by participants for the Software component, namely: participatory software development, testing and troubleshooting; fair and balanced ERP vendors/suppliers' relationships; country-related functional requirements; adequate ERP infrastructure and hosting; and sufficient IP maturity of organizations.

Participatory software development, testing and troubleshooting: participants underlined the importance of the choices made through theses phases, and the need for user participation in the process to facilitate adoption. They highlighted the difficulties associated with the fact that these steps are often outsourced, without real inputs from directly implicated PSO stakeholders (e.g., users, M&E specialists, etc.). Furthermore, the lack knowledge transfer to local IT teams throughout the development, testing, and troubleshooting phases complicate not only maintenance, but hinders the adaptation of the software to PSOs needs.

Fair and balanced ERP vendors/suppliers' relationships: Participants highlighted that the absence of local vendors gives disproportionate power to international vendors, thus hindering optimal selection of ERP systems by PSO. Furthermore, vendors seemed reluctant to adapt their products to PSOs particular needs, knowing that they will have to buy their products anyway.

Country-related functional requirements: Participants also discussed the fact that ERP often did not meet their specific PSO requirements, e.g., integration of performance indicators at the result level, reporting formats that do not fit the donor requirements, etc. In many cases, PSO needed to combine the ERP with other monitoring tools (e.g., Excel sheets and MS Project) to fulfill their monitoring requirements.

Adequate ERP infrastructure and hosting: More and more ERP systems are cloud-based. Because of the lack of access to basic amenities in many parts of African countries, many ERP options are not feasible. ERP hosting is also a problem, not only because of security issues but also because of limited access to electricity.

Sufficient IT maturity of organizations: Participants also underlined the low IT maturity in most African PSO, which hinders their ability to facilitate ERP implementation, and to maintain the system adequately. This situation furthers their dependence on ERP vendors, and limits appropriation of the system by local IT teams.

B. Process flow

The Process flow component includes two subcategories: Process and Data. In total, seven CSF were identified by participants for the Process flow component.

a. Process

In total, three CSF were identified by participants for the Process subcomponent, namely: fit between ERP and an organization's procedures; harmonized practices, procedures and processes; and good communication management processes.

Fit between ERP and an organization's procedures: PSO in developing countries, because of their funding and organizational structure, have specific procedures (e.g., burdensome administrative and procurement procedures, strict monitoring and evaluation requirements, etc.). ERP systems are created around private-sector (occidental) best practices. Therefore, the product offered is often than not difficult to adapt to African PSO's needs.

Harmonized processes and procedures: ERP systems aim to limit the possibility of errors by limiting the number of times a same information has to be entered in the system. Yet, because of the lack of harmonized procedures, users still have the obligation to enter information on multiple software.

Good communication management processes: participants highlighted the need for clear and effective communication and information management processes, for example in sharing management's plan, in order to maximize the probability of successful implementation.

b. Data

In total, four CSF were identified by participants for the Data subcomponent, namely: efficient data quality control, good data collection and methods, solid data management practices, and clear data conversion plan and management.

Good data collection processes and methods: to populate an ERP, you need data. Participants discussed the need for an effective monitoring and evaluation (M&E) system that promotes good data collection processes and methods. On the other hand, unrealistic frequency of collection or level of detail of data requested was believed to hinder the support for the ERP implementation project.

Efficient data quality control: once you have data to populate your ERP, you have to trust it. Participants highlighted the need to have in place efficient quality control processes, to ensure data reliability. Ultimately, data of questionable quality was perceived to be associated with a reluctance from users and other stakeholders to adhere to the ERP implementation project.

Solid data management: good and solid data management was considered at the core of ERP implementation process. This included not only processes to insure data management as a hole, but also addresses the topics of data security, access, and traceability.

Data conversion plan and management: data conversion, meaning planning, managing and controlling of prior data integration in the ERP, was seen as a core component of an ERP implementation project by participants. Yet, many highlighted the lack of actual planning around this activity. Participants suggested the need for standardized guidelines and processes around data conversion that would cover: which data to conserve and, which to drop; how far back should PSOs go in converting data; what format to choose; who is responsible to integrate this data, etc.

C. Change management

The Change management component can be divided into four subcomponents, namely: user attitude, project change management, business process change management, and system change management. In total, nine CSF were identified by participants in the Change management component.

a. User attitude

Participants identified three CSF pertaining to user attitude management, namely: Need for communication, Need for training and education, and User active participation in ERP implementation.

Effective communication of the change to users:

Information and effective communication with users are crucial tools to manage expectations, facilitate appropriation and ease tensions with users. This process should start at conception, and continue throughout the project, and be planned carefully and strategically.

Adequate training of users: Often, training is seen as the last milestone before transfer to operations. Yet, participants highlighted the need for training to start earlier in the process, since it often uncovers problems or incongruities with the ERP system and its application to their everyday work. When done to late in the process, project often do not have the resources (and time) to redo the work, therefore delivering a product that does not fit users' needs.

Active participation of users: Users needs differ from other stakeholders, and can be misunderstood. As for communication, users' participation is essential in an ERP's appropriation and future use, and should be planned throughout the implementation project's life-cycle.

b. Project change management

Participants identified one CSF pertaining to Project change management, namely: effective change control management processes and procedures.

Effective change control management processes and procedures: Changes are inevitable in projects. Yet, the absence of a formalized and effective change control management, and clear procedures to support it, made it difficult for ERP implementation projects to stay on track. At opposite, effective change control management seems to have helped project managers to limit unnecessary changes to the project scope, by giving them the tools to answer to stakeholders' pressures and change demands that might fall outside the intent of the project.

c. Business processes change management

Participants identified two CSF pertaining to Business process change management, namely: harmonization of practices and processes, and assessment of best practices.

Harmonization of practices and processes: The importance of understanding all business systems, policies and institutional procedures to ensure better alignment with ERP system functions. For example, procurement requirements and local vs. international accounting standards are not compatible with the system's data collection procedures.

Assessment of best practices: Participants expressed the need to know more about best practices before making any changes. They say they want to be informed of best practices in the African context in order to continue efforts towards continuous improvement and institutional capacity building.

d. System change management

Participants identified three CSF pertaining to System change management, namely: management of interests; communicate change throughout the organization; and plan and manage corporate culture change.

Management of interests: participants highlighted the importance of targeting the expectations of different users and other stakeholders, not all of whom have converging interests.

Communicate change throughout the organization: All required changes should be communicated in advance. The need to put in place communication procedures to promote acceptance and ownership of changes throughout the implementation of the system.

Plan and manage corporate culture change: Participants also mentioned the importance of matching the organizational culture with the desired properties and functions of the ERP system. For example, a shared values charter at the beginning of the project was mentioned as an element in an organizational change management plan that accompanies process re-engineering.

D. Customer mindset

The Customer mindset component includes three subcategories, namely: User mindset, Team mindset, and Organizational mindset. In total, fourteen CSF were identified by participants for the Customer mindset component.

a. User mindset

In total, three CSF were identified for the User mindset subcomponent, namely: users' attitudes/openness to change, adequate technical level of competencies and knowledge of users, and access to training.

User attitude/ openness to change: Openness or, on the contrary, resistance to change was systematically highlighted as a major factor influencing success of ERP implementation.

Adequate technical level of competencies and knowledge of users: users need to have sufficient knowledge of computers systems and IT competencies to be able to not only feed data but also use efficiently the ERP system.

Access to training: ERP systems modifications and upgrades are inevitable; so are new hires or transfers in teams using ERP systems modules. Therefore, users need access not only to initial but also to continuous training to be able to stay current with the latest development of the ERP system.

b. Team mindset

In total, five CSF were identified for the Team mindset subcomponent, namely: adequate team competencies, team composition, stability of teams / low attrition rate, good collaboration, and leadership.

Adequate team competencies: Participants highlighted the need for a multidisciplinary and diversified team that addresses both the IT component, but also the organization change management facets of an ERP implementation project.

Team composition: participants also discussed the influence of differences of status/treatment and employment on the team mindset.

Stability of teams/Low attrition rate: In some African countries, PSO's employment conditions (such as salary, insurance, etc.) makes private employment more attractive in sectors such as IT.

Good collaboration: collaborative relationships between team members are essential to navigate the complexity and problem diversity of ERP implementation. This includes:

good team work, respect between co-workers, and collaboration.

Leadership: ERP projects being complex, participants also highlighted the need for leadership inside the team, for example to avoid being lost in multiple stakeholders demands. Strong management skills from team leaders was also put forward as a CSF in ERP implementation.

c. Organization mindset

In total, seven CSF were identified for the Organization mindset subcomponent, namely: prior experience in ERP/major IT project implementation, change management competency, organizational support/commitment, presence of a champion, shared vision, mission and organizational goals, stakeholders' ownership of the project; and need for real-time information.

Prior experience in ERP or major IT project implementation: participants highlighted PSO experience in implementing similar projects (in form or complexity) as a CSF of ERP implementation success.

Change management competency: Participants systematically identified PSOs' change management abilities or competencies as CSF for ERP implementation success.

Organizational commitment: ERP systems implementation include not only a prior preparatory phase, the project phase itself, but also maintenance and upgrades. Furthermore, with a 5-8 year product life-cycle, ERP implementation can be seen as a long term commitment for PSOs, that will require both funding, adequate staffing and logistics.

Presence of a champion: participants highlighted the importance of having a champion. This person needs to be part or linked to high management of PSO, and have sufficient power within the organization.

Shared Vision, mission and organizational goals: ERP are useful tools to operationalize an organization's strategy. Yet, to be able to perform, participants highlighted the need for shared vision, mission and organizational goals. This include: mission and vision definition, communication and appropriation by stakeholders.

Stakeholders' ownership of project: all stakeholders need to feel implicated in the project, and have a sense of responsibility toward the success of the ERP implementation project – and its utilization.

Need-driven endeavor: To be successful, participants highlight that the ERP must be understood as a mean to an end, such as the need for real-time information.

E. Methodology

In total, two CSF were identified by participants for the Methodology component, namely: good project management, and clear ERP implementation strategy.

Good project management: Participants stressed the importance of good project management in ERP implementation, namely the need for clear planning, project division in multiple steps; realistic performance demands and deadlines, collecting of lessons learned; planning of implementation costs and maintenance.

Clear ERP implementation strategy, and its communication to stakeholders, were also seen prerequisite for ERP implementation success.

F. External environment

In total, three CSF were identified by participants in the External environment component, namely: fit with national culture and values; balanced donor-recipient relations; and adequate local infrastructure.

Fit with national culture and values: the participants mentioned the lack of coherence between some habits and customs and the purposes of a well-established ERP. ERPs aim to foster transparency and accountability in public projects, therefore supporting the fight against corruption in PSO.

Balanced donor-recipient relations: More often than not, donors were not only (openly or not) the instigators of the ERP implementation project, but also guided the choice of vendors/suppliers. "Give and take" in the needs of both donors and recipients was seen as a CSF of ERP implementation success.

Adequate local infrastructure: Access to electricity, telecommunications and Internet remains problematic in many African countries, especially when outside urban agglomerations [28], though significant improvements have been made in recent years. This has a major impact not only on ERP implementation but adoption by users.

V. DISCUSSION

As mentioned, ERP systems implementation projects aims to the achievement of organizational benefits [9], regardless of the nature of organizational, private or public activities. Yet, our results suggest that the benefits sought in terms of financial, organizational, communication and evaluative performance in African PSOs are limited by various barriers identified in this study. Furthermore, our results highlight the specific nature of ERP systems implementation in PSO in African countries, and the need to better understand how these specific CSF influence ERP implementation success in these context.

Software dimension: Yet, of the five CSFs in the Software dimension, three (participatory software development/testing/troubleshooting, fair and balanced ERP vendors/suppliers' relationships, and country-related functional requirements) seem to be specific to PSOs in African developing countries.

Participation stands out as the first CSF in the software dimension. Participatory approach remains one of the methodologies advocated as a key success factor in international development projects. This is also what was identified in Poonam and Agarwal's ERP study [29]. Yet this participatory approach seems difficult to achieve considering the unequal power balance between stakeholders in international development.

The power balance between the vendors and African PSOs is an unequal relationship, where PSOs do not have

all the knowledge to make informed choices, nor the power to influence the outcome of the decision process [30] [31]. This limits the ability of PSOs to introduce country-specific requirements in the contract negotiations.

Furthermore, the funding agency have been known to have direct interest with vendors and ERP service providers, biasing the selection processes. Even when this is not the case, the choices must meet the requirements set out in the loan agreement, which limits the options to use local suppliers. This situation complicates the relationship between the vendors or the supplier, and the customer, in this case the PSO, since the contractual basis, or tacit contract, includes three parties. Suppliers are often selected for their track record in large Western organizations [31], which do not have the same organizational maturity as understood by Western standards [32]. New African-based competitors – although their products are far from optimal at this moment – hopefully will change this dynamic, and might foster a more balanced relationship between vendors and PSOs. Surprisingly, these two CSFs were not identified in the study conducted by the World Bank Group [22].

Process dimension – Data sub-dimension Data quality and reliability is essential to any ERP implementation project. Yet, what makes this CSF specific to African developing PSOs is the scale of the M&E necessary to populate the ERP. It is important to keep in mind that in African developing context, one of the main drivers of ERP implementation project is to support PSOs in their efforts to provide proof of results in light of funding received. This is achieved through the implementation of a results-based management system that encompasses the monitoring of outcomes and results indicators [33]. These indicators are collected either through project and program-funded data collection, or through national statistical data collection agencies – both of variable and questionable quality in developing countries [34]. This highly contrasts the context of private organization, where most data integrated into the ERP is internally collected, and quality can be more easily controlled.

In these contexts, ERP implementation and deployment initiatives are often accompanied by a myriad of institutional capacity building measures, such as donors finance reform initiatives [29]. In exchange for support in public financial management, donors will often include conditionalities such as demands for improvements in technological infrastructure in their funding agreement. These will in turn influence the ERP implementation project, therefore adding a level of complexity for African PSOs that other organizations do not have.

Furthermore, although several CSFs had been identified in previous studies [10] [17] [18], a closer reading of the results provides some nuances. For instance, «Team composition», «collaboration», «leadership» and «competencies» were found to be CSF in all studies [10] [17] [18]. However, the way they materialize differs. To illustrate this, let us take the CSF «Team composition» as an example.

All studies agree on the importance of building teams that are diversified in terms of skills, experience and abilities, with good intra and inter collaborative skills [10] [17] [18]. The importance of collaboration is not specific to the ERP implementation project. A recent study identified this factor as central to the equation leading to capacity building in so-called developing countries [35]. However, our results attempt to demonstrate that the retention of employees assigned to ERP implementation projects is problematic. Several factors explain this situation, including the high rate of absenteeism and the lack of incentives for public servants [36]. The stability of teams is often compromised, and consultants, who are highly solicited in these types of complex projects, accentuate the motivational problems of government employees. In most cases, consultants assigned to ERP implementation projects, often referred to as "technical assistants", receive much higher compensation than civil servants [37]. This gap is even more acute when the technical assistant comes from an OECD member country, for example. This situation, perceived as unfair by local team, has negative effects on the dynamics of project teams and their performance. ERP project teams in developing countries are a combination of consultants, who are often lent by the PSO themselves (not always for their competencies), and that are paid in a day what the rest of the teammates will sometimes do in a month. The apparent unfairness in the treatment of team members, although important, may be accompanied by other elements that should be addressed.

Another example of CSF's specificity is the «Organizational commitment». In all studies, organizational commitment, such as support from top management, is seen as a major CSF for ERP implementation. The World Bank Group's study [22] also linked this CSF to the CSF labeled «suitable political environment». While the majority of the studies cited this variable as one of the most commonly identified CSFs, the underlying explanation differs from other contexts. Yet, in African PSOs, top management is often the one who benefits from the lack of transparency and accountability [38], and therefore are the main opponents of these type of initiatives [39].

Change management dimension Our results also found that CSFs relating to Change management dimension encompasses all organizational levels. However, as noted above, if the initiative comes from an external source, the different dimensions of change (user attitude, business process change and system changes) may suffer from internal support, thus limiting internal initiatives for preparing and adapting to change. Of the 9 CSFs listed under this dimension, the "assessment of best practices" and "management of interests" seem to be only found in this context. On the one hand, best practices are taken from Western organizations, which do not seem to be adapted to the contexts of African PSOs. This universalist approach shows some limitations, as previously highlighted by Hasheela-Mufeti [40]. On the other hand, «management of interest» is one of the CSFs that complicates the

management of ERP implementation projects, since many external stakeholders are involved in these initiatives.

External environment dimension Lastly, External environment dimension appears to be highly relevant in African PSO context. Our results reflect the many CSF that need to be considered in order to increase the chances of success of ERP implementation projects. The most salient refers to the level of development of public infrastructure, such as electricity and technology. Again, although the study focuses on PSOs in so-called developing African countries, levels of "development" vary between countries. Following the example of the Gapminder Institute's work [42], a large proportion of African countries are at level 2 (out of 4), which results in inadequate public services in several respects. This situation is reflected in frequent power cuts, a faulty or even non-existent Internet network in many cases. The reliability of these two types of infrastructure, in terms of access and availability, remains a major challenge [43]. The CSFs identified in this dimension are the first factors that all organizations working in international development must evaluate before even starting any ERP implementation project, regardless of its size.

VI. CONCLUSION

ERP implementation projects are often wrongly considered IT projects, when in fact they are major organizational transformation initiatives [22] that will significantly change the processes, structure, even the culture of an organization [10]. In line with current research [12], the need for training and education (both for users and project team members), top management support and multilevel change management were most cited CSFs by participants.

Team members' mindset also seems to have a major influence on ERP implementation success – and on its failure. Yet, current research has done little to study the issues specific to the dynamics of the teams in charge of implementing ERP implementation projects in the context of African countries receiving international aid, with all financial and legal complexities that it implies.

Ultimately, our results highlight that CSF' influence vary depending of many factors, such as organizational and national culture, type of implementation process chosen (one time or gradual implementation), etc. This converge with Zouagui and Laghouag's findings [44]. Yet, these specificities are rarely taken into account in ERP implementation in PSO in African developing countries projects. While this study highlights factors that seem specific to ERP implementation in West African countries (e.g., fit with values, etc.), other could be generalize to all countries that rely on international development (e.g., fair and balanced ERP vendor/buyer relationships, balanced donor-recipient relations, etc.). Still, further research is needed to better understand and conceptualize the CSF in ERP implementation in PSO in the African developing countries.

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Appendix

Table I: Aggregated results of CSF of ERP implementation in African PSO

Dimensions	Sub-dimension (if applicable)	Critical Success Factor
A. SOFTWARE		1. Participatory software development/Testing/Troubleshooting 2. Fair and balanced ERP vendors/suppliers relationships 3. Country-related functional requirements 4. Adequate ERP infrastructure/hosting 5. Sufficient IT organizational maturity
B. PROCESS FLOW	**B1 Process**	1. Fit between ERP and an organization's procedures 2. Harmonized practices/procedures/processes 3. Good communication management processes
	B2 Data	4. Efficient data quality control 5. Good data collection processes and methods 6. Solid data management practices 7. Clear data conversion plan and management
C CUSTOMER MINDSET	**C1 User influence**	1. Users' attitudes/Openness to change; 2. Adequate technical competencies and knowledge of users 3. Access to training
	C2. Team influence	4. Adequate team member competencies 5. Team composition 6. Stability of teams/Low attrition rate 7. Good collaboration 8. Leadership
	C3. Organizational influence	9. Prior experience in ERP/major IT project implementation 10. Change management competency 11. Organizational support/commitment 12. Presence of a champion 13. Shared vision/ mission/ organizational goals 14. Stakeholder's ownership of the project 15. Need driven endeavor;
D CHANGE MANAGEMENT	**D1. User attitude**	1. Effective communication the change to users 2. Adequate training and education of users 3. Active participation of users
	D2. Project (scope) changes	4. Effective change control management processes and procedures
	D3. Business process changes	5. Harmonization of practices and processes 6. Assessment of best practices
	D4. System changes	7. Management of interests 8. Communicate change throughout the organization 9. Plan and manage corporate culture change
E EXTERNAL ENVIRONMENT		1. Fit with national culture and values 2. Balanced donor-recipient relations 3. Adequate local infrastructure
F METHODOLOGY		1. Good project management 2. Clear implementation strategy