Public–private partnerships for e-government in developing countries: An early stage assessment framework

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1. Introduction

In light of the current economic and technological changes, countries that have achieved relative economic and political stability but are currently striving for development are classified as “emerging markets and developing countries” (IMF, 2018) or “middle-income countries” (Bank, 2018a; UNDESA, 2017). Commonly known and hereinafter denominated as ‘developing economies’ (D-ing), these countries have significant challenges to overcome within their public administration practices (Aladwani, 2016; Basílio, 2017; Dada, 2006). In their race to catch-up with more advanced nations, the enhancement of government capacities (Ferk & Ferk, 2017; Kaliannan et al., 2010; Roehrich, Lewis, & George, 2014) and e-government ecosystem’s maturity (Araya & Porrua, 2004; Joshi & Islam, 2018) becomes an important means for ensuring increased access to their users (Joshi & Islam, 2018) as well as affordable technology upgrades (Narasimhan & Aundhe, 2014), thereby increasing their institutional capacities (Ferk & Ferk, 2017; Kaliannan et al., 2010; Roehrich, Lewis, & George, 2014) and e-government ecosystem’s maturity (Araya & Porrua, 2004; Joshi & Islam, 2018). The use of PPP mechanisms seems to represent a great opportunity (Basílio, 2017; Kaliannan, Awang, & Raman, 2010) for D-ing in particular, as they allow these governments to not only focus on the quality of citizen services rather than on the assets and tools to provide such services, but also become an important means for ensuring increased access to their users (Joshi & Islam, 2018) as well as affordable technology upgrades (Narasimhan & Aundhe, 2014), thereby increasing their institutional capacities (Ferk & Ferk, 2017; Kaliannan et al., 2010; Roehrich, Lewis, & George, 2014) and e-government ecosystem’s maturity (Araya & Porrua, 2004; Joshi & Islam, 2018).
where a private party and a government entity collaborate to complete a project or service (traditionally provided by public administration). These parties establish an arrangement with a shared mid-to-long-term vision (Narasimhan & Aundhe, 2014) which allows risks and management responsibilities (Bayliss & Van Waeyenberge, 2018; Gidman et al., 1995; Roehrich et al., 2014), sharing resources, skills, competencies (Bayliss & Van Waeyenberge, 2018; Gidman et al., 1995; Narasimhan & Aundhe, 2014), benefits, and rewards (Gidman et al., 1995; Pangeran & Wirahadikusumah, 2010; Roehrich et al., 2014), and building a joint vision and innovative governance for decision-making (Scupola & Zanfèi, 2016). Based on these premises, the use of PPP arrangements in specific projects of the e-government portfolios of D-ing could represent a way to share risks and improve access to financial resources (Bayliss & Van Waeyenberge, 2018; Gidman et al., 1995; Roehrich et al., 2014; Taher et al., 2012; Yehoue, Hammami, & Ruhashyanikko, 2006) in the face of budgetary limitations. Furthermore, the impact of using PPP contracts in e-government services could be even more critical in D-ing due to specific conditions, such as a weak internal capacity to pursue projects (Belachew & Shyamasundar, 2013; Felsinger, 2008; Kaliannan et al., 2010). E-government services by nature involve higher and newer technological content and management complexities and therefore require more advanced skill sets than those required for traditional public services (Joshi & Islam, 2018; Kaliannan et al., 2010). Furthermore, due to the specific capacities needed to move from the design to the operation stages of re-engineered process flows, D-ing may leverage PPP arrangements to tap the newest available technologies (Belachew & Shyamasundar, 2013; Grasman, Faulin, & Lera-López, 2008; Kaliannan et al., 2010).

Despite the fact that the world’s 2030 Agenda for Sustainable Development underpins the relevance of ICT and PPPs in achieving the Sustainable Development Goals (SDGs), the investment in PPP accounts for less than a quarter of public investment in emerging markets and developing economies (Jomo, Chowdhury, Sharma, & Platou, 2016; Ojo & Millard, 2017). One of the suspected reasons for this is related to the availability of tools for the early assessment of initiatives, which leads to difficulties for managers when they must recommend these mechanisms during the early planning stages (Bank, 2017a; 2018a; Cruz & Marques, 2013; Felsinger, 2008; Taher et al., 2012). Moreover, surveys of decision-makers in advanced countries indicated that it was difficult for them to compare PPP mechanisms with traditional contracting if they lacked knowledge or experience (OECD, 2013). If even practitioners in high-income ecosystems exhibit such doubts, it is likely that those in developing countries would hesitate to adopt PPP modalities. The literature on developing countries adds to this argument by mentioning the higher failure rates of collaborative developing-sector projects (Pfisterer, 2017; Suri & Sushil, 2017), particularly when considering the complex nature of e-government initiatives (Bhatnagar, 2004; Infodev, 2009a; Shugart, 2006).

Applying Cruz and Marques (2013) perspective of a PPP project in the e-government lifecycle, it is possible to visualize the early stages: once a project portfolio is aligned and settled on by the strategic decision-making authorities, options for executing the project will come from the tactical level (Bhatnagar, 2004; Bugli, 2015; Infodev, 2009b; Mkude & Wimmer, 2015). As reflected in Table 1, the next issue practitioners face at this stage is how to recommend the appropriate procurement model, that is, which tactic should be used for each initiative within an e-government project portfolio (Criado & Gil-García, 2013; Dawes, 2013). They must decide which factors to include and how to assess whether the project is to be pursued through a traditional procurement or a PPP model (Narasimhan & Aundhe, 2014). Although this stage is reported to be crucial to a successful outcome (Bank, 2018b; Cruz & Marques, 2013; Taher et al., 2012), governments seem to recognize the criticality of this planning phase within the PPP cycle, “less than one-third” (Bank, 2018b, p. 38) utilize a consistent method to assess PPP in those early stages (Bank, 2017a; EIU, E.I.U., 2017). In particular, this difference is noted in developing countries (Bank, 2017a, 2018a), where it is suspected that this lack of consistency may be related to the challenges these countries face. Such challenges include a lack of capacities (Felsinger, 2008; Taher et al., 2012) due to insufficient expertise in the application of PPP, especially in ICT-related projects (Al-Shqairat, Al Shra’a’h, Al-rawad, & Al-Kilani, 2014; Taher et al., 2012), or weak institutional governance (Dutz, Harris, Dhingra, & Shugart, 2006; Felsinger, 2008), which can hamper the effective coordination needed between stakeholders and the ability of dedicated PPP units to provide the necessary technical advice to the teams in charge of the project (Aziz & Elmahdy, 2015; Bank, 2017a; Dutz et al., 2006; EIU, E.I.U., 2017). Thus, given the possible value that PPPs might bring to e-government projects, this paper’s objective is to explore and present a practical yet methodical approach as an alternative to be adopted during the early assessment of e-government projects, when practitioners are appraising whether or not to consider a PPP contracting model.

This paper is structured as follows. First, the following section will summarize the reviewed literature on the conditions of e-government in D-ing and the attributes of PPP, in particular during the early planning stages. Then, after explaining the research method and chosen techniques, the research framework, hereinafter referred to as the “PPP4e-Gov,” will be proposed. The Results section will illustrate how practitioners could make use of this framework, applying it to assess a portfolio of Costa Rican e-government projects and briefly commenting on some lessons learned. In the Conclusion section, the contributions and limitations of this work will be listed, and a set of recommendations for future work in this field will be provided.

2. Literature review

2.1. E-government in developing countries

The international system groups countries as low, middle, or high income (Bank, 2017b; Nielsen, 2011). Based on the income level classifications used by the World Bank Group (WB) (2017), nations with reported incomes between USD 1,046.00 and USD 4,125.00 are labeled as low, those between USD 4,126.00 and USD 12,745.00 are considered middle-income (LMI), and those exceeding USD 12,745 are upper middle-income (UMI). Why should studies on e-government evaluation and planning research pay attention to the developing countries? The group labeled D-ing in this paper not only represents more than one-third of the world’s population but also accounts for many different ecosystems compared to their peers (UNDESA, 2018). Thus, there has been increasing interest in management journals in understanding them (Almeida & Zouain, 2016; Choi & Park, 2018).

Although e-government in D-ing might have overcome some fundamental issues, instabilities in their public arrangements persist. Many still face struggles in their governance due to weaknesses in their institutional structures (Nielsen, 2017; Srivastava & Teo, 2007; Suri & Sushil, 2017). Some of the characteristics of these D-ing are shared with nations commonly labeled as developing countries; for example, insufficient resources (e.g., human capital, assets, infrastructure, budget) (Almeida & Zouain, 2016) a gap in the use of ICT in governance systems (e.g., asymmetric adoption of e-government services), and a lack of competitiveness (Chen, Chen, Huang, & Ching, 2006; Dada, 2006; Mkude & Wimmer, 2013, 2015). Other major common issues are due to the differences in their economic structures (e.g., education, culture, agriculture), which lead to social problems related to the lack of access and opportunities to grow and scale productivity (Basu, 2004; Heeks, 2002; Mkude & Wimmer, 2013). Moreover, the level of trust and citizen participation is affected by the vulnerable relationship between civil and public stakeholders. Many of these issues affect the success rate of e-government initiatives (2002, Arnold, 2004; Heeks, 2001, 2003; Ofori, 2013; Suri & Sushil, 2017; UNDESA, 2014).
The concept of PPPs is comprised of a broad spectrum of relationships between the public and private sectors to develop projects or services. These contractual arrangements are built as a joint commitment, where ideally cooperative works occur along with shared objectives and authority, tapping into each sides’ strengths, such as creativity, efficiency, joint investment, and risk and reward allocation (Kwak et al., 2009; Roehrich et al., 2014). Various authors studied the conceptual definition of PPPs, while Hodge and Greve (2007, p. 546) referred to the concept as “a tool of governance, an institutional arrangement between public and private sector actors,” where a combination of qualities from different parties are used for the successful accomplishment of a common goal. For Poisson (2009), the length of the relationship and the role changes in the service acquisition are the critical differentiators between PPP and other arrangements. Highly cited experts on the field have emphasized the incentives related to PPP arrangements (Grimes & Lewis, 2002, 2007, 2005). For instance, they address the ability to foresee and mitigate uncertain events and then select a suitable partnership structure (Grimes & Lewis, 2005). As an operational definition, the present study understands PPP in e-government as a contractual mechanism between a private and a public institution, where the latter provides a particular ICT asset (facility or electronic service); they share responsibilities and risks, but they also invest jointly in organizational resources. In exchange for these efforts, both parties are rewarded based on agreed shared revenue and performance-based fee-collection and payment models (Basilio, 2017; Gidman et al., 1995; Infodev, 2009a; Jamali, 2004; Pangeran & Wirahadikusumah, 2010). Fig. 1 illustrates the scope of PPP schemes in e-government projects.

The use of PPP arrangements—when conceived under the right conditions—is reported to result in essential benefits for the government, private sector, and the citizens. The mentioned contracting mechanisms, are commonly praised due to their ability to build, operate, and share mutual responsibility and commitment (Tahe et al., 2012); the government’s role changes from a service provider to a service co-designer and buyer (Kaliannan et al., 2010). In e-government projects, PPPs tend to enable greater access to creativity, technology, and knowledge transfers (Kwak et al., 2009; Roehrich et al., 2014; Tahe et al., 2012) as well as the possibility to deliver more value to the citizen (Belachew & Shyamasundar, 2013; Kaliannan et al., 2010), ensuring value for money (Abbiyikli, 2017; Burger & Hawkesworth, 2011; Grimes & Lewis, 2005; Morallos & Amekudzi, 2008; Sarmento, 2010; E. Yescoume, 2011). Along with the ability to leverage financial resources and overcome budgetary challenges, PPP arrangements lead to cost savings and improved effectiveness while reducing the need for public sector borrowing (Estache, 2006; Ferk & Ferk, 2017; Kaliannan et al., 2010; Taher et al., 2012; Yehouse et al., 2006). The latter is of particular relevance for D-ing because it opens a window to consider projects that would not be affordable otherwise (Ferk & Ferk, 2017; Yehouse et al., 2006).

Governments can also tap into the private sector’s flexibility to innovate, gaining from the latter’s expertise and promoting efficiency within government sector personnel by incorporating private best practices as well as state-of-art technologies (Kaliannan et al., 2010; Scupola & Zanfei, 2016; Taher et al., 2012). Likewise, e-government PPP projects allow the public to learn new innovative ways to solve issues, improving their capacities and leveraging the private sector’s expertise by shifting personnel from basic operating tasks to the planning and supervision of agreed service level agreements (SLA) (Belachew & Shyamasundar, 2013; Pillay & Hearn, 2009). This allows public administrators to focus on more value-oriented activities. Other strengths are time and risk reduction in service delivery, quality improvements through technology upgrades, and added flexibility due to the as-a-service payment models (Belachew & Shyamasundar, 2013). Another reason why administrations in D-ing consider PPPs is to learn from the private sector and grow by implementing new mechanisms (Ferk & Ferk, 2017; Kaliannan et al., 2010). Additionally, the capacity to bundle a service into this type of arrangement may ensure optimal whole lifecycle costing (Kaliannan et al., 2010; Yuan, Zeng, Skibniewski, & Li, 2009) and better asset utilization (Khan, Surat, Tareen, and Saeed, 2016; Taher et al., 2012).

For the private sector, a PPP represents a new revenue stream in an otherwise restricted market (Ferk & Ferk, 2017; Kaliannan et al., 2010). On the one hand, it supports the development of additional competencies and skills (Belachew & Shyamasundar, 2013) while delivering services that were traditionally in-house government services; on the
other, by serving a broader community, companies gain access to the needs and preferences of various population segments (Kaliannan et al., 2010). By bringing value to a more extensive range of services, companies can ensure business throughout extended contract periods (Kaliannan et al., 2010). Such benefits ensure that, in comparison with traditional procurement, the private sector might have more chances to innovate (Taher et al., 2012) and add value to any endeavor due to the flexibility in service delivery (Belachew & Shyamasundar, 2013; Harland, Knight, Lamming, & Walker, 2005; Infodev, 2009a, 2009b; Jamali, 2004). Since PPP mechanisms are planned based upon the needs of citizens, enterprises, or peer government agencies, which represent the e-government services’ client base, if the right combination of the best of the public and private sectors is achieved, the clients’ needs and preferences of various population segments (Kaliannan et al., 2010), universal access to public services (Estache, 2005; Ferk & Ferk, 2017), and added value in both cost and quality (Kaliannan et al., 2010) have been proven to be fruitful mechanisms for economic development (2005; Ferk & Ferk, 2017), and added value in both cost and quality (Kaliannan et al., 2010).

Based on the abovementioned benefits, PPPs and e-government have been proven to be fruitful mechanisms for economic development (Bugli, 2015; Infodev, 2009a, 2009b; Mkude & Wimmer, 2013, 2015); however, practitioners face a variety of challenges and problems when trying to embrace these types of projects (Basílio, 2017). Some examples of this are job creation (Roehrich et al., 2014), higher accountability and performance through citizen empowerment (Kaliannan et al., 2010), universal access to public services (Estache, 2005; Ferk & Ferk, 2017), and added value in both cost and quality (Bank, 2014; Harland et al., 2005; Kaliannan et al., 2010).

The process of a PPP project can be simplified into the following stages: preparation, procurement, and contract management (Bank, 2017a, 2018a; Cruz & Marques, 2013; Taher et al., 2012). Struggles are reported in the earliest phase, when the preparation starts, specifically when an initiative (most likely coming from a political and government strategic vision) is to be transformed from the strategic level into a tactical project proposal and further into contract preparation (Cruz & Marques, 2013). In this phase, challenges include a lack of technical support from within the administration (Felsinger, 2008; Taher et al., 2012), a need for the institutional capacity to organize a PPP process, the existence of PPP units in a position to coordinate and prepare manuals and methodologies to guide the evaluation process (Bank, 2017a; Dutz et al., 2006), technical support for the project design and implementation (Aziz & Elmahdy, 2015; Felsinger, 2008), and an insufficient budget for external technical assistance (EIU, E.I.U., 2017). Within this context, discerning whether a PPP mechanism is suitable for a project seems to be a relevant issue (Cruz & Marques, 2013; EIU, E.I.U., 2017; Felsinger, 2008; Taher et al., 2012). Indeed, some practitioners reported a hesitance to use PPP, either due to insufficient experience or to the complexity of the tools and methodologies required for the planning and assessment of such options (Burger & Hawkesworth, 2011; OECD, 2013). Similarly, benchmarking studies have underscored the lack of application of systematic methodologies, although best practices seem to strongly recommend the use of such methodologies to compare traditional procurement versus PPP in the early preparation stages. Moreover, there are significant gaps between developed and other countries with regard to the preparation stages (Bank, 2017a, 2018a). Other studies, focusing on emerging and developing nations, referred to similar challenges that managers face during the early stages as well as a hesitance to suggest carrying out a PPP due to the absence of optimal planning conditions (Basilio, 2017; Bugli, 2015; Dutz et al., 2006; Ferk & Ferk, 2017). Table 1 illustrates the previously described process of early assessment pursued by PPP and e-government practitioners.

When looking deeper into the methods available to support the early stage rationale for PPP, there seems to be a lack of an integrated perspective that links the theoretical studies to practical needs (Cruz & Marques, 2013; Pfisterer, 2017). Assuming that government officials struggle in planning when and how to implement PPPs within their portfolios, in the case of advanced economies, they count on PPP units that not only specialize in the topic and regularly publish technical advice and standard guidelines to assist management teams but also coordinate across the public sector to provide technical guidance in the planning stages (Bank, 2018b; Burger & Hawkesworth, 2011; Cruz & Marques, 2013). As an example, Araya and Porrúa (2004) explained successful cases in the United States and Canada and offered recommendations for other countries. While the existence of more structured methods to compare and select an appropriate mechanism is a critical success factor (Bhatnagar, 2009; Infodev, 2009a; Leigland & Shugart, 2006; Pangeran & Wiradikusumah, 2010), in emerging economies, the planning decision is led by the project manager’s championship and intuition or by strategic motivations specific to the current political administration and decision-makers (Bhatnagar, 2004; Leigland & Shugart, 2006).

The tools to analyze and evaluate the use of PPPs have been traditionally applied in infrastructure and social overhead projects. Consequently, the critical success factors and enabling features of these contracting mechanisms in new public initiatives such as e-government (Bhatnagar, 2004) has increasingly been a focus of study (Belachew & Shyamasundar, 2013; Bugli, 2015; Infodev, 2009b; Kaliannan et al.,...
In the context of existing knowledge, the most applicable tool was suggested by Bhattacharyya (2004), who proposed comparing risk and value as a means to assess a project within an e-government portfolio. They argued that assessing the balance between risk and value could be the best approach for e-government in developing countries. This idea enlightened our review, and by looking further into it, the study encountered stronger evidence of the importance of risk (Akintoye, 2003; Al-Shqairat et al., 2014; Chou & Pramudawardhani, 2015; Loukis & Charalabidis, 2011; Narasimhan & Aundhe, 2014; Takashima, Yagi, & Takamori, 2010; Wang, Dulaimi, & Aguria, 2004; Yuan et al., 2009; Yuan, Chan, Xiong, Skibniewski, & Li, 2015) and value assessment (Akbiyikli, 2017; Al-Raisi & Al-Khour, 2010; Karunasena & Deng, 2012; Kears, 2004; Quiróz, 2015; Sarmento, 2010; Siemiatycki & Farooqi, 2012) during PPP project planning. However, the proposed frameworks and critical factors still require practicality to identify the reported link between theory and practice (Pfisterer, 2017). Hence, there is a need to find a method that enables practitioners to self-assess their circumstances while facilitating the estimation of how much risk or value is borne within their projects. The latter represents the motivation and initial milestone for the present study, which recognizes that although the research question may be addressed through several methods, initial exploratory work is needed to help find an accurate tool that developing countries can utilize for preliminary assessments and rationale of their strategic e-government agendas.

3. Research method

3.1. Qualitative meta-synthesis

The present study entailed a qualitative meta-synthesis, based on the recommended steps of Bates (1989), Walsh and Downe (2005) and Zimmer (2006). The initial stage began with non-structured queries that looked into different groups of knowledge (PPP, project planning, e-government, D-ing). Eventually, a structured method was applied to filter and integrate the contents of studies from different fields and with different approaches. Before long, the study obtained a set of filtered factors that characterize the early assessments of a manager in the e-government field in a D-ing. This study made use of previous literature obtained from online search engines (Web of Knowledge, Scopus, Google Scholar) as well as books and reports on e-government and PPP. The first set of results included articles, editorials from scholarly journals, conference papers, and reports published by multilateral international organizations. The data were retrieved using keywords including PPP, e-government, projects, decision-making, planning, and developing countries.

This type of qualitative research method has been used in information systems and e-government research for exploratory studies (Lee, 2010; Napitupulu & Sensuse, 2014; Siau & Long, 2005) and is recommended when attempting to propose a model to bring together the contributions of several sets of qualitative studies (Walsh & Downe, 2005). The main idea is to reveal and combine a group of phenomena that can be combined into a new context. Regarding the filtering and integration techniques, the adopted methodological approaches were inspired by Bates (1989) berry-picking techniques, which were also used by Nielsen (2017). A key aim of the meta-synthesis technique is to provide a model that can explain specific findings from qualitative studies in order to understand a particular phenomenon. The chosen process consists of the following steps: after identifying the research problem and the sources to be consulted, the process should involve “i) searching and screening, ii) deciding what to include, berry picking, iii) integration of the findings of multiple studies in the related fields (PPP, e-government, developing countries), iv) translation of the results” (Lee, 2010; Walsh & Downe, 2005; Zimmer, 2006).

Thus, the following main stages were followed. Stage 1 was “Identification,” which involved searching the appropriate sources. The universe of interest, as Bates (1989) referred to it, was focused on several queries that were interrelated, all based on scholarly articles or reports from international multilateral organizations providing knowledge on PPP and e-government. These included conceptual definition reviews, basic attributes of PPPs and e-government, as well as a comparison of the contexts in developing countries versus those in developed ones. Simultaneously, the study revised academic contributions or guidelines for practitioners on the planning, assessment, and decision-making of PPP projects from the public manager’s perspective (i.e., an e-government project manager). In the later sub-stage of identifying knowledge, the search was concerned with a deeper understanding of risk and value within the PPP and e-government fields. To ensure quality in the results, the search was limited to results from academic journals and reports available from the United Nations (UN), WB, OECD, Asia Development Bank (ADB), Inter-American Development Bank (IADB), and African Development Bank (AfDB). Stage 2 was labeled “Filtering & Berry-picking.” The team used filtering questions to narrow down the information that was relevant to the object of study: Does the information obtained by the authors come from a public sector perspective? Is it focused on the context of a high-, middle-, or low-income country? Which field of study was it from? The following keyword filters were used: e-Government, PPP, PPP Contractual Mechanisms, PPP Planning Assessment, PPP versus Traditional Procurement Comparison, PPP Critical Success Factors, Evaluation, Planning, and Decision-Making. In addition, to structure the collected factors, the technology-organization-environment (TOE) framework (Tornatzky, Fleischer, & Chakrabarti, 1990) was utilized, based on the understanding that e-government is a process and service innovation within the public sector and that its system components can be explained under the TOE axis (Heeks, 2005b).

By the end of Stage 2, the study had identified 22 risk and 19 value factors. To develop the criteria to filter the results from the initial stage into more structured and focalized content, a core component of this step was pre-identifying the criteria based on developing countries’ conditions. The latter criteria also came from the available literature. They were classified based on whether the study focused on one or several developing countries and analyzed to reveal critical success factors, barriers, and enablers of e-government projects in middle- and low-income countries. The filter, denoted as “e-Gov@D-ing” and composed of ten attributes, was used to classify the information coming from the first two stages that could apply to general contexts. After comparing each gathered factor to the e-Gov@D-ing, it was analyzed and compared to identify appropriate attributes for e-government PPP project planning. Stage 3 was “Integrating.” By this phase, the study had identified 13 risk and 14 value factors. Now that a preliminary list of “PPPRisk” and “PPPValue” factors was filtered, literature findings that were exclusively focused on PPP and e-government and reported specific factors for the developing country context were included, considering their direct applicability to their particular situations. During the last stage, called “Synthesis,” the overall translation of the findings was corresponded to this new set of knowledge. Thus, the explanation of each one of the results was built summarizing the 18 PPP Risk4D-ing and 19 PPPValue4D-ing factors. To better understand the flow of the chosen methodology and for replication purposes, Fig. 2 illustrates the selected process adopted from Walsh and Downe (2005) and inspired by Lee (2010). Importantly, the resulting list of factors from the synthesis stage as well as the integrated definitions were consulted through the first round of unstructured interviews with ten e-government experts from Costa Rica, endorsing the results of the
previously described methods.

3.2. Weighted scoring model

Once the list related to developing countries was filtered and integrated into “PPPRisk4D-ing” and “PPPValueD-ing,” the next step was to design a way to score value and risk for a given e-government project. However, to build a scoring system, the weights for each factor of the risk and value constructs needed to be defined. Considering the different conditions faced by developing countries (Choi & Park, 2018; Heeks, 2003; Mkude & Wimmer, 2015), the chosen approach was to provide the practitioners with enough flexibility to fit their own country and project characteristics. A mechanism was provided to adjust the importance of certain factors based on how much value a project could generate and, at the same time, how much risk it could represent. The accurate assignment of the criticality of each factor is a key feature of the proposed framework, and it provides a flexible and straightforward mechanism so countries can customize it to their particular conditions. For illustration purposes, this study suggested a criticality level and sample weights for each factor. Although these could be used as defaults, as more confidence is gained with the use of the tool, they could be adapted according to the context of each e-government project. While it could be argued that such flexibility could represent a significant risk to teams lacking experience or capabilities in this field at this early stage, such potential threats may be eliminated or managed during the following stages. As illustrated by Cruz and Marques (2013) and Taher et al. (2012), even after utilizing a mechanism for tactical assessment of the PPP or traditional procurement, comprehensive due diligence must be performed and the operational feasibility of the project must be thoroughly assessed in the next stages. The proposed criticality was estimated based on the relevancy of each factor related to the developing countries’ conditions and evidenced with findings from qualitative and quantitative studies. Considering that previous studies have already performed tests for some of these factors, weighted measures or qualitative classifications were extracted from their conclusions and interpreted in light of how critical they were to the deployment of a given project in developing countries. Therefore, by combining different sources from the literature that indicated a factor’s degree of importance in the successful deployment or failure of a PPP program, a final list of factors and their respective weights was prepared.

The scoring method was designed as follows. The factor criticality logic was defined based on the literature of the potential value and failure risk of e-government project (Belachew & Shyamasundar, 2013; Choi, Park, Rho, & Zo, 2016; Das Aundhe & Narasimhan, 2016; Dwivedi et al., 2015; Mates, Lechner, Rieger, & Pěkná, 2013; Suri & Sushil, 2017). Although e-government project failure is considered very difficult to measure (Heeks, 2002), many recent studies have implied that the failure rates have not decreased (Dwivedi et al., 2015; Stanforth, 2010). Thus, it seems likely that the high-level risk factors represent more than half of the weight of the whole set of factors, moderate-level risk factors represent at least one-third of the whole set of risk conditions, and the factors with a low level of risk only represent less than 10% of the overall risk. A simple equation was used to calculate the weight from its criticality. The risk factors’ weighting factors (wF) were estimated as follows: 11 Very High or High (VHH) + 4 Medium (M) + 3 Low (L) = 1; High (H) = 6 L M = 3 L. As a result, the weighting factors for risk values were as follows:

- Low Criticality = 1/81 = 0.012, Medium Criticality = 0.037, and Very High or High Criticality = 0.074

In a similar fashion, the weighting factors for value were calculated as 12VHH + 6 M + 1 L = 1; Medium (M) + 3 Low (L) = 1; High (H) = 6 L M = 3 L. As a result, the weighting factors for value were:

- Low Criticality = 1/91 = 0.011, Medium Criticality = 0.033, and Very High or High Criticality = 0.066

The weighting factors were then inserted into the resulting sample of the PPP4-eGov framework to independently evaluate each factor that is part of the risk and value criteria for a given e-government project. These results are summarized in Table 2. Finally, the following step involves using a tool to survey and understand how these criteria represent the risk or value of a certain project. Developing countries may use the framework through a self-assessment questionnaire, which transforms each risk and value factor into statements based on the explanations built in Table 2. The goal is to induce the project manager to...
<table>
<thead>
<tr>
<th>Code</th>
<th>PPP4e-Gov Risk Factors</th>
<th>Description</th>
<th>Sample WF</th>
<th>Sample CF</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT1</td>
<td>Technical Design &amp; Construction</td>
<td>Refer to the Degree of change of improvement processes or technologies that a certain project could require</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
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<tr>
<td>RT2</td>
<td>Technical Operation &amp; Maintenance</td>
<td>Refers to the experience that stakeholders have towards the service provision, their ability to execute IT systems and meet the agreed technical cost</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RT3</td>
<td>Complexity Level</td>
<td>Refers to the degree of change or improvement (process or technology) that a certain project could require</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RT4</td>
<td>Project Management Performance</td>
<td>Refers to the experience that stakeholders have towards the service provision, their ability to execute IT systems and meet the agreed technical cost</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RO1</td>
<td>RO2 Overrun &amp; Price Change of Operations &amp; Maintenance</td>
<td>Refers to unexpectedly higher operational or maintenance costs than estimated during the planning and development phases, which will impact the price of the service and generate greater adoption/satisfaction problems.</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RO3</td>
<td>Stakeholder Relationship Management</td>
<td>Refers to organization and coordination risks, such as third-party delays/violations, staff conflicts, lack of top management assurance, and the lack of government commitment.</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RE1</td>
<td>Macroeconomic Environment</td>
<td>Refers to the uncertainties in the value of the assets due to a volatile economic environment with special attention to the mid and long term, such as at the end of the PPP project.</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RE2</td>
<td>Foreign Exchange &amp; Imports</td>
<td>Refers to the risks due to significant fluctuation in currency exchange rate, inflation rate, or interest rate volatility and immature local economic conditions.</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RE3</td>
<td>User Fee Collection</td>
<td>Refers to the case where users may consume the project’s service but not actually pay for them, i.e., due to sudden regulation changes on fee charges.</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RE4</td>
<td>Natural &amp; Political Force</td>
<td>Refers to unforeseen natural conditions, major unexpected events (war, coup, etc.).</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RE5</td>
<td>Social &amp; Political Alignment</td>
<td>Refers to the extent of public support or opposition, level of expectations, local culture, language, corruption, political influence, and the linguistic barrier for the contract.</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>RE6</td>
<td>Regulatory &amp; Policy Improvement</td>
<td>Refers to the degree of change in country’s fiscal regime, the budgetary process, the level of enforcement of regulations, and the level of compliance with the contract.</td>
<td>M 0.037</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>PPP4e-Gov Value Factors</th>
<th>Description</th>
<th>Sample WF</th>
<th>Sample CF</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT1</td>
<td>Process &amp; Service Innovation</td>
<td>Refers to the value generated in process efficiency due to the innovation capacities and greater interest of the private partner.</td>
<td>H 0.066</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>VT2</td>
<td>ICT Capacity Development</td>
<td>Related to the impact on internal technical capacity due to exposure to higher technology &amp; innovation levels (i.e., infrastructure, knowledge transfer).</td>
<td>H 0.066</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>VT3</td>
<td>Regulatory &amp; Policy Improvement</td>
<td>Value that enable the improvement of ICT infrastructure within public organizations through better layering of computer networks.</td>
<td>H 0.066</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
<tr>
<td>VT4</td>
<td>Public Service Delivery</td>
<td>Value that enable the improvement of ICT infrastructure within public organizations through better layering of computer networks.</td>
<td>H 0.066</td>
<td>VH 0.074</td>
<td>Concerns the risk related to lack of experience in IT design and engineering, i.e., due to an inferior capacity to design workable contracts and develop requirements (under-performance).</td>
</tr>
</tbody>
</table>

(continued on next page)
reflect on the conditions that should be considered when preliminarily assessing the use of PPP. The survey was designed using a 5-point Likert scale, and the exercise provides a numeric score of risk and value through the summation of the project managers’ average scores per factor, normalized to a 0–1 scale and multiplied by each respective weighting factor.

The risk score calculation method is shown in Eq. (1):

\[
Risk\ score = \sum_{i=0}^{5} \left( Weighted\ Factor_{i} \times \frac{1}{N_{i}} \sum_{j=1}^{N_{i}} Average\ Score_{i,j} \right) + \sum_{i=0}^{4} \left( Weighted\ Factor_{i} \times \frac{1}{N_{i}} \sum_{j=1}^{N_{i}} Average\ Score_{i,j} \right) + \sum_{i=0}^{9} \left( Weighted\ Factor_{i} \times \frac{1}{N_{i}} \sum_{j=1}^{N_{i}} Average\ Score_{i,j} \right)
\]

(1)

The value score calculation method is shown in Eq. (2):

\[
Value\ score = \sum_{i=0}^{6} \left( Weighted\ Factor_{i} \times \frac{1}{N_{i}} \sum_{j=1}^{N_{i}} Average\ Score_{i,j} \right) + \sum_{i=0}^{8} \left( Weighted\ Factor_{i} \times \frac{1}{N_{i}} \sum_{j=1}^{N_{i}} Average\ Score_{i,j} \right) + \sum_{i=0}^{5} \left( Weighted\ Factor_{i} \times \frac{1}{N_{i}} \sum_{j=1}^{N_{i}} Average\ Score_{i,j} \right)
\]

(2)

The final step of this calculation process is normalization, which uses the following method to ensure that the 1–5 scales are normalized into a 0–1 scale, where 0 means no risk or no value and 1 means the maximum amount of risk or value. The normalization method is shown in Eq. (3):

\[
X_{i,0to1} = \frac{X_{i} - X_{Min}}{X_{Max} - X_{Min}}
\]

(3)

4. Research framework

4.1. PPP4-eGov: Early stage assessment of e-government projects

Following the process detailed above, the study detailed a comprehensive characterization of the risk and value of PPP projects for deploying e-government services in developing countries: PPP4-eGov’s 18 risk and 19 value factors, explained in Table 2. During the early assessment stage of an e-government project, the factors explained below can be used to estimate whether a PPP contracting mechanism may be suitable, based on the characteristics of each project.

Although both risk and value results can provide insights, it is suggested that the assessment process include a combined score of both to provide clear and direct guidance. Therefore, the present work developed an improved version of the risk and value comparison method of Bhatnagar (2004). The suggested version is based on the methods explained above: two normalized value and risk scores are compared equally, for which two operational definitions are adopted. For risk, this definition can be explained as “How much risk is generated due to a PPP in an e-government project?” For value, it is “How much value is generated due to a PPP in an e-government project?”

Based upon Bhatnagar’s (2004) findings as well as studies focused on risk (Akintoye, 2003; Ameyaw & Chan, 2015; Chan, Yeung, Yu, Wang, & Ke, 2010; Chou & Premadawardhani, 2015; Grimsey & Lewis, 2002; Loukis & Charalabidis, 2011; Wang et al., 2004; Weerakkody, Irani, Lee, Osman, & Hindi, 2015; Yuan et al., 2015; Zou, Wang, & Fang, 2008) and value (Akbiyikli, 2017; Al-Raisi & Al-Khouri, 2010; Cordella & Bonina, 2012; de Boer, 2017; Pereira, Macadar, Luciano, & Testa, 2017; Quiroz, 2015; Sarmento, 2010; Scott, DeLone, & Golden, 2016; E.

---

Table 2 (continued)

<table>
<thead>
<tr>
<th>Code</th>
<th>Developing Country Factors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V06</td>
<td>Financial Benefits</td>
<td>Since limited or a lack of financial resources is a common issue in developing countries, this factor refers to the ability to support multiple, concurrent projects and to sustain the operations of a PPP. The benefit factor assesses the project’s financial sustainability.</td>
</tr>
<tr>
<td>V07</td>
<td>Project Sustainability</td>
<td>Refers to the project’s stability and reliability, considering the project’s potential for long-term operations. This factor evaluates the project’s ability to provide consistent and reliable services over time.</td>
</tr>
<tr>
<td>V08</td>
<td>Business Model</td>
<td>Concerns the value added if the project is more stable through a PPP arrangement than otherwise, i.e., if it can continue even when political groups change.</td>
</tr>
<tr>
<td>V09</td>
<td>Capital at Risk Incentive</td>
<td>Required to improve the project’s overall plan and execution, the capital at risk is an indicator of the level of financial risk associated with the project.</td>
</tr>
<tr>
<td>V10</td>
<td>Third-Party Due Diligence</td>
<td>Concerns the possible development of capacities in the local industry sector due to local vendors involvement in a value chain otherwise hard to access.</td>
</tr>
<tr>
<td>W01</td>
<td>Environmental Sustainability</td>
<td>Refers to the environmental impact of government services, such as paper usage reduction, printing, and traveling.</td>
</tr>
<tr>
<td>W02</td>
<td>Industry Development</td>
<td>The value a project can generate if it can ensure an operation model that allows for a payment mechanism that relies on user fees rather than solely on a government budget.</td>
</tr>
</tbody>
</table>
Yescombe, 2011; Yuan et al., 2015) in PPP mechanisms in developing countries, the comparison shown in Fig. 2 illustrates that at the initial stage that is the focus of this research, the tactical assessment of whether a given project is a candidate for a PPP arrangement could be made based on whether the value that the PPP brings to the project is higher than the risk it generates. For simplification purposes, it may be assumed that if the value scores higher than the risk, then the project may be worthy of PPP; if not, developing countries might be better off refraining from investing further efforts into such arrangements. However, if the framework were to be shown in the previous plot, it would suggest similar insights to those of Bhatnagar (2004). To assess this at the early planning stage in a more precise way, practitioners require a simple but consistent method to perform the comparison and plan for the next step (Bank, 2018b; Felsinger, 2008). Therefore, the framework proposes to estimate α and β values, as illustrated in Fig. 3. For such an estimation, there could be several approaches. One would be to leave it to each country to assign its capacity to assume risk based on environmental conditions. For developing countries, the practitioner could arbitrarily set those thresholds according to their intuition about the project’s nature and circumstances. However, this would be far too subjective and would diminish the value of the framework’s contribution.

The result of this review indicated that there is no real statistical data on the failure of e-government projects, but there is also no theoretical reason to support the idea that the degree of failure in e-government in developing contexts is lower than in advanced economies (Choi et al., 2016; Heeks, 2003; Mates et al., 2013; Suri & Sushil, 2017). Thus, PPP4e-Gov assumes that in a developing country, the potential to fail would be a risk rate over 65%, or, on our 0–1 scale, 0.65, and the possibility to succeed could be less than 15%, or 0.15 (Heeks, 2005b; Stanforth, 2010). This assumption determines the threshold and completes the proposed framework. Thus, PPP4e-Gov (Fig. 3) provides four different scenarios that could be chosen by an e-government manager when unsure about using PPPs: A) must, B) yes, C) no, and D) never.

5. Results

5.1. PPP4-eGov framework scenarios

Based on the perceived risk and value, each project can be classified into the following scenarios: MUST (Scenario A: Risk Score = [0–0.15], Value Score = [0–1.00]). This scenario applies when the project’s perceived risk is so low that it is worthwhile to use a PPP to achieve greater value. Developing countries may use this as an opportunity to gain experience; therefore, they should attempt to pursue such projects through PPPs. Bhatnagar (2009) explained that in similar cases, developed countries would opt for traditional procurement rather than PPP arrangements. There were only a few cases like the one reported by Yescombe (2011), in which a PPP initiative was undertaken for benchmark purposes and “to test them against public-sector procurement rather than for budgetary reasons” (Yescombe, 2011, p. 26).

YES (Scenario B: Risk Score = [0.15–0.65], Value Score = [0.15–1.00]): A Scenarios B project shows a moderate level of risk, but the potential value is much higher. This scenario depends on the value versus risk ratio, but given the susceptibility of developing countries to risk, an additional safety measure was added for assessing Scenario B projects. The score of the project should not exceed two high-risk scores (noted by * * * * “ in Fig. 2) in the PPP4e-Gov Assessment Tool. Scores will be considered high risk when an average score equals five on two or more occasions. High-risk scores have the power to make any project go from Scenario B to Scenario D (i.e., never).

NO (Scenario C: Risk Score = [0.15–0.65], Value Score = [0–0.65]): When the risk the project could generate through a PPP is too high compared to the value it would potentially generate, it falls into this scenario. Just as in Scenario B, project managers will hesitate to implement or reject a PPP. The issue here is that the project will not generate enough value to make the risk worthwhile.

NEVER (Scenario D: Risk Score = [0.65–1.00], Value Score = [0–0.65]): This scenario applies when the project’s perceived risk is so high that regardless of the value of the project, the technological, organizational, and environmental conditions are not appropriate for choosing a PPP arrangement.

5.2. Applying PPP4e-Gov to Costa Rica

Costa Rica is a Central American country that has enjoyed a consolidated, multi-party democracy for more than 60 years, and throughout this period of socio-political stability, it has achieved an economic development model that stands out within its region (Barahona & Elizondo, 2014; CAMTIC, 2012; OECD, 2012; Retana, 2014; Romero, 2018; Travica, 2002). Some examples of the nation’s commitment to pursuing better governance through ICT services are the national digital certification base on public key infrastructure (PKI), the back-office interoperability platform for government-to-government services, and the national e-procurement system (Barahona & Elizondo, 2014; Palaco, Avendaño, & Núñez, 2015). Because of Costa Rica’s trajectory of e-government projects, we chose to illustrate how the PPP4e-Gov framework could be used by executing a demonstration exercise to show how other practitioners could eventually apply it during their planning processes. The process included a second round of interviews with the same project managers who had consulted on the PPP4e-Gov risk and value factors. This time, they were asked to pick
one e-government project within the national ICT strategy and project portfolio, between 2006 and 2014, which included two different government administrations as well as one that was under their direct scope of tactical responsibility.

The exercise used an assessment tool for PPP4e-Gov. During the interview, the project managers were guided to revisit the thought process for these projects as if they were about to enter the planning stage and were appraising whether or not to arrange the projects through a PPP mechanism. Appendix A summarizes the nature of the projects chosen by the experts as well as their affiliations, corresponding positions, and years of experience working in the public sector. As per the Costa Rican example, this paper proposes that after applying the proposed framework, developing countries can gain a holistic overview and recommendation of whether or not a project is suitable for a PPP. The data collected through applying the PPP4e-Gov assessment tool to 10 Costa Rican e-government projects is plotted in Fig. 4. Developing countries may visualize how the project portfolio was spread out according to the different natures and circumstances of their risk and value conditions in all technological, organizational, or environmental contexts. The data in the framework plot are included in Appendix B.

MUST: The projects chosen by the Costa Rican project managers did not result in any MUST scenarios. According to the survey, the reasons for this could be related to the fact that teams in charge may not have enough maturity, in terms of their expertise in handling e-government projects and typically feel that even a simple website or app development project could be riskier if the core capacities and some minimum preconditions do not exist. One of the managers stated, “Even deploying a static website means a lot of risk if the only thing you have in your department is a technical support technician and no software developer or computer science engineer” (Avendano, 2016).

National Identification (NID) (Yes PPP): Of the projects analyzed, only one resulted in this scenario. The project was launched in 2010. However, in 2015, it was attempted through a PPP. Although it was a very difficult attempt due to its complexity compared to other projects (e.g., a government portal), the project was executed under different circumstances. The project manager explained that “a certain maturity was achieved in the team until 2015; already 3 or 4 other projects were done through PPPs, and then the perception of risk of launching this service was reduced” (Morales, 2016). Another important matter is that choosing a PPP for this project was not only a matter of investing in the hardware and platform but also required expertise. The identification-related biometric technologies required specific knowledge to identify the most appropriate options for the scope and nature of the entity in charge of the NID operation. The manager added that “access to private capital, not only financial but human resources, is key to this project as well as sharing the technical risk and warranting a whole-of-life—costing sustainable model” (Morales, 2016).

Single Window Project “VES” (No PPP): This project did not reflect enough value to decide to deploy the project in a PPP arrangement. The relationship between the risk and value was much lower compared to other projects. When the project managers were consulted, many of their answers were related to the availability of financial and human competencies for this project as well as the strong commitment they needed from supporting agencies and teams: “Although we had little expertise to operate such a system, the project’s nature forced us to develop more internal capacity” (Viquez, 2016). This was key in the assessment of value and risk for this project.

PKI (Never PPP): Today, the Central Bank of Costa Rica hosts the certification authority and the operating PKI system. The reasons for the high-risk evaluation was related to the absence of a capacity to operate or supervise such a service. The Director explained that the “Ministry of Science, Technology and Telecommunications (MICITT) did not have a data center or any kind of proper infrastructure of its own. We only had one computer science engineer performing technical support activities” (Barquero, 2016). The PKI project needed expert personnel, and the minimum internal requirements included a redundant solution and a business continuity policy; thus, the business model and the cost to the intermediary entities (such as banks) and final users was a critical factor in ensuring adoption.
6. Conclusion

E-government emerged as a popular governance reform (De Vries, 2010; Heeks, 2001; Suri & Sushil, 2017) and is still relevant in developing nations (Almeida & Zouain, 2016; Choi et al., 2016; UNDESA, 2018). Nevertheless, its implementation is hampered by certain roadblocks, such as a lack of technical and financial resources as well as access to affordable state-of-the-art technology (Aladwani, 2016; Dada, 2006; Gil-Garcia & Martinez-Moyano, 2007; Khan, Khan, & Zhang, 2012, 2016; Schuppian, 2009; Scupola & Zanfel, 2016; Sharma, 2007; Suri & Sushil, 2017). As mentioned earlier, PPP mechanisms have been utilized as a tactical strategy to overcome some of these challenges (Al-Shqairat et al., 2014; Bhatnagar, 2004; Das Aundhe & Narasimhan, 2016; Sharma, 2007). Some governments are motivated to develop their capacities by leveraging on the strengths of the private sector and state-of-the-art technologies (Belachew & Shyamasundar, 2013; Bugli, 2015; Kaliannan et al., 2010; Scupola & Zanfel, 2016). Others are motivated by better asset utilization (Taher et al., 2012) as well as critical success factors in PPP projects (Al-Shqairat et al., 2014; Bhatnagar, 2004; Das Aundhe & Narasimhan, 2016; Sharma, 2007) dealing with the application of PPP mechanisms in D-ing as well as critical success factors and attributes in the context of e-government in D-ing. The results contribute to the discussion on the reported lack of consistent planning mechanisms (Bank, 2017a, 2018a; Cruz & Marques, 2013) during the preliminary phases of PPP and broaden the available literature on integrating e-government and PPP project characteristics. Similar to Bhatnagar (2004), this study attempted to guide the analytical exercise of a manager in the prioritization of a project portfolio. It extends previous findings on e-government risk and value assessments as well as critical success factors in PPP projects (Al-Shqairat et al., 2014; Bhatnagar, 2004) by revealing a list of filtered and integrated risk (18) and value-related (19) factors. The study provides comprehensive insights on the characteristics of e-government and PPP. In addition, with the use of a weighted scoring model and a self-assessment tool, these criteria provide a sound foundation for estimating a numeric score of risk and value. This feature facilitates the estimation of whether or not the use of PPP is worthy of further review. Unlike previously available analyses, our PPP4e-Gov framework could represent an intermediate step and a straightforward method guiding practitioners toward a comprehensive assessment exercise that facilitates their analysis of the value of PPP versus traditional procurement methods. As an example of how the tool can be used, ten sample projects from Costa Rica were analyzed, and the usefulness of the proposed PPP4e-Gov assessment tool was proven.

While the proposed framework represents an exploratory effort to link practitioners’ reported needs (Bank, 2017a; Pfisterer, 2017) with available academic knowledge, it also is intended to initiate a discussion on possible methodological solutions for assessing PPP as an option in the context of e-government projects in developing countries. However, in this pursuit some limitations were encountered. Future studies could improve on the present work by considering the application of statistical techniques to analyze and test the relationship and validity of the risk and value attributes related to PPP success in e-government and D-ing contexts. Other research could attempt to confirm the results of the analysis of an early assessment stage with the later processes when the due diligence is performed. Care should be taken concerning the simplification of comparing risk and value. Another future opportunity could be to apply a third-party consultation method, such as a Delphi study, including experts from not one but several countries and representing a significant portion of developing countries, to validate the framework and attempt to build generalizable weighting factors for developing countries. Finally, future efforts could further examine risk and failure measurement. Although recent studies confirm that the high failure rate of e-government projects in D-ing is not decreasing (Dwivedi et al., 2015; Stanforth, 2010), it is still difficult to apply a systematic tool to determine or measure the risk of failure. Further studies that measure the percentage of failure of e-Government projects, accounting for the procurement methods used (PPP or traditional procurement), could offer significant contributions to this and other related fields.

Appendix A. Costa Rican e-government project portfolio & managers interviewed

<table>
<thead>
<tr>
<th>#</th>
<th>Project Name</th>
<th>Project Context &amp; Description</th>
<th>Entity in charge*</th>
<th>Position</th>
<th>Years working in Public Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>National Public Certification (PKI) ‘FirmaDigital’</td>
<td>Led since 2008, by MICITT National Root Certification Authority (CA), &amp; Registration Authorities (RA), managed by Central Bank. The scope of the system includes the national Root CA as well as the service to issue the certificates for other CA, RA along the national territory.</td>
<td>Ministry</td>
<td>Director</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>Open Data Portal ‘DatosAbiertos’</td>
<td>Led since 2012, its purpose was to motivate public institutions to release data for reuse, transparency, and accountability purposes. While this was not a formal “institutionalized initiative” it was a result of Costa Rica’s national commitments for the Open Government strategy. The project included not only the technological platform that allowed connected entities to post datasets, but also hosting promotion activities, such as App development contests (hackathons), using the data in the portal.</td>
<td>eGov Unit</td>
<td>Project Manager</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Interoperability Hub ‘CrearEmpresa’</td>
<td>Launched in 2010, as the first and main service was oriented as a G2B platform called, ‘CrearEmpresa’ or Starting a Business. The platform (<a href="http://www.crearempresa.go.cr">www.crearempresa.go.cr</a>) serves as a single window for citizens to perform all their transactions related to putting a business in operation. Prior to the implementation of the Interoperability Hub that enabled this service, the process would have taken up to 1 year.</td>
<td>eGov Unit</td>
<td>Deputy Director</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>Health Permit Online Registration ‘Registro’</td>
<td>Launched for the Ministry of Health in 2014, the platform (<a href="http://www.registrolo.go.cr">www.registrolo.go.cr</a>) enables online registration of new products, renewing health records, certification of imported medicines, foods, cosmetics, natural products, biomedical equipment, etc.</td>
<td>Ministry</td>
<td>Deputy Director</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>Electronic Services Kiosks ‘VES’</td>
<td>Launched for the Costa Rican Post Office and the National Immigration Agency, to facilitate the provision of services to citizens through the post office branches. This service reactivated the post offices and initiated by issuing passports and resident cards to foreign residents. VES offered citizens an additional extension of governmental services in 60 different service points in urban and rural areas.</td>
<td>eGov Unit</td>
<td>Deputy Director</td>
<td>10</td>
</tr>
</tbody>
</table>
Appendix B. Costa Rican example of PPP4eGov scores & summary

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Code</th>
<th>Project Risk</th>
<th>Project Value</th>
<th>No. High Risk Scores</th>
<th>PPP4e-Gov@Ding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 National Public Key Infrastructure</td>
<td>PKI</td>
<td>0.67</td>
<td>0.71</td>
<td>4</td>
<td>NEVER (D)</td>
</tr>
<tr>
<td>2 Open Data Portal</td>
<td>ODP</td>
<td>0.40</td>
<td>0.57</td>
<td>0</td>
<td>YES (B)</td>
</tr>
<tr>
<td>3 Interoperability Hub</td>
<td>HUB</td>
<td>0.70</td>
<td>0.78</td>
<td>4</td>
<td>NEVER (D)</td>
</tr>
<tr>
<td>4 Health Permit Online Registration</td>
<td>REG</td>
<td>0.26</td>
<td>0.76</td>
<td>0</td>
<td>YES (B)</td>
</tr>
<tr>
<td>5 Single Window Kiosks</td>
<td>YES</td>
<td>0.35</td>
<td>0.30</td>
<td>0</td>
<td>NO (C)</td>
</tr>
<tr>
<td>6 National Smart ID</td>
<td>NID</td>
<td>0.17</td>
<td>0.86</td>
<td>0</td>
<td>YES (B)</td>
</tr>
<tr>
<td>7 e-Government Portals</td>
<td>eGP</td>
<td>0.44</td>
<td>0.85</td>
<td>0</td>
<td>YES (B)</td>
</tr>
<tr>
<td>8 Electronic Medical Record</td>
<td>EMR</td>
<td>0.83</td>
<td>0.84</td>
<td>8</td>
<td>NEVER (D)</td>
</tr>
<tr>
<td>9 e-Security (Smart CCTV)</td>
<td>CCTV</td>
<td>0.35</td>
<td>0.61</td>
<td>2</td>
<td>NEVER (B)*</td>
</tr>
<tr>
<td>10 Citizen Security App</td>
<td>APP</td>
<td>0.24</td>
<td>0.61</td>
<td>0</td>
<td>YES (B)</td>
</tr>
</tbody>
</table>

References


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