

A paradigm shift in risk management in public–private partnership arrangements

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ABSTRACT

This research sought to determine how public–private partnership (PPP) arrangements can more efficiently address risk management issues using the example of Mozambique as a case study. Analyses of 15 interviews in this country were conducted using the Gioia methodology. The results indicate that integrating key risk indicators into PPP contracts can improve risk management. These measures have been widely used in company risk management. The indicators can serve as monitoring, reviewing and supervising tools, allowing the integration of external factors into PPP contracts at the right time, which is hard to predict when the contracts are signed. Key risk indicators can capture megatrends, track risk evolution and develop future scenarios throughout the entire lifecycle of contracts, preventing conflicts between partners, contract renegotiations or early contract terminations by facilitating an improved understanding of contracts' current realities. The findings suggest that these measures should be applied by PPP units. The proposed approach encourages originality and empirical research-based improvements of PPP risk management frameworks and provides guidelines for future studies.

Key words: Key risk indicator, Public–private partnership, Risk management

HIGHLIGHTS

- Integrating key risk indicators into PPP contracts can improve risk management.
- The key risk indicator approach to PPP contracts adds an extra phase to contract supervision (i.e., monitoring and reviewing) that assesses risks' evolution and trends.

1. INTRODUCTION

Promoting human development is high on the agendas of countries worldwide whose governments are expected to take actions to ensure their citizens have access to utilities' services (Tortajada, 2014). Economic infrastructure projects that include facilities and services contributing to the achievement of economic development targets have also increasingly attracted researchers' interest (Marques *et al.*, 2015; Cui *et al.*, 2018). In this context, public–private partnership (PPP) arrangements have emerged as an interesting solution that can fill infrastructure gaps, especially in developing countries (Idelovitch & Ringskog, 1995). From 2015 to 2019, investments in PPP arrangements reached a total of 469.82 billion United States dollars distributed over 1,917 projects (World Bank, 2018, 2020).

PPP contracts are long-term strategic alliances (Grimsey & Lewis, 2002). They are signed by public and private sector parties (i.e., finance and/or industrial contractors), with programmed payments over the lifecycle of

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contracts covering the utilisation of facilities by the public sector or users (Yescombe, 2007). These arrangements can be a vehicle to carry out complex infrastructure projects while maximising their efficiency and improving monitoring processes (Yu *et al.*, 2018). However, PPP contracts are subject to criticism and public scepticism.

Thus, a comprehensive review is needed for various vectors that can produce good or bad relationships during the lifecycle of contracts. Conflicts can arise because public partners do not prepare adequately for projects or develop effective monitoring plans (Guasch *et al.*, 2014). When combined with incomplete contracts and inadequate internalisation of structural, social and economic changes, information asymmetries between partners can mean that terms have to be renegotiated. Cui *et al.* (2018) found that 379 studies focused on infrastructure projects from 1990 to 2016. Project risk and success factors ranked as the fourth more important topic, while 18% of the main domains investigated included PPP contracts. The top five sectors were transport (transport, road and highway), health/hospital (health and hospital), water supply, network (network and telecommunications) and power plant/energy (power plant, energy, bioenergy and others) concentrated 232 (61%) from the total of 379 studies. The PPP model is dynamic and should take into account the context and sector needs. However, a PPP contract in the health sector is very different from one of the water sectors (Ferreira and Marques, 2020).

Multiple scholars have also identified risk as an important topic in this context (Ke *et al.*, 2009; Chen *et al.*, 2016; Lima *et al.*, 2019). Risk is, by definition, the uncertainty effect on objectives' achievement (International Organization for Standards [ISO], 2018) and unpredictable variations in value, in which the total project value is affected by unpredictable fluctuations in the project value. This effect can be positive, negative or both, and it can be generated by opportunities or threats to project goals (Irwin, 2007).

Risk evaluation is thus related to the likelihood of particular events occurring multiplied by the corresponding quantification of the impacts (Marques & Berg, 2011). Risk management comprises, first, risk assessment, in which risks are identified, analysed and evaluated, and second, treatment or mitigation measures implemented to cope with the risks identified in the first phase (Ameyaw & Chan, 2015a; Cui *et al.*, 2018). The literature does not reveal a consensus between scholars about the best risk management methodology and terminology, thereby leaving room in this field for improvement (Luís *et al.*, 2016; Lima *et al.*, 2019).

Risk management implies introducing tools that help control critical risk factors and future threats (Moeller, 2007). The concept of key risk indicators emerged in this context. Traditionally, these indicators provide statistics or metrics to support organisations' risk position (Peček & Kovačič, 2019). The objective of key risk indicators is to provide relevant measures to assess critical risk factors and potential risks (Beasley *et al.*, 2010). This strategy, thus, highlights another fundamental issue: the need to measure and monitor risk (Timmermans *et al.*, 2016).

The present research aims to make important contributions to improving current PPP risk management frameworks. The research shows that context and PPP contract issues aggregated dimensions can lead to the introduction of a new solution: key risk indicators in PPP contracts. To answer this question, a study was carried out using a qualitative methodology, including in-depth interview analyses based on the Gioia methodology. Although a single case study (country analysis) was carried out, it can represent a pattern for similar countries and, therefore, the lessons learnt can be used by other policy-makers and practitioners.

Fifteen PPP experts based in Mozambique were interviewed to clarify their opinions and address a single research question: How can key risk indicators improve the current risk management frameworks applied to PPP contracts in Mozambique and similar countries?

2. RESEARCH METHODOLOGY

In-depth interviews were conducted to capture and understand the perspectives of individual experts on one or more narrowly defined themes (Brounéus, 2011). The in-depth interview method was selected to allow

participants to give their opinion on how key risk indicators can improve PPP risk management frameworks currently used. In-depth interviews have been successfully used to collect data in previous studies in this field (Bylund *et al.*, 2020; Yousaf & Fan, 2020).

To identify patterns and generate results, the data analysis relied on a qualitative approach in which the transcribed interviews were processed using the thematic content analysis. The coded outputs were based on the Gioia methodology using a systematic inductive procedure (Gioia *et al.*, 2013). This methodology has also been effectively applied in prior research (Meister *et al.*, 2017; Lombardi *et al.*, 2020). The outputs were produced by the qualitative data analysis software MAXQDA that was used previously in similar methodologies (Quinn *et al.*, 2019; Al-beity *et al.*, 2020).

The interview protocol included five steps of which the first was to develop a complete understanding of the problems and/or questions. The second step involved creating a set of adequate questions to address the research question, while the third was to decide which was the best context to conduct the interviews. The fourth step is comprised of getting in touch with the prospective subjects and providing guidelines. The last step was to conduct the interviews, complete their transcription, analyse the results and report the findings (Given, 2008; Bogner *et al.*, 2009).

Constructing the sample of the current study was extremely challenging but necessary in order to fulfil the research objective. The non-probability snowball sampling or networking technique was applied to identify the participants (Malhotra & Birks, 2007). To filter out ineligible interviewees, two criteria were defined:

- i. Work experience (minimum period of 10 years) dealing with PPP contracts in Mozambique or similar countries.
- ii. Extensive professional experience with governments, sector regulations and utilities' sectors in Mozambique or similar countries.

2.1. Fieldwork

Five initial potential interviewees were identified. A journey to Mozambique was scheduled to conduct the interviews and collect any additional relevant information, including gaining access to the most critical governmental institutions with direct or indirect responsibility for PPP utility contracts.

The answers of participants were written down manually and transcribed. The interviews content for the sample was translated into English and coded. The results' quality exceeded the initial expectations. In general, the interviewees' feedback on the proposed key risk indicator approach was extremely positive recognising the importance of this issue. The interviews took place in quite different contexts and at the convenience of the participants. A total of 15 interviews were conducted with a broadly heterogonous sample (i.e., PPP working field experience, including sector, function and if represented the public or the private partner). Similar studies have been successfully carried out with fewer participants (Ameyaw & Chan, 2015a). Mason (2010) supports this claim, suggesting that when performing in-depth interviews with the purpose of identifying possible new codes by applying qualitative methods, a relatively small and heterogeneous sample is valid to the development of the meaningful themes, allowing interpretations and conclusions. The saturation principle is applied.

2.2. Participants' profile

The final set of interviewees was based on their accessibility and willingness to participate in the study (see Table 1). The participants included top management (5), directors (2), coordinators (2), technical experts (3), advisors (2) and a consultant (1). An effort was made to ensure that the private sector was represented in the sample. In the end, 12 (80%) interviewees were from the public sector, mainly from the industry and water sectors, and 3 (20%) came from the private sector, primarily from consulting firms and private water developers.

Table 1. | Participants' profile.

Expert	Position	Type of sector
1	Technical expert	Public
2	Top management	Public
3	Top management	Public
4	Advisor	Private
5	Advisor	Public
6	Technical expert	Public
7	Top management	Public
8	Top management	Private
9	Director	Public
10	Director	Public
11	Coordinator	Public
12	Consultant	Private
13	Top management	Public
14	Technical expert	Public
15	Coordinator	Public

All the participants held senior-level positions. These experts' extensive experience, background and important organisations ensured their opinions would be reliable (Ameyaw & Chan, 2015b). Some participants had experience in more than one sector, encompassing utilities, railroads, roads, ports, and oil and gas. The interviewees' professional activities included working as private partners, government officials, sector regulators and utilities' managers with PPP contract experience in Mozambique or similar countries.

3. RESULTS AND DISCUSSION

The literature reviewed showed that no consensus exists among researchers regarding the best methodology and terminology to use in risk management. Hayne & Free (2014) conducted a wide range of interviews of key stakeholders and concluded that organisations and individuals act and behave in varied ways to keep their institutions risk-free. The mentioned study found that risk management strategies are based on diverse forms and techniques of applying theories, methods, construction procedures, designs, implementations and monitoring. To design, create, implement, maintain and update a risk management framework during the PPP contract lifecycle, partners need to introduce the concepts of communication, consultation and monitoring into the framework (see Figure 1).

The proposed risk management framework shown in Figure 1 introduces key risk indicators as measures that support all process phases. The interviewees were invited to give their opinions on this approach. They were asked the following open-ended question: How can key risk indicators improve the current risk management frameworks applied to PPP contracts in Mozambique or similar countries?

Key risk indicators are broadly used in the literature to provide support for risk management (Timmermans *et al.*, 2016; Peček & Kovačič, 2019; Radojković *et al.*, 2019). Reviewing and monitoring risk management frameworks is necessary to improve the effectiveness of the process design (ISO, 2018). The introduction of measures has a significant impact on the outcomes of risk management. The ISO (2018) recommends that reviewing and

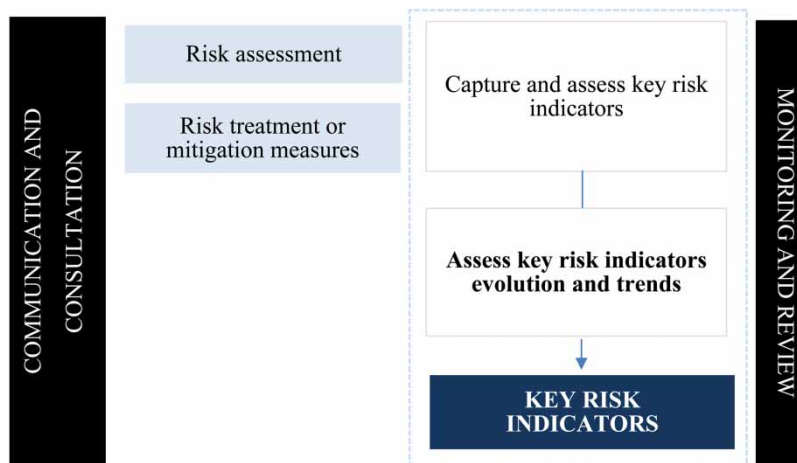


Fig. 1. | Key risk indicator framework.

monitoring processes should be planned and become a permanent part of all risk management phases. These processes must include collecting and analysing information, auditing, recording results and presenting feedback to the parties involved. The findings then need to be incorporated into the relevant organisations' performance. Peček & Kovačič (2019), however, argue that the ISO has failed to provide adequate tools to facilitate risk reviewing and monitoring processes.

The present research focused on adapting key risk indicators that have already been successfully applied in different organisations to help prevent present and future risks (Yuan *et al.*, 2015; Blokdyk, 2020). These indicators can be modified to suit the needs of PPP arrangements as a way to improve the monitoring processes of these contracts. The current results are based on interview data analyses and limited to content analysis and the Gioia methodology's stages described below. Notably, this methodology's ability to capture what could be observed from the data and to address the research question was uncertain. The interviews focused on eliciting the participants' opinions on key risk indicators use in PPP contracts and assessing and defining ways that these indicators could be linked to the Mozambique context or of similar countries.

The present research conducted the first-order analysis by identifying and creating codes for the data collected based on informants' terms, conventions and phrases (Gioia *et al.*, 2013; Meister *et al.*, 2017). To assess the codes' similarities, the literature on PPP contracts and key risk indicators was consulted to obtain positive, useful insights based on a second-order theme analysis (Gioia *et al.*, 2013). Next, the data structure was analysed and summarised (see Figure 2). Finally, the relevant PPP and key risk indicator theories were applied to explain the links between the second-order themes identified. To understand how the interviewees presented their arguments, the model below was generated from the data structure after the raw material was assessed and coded.

The analyses revealed how the interviewees structured and presented their opinions (see Figure 3). These experts started by identifying the environment, data context (i.e., first aggregate dimension) and PPP contract dimension (i.e., second aggregate dimension). The participants finished by assessing how key risk indicators could help partners take advantage of opportunities to improve their current risk management framework (i.e., third aggregate dimension). The experts discussed these points with reference to a problem-solving model. In parallel, their opinions went from more extensive, broader background arguments to more focused project-approach arguments, finally addressing the question of how key risk indicators could improve current frameworks. The interviewees thus proposed concrete solutions to improve PPP contracts using these indicators.

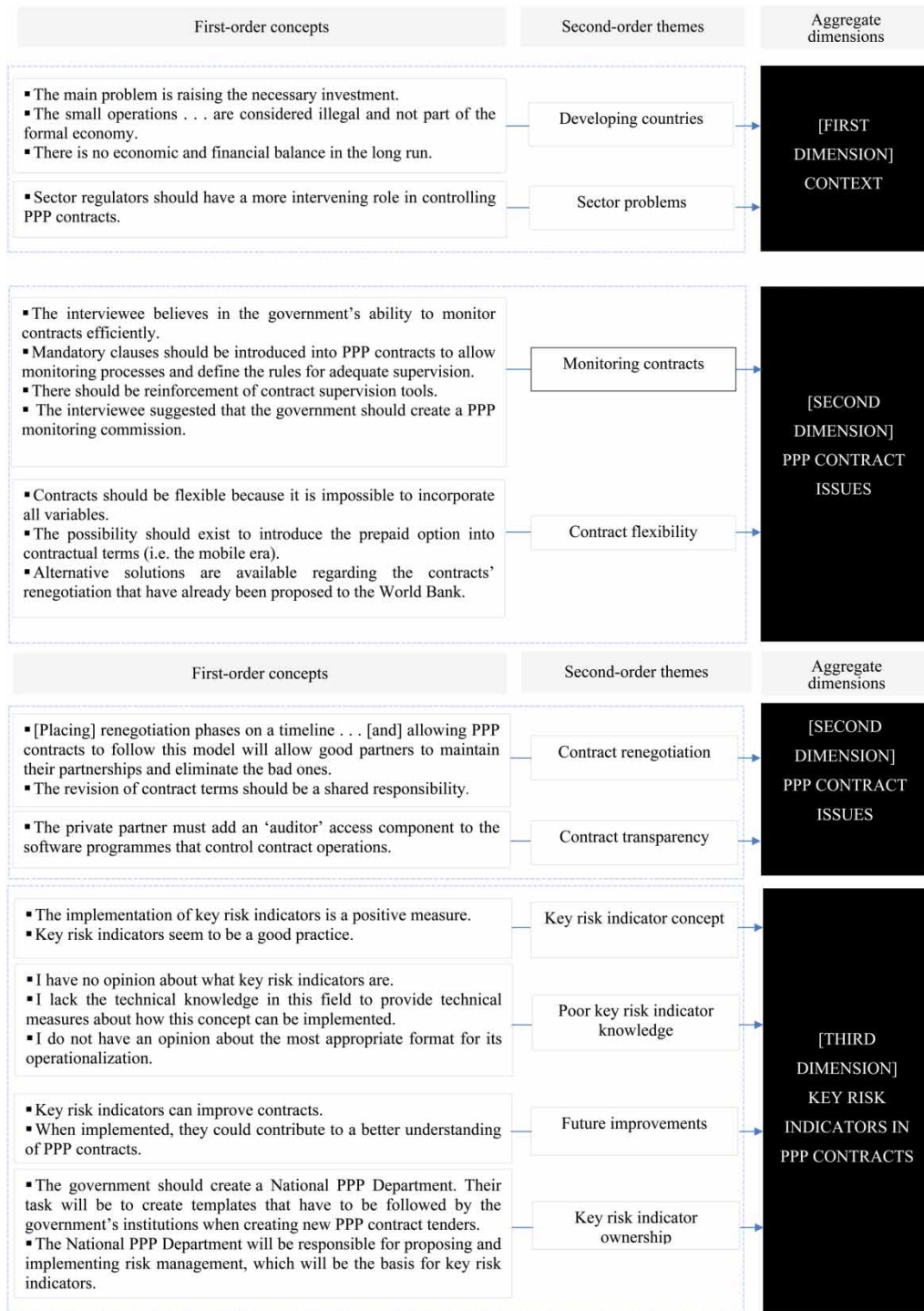


Fig. 2. | Key risk indicator data structure. (continued.).

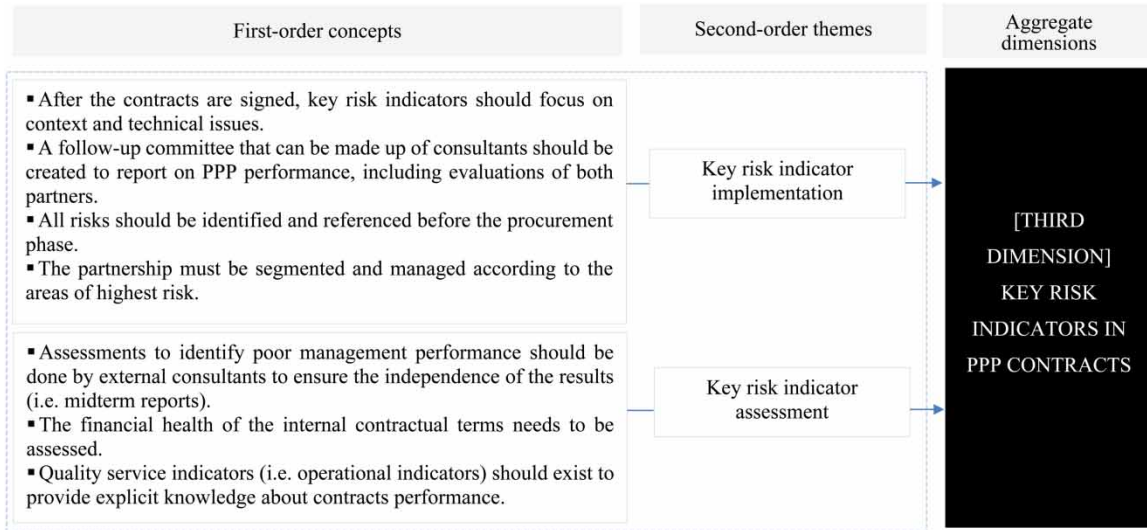


Fig. 2. | Continued.

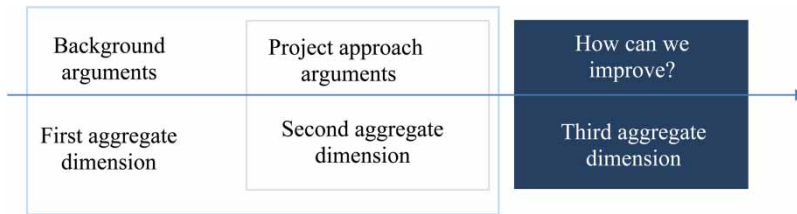


Fig. 3. | Interviewee arguments' structure.

Figure 4 shows how the second-order and aggregate dimensions results were integrated into the model. Three aggregate dimensions were identified in the model: the enabling environment, PPP contract issues and a paradigm shift considering explicitly the risk issues (i.e., key risk indicators in PPP contracts). The interviewees' opinions were coded in order to answer the predefined research question. To understand how to reach sound conclusions, the relationships within the first-order coding results were first examined, which then led to the second-order codes and the last level – the model's aggregate dimensions. In the following subsections, examples are provided for the links between the first-order codes, as well as their relationships to the second-order codes.

3.1. Context

The first aggregate dimension – context – was linked to the following question: Why PPP contract results are not what we expected? This dimension was based on the combined themes of developing countries and sector problems.

The data structure analysis extracted expressions showing the first-order codes links to the second-order codes for the developing countries theme. Various sentences were connected to economic structural problems such as 'the main problem is raising the necessary investment', 'there is no economic and financial balance in the long

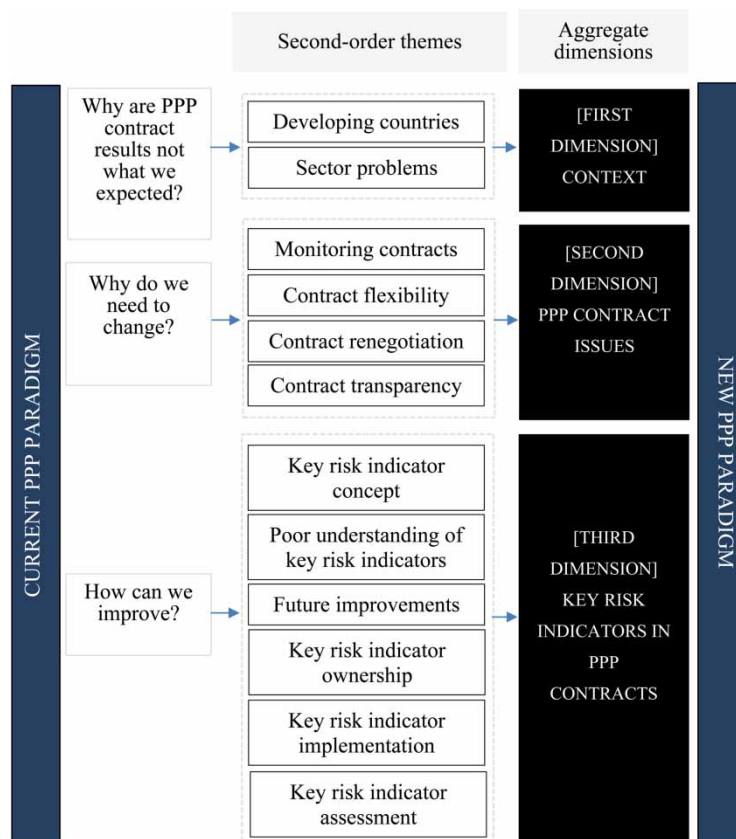


Fig. 4. | Model generated based on the data structure.

run' and 'small operations ... are considered illegal and not part of the formal economy'. Note that these issues are similar to the ones found in other countries (Ferreira *et al.*, 2021).

In addition, the substantial weight attributed to poor national and sector accountability linked to control methods can affect PPP contracts (Marques, 2017). A sentence identified as part of the second-order theme of sector problems reinforces this statement: 'sector regulators should have a more intervening role in controlling PPP contracts' (Marques, 2017). The macroeconomic context in which PPP contracts operate is decisive in the preparation of new partnerships, and political decision-makers cannot ignore local requirements, contexts and environments. The literature on previous studies has also discussed the importance of these matters (Marques & Berg, 2011; Kwofie *et al.*, 2016; Cui *et al.*, 2018).

Researchers have observed variations in PPP implementation across countries (Cui *et al.*, 2018). The problems shown by the developing countries are different from those of developed countries, particularly capturing the necessary level of investment, governments' negative reputation and inefficacy, reduced political will and contractual environments' uncertainty (Babatunde *et al.*, 2015). Depending on internal policies, the water sector can, for example, be frequently considered a national priority, so policy-makers become overly focused on ensuring that all population has access to adequate levels of service (e.g., water quality standards). Public partners may thus neglect their water systems' economic sustainability. The result leads to poor PPP contract designs that fail to cover relevant project contingencies (Appuhami & Perera, 2016).

When adequately formulated, PPP contracts can present advantages for developing countries because good contracts allow partners to avoid inadequate internal human resources and technological skills. Well-designed contracts also provide opportunities to improve stakeholders' understanding of all aspects of PPP arrangements (Appuhami & Perera, 2016). Financial benefits can arise as good PPP contracts capture significant levels of international investment (Cui *et al.*, 2018). These advantages show that the PPP project business model continues to be able to improve national economies and populations' living standards.

3.2. PPP contract issues

The second aggregate dimension identified was the main reason that justifies a need for a paradigm shift in PPP contracts considering explicitly the risk issues in the contract lifecycle. PPP contract issues are linked to the following question: Why do we need to change? These issues came from the second order of research topics: contract monitoring, contract flexibility, contract renegotiation and contract transparency and other good governance principles (see Figure 4).

An analysis of the first-order codes that support the second-order themes revealed that PPP contract improvements should be based on the interviewees' opinions. The second-order theme of contract monitoring includes expressions such as 'the interviewee believes in the government's ability to monitor contracts efficiently'. Other examples are 'mandatory clauses should be introduced into PPP contracts that facilitate monitoring processes and define adequate supervision rules' and 'the interviewee suggested that the government should create a PPP monitoring commission'.

Contract flexibility and renegotiation also emerged as important topics (Cruz & Marques, 2013). These first-order concepts cover expressions such as 'contracts should be flexible because it is not possible to incorporate all variables'. Another example is '[including] renegotiation phases on a timeline ... [means that] PPP contracts following this model will allow good partners to maintain their partnership and eliminate the bad ones'. Finally, for the adequate level of contract transparency, regarding the expected inputs and outputs of the contract, the second-order theme was identified as an important issue when designing and controlling PPP contracts. This theme included the sentence 'the private partner must add an "auditor" access component to the software programmes that control contract operations'.

The second-order themes highlight the urgent need to improve the contracts of current projects by introducing tools and methods that will allow control and renegotiation and add transparency through increased monitoring of contracts. Scholars have identified and assessed multiple factors contributing to the generation of contracts' efficiency throughout their lifecycle and producing balanced value-for-money outputs (Xia *et al.*, 2012; Ameyaw & Chan, 2013; Cui *et al.*, 2018). By definition, PPP contracts should have a medium- or long-term duration.

Studies have shown that conflicts can arise when projects are inadequately prepared during the design and procurement phases and when contracts fail to include effective monitoring plans (Marques & Berg, 2010; Guasch *et al.*, 2014). Contracts with an insufficient capacity to internalise structural, social and economic changes further contribute to incomplete PPP contracts. In combination with information asymmetries, these contracts can require renegotiations of the terms of the arrangements (Marques, 2018).

The incomplete contract theory thus added an important aspect to the model – renegotiation in which contract revisions can involve updating terms in response to new information unavailable when the initial contracts were signed. This finding introduced the contract flexibility concept into the framework (Grossman & Hart, 1986). Improving PPP contracts by adding the monitoring concept further provides transparency and flexibility, and facilitates the contract renegotiation process.

3.3. Key risk indicators in PPP contracts

The last aggregate dimension supported the previously mentioned paradigm shift in PPP contracts. Key risk indicators in PPP contracts are connected to the question of how stakeholders can change. This third aggregate dimension resulted from a conjunction of seven second-order themes: key risk indicator concept, key risk indicator knowledge, future improvements, key risk indicator ownership, key risk indicator implementation and key risk indicator assessment.

The second-order theme of the key risk indicator concept was associated with positive feedback in 11 interviews. Nearly three-quarters of the interviewees (74%) provided support for this theme with sentences such as 'the implementation of key risk indicators is a positive measure' and 'key risk indicators seem to be a good practice'. The literature also augments these results by connecting this concept to monitoring, supporting and improving risk management frameworks (Timmermans *et al.*, 2016).

The most frequently mentioned risks' dimensions associated with the water sector (ADB, 2009; Marin, 2009; Ameyaw & Chan, 2013) correspond to economic externalities, political and institutional factors (including governments' breach of contract and interference), natural disasters such as climate changes and calamities, financing (including capital investments), water pricing uncertainty, water tariffs, water resources, price instability, and poor performance and productivity. According to the literature, it is still possible to add other risks, such as risks related to the foreign exchange rate, corruption, water theft, non-payment of bills, political interference, high operational costs, pipeline failures, lack of PPP experience, inflation rate volatility, construction time and cost overrun, poor contract design, interest rate, political discontent, early contract ending, poor design and construction problems, conflicts between the partners, financing, land acquisition issues and public resistance to PPP contracts (Marques & Berg, 2010; Ameyaw & Chan, 2015a).

The interviewees' poor understanding of key risk indicators was identified as an opportunity for improvement, which should be addressed when adapting the key risk indicator concept to PPP contracts. Expressions related to this second-order dimension included 'I have no opinion about what type of key risk indicators [should be included]' and 'I lack the technical knowledge in this area to provide the technical measures to implement this concept'. Another example is 'I do not have an opinion about the most appropriate format for its operationalisation'.

Building on earlier research output, the analysis identified the second-order theme of future improvements and the potential for adapting key risk indicators to PPP contracts. Sentences such as 'key risk indicators can improve contracts' and 'when key risk indicators are implemented, they can be defined' showed that the introduction of this concept into the framework can contribute to a better understanding of PPP contracts. The ability to replicate and retain knowledge actively is a critical component of learning, capturing and preserving experiences and good practices, as well as improving mechanisms (Berta *et al.*, 2010). Researchers have confirmed the importance of developing knowledge as a decision-making tool (Jin *et al.*, 2020).

The last subgroup of the second-order themes was analysed together because of their strong interrelationships. The interviewees' contributions in this area were essential to building a risk management framework based on key risk indicators. The theme of key risk indicator ownership was connected to the contract monitoring theme, which was previously identified in the second aggregate dimension (Marques, 2018). Monitoring contracts can only be valid if entities outside these partnerships are responsible for performing that task. This argument appeared in various sentences, such as 'the government should create a National PPP Department ... that creates templates to be followed by government institutions when creating new PPP contract tenders'.

The creation of national entities (i.e., PPP units) to control PPP contracts is not a new idea. The overall expansion of these contracts has generated interest in establishing PPP units to implement or analyse PPP arrangements

(Tserng *et al.*, 2012). Developed and developing countries have already put this idea into practice (e.g., Unidade Técnica de Acompanhamento de Projetos¹ in Portugal, the Infrastructure and Projects Authority² in the United Kingdom and the PPP unit³ in Mauritius). The Organisation for Economic Co-operation and Development (OECD, 2010) conducted a study that found support for creating PPP units to improve the existing knowledge about PPP project preparation, procurement and contract performance.

However, these units still have room for improvement. For instance, an inadequate definition of roles and lack of independence can contribute to inadequate PPP project options (OECD, 2010). The existence of PPP units – even those provided with qualified staff – is not enough to ensure the success of PPP projects. Roles must be clearly defined and proper government endorsement and independence achieved (Casady & Geddes, 2016).

The participants' support for the second-order theme of key risk indicator implementation included expressions such as 'these partnerships must be segmented and managed according to the areas of higher risk'. Another example is 'a follow-up committee [should be created to] ... report ... about PPP performance [and] evaluation[s] of both partners'. This theme leads directly to the last second-order theme of key risk indicator assessment, in which the interviewees suggested possible ways to evaluate the performance of PPP contracts. The data analysis identified related interview content including 'assessments to identify poor management performance should be carried out by external consultants to ensure the independence of the results (i.e., midterms report)'. Another instance is the idea of 'assess[ing] the financial health of internal contractual terms'. The key risk indicator assessment was the last yet most important second-order theme identified in the present research on a key risk indicator approach to PPP contract schemes (see Figure 5).

The second-order themes of key risk indicator ownership, key risk indicator implementation and key risk indicator assessment combined to reveal a logical, coherent route to improving how PPP contracts are monitored and controlled. This approach captures existing critical risk assessment methods and assesses critical risk indicators' evolution and trends. The proposed model should facilitate improvements in the current knowledge about contracts and predictions of possible external changes that could have an impact on the terms of the partnerships (Luís *et al.*, 2016).

The development of key risk indicators needs to be tailored to suit each contract needs and objectives. Luís *et al.* (2015) propose that a heat map be constructed to compare critical risks and outcomes with each risk category's narrative and context for each water company. In addition, the identification of significant risk indicator trends must take into account megatrend characterisation, cross-consistency assessment and scenario selection and characterisation including how baseline risks evolve in each scenario (Luís *et al.*, 2016). Future risk identification should be supported by risk recognition, definition, measurement, analysis, measure improvement, control and sustained measures (Blokdyk, 2020).

3.4. Aggregate dimensions' links

The three identified aggregate dimensions are clearly linked. The question of why the PPP contracts are not providing the expected results supports their routes on the first aggregated dimension, context. This leads us to the need to change and to the second aggregated dimension PPP contract issues. For last, the search for a solution

¹ The *Unidade Técnica de Acompanhamento de Projetos* is a governmental entity with administrative autonomy under the Ministry of Finance's supervision. This organisation is responsible for monitoring the PPP processes overall and ensuring specialised technical support, particularly in economic, financial and legal matters.

² The Infrastructure and Projects Authority is responsible for the Infrastructure Delivery Plan and National Infrastructure and Construction Pipeline.

³ The PPP unit is part of the Ministry of Finance, Economic Planning and Development, and the unit controls PPP projects.

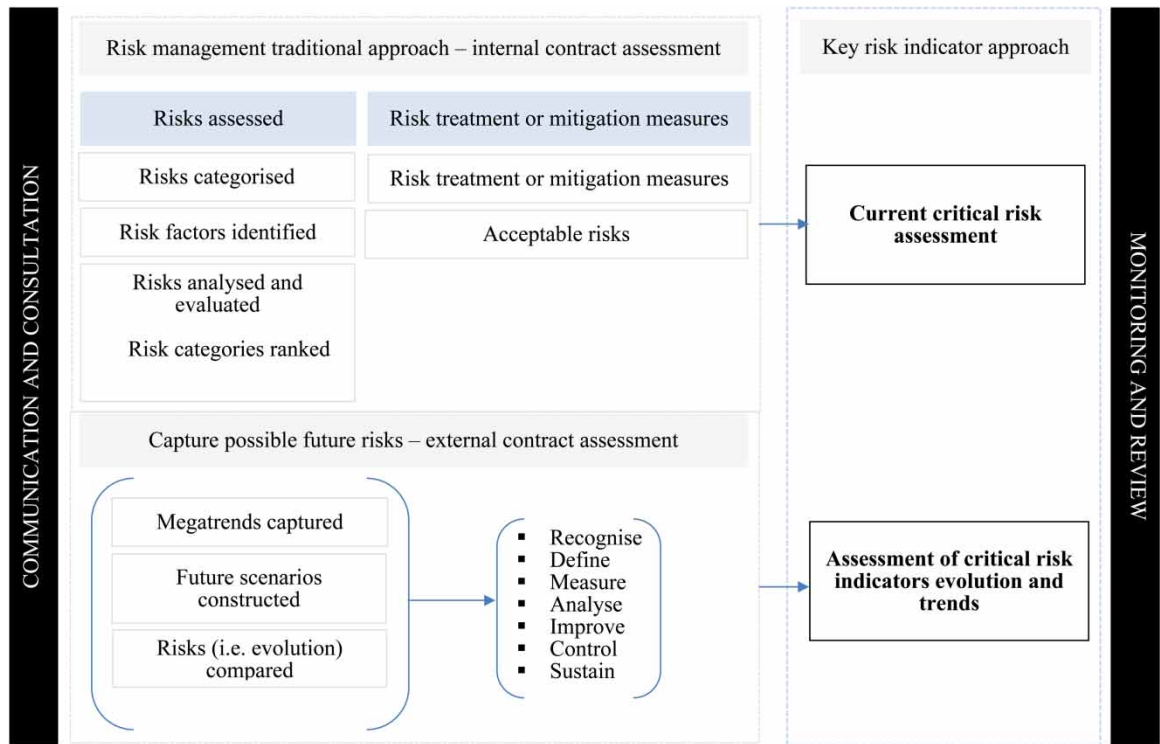


Fig. 5. | Research on the key risk indicator approach to PPP contracts.

conducts us to the key risk indicators in PPP contracts as the third aggregated dimension. The results reveal how the interviewees constructed their opinions and arguments. That is, contexts – followed by PPP contract issues – are logical arguments supporting the third aggregated dimension approach to improving PPP contracts.

The interviews carried out in Mozambique provided insights into how the process should be organised, as well as indicating that the government is the logical process owner. Thus, PPP units already in place in various countries were examined, and their advantages were reviewed. Dedicated PPP units can contribute to increasing countries' attractiveness to private partners as the latter perceive the existence of a sovereign country's PPP programme as providing technical capacity, greater transparency and other good governance principles including predictability and legal certainty.

PPP units, however, have a long way to go and much room for improvement. A solid government reputation associated with high levels of transparency can increase the potential for current and future PPP projects. The literature reports that PPP units can be fundamental to increasing PPP projects' success, but units' qualified personnel and management are not enough to secure this success. Supervision of tasks and governments' legal support combined with PPP units' empowerment and independence are also essential to their ability to fulfil their mission (Casady & Geddes, 2016).

4. CONCLUSIONS

The above findings and discussion were organised to answer the predefined research question: How can key risk indicators improve the current risk management frameworks applied to PPP contracts? The Gioia methodology

was combined with the MAXQDA software analyses to enable the coding of first- and second-order themes. However, a non-probability snowball sampling or networking technique was applied to identify the participants and the results are based on the interviewees' opinions, which constitute a limitation in this study, although the findings are supported by the extant literature and research. A different sample could have produced different outputs.

These research outputs validate the claim that introducing key risk indicators supports and improves the existing risk management frameworks. Forecasts of macroeconomic and market trends are at present difficult to introduce into PPP arrangements during the procurement phase until after contracts are signed. Contract renegotiation is available as an alternative solution, but this option is costly and time-consuming. PPP units are a solution broadly used, and with space to improve, emerging as a logical owner for the implementation and control of the key performance indicators.

Therefore, future research should choose a different combination of sampling criteria in order to include a different range of PPP contract-related experience (i.e., different sectors and social and economic contexts). Expanding the geographical context (i.e., amplify the interviewees' scope to other developing countries' context beyond Mozambique and compare with similar countries) will enrich the study results.

In addition, introducing key risk indicators into PPP contracts shows promising results, so further research is needed to explore and test a risk management framework that includes key risk indicators in PPP contracts.

DATA AVAILABILITY STATEMENT

Data cannot be made publicly available; readers should contact the corresponding author for details.

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