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Owner capabilities in social infrastructure projects: Towards an expansion of the dynamic capabilities' framework

Abstract

Purpose - The project organising literature has increasingly paid attention to the dynamic capabilities required for the development of projects. The current research aims to expand the dynamic capabilities framework by including owner capabilities required throughout the whole project lifecycle.

Design/methodology/approach - The research uses an interpretive qualitative research approach. 19 semi-structured interviews were conducted with the key actors of a social infrastructure project.

Findings - The findings suggest that the expansion of the dynamic capabilities framework to include owner capabilities required throughout a project lifecycle could impact positively in the success of a project. "Transformational capabilities" are recommended to enable the owner to overcome challenges and lead the evolution towards project organisations that are capable of transforming its outputs into beneficial use.

Originality/value – Existing research on dynamic capabilities does not address the particular challenges of social infrastructure projects such as housing. The current research fills this gap by exposing the challenges experienced by owners in the development of certain capabilities and their impact on the performance of a project.

Keywords - Owner capabilities, Capable owner, Leadership of projects, Project organising, Social infrastructure

Paper type - Research Paper

1. Introduction

The theory of dynamic capabilities establishes that these are required to develop and preserve the tangible and intangible resources that underpin a business' sustainable superior performance (Teece *et al.*, 1997; Helfat and Peteraf, 2003; Teece, 2007). The established research on project organising focuses on the dynamic capabilities required for suppliers in the execution phase of projects but excludes key elements that are critical for the success in the leadership of projects (Morris, 1994; Morris, 2013). For this reason, Winch (2014) proposes a new conceptual framework regarding the relations among those involved in project organising, to include all the actors that form part of the project coalition called the "three domains of project organising": the suppliers as project-based firms, the projects and programmes, and the owners and operators. It is key to comprehend the relations between the organisations that are involved in the development of a project for further understanding of the causes that lead to its outcome.

Outputs of a project need to move into beneficial use in order to achieve the outcomes of the project; and its owner should possess certain capabilities for this transformation to occur (Cha *et al.*, 2018; Zerjav *et al.*, 2018; Davies *et al.*, 2016; Winch,

2014; Aritua *et al.*, 2009; Morgan *et al.*, 2008). Based on Winch (2014) and Davies and Brady (2016), recent contributions to the study on project organising have identified the importance of these owner capabilities (Adam *et al.*, 2019; Cha *et al.*, 2018; Zerjav *et al.*, 2018; Turner and Muller, 2017; Winch and Leiringer, 2016). On this subject, Winch and Leiringer (2016) define areas of capabilities required by owners in the context of transportation infrastructure projects for the implementation and arrival to successful outcomes. The authors, as well as Davies and Brady (2016) and Cha *et al.* (2018), call for further studies on the processes of capability development within the perspective of the owner organisations. The aim of this article is to respond this call by investigating the development of capabilities and the particular challenges in the process, for owners associated with social infrastructure projects, where housing is the principal output and homes the principal outcome. The research also contributes in showing that the Winch and Leiringer (2016) theory applies to settings apart from the one in which it was studied (Gibbert and Ruigrok, 2010).

Social housing has a major relevance globally. The World Bank (2016) reports that 1.2 billion people live in substandard housing and that by the year 2030, 3 billion people will need new housing and associated infrastructure. An investment of approximately $16 trillion is required to replace substandard housing and build additional units by the year 2025, of which $1 trillion to $3 trillion may have to be funded publicly (McKinsey Global Institute, 2014). The economic implications of social housing should be considered, such as the increment of productivity of a city by including lower-income populations into the economy. The correct

implementation of social dwellings could also enable the mobility of labor, increase consumption of households, and in the long-term, allow people to move up the income pyramid, thus helping the GDP growth (McKinsey Global Institute, 2014). Consequently, the effects on society could be detrimental if social housing is improperly implemented. It is thus fundamental to further study the organisational aspects of projects in this area in order to contribute to a more efficient performance and effective delivery. Specifically, the role played by the owners of social infrastructure projects is worth analysing, considering the relevance of the "strong owner" concept introduced by Morris and Hough (1987), and further developed by Winch and Leiringer (2016) and Adam *et al.* (2019) through the capabilities needed to become a "strong owner".

The research questions this article aims to answer are:

RQ1. What are the owner capabilities necessary for successful outcomes of social infrastructure projects?

RQ2. How can challenges arising from the development of owner capabilities be addressed in social infrastructure projects?

These questions are of value to the project organising literature, as they address the need for research into the owner's role in projects. The identification of challenges arising during the development of a social housing project, and the recommendation of development strategies become of central relevance considering the mentioned global housing deficit and its impact on global economy. It also

serves as a guide for owners of social infrastructure projects to become a "capable owner", improving the development of projects and assuring successful outcomes.

The following sections will portray the theoretical framework of dynamic capabilities. The role of the owner will be addressed, and the capabilities required for the successful outcome of projects will be analysed. This insight will then be applied to the importance of an analysis of the owner's role in social infrastructure projects. This is followed by an overview of the research methods used, which explains the case study approach adopted and the way the collection and analysis of data were performed. The owners' capabilities and the challenges that emerge in their development during a social housing project are then examined, followed by an analysis in the light of the reviewed literature. The final section provides the contribution of this article, the limitations of the study and a proposal of future research directions.

2. Capabilities

2.1. Conceptualisation of dynamic capabilities

Traditional research focuses on analysing dynamic capabilities as a firm's ability to adapt skills, competencies and resources with environmental changes (Teece *et al.*, 1997) to obtain unceasing competitive advantage. From the point of view of the strategic management literature, capabilities are defined as the collection of individual competencies and resources that can lead to the achievement of the goals of an organisation (Cha *et al.*, 2018); these are practice-oriented and keep changing

throughout the lifecycle of firms (Rungi, 2014). According to Helfat *et al.* (2007) dynamic capabilities, signify the ability of maintaining, creating, extending or modifying an organisation's resource base through the improvement of its practices. In the case of a stable and predictable environment, dynamic capabilities focus on exploitation and enforcement of operating routines, whereas in volatile and uncertain environments, these capabilities emphasise exploration and the creation or change of operating routines, and thus have a fragile and fluid behaviour (Davies *et al.*, 2016). Dynamic capabilities are distinguished from operational capabilities which are central to the achievement of the organisations ongoing goals (Helfat *et al.* 2007; Helfat and Winter, 2011). Operational capabilities are focused on the resolution of problems and task accomplishment; that is, the capacity of the organisation to coordinate its assets for the provision of products and services to its clients in an efficient and effective way (Winch and Leiringer, 2016). It is Davies and Brady (2000) who introduce the term of project capability as the capabilities required for the successful development of a project. The authors further extend their study and differentiate between project and dynamic capabilities, placing the first at the operational level and the latter at the strategic level (Davies and Brady, 2016). Most of the current body of knowledge mentioned, as being execution-oriented, is focused on the delivery of the outputs of the project, rather than the realisation of the beneficial outcomes which are the central objectives of the investment (Cha *et al.*, 2018) performed by an owner organisation.

2.2. Owner project capabilities

Contrary to Davies and Brady (2016) who distinguish between project and dynamic capabilities from a supplier's perspective; recent research has proven that dynamic and operational capabilities in projects are connected closely from an owner's perspective (Zerjav *et al.*, 2018). Winch and Leiringer (2016, p. 272) define owner project capabilities as: "the dynamic capabilities required by the owner organisation for the acquisition of infrastructure assets in order to extend or improve its operational capabilities". Project capabilities are required to reconfigure and adapt to changes in the project environment (Zerjav *et al.*, 2018). Winch and Leiringer (2016) develop a framework to understand the capabilities required by owners to achieve the position of "strong owner", and thus reach project success, in the context of transportation infrastructure projects. Three areas of capabilities are described as required by the owner to implement its projects and arrive at a successful outcome; which are: strategic, commercial and governance capabilities.

These strategic capabilities are full responsibility of the owner organisation alone. Selection of projects and definition of its mission, financing and managing the selected projects and their stakeholders, and the coordination of the portfolio of projects form part of these strategic capabilities (Winch and Leiringer, 2016). As for the commercial set of capabilities, they refer to the capabilities required by the owner when relating to its supplier (Bröchner *et al.*, 2004; Cha *et al.*, 2018). Capabilities included are the ability of dividing and packaging the project, contracting, and interacting with the suppliers effectively, basing the relations both on formal

methods and on trust. The governance capabilities underpin the interface between the owner and the project. They include assurance capabilities in terms of control mechanisms throughout the whole progress of the project, project coordination capabilities and finally the capability of asset integration to manage the transfer to operations and bring the asset into beneficial use (Sergeeva, 2019).

3. Owner organisations

3.1. Owner conceptualisation

Owner is defined as a relatively permanent organisation that creates a temporary organisation to obtain value (Turner, 2006; Winch, 2014). Even though in 1987 Morris and Hough already identify the relevance of a "strong owner" for obtaining high performance on major infrastructure projects, much of the literature continues to see owners mainly as customers of contractors providing products or services for the delivery of the project, instead of putting them in the central position that they should have and analyse all the facets of their strategic role (Winch, 2014). Engwall (2003) uses the concept of "parent organisations" and refers to the need to examine their linkages with the project. Turner (2006) acknowledges the role of the owner as the one that "provides the resources to buy the asset and will receive the benefit from its operation" (Turner, 2006, p.95). Flowers (2007) examines the main challenges encountered by clients that acquire high-technology capital goods, systems and services. Love *et al.* (2008) recognise the importance for clients to

perform an appropriate selection of the procurement method that will assure them value for money and the accomplishment of the project objectives.

Aritua *et al.* (2009) highlight the necessity for the public sector to become an "intelligent client" to fulfil the expectations and overcome the increasing pressure from end-users and stakeholders of major programs and projects. Bröchner *et al.* (2004) discuss the ways owners of multi-tenant office building pursue various strategies for providing services to building users. They suggest that service-offering owners should enhance their strategic capabilities by monitoring and coordinating service delivery. Gil (2009) explores the challenges experienced by project clients of new infrastructure developments when applying a relational contracting strategy, and ways to overcome them. Hui *et al.* (2008) recognise that construction owners with high involvement in their projects tend to accomplish better results.

3.2. Importance of a capable owner

The relevance of the owner role and the importance of its capabilities is being recognised further in recent literature. Cha *et al.* (2018) acknowledge in their work the importance of owner capabilities and explores those required in the context of Information Systems (IS) projects. The authors highlight training and skill development, and knowledge and experience transfer as key project back-end capabilities. The engagement of the project owner, commercial and contract management are mentioned as important project front-end capabilities. In addition

to these two categories of capabilities, the significance of a coherent implementation of project governance is also emphasised.

Davies *et al.* (2016) analyse the importance that the owner plays in the success of a complex project when implementing effectively its capabilities in the case of London Heathrow Terminal 5. The scholars identify a process consisting of three phases through which dynamic capabilities are developed. The learning phase is used to identify the processes, technologies and practices to be used, through an analysis of previous own and external experiences, and lessons learned. During the codifying phase, the processes are articulated through formal procedures. Lastly, in the mobilising phase, the procedures established should be applied and maintained.

Adam and Lindahl (2017) recognise the usefulness of the dynamic capabilities framework when examining the ways a public client organisation senses, seizes and transforms opportunities. Adam *et al.* (2019) investigate the dynamic capabilities of construction owner organisations in the healthcare sector and suggest that the approaches for developing new project capabilities for studies firms differ depending on the level of stability in the environment and resource utilisation.

3.3. Owner organisations and project success

The main aim of owners when embarking on projects is to achieve project success, in terms of the accomplishment of the expected benefits of the investment (Cooke-Davies, 2004; Winch and Leiringer, 2016). The degree to which the objectives of all stakeholders of a project are met, throughout its lifecycle and at all levels in the

management hierarchy, determines the success or failure of a project (De Wit, 1988). According to Samset (2008), most of the attention of project success is focused on its tactical performance. This comprises the efficiency indicator that evaluates the project output in terms of compliance with budget, schedule, quality and scope of a completed physical asset. However, these parameters only provide a narrow view of the success of a project (Spencer and Winch, 2002) rather than effectiveness in terms of the outcomes provided by the asset in beneficial use. Only by achieving both criteria, can it be said that the a project is successful. Analysing further the strategic success factors mentioned by Samset (2008), there are four more indicators to consider. The relevance of a project implies the alignment of its objectives with the needs and priorities that justify the decision to undertake it, and the real effect that can be expected to have on others. The effectiveness of a project is obtained by assuring that the intended effect will be accomplished as planned, that is, that the project's objectives are realistically attainable. Sustainability is secured, and adverse impacts are avoided when a deep analysis of the context in which the project is implemented and operated is performed. This includes identifying all stakeholders involved, their needs and priorities, and fostering communication and involvement among all participants.

Given the owners' main purpose of achieving successful outcomes in their projects, in terms of project accomplishment and post-implementation benefits (Cha *et al.*, 2018), it is important to analyse the capabilities required by them, with regards to the strategic decisions to be made, the commercial interface with project-based

firms (Bröchner *et al.*, 2004), and the governance interface with projects and programs (Sergeeva, 2019).

4. Owner capabilities in social infrastructure projects

The concerns over the performance of infrastructure projects are global. Frequent problems identified include overruns in budget and schedule, low productivity, bad quality, unsatisfactory revenue and deficits in investment (Flyvbjerg *et al.*, 2009; Kessides, 2004). There is a need to improve the performance of infrastructure projects to be able to increase the productivity of the economy and assure the wellbeing of the growing population (The World Bank, 2018; IDB, 2017; ICE, 2017). A particular emphasis has to be placed on social infrastructure projects, to which the literature has given little attention in terms of their organisation. Love *et al.* (2012) analysis of the deficiencies in social infrastructure projects in Australia does not examine further the organisation of this type of projects, nor the relations among the participants.

Analysing the situation of social housing specifically, Okuwoga (1998) and later Ojo, Adeyemi and Fagbenle (2006) set their studies in Nigeria, concluding that the performance of public sector housing projects is unsatisfactory, specifically in terms of cost and time. The authors measure the magnitude of the overruns; however, do not point out the root causes of the underperformances neither focus on analyzing the organisation of the projects and the relations between those involved. The importance of the owner has practical implications for the infrastructure sector. The

UK construction industry, specifically the Infrastructure Clients Group under the auspices of the Infrastructure and Projects Authority is working on a new approach to delivering high performing infrastructure. The report "From Transactions to Enterprises" commissioned by the ICE in 2017 constitutes a milestone since it recognises the deficiencies of traditional commercial approaches based on transactional relationships, disintegration and disaggregation. The group argues the pursuit of the lowest price by clients, and the inability of contractors to manage delivery processes efficiently and to assume the risks clients transfer them through contracts. "Project 13" is introduced then as an initiative to improve the management and delivery of high-performing infrastructure in the UK (ICE, 2017, 2018). "Project 13" proposes the creation of project enterprises with integrated core functions of the infrastructure owners plus the capabilities of advisors and suppliers. Five features are defined as fundamental for this new approach: a governance framework, a coalition of owners and suppliers as organisational structure, integration through effective teamwork underpinned by a capable owner, and digital transformation as a change enabler. The owner is seen as an organisation that should be able to articulate the voice of the customer and operations. The owner should also have a value-driven mindset, be able to relate with the supply chain and create complex systems. Furthermore, the ability to recruit, build and retain talent is fundamental. An example of this from the UK rail sector is provided in Winch and Msulwa (2019a,b).

However, the extant literature does not address in any way the role of the owner in the context of social infrastructure projects, nor are there studies focused on

developing economies. Table 1 summarises the references made to owners and their role in different contexts.

<Table 1. References to owners in literature.>

5. Research methods

5.1. Research context

A social housing complex development project is the unit of analysis used in this research. The San Francisco project proposes an integral housing solution for the inhabitants of problematic flood areas in the city of Asuncion, the capital of Paraguay, by relocating 1,000 affected families into a new and safe area. The flooding is the result of a cyclical increase of the water level of the Paraguay river; which takes place every year, and it aggravates when the "El Niño" phenomenon occurs. San Francisco is currently the most important project developed in the history of the country in terms of social dwellings (Itaipu, 2016) to address partially the deficit of over 1,100,000 homes the country experiences (Habitat for Humanity, 2018). The project proposes multi-family buildings and single-family houses to accommodate the families, as well as infrastructure and public services (Itaipu, 2016).

The Paraguayan government entrusted the design, development and funding of this project to Itaipu, a binational company owned by the governments of Brazil and Paraguay. Itaipu is the owner and operator of the hydroelectric power plant that

provides energy to both countries. Apart from its core business of energy provision, Itaipu develops a portfolio of construction projects in order to accomplish its corporate responsibility strategic objective (Itaipu, 2018).

Figure 1 schematises the organisation of the project, the stakeholders involved and the relations between them. The main stakeholders identified correspond to Itaipu as the owner organisation, the suppliers as the project-based organisations, other government institutions as the operators, and the families as final users. The design was originally outsourced to the Faculty of Engineering of the National University, and later finished by Itaipu's in-house design team. For contracting purposes, the construction phase of the project was separated into 24 different packages. Contracts were awarded through traditional bidding processes, in which the lowest price was awarded once financial and experience requirements were verified. Itaipu's Board established a PMO (Project Management Office) on site, with junior project managers.

The Paraguayan government established the operators to whom Itaipu should hand over the facilities. The Ministry of Public Housing (Senavitat), as main operator of the dwellings, performed the social process in terms of the evaluation, selection and training of the families. In order to support Senavitat in these tasks, Itaipu contracted two NGOs (Non-governmental organisations) specialised in social development. Other operators constitute the service providers of water and electricity, and the City Hall in charge of the roads and common areas such as parks.

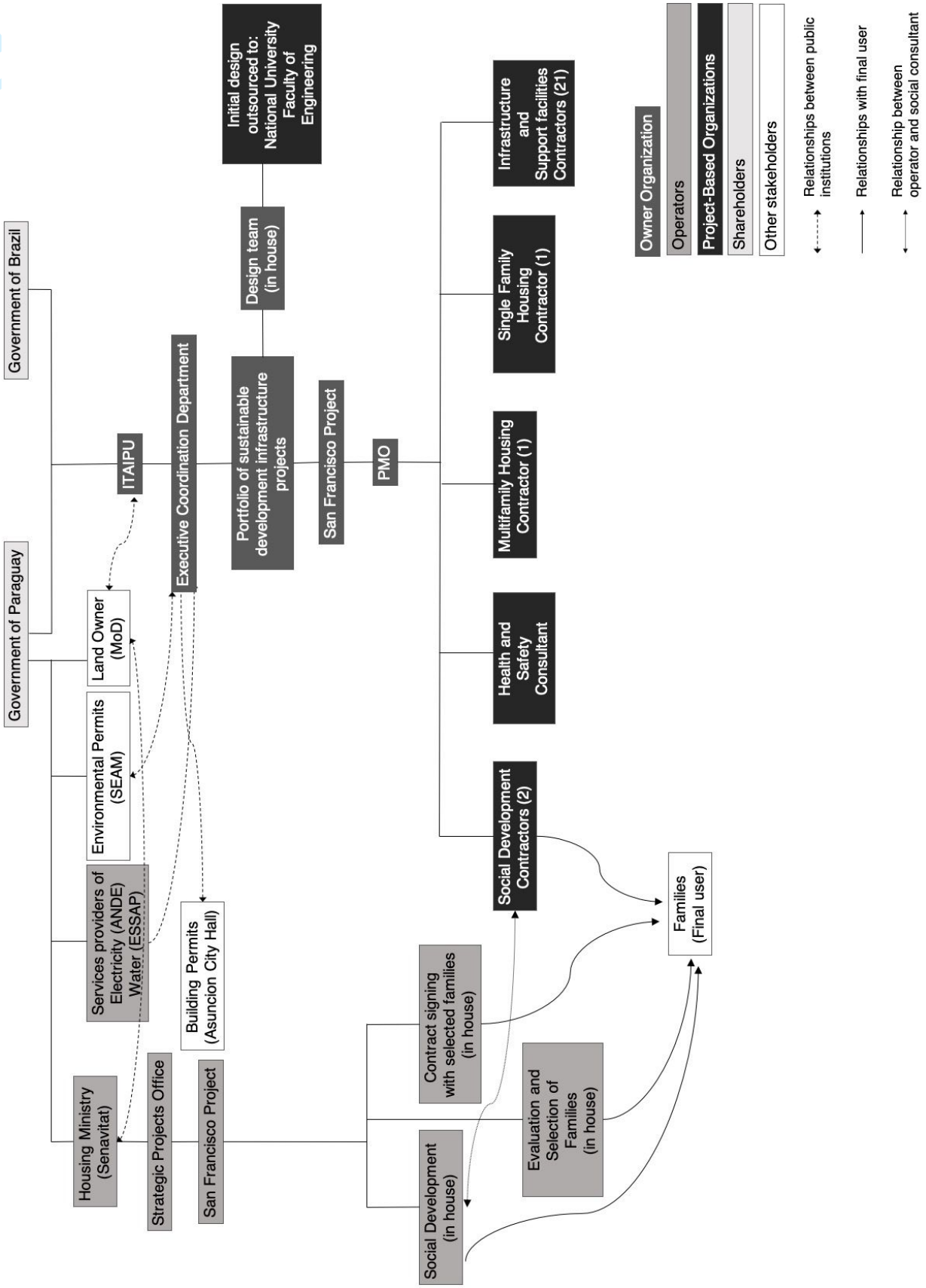
Government of Brazil
Government of Paraguay
ITAIPU
Land Owner (MoD)
Environmental Permits (SEAM)
Services providers of Electricity (ANDE) Water (ESSAP)
Building Permits (Asuncion City Hall)
Housing Ministry (Senavitat)
Strategic Projects Office
San Francisco Project
Executive Coordination Department
Portfolio of sustainable development infrastructure projects
San Francisco Project
PMO
Initial design outsourced to: National University Faculty of Engineering
Design team (in house)
Infrastructure and Support facilities Contractors (21)
Single Family Housing Contractor (1)
Multifamily Housing Contractor (1)
Health and Safety Consultant
Social Development Contractors (2)
Contract signing with selected families (in house)
Evaluation and Selection of Families (in house)
Social Development (in house)
Families (Final user)
Owner Organization
Operators
Project-Based Organizations
Shareholders
Other stakeholders
Relationships between public institutions
Relationships with final user
Relationship between operator and social consultant

Figure 1. Organigram of the project.

5.2. Data collection and analysis

Based on the unique and complex situations in the field of projects, and the main aim of this research study to have a more holistic and contextual understanding of these situations (Bhattacharya, 2012), an interpretive qualitative approach is adopted. It is based on a single case of the organisation of a social infrastructure project. The San Francisco case presented an owner organisation with a central role and a large number of actors and stakeholders involved. This created the ideal scenario for analysing the capabilities and the challenges that arose thereby increasing the richness of the case study.

Semi-structured interviews were used as the data collection method. In order to gain an in-depth understanding of the role of the owner, 19 individuals who were actively involved in the San Francisco project were interviewed using a laddering technique (Bourne and Jenkins, 2005). The size of the sample follows the idiographic aim of seeking an intensive analysis of each interview, giving each individual a locatable voice within the study (Robinson, 2014).

The respondents can be grouped into three categories, the owner organisation, the suppliers which are project-based organisations, and the operator, as seen in Figure 1. Among the owner, interviews were conducted with individuals with key positions during the project, such as the project director, the project manager, site

managers and the design team. The suppliers interviewed include site managers and directors of contracting companies with contracts representing 80% of the whole project in terms of budget. Finally, representatives of the Housing Ministry (Senavitat) were interviewed, which constitutes the main operator of the complex.

Based on the two research questions of this study, the interview questions were prepared, considering Winch and Leiringer (2016) framework of owner project capabilities. Each question was related to one capability. Subsequently, questions about the role of the owner, its main strengths and weaknesses, how to overcome them and improve the performance were asked. First order data was initially obtained, coded and compounded from the respondents' views. The obtained codes were then organised into second-order themes, drawn from theoretical concepts, to extract the essential meanings and more important aspects into theoretical dimensions. Lastly, the terms, themes and dimensions were assembled into a data structure (Gioia *et al.*, 2013). The interview data was transcribed and analysed using the software application NVivo 12. The process of elaboration of the codes consisted of assigning each set of capabilities to one code. In this way, three groups were created for the strategic, governance and commercial capabilities. Subgroups with the corresponding capabilities for each set were then generated. Later on, other codes were added, such as the role of the owner, its weaknesses, and mitigation suggestions. The common themes across all the interviews are presented below.

6. Findings

6.1. Role of the owner

In terms of the overall performance of the owner and its influence in the development of the project, respondents saw Itaipu's role as active during the whole project, but with deficiencies which impacted on the performance of the project.

6.2. Key challenges for the development of owner capabilities

- *Strategic capabilities*

Even though the importance of the project selection and project mission definition capabilities was clear for the interviewees, no evidence of formal processes of investment appraisal or cost-benefit analysis were found in the San Francisco case prior to the allocation of the capital. The form in which the project was chosen reveals the idiosyncratic, political and religious influences in the selection of social infrastructure projects, particularly in developing countries.

Difficulties were identified by the interviewees in terms of the stakeholder management. The owner's closed mindset that led to each project team working as silos, and a deficient communication of the project and its impact to the community were the challenges identified in the management of the stakeholders involved:

"Itaipu should try to work in an open way with other institutions, which will finally be the operators of the infrastructure, and not work as a cloister" (Project coordinator from Operator institution).

"At some point, we were notified by Itaipu that we couldn't make anything from the project public. They thought that communicating the information could generate them problems internally or with the Government, when in reality, people were anxious to know what was being done" (Director of construction company).

- *Commercial capabilities*

Considering the packaging capability, every group of interviewees coincided that the breakdown of the project into packages was necessary, but done in a way that led to a series of complications during the execution phase. As seen by the Project Director from Itaipu:

"Particularly I think the division of works was beneficial for the project, considering the optimisation of costs and specialisation of each contract. Yes, it generated more pressure over the articulation of works as well"

The deficiencies in the clustering of contracts impacted on the execution stage, in terms of an overlap of works that demanded an extremely fine coordination from the Project Management Office (PMO). In the lack of it, reworks were a constant, leading to time and cost overruns.

The failure to contemplate the technical and financial capabilities of tenderers, and the prioritisation of the lowest price to award contracts led to the selection of contractors with insufficient capacity. This resulted in difficulties in the completion of the contracts satisfactorily, and the inability of contractors to absorb eventual risks that arose. Furthermore, the negotiations over additional works were described as

exhausting by both sides. This perhaps was due to the lack of contractual mechanisms that could facilitate the process.

The observations did not indicate the existence of trust-based relations between the owner and suppliers in the San Francisco project. Itaipu's rigid attitude when uncertainties appeared on site and its inability to foster cooperation among contractors were the difficulties encountered regarding its relational capability. One of the participants described Itaipu's attitude as "closed and little participatory".

"Itaipu considers that all they do is perfect… They don't allow different ideas. This is the 'Itaipu culture'. When real problems come up on site, the responsibilities go over the contractors, Itaipu does not assume its responsibility in the lack of general management" (Director of construction company).

- *Governance capabilities*

During the initial stages of the project, from the feasibility and definition processes, no formal revision was performed. Particular emphasis has to be put on the defective design as a result of the poor verification.

"As soon as a design was finished, after a few days, it already passed to a procurement process for its construction, which was a very fast process. The contract was awarded, and the construction started. The priority of Itaipu was to accelerate the processes" (Former member of Itaipu design team).

The poor revision of the designs had its consequences during the construction stage. All suppliers interviewed agreed that the designs received were incomplete, with numerous errors and in several cases a complete redesign was necessary:

"We had several problems with the design Itaipu gave us. It had to be completely redesigned" (Director of contracting company).

The suppliers stated as well that during the construction phase, the PMO established by Itaipu was present on site, but their work in terms of follow up and control was deficient:

"In our contracts, it was notorious the deficient supervision and control, which led to reworks, since the directions we received from the PMO were not clear" (Director of contracting company).

The lack of a formal procedure to supervise the social process and the absence of parameters to measure its advancement, resulted in a series of difficulties involving the final users. This led to disorganised and unsystematic processes of organisation of the selected families, training in the use of the facilities and moving into the complex. The Director of the social consulting company remarked:

"I do not see that they have a standard to measure the social intervention. They have a lot to learn in terms of the social process that needs to accompany the infrastructure"

A deficient arrangement of the internal managerial resources had an effect on the proactiveness of decision-making processes. The concentration of the decision power over the senior professionals, with work overload from San Francisco and other projects, was noticed by the Director of one of the contracting companies:

"There were professionals assigned but the senior management office was in Ciudad del Este [city at a 330 km distance from the project site]. They came to the site but when they did, they had to attend so many issues from all the contracts. Perhaps they should have empowered the Project Management Office (PMO) more. They had their representatives which were young professionals with little previous experience that did not have any decision power…"

The weak involvement of the institutions acting as operators at the front-end process resulted in difficulties in the delivery of the assets. The lack of consideration of the final user and a deficient maintenance plan, caused problems in the use of the facilities. Even though there was a relation between Itaipu as the owner, the operators such as Senavitat, Essap and others, and the selected families as final users; there was an absence of actual connection between them.

"The moving of the families could have been performed in a better way if the planning was respected, but the urgency killed the important. Families were completely flooded. All the planning and program for the moving was changed drastically…" (Director of social consultant company)

"There was the difficulty that the institutions that should be receiving and operating the facilities were not doing so… Since they were not receiving the facilities, all vandalism acts and problems due to misuse had to be fixed by Itaipu… Basically, this is because the institutions were not doing a good job in training on how to use the facilities" (Site Manager from Itaipu)

"When working with vulnerable populations, certain aspects have to be taken into account in the designs, prioritising the security and not so much the image. Keep in mind for whom the design is. I think this was one of the weaknesses… I think that a design contemplating the final user is key" (Project Coordinator from Operator institution)

The main challenges encountered are grouped and summarised in Table 2.

<Table 2. Challenges in the development of owner capabilities.>

6.3. Owner Capability Improvement

Interviewees were asked to propose improvement forms to overcome the mentioned challenges. Two capabilities, project coordination and assurance, should be emphasised in their importance. The failure in their implementation could lead to problems in the development of the other capabilities.

The analysis revealed the importance of an efficient organisation of internal resources; specifically, human resources in terms of project staffing; to assure an efficient distribution of tasks and responsibilities that enhance work proactivity. The concentration of responsibilities and decision power with the senior management not involved in the project on a regular basis has proven to be counterproductive for the development of the project.

The analysis confirmed the significance of efficient assurance processes to minimise challenges that lead to delays in schedule, overruns in costs, issues with

the quality of materials and products, possible tension in the relations with suppliers, and difficulties in the handover to operations of the project. For this, it is fundamental to implement formal and effective revision processes between and within each stage of the project. Particular emphasis has to be made to the verification of the design stage.

6.3.1. Transformational capabilities

The study revealed that strategic, commercial and governance capabilities do not embrace certain key aspects of the role of a truly "capable" and "strong" owner. These aspects are required by the owner itself and expected from the owner by the stakeholders involved in social infrastructure projects.

A change of the traditional culture of working in isolation to a more inclusive and open organisation of works, fostering cooperation between all parties involved is recognised of particular importance in social infrastructure projects. A *collaboration* capability encompasses these aspects, which should be adopted from the front-end of projects, at initial stages of feasibility studies.

At the same time, owners need to evolve from the traditional contracting forms focused on the lowest price, to innovative, more collaborative contracts, where risks are shared and not transferred completely to suppliers. Innovation should also be encouraged in terms of sustainable and resilient social infrastructure. An *innovation* capability is thus proposed, also required from the initial front-end processes.

In pursuit of continuous improvement, a systematisation of the lessons learned is key, to assure the transfer of these lessons to the owner organisation for the improvement of its future projects. *Project-led learning* is hence recommended, as a back-end capability.

Lastly, it is vital that a connection is established between the owner, the operators and the final users at the front-end of projects. The consideration of the final user characteristics and necessities at the front-end is a crucial issue, as it has been proven in this case the high prominence for social infrastructure projects of the final user. The implementation of a formal process for the supervision of social works that should accompany the infrastructure works is key. A clear and efficient communication of the project to all stakeholders involved, principally to the users, is necessary. It is then suggested, a *user-driven mindset* capability, at the front-end of projects.

Collaboration, *innovation*, *project-led learning* and *user-driven mindset* capabilities are proposed as a set of transformational capabilities. Figure 2 schematises the improvement forms suggested and their corresponding capabilities.

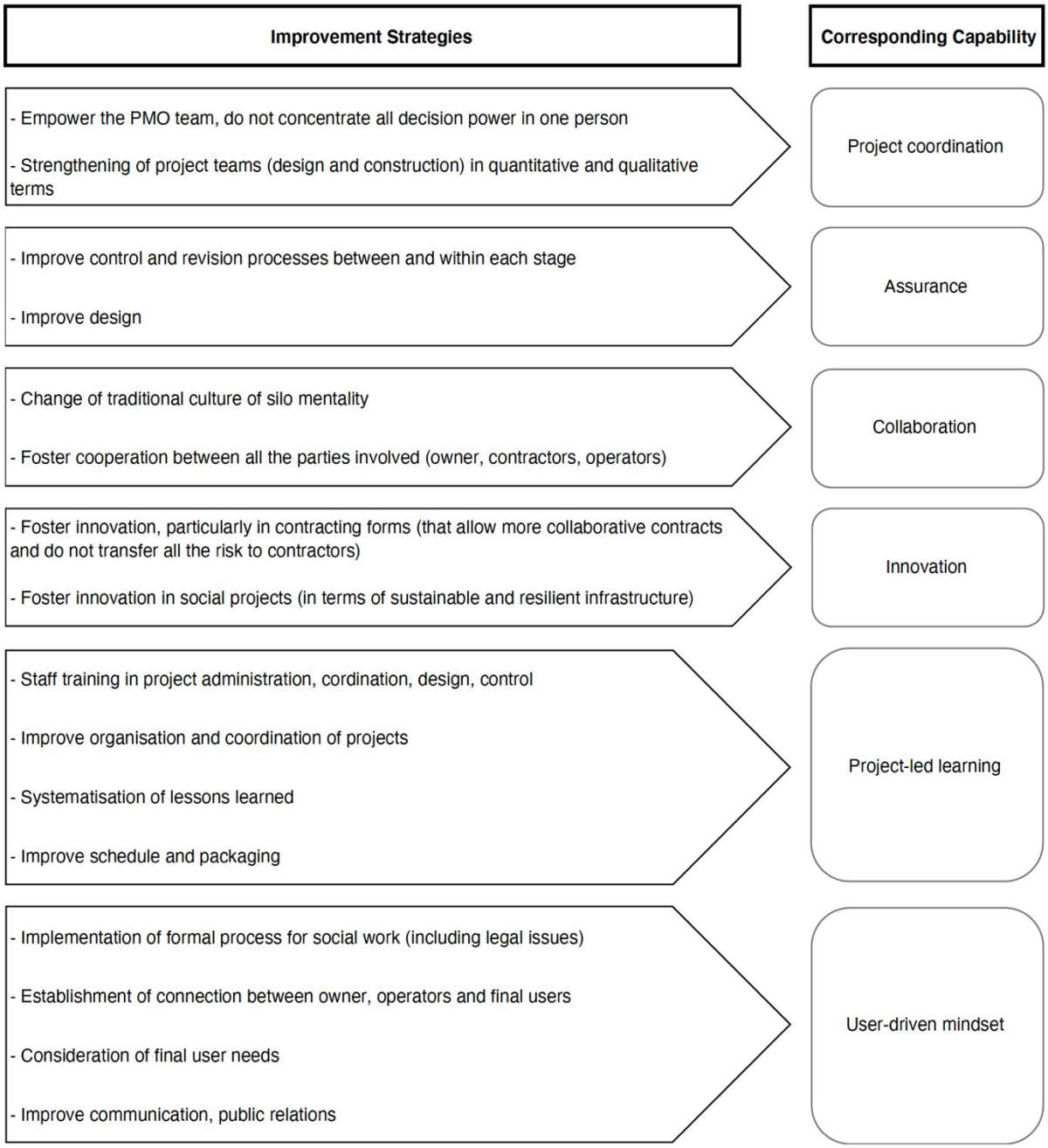

Figure 2. Improvement strategies and their corresponding capabilities.

6.4. Owner capabilities along social infrastructure projects' lifecycle

The analysis indicates that the three sets of owner capabilities; strategic, commercial and governance, apply to social infrastructure projects and that the active and capable role of an owner is of central relevance for an efficient

development of the project. In addition, this study recommends the set of transformational capabilities: collaboration, innovation, user-driven mindset and project-led learning.

Figure 3 proposes the stage in which each capability is required during a project lifecycle. The significance of "dynamic" stands out, as each capability flows throughout the project lifecycle, has to reconfigure or adapt at different stages. For example, the mission definition capability should occur right through, so the owner can keep in mind and communicate the mission to the stakeholders that become involved at the different stages of the project. Capital raising is also required right through the project, when funding is given for certain stages, or in the event that additional financing is needed. Asset integration and project-led learning go backwards, because even though they occur at the back-end, they should be considered since the front-end of any project.

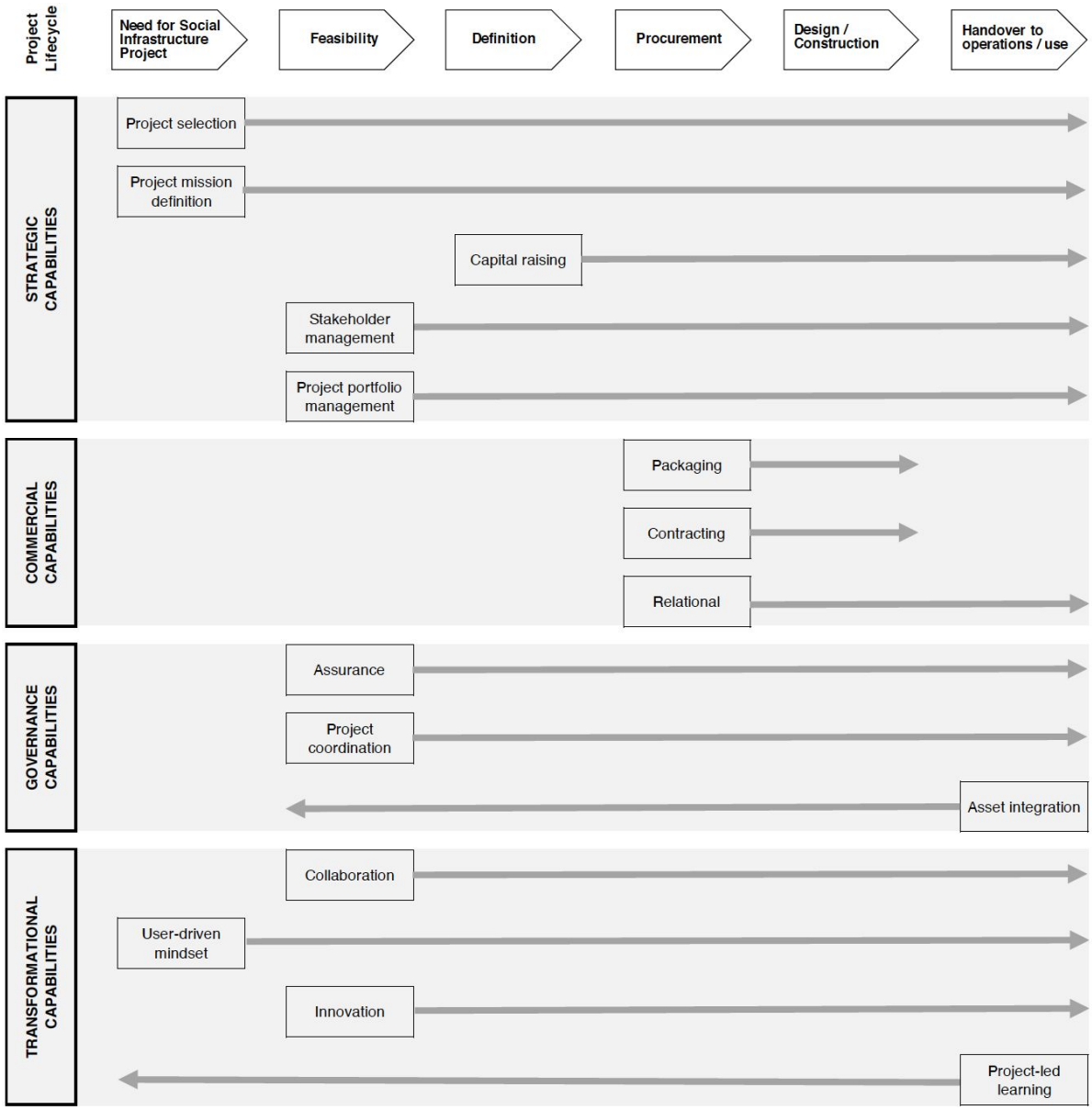

Figure 3. Proposal of owner capabilities and their application throughout a project's lifecycle.

7. Discussion

7.1. Reflection on the role of the owner and its capabilities in projects

This study confirms the need to broaden the perspective of established body of knowledge of the dynamic capabilities' framework to the whole life cycle of projects. The execution-oriented segregated vision has led to the focus on the obtention of

each organisation's goals, with unsatisfactory performance of projects; instead of an integration of all the parts that form part of a project to carry it into beneficial use. With regards to most recent research, specifically the conceptualisation that Winch and Leiringer (2016) and Adam *et al.* (2019) make of owner capabilities as the dynamic capabilities necessary for owners to acquire infrastructure assets that enhance its operational capabilities, it can be argued that this definition is limited to a context of economic infrastructure. From the viewpoint of an owner of social infrastructure projects, its main aim is different from the extension or improvement of its operational capability. From the findings of this study, it is suggested that the main purpose of owners of social infrastructure projects is to fulfil a social responsibility objective. The final user acquires a central role in this type of projects. In order for the owner to achieve its objective, the final user necessities are required to be satisfied. Only then it can be said that the owner achieves its objective. It is proposed then, as the definition of owner capabilities for owners of social infrastructure projects: the dynamic capabilities necessary for owner organisations to achieve the outcomes of the project, by transforming the outputs of a project into beneficial use.

In the case of San Francisco, the user was not completely considered in terms of its requirements and idiosyncrasy. Thus, Itaipu has not yet succeeded in turning the outputs of San Francisco into beneficial use for its users, that is to say, turning houses as outputs from the project process into homes for the families as the final outcome. From the findings, it can be inferred that this is a complex process that

involves an emphasis on the final user and the collaboration of the operators; and that the handover to use of the project should be precisely planned and performed accordingly, coinciding with Zerjav *et al.* (2018) study.

According to our results, it is necessary to note the limits encountered in the scope of certain capabilities studied by Winch and Leiringer (2016). In particular, their analysis of the stakeholder management capability, although considered as central to managing large projects, does not afford a high priority to the final user. The result of this research highlights more complex and diverse stakeholder management issues in social infrastructure projects. The involvement of other institutions as operators of the facilities, entails the necessity of their early participation in front-end decision-making processes and the maintenance of a dynamic relation throughout the project. In this sense, the differentiation of the roles of owner and operator is distinguishable in the case study; whereas, the three domains model of project organising from Winch (2014) is unclear in the distinction of the role of the owner and operator.

In the same way, the relational capability proposed by Winch and Leiringer (2016) involves only the commercial relationship between the owner and the supply chain. As mentioned above, owners are obliged to interact with several other organisations in the case of social infrastructure projects, for which it is even more important the preservation of a trust-based relation, since this type of links are based mainly on informal relations. These limitations in the stakeholder management and

relational capabilities result in the proposal of a collaboration capability for the owner in its projects.

With respect to the asset integration capability, the findings reveal the need for operators to be involved in the front-end design stages. The need for final users to receive training before the actual handover takes place is acknowledged by Winch and Leiringer (2016) and Zerjav *et al.* (2018), yet the authors do not address the importance of a user-driven mindset at the front-end of the project. This becomes crucial in social infrastructure projects where the social process with the final users is of equal importance as the infrastructure works, for the success of the operation stage.

Winch and Leiringer (2016) refer to organisational learning as an approach for acquiring the owner project capabilities. Cha *et al*. (2018) consider training and skill development as a back-end capability for IS projects. Brady and Davies (2004) propose a project capability building model for suppliers of projects. Similarly, the findings of this research suggest the importance of including project-led learning as an owner project capability, in order for the owner to achieve continuous improvement in its projects.

Lastly, recent literature on owner capabilities make no reference to the owner organisation and its role in fostering innovation in projects. The result of this study suggests the need for the owner to lead and encourage innovation in terms of new forms of organisations that embrace teams driven by value and collaboration, to create sustainable and resilient infrastructure, such as ICE's "Project 13".

7.2. Implications for the success of projects

The findings suggest that the challenges identified in the development of the owner capabilities have consequences that impact on the outcome of the project. Four main effects were observed in the San Francisco case; schedule and cost overruns, defective quality of certain products, dissatisfaction of contractors, and difficulties in the operation and use of the facilities. These findings can be related to the five success factors of efficiency, effectiveness, relevance, impact and sustainability highlighted by Samset (2008). Following this work, it can be said that schedule and cost overruns, and the defects in the quality of works will put at risk the efficiency of the project, but that the other indicators should be considered as well to have a thorough analysis of the success of the project. In this sense, the dissatisfaction of contractors due to the complications experienced during the project threaten the overall positive impact of the project. The difficulties in the operation and use of the facilities are a risk to the effectiveness and sustainability of the project.

It can be argued then that the success of a social infrastructure project, and hence the achievement of the owner's objectives, depends on the efficient implementation of the owner capabilities, this is, on an active and capable role of the owner throughout the project. Failure to do so will probably impact and put at risk one or several of the mentioned success factors.

8. Concluding remarks

8.1. Theoretical contributions

This research makes three contributions to the research on dynamic capabilities and owner organisations. First, by broadening the dynamic capabilities framework including owner capabilities and hence emphasising the capable role of an owner in the development of social infrastructure projects. Second, by identifying the challenges that owner organisations confront in the development of these capabilities and exposing their influence on the success factors of projects. And lastly, by proposing a set of transformational capabilities that could enable the owner to further evolve in its strong and capable role. With this, the future project management literature should stress the owner's strategic and leading role in infrastructure projects.

The key challenges identified in the development of owner capabilities refer principally to failures at front-end processes of project portfolio and stakeholder management, and to the lack of consideration of the back-end process of asset integration. Challenges from the execution phase refer mainly to non-fulfilment of the packaging, relational, assurance and project coordination capabilities. This confirms the need of a more holistic view of project organising, following Morris (1994; 2013) theory of the management of projects.

The study contributes then to an analytical generalisation of Adam *et al*. (2019) and Winch and Leiringer (2016) framework of owner capabilities. Additionally, the analysis of a specific case study with a qualitative approach for the identification of the dynamic capabilities required by owner organisations in the context of a social infrastructure project constitutes an approach that relevant studies have not taken.

8.2. Practical recommendations

In terms of the application of this study in practice, the results embrace the lessons learned from a social infrastructure project that could be used for the development of owner capabilities. Owners of social infrastructure projects may alter their approach to dealing with their projects after understanding the setting of this study. They may now focus on the importance of project front-end and back-end issues, particularly the need to center their attention on the social process involving the final user, equally to the infrastructure works.

Moreover, the challenges identified could also help understand the difficulties that social projects go through, predominantly in developing countries. In this sense, the proposed set of transformational capabilities, in addition to contributing to the mitigation of the identified challenges, will be critical to lead owners to new approaches of project organisations, such as ICE's proposal of project enterprises, where the owner becomes a promoter of this change.

8.3. Limitations

Limitations of the method and the data collection are present in this study's findings. The selection of the San Francisco project as the subject of the case study was driven by its ability to be related to some theoretical concepts (Yin, 2009). In order to do so, temporal and geographic boundaries were imposed by the context analysed.

The data collected through interviews, though representative in terms of the quality of the interviewees from their key roles in the project, could be further validated by a documentary analysis that would provide more reliability to the results. Potentially biased opinions could have filtered through the interviews.

Since the data collected correspond only to a specific project from a Paraguayan public institution, the research results are subject to certain limitations. For example, certain capabilities such as project selection and capital raising could not be evaluated in-depth due to particularities of the owner organisation. Projects from other organisations in other countries may have different results and thus the perspectives and concerns in terms of the owner role and the capabilities required could differ. The results cannot cover all social infrastructure projects across the world because they have different structures.

8.4. Ideas for future research

In response to the limitations of this study, future research on owner capabilities could consider the development of a greater number of case studies, including interviews and other forms of data collection such as documentary analysis for an improved triangulation of results. Further studies of other social infrastructure projects would allow to contrast results and contribute to better understanding the contextual differences impacting owner capabilities.

Other research topics related to this research study could center on further examining the owner capabilities such as collaboration, innovation, user-driven

mindset and project-led learning. These capabilities are highlighted in the findings of this article. However, an exhaustive analysis of those capabilities was not performed. Hence, the interrogation of how transformational capabilities can be fostered and how this can be favorable for project success can be responded by carrying out additional study. We have also demonstrated the importance of owner strategic capabilities such as constructing coherent narratives of project mission and scope. Further research is needed to show the ways project narratives are constructed and communicated by owner and operator organisations for different purposes and audiences.

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Table 1. References to owners in peer-reviewed literature.

Reference	Term used	Context
Morris and Hough (1987)	Owner	Owner-contractor relationships in civil construction, power, North Sea oil, product development, computerization and aerospace
Engwall (2003)	Parent organization	Case study on power utility in Scandinavia
Turner (2006)	Owner	Project governance and project management, with reference to UK Government
Flowers (2007)	Client	High-technology capital goods, systems and services
Love *et al.* (2008)	Client	Public sector clients in Western Australia
Aritua *et al.* (2009)	Intelligent Client	UK public sector organizations
Gil (2009)	Client	Case study on London Heathrow Terminal 5
Vennström and Eriksson (2010)	Client	Swedish construction clients
Winch and Leiringer (2016)	Owner	Owner project capabilities in transportation infrastructure
Davies *et al.* (2016)	Owner	Development process of owner project capabilities. Case study on London Heathrow Terminal 5
Adam and Lindahl (2017)	Client	Examination of a public construction client through dynamic capabilities framework
Cha *et al*. (2018)	Owner	Owner project capabilities in Information Systems projects
Adam *et al.* (2019)	Client	Maintenance or development of project capabilities in public construction clients in the healthcare sector

Table 1. Challenges in the development of owner project capabilities.

Group	Capability	Challenge
Strategic Capabilities	*Project selection*	Influence of political interests
	Stakeholder management	Silo-driven mindset
		Deficient transmission of information
	Project portfolio management	Deficient management of internal resources
		Decision power concentrated on Senior management
Commercial Capabilities	*Packaging*	Deficient work clustering
	Contracting	Insufficient experience of contractors
		Transfer of risks to contractors
		Legal aspects of assets' delivery not contemplated in contracts
		Focus on lowest price
	Relational	Reluctance to negotiation when contract inconsistencies arise
		Inability to foster good relations among contractors
Governance Capabilities	*Assurance*	Deficient formal revision process of each stage of project, with particular emphasis on defective design as result
		Poor communication between owner teams
		Lack of formal procedure to follow-up social process
	Project coordination	Insufficient human resources
		Human resources with lack of experience
		On site team with null decision power
		Unreal and deficient schedule
	Asset integration	Deficient coordination with operators in front-end processes, resulting in difficulties in delivery of assets
		Absence of human resources specialized on social field, resulting in deficient approach of the social aspect of project
		Background of users not considered in front-end design process
		Users with lack of preparation on the use of facilities