
1 **Balancing project management success and operation success in**
2 **public projects: A comparative study of intra- and inter-**
3 **organizational boundary perspectives**

4 Ning Sun¹; Yan Ning²; and Yadi Li³

5 **Abstract:** While public projects pursue both project management success and operation
6 success, the tension between them is not uncommon. This research aims to examine how
7 project management success and operation success are balanced under intra- and inter-
8 organizational boundaries. A qualitative research design was carried out, with semi-structured
9 interviews with 60 respondents and a multiple-case study on three public hospital projects.
10 Through an inductive analysis, the findings revealed that: (1) from the aspects of interface
11 management and incentives, the intra-organizational owner-manager boundary can benefit the
12 balance of project success; (2) when considering controls and human capital resources,
13 contract-based inter-organizational owner-manager boundary facilitates a moderate balance of
14 project success, while the intra-organizational and noncontract-based inter-organizational
15 boundaries each tend to favor project operation success and management success, respectively.
16 This research contributes to the literature by presenting a framework for understanding the
17 balance between project management success and operation success in public projects through
18 a comparative study of intra- and inter-organizational boundary perspectives.

19 **Keywords:** Public project, Project management success, Operation success, Balance,
20 Organizational boundary

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¹ Ph.D. student, The Bartlett School of Construction and Project Management, University College London, 1-19 Torrington Place, London WC1E 7HB, United Kingdom. ORCID: <https://orcid.org/0000-0001-7644-8862>. Email: n.sun.22@ucl.ac.uk

² Professor, School of Management and Engineering, Nanjing University, Nanjing, China. ORCID: <https://orcid.org/0000-0003-4125-8844>. Email: ny@nju.edu.cn

³ Lecturer, School of Business, East China University of Science and Technology, Shanghai 200237, China (corresponding author). ORCID: <https://orcid.org/0000-0002-2145-2810>. Email: liyadi@ecust.edu.cn

22 1. Introduction

23 Public projects (e.g., transportation, health care, and institutional infrastructures) are funded by
24 public organizations, such as government sectors and non-profit organizations, to serve the
25 public (Candel et al., 2021). Public project success is often considered to include project
26 management success and operation success (Pinto et al., 2021; Serrador & Turner, 2015).
27 *Project management success* is exemplified by the timely, budget-conscious, and specification-
28 compliant delivery of the project. It is facilitated by the owner's project manager, often a
29 project management (PM) department or organization. *Project operation success* means that
30 the project operated by the project owner can meet functional requirements and deliver quality
31 service to users (Silvius & Schipper, 2016; Zwikael et al., 2019).

32
33 The tension between project management success and operation success, however, is pervasive
34 (Joslin & Müller, 2016; Samset & Volden, 2016). This tension primarily stems from conflicting
35 interests among stakeholders, particularly project owners and their project managers (Badewi,
36 2022). Project owners prioritize users' needs for project operation success, and continuously
37 update requirements. Yet, this pursuit requires additional resources, training, and adaptation
38 time, with inherent risks of cost and schedule overruns (Zwikael & Smyrk, 2015). Conversely,
39 the owner's project managers may prioritize project management success, being less motivated
40 to introduce innovation or implement improvements (Andersen, 2012). This may result in
41 limited adaptability to changing needs and market trends, ultimately compromising projects'
42 overall relevance to users' needs (Angus et al., 2005).

43
44 Past studies have attempted to tackle this tension by seeking to align the interests of project
45 owners and managers, such as through boundary-spanning and long-term collaboration (Krane
46 et al., 2012; Whyte & Nussbaum, 2020). However, they primarily focus on the inter-

47 organizational owner-manager boundary in external projects. In practice, two types of owner-
48 manager boundaries exist in public projects (Zwikael & Meredith, 2018): (1) the intra-
49 organizational boundary, where the project manager is an internal department within the project
50 owner. This is a domain unexplored in the existing literature (McHugh & Hogan, 2011); (2)
51 the inter-organizational boundary, where the project manager is an external PM organization
52 delegated by the project owner. It is still not known whether the findings drawn from the inter-
53 organizational boundary are applicable to the intra-organizational boundary context.

54

55 Intra- and inter-organizational boundaries are characterized by different decision rights
56 distribution, incentives, controls, communication, and capabilities integration (Gil & Fu, 2022;
57 Santos & Eisenhardt, 2005). Prior studies on organizational boundary in PM literature focus
58 on owner-contractor and contractor-subcontractor. Only a few consider the owner-manager
59 boundary. Among them, the conclusions are still inconsistent. Some researchers posit the
60 internal project manager as contributing to overall project success (Sato & Gnanaratnam, 2014;
61 Walker, 2015), whereas others regard the external project manager as more competent in
62 controlling project cost, schedule, and quality, leading to PM success (Liu et al., 2022).

63

64 Therefore, this research aims to empirically explore the research question of “*how do project*
65 *managers balance project management success and operation success facing intra- and inter-*
66 *organizational boundaries?*”.

67

68 Through an inductive analysis with interview data, we developed a framework about
69 differences between intra- and inter-organizational boundaries. It includes dimensions of
70 interface management, incentives, controls, and human capital resources. Guided by this
71 framework, a multiple-case study of Chinese public hospital projects was conducted to

72 investigate the project managers' preferences for project management success and operation
73 success in different organizational boundaries.

74

75 This study enriches the project management literature by examining the differential
76 prioritization of project management success and operation success among project managers
77 operating within intra- and inter-organizational owner-manager boundaries. It responds to the
78 recent call for the buyer-supplier relationship in the project context from an organizational
79 boundary perspective (Winch, 2014; Zwikael et al., 2019) and a balance between project
80 management success and operation success (Wiewiora & Desouza, 2022).

81

82 This rest is organized as follows. Section 2 presents the literature review on project success
83 and organizational boundary. Then, the research methodology of interviews and a multiple-
84 case study of public hospital projects is presented in Section 3. It is followed by Section 4 of
85 the findings. The final three sections present discussion, implications, and conclusions,
86 respectively.

87

88 **2. Theories and conceptual framework**

89 *2.1 Project management success and operation success*

90 Project success is defined as the extent to which project goals and expectations are achieved
91 (Lam et al., 2010). Private projects serve companies' shareholders and focus on financial
92 profitability, whereas public projects consider the projects' economic and social value
93 (Musawir et al., 2020; Volden & Welde, 2022).

94

95 Public project success is judged through several classical aspects, see **Table 1**. Project
96 management success focuses on the iron triangle (cost, time, and quality) (Samset & Volden,

2016). Project operation success pertains to the utility after the delivery of the project output (Baccarini, 1999; Serrador & Turner, 2015). It means a long-term impact that remains relevant and effective over the project lifespan, such as being relevant to users' needs and resilient to local population size for a public project (Samset, 2013). The accountabilities for project management success and operation success realization remain with the project manager and the project owner respectively (Zwikael & Meredith, 2018; Zwikael et al., 2019). *Project manager* is a dedicated PM department or organization acting as the owner's representative during the project execution stage. *Project owner* refers to the organization investing in projects to expand or upgrade its abilities to deliver goods/services to customers (Winch, 2014).

Table 1. Public project success criteria

Aspects	Public project success criteria and terms
Overall project success	Macro viewpoint (construction completion and operation satisfaction), also called project success (Cooke-Davies, 2002; Ika, 2009; Lim & Mohamed, 1999)
Project management success	Focuses on project execution efficiency: <ul style="list-style-type: none"> • time, cost, and quality (scope) (Baccarini, 1999; Pinto & Slevin, 1987); • project management success (Cooke-Davies, 2002; Ika, 2009; Zwikael & Smyrk, 2012); • project short-term success (Badewi, 2016; De Wit, 1988); • project plan success (Ika & Pinto, 2022) • micro viewpoint (Lim & Mohamed, 1999)
Project operation success	Focuses on the project operation stage (Marnewick & Marnewick, 2022): <ul style="list-style-type: none"> • product success (outcome realization) (Baccarini, 1999); • project ownership success (business case success) and project investment success (value for the funder) (Zwikael & Smyrk, 2012); • project medium- and long-term success (Badewi, 2016); • tactical level (effectiveness or agreed outcome) and strategic level (relevance, sustainability, benefit-cost efficiency, and other impacts) (Samset & Volden, 2016; Volden, 2018b)

The tension between project management success and operation success is widely acknowledged (Stjerne et al., 2019; Wiewiora & Desouza, 2022). One of the root reasons lies in conflicting interests among stakeholders, especially project managers and owners (Pisotska et al., 2022; Silvius & Schipper, 2020). While project managers prioritize PM success, reflected in their reward structure (Gil, 2022), public project owners primarily act as operators and emphasize project operation success, often exhibiting tolerance towards cost and schedule overruns (Winch & Leiringer, 2016; Zwikael et al., 2019). This dichotomy creates a

115 challenging dynamic. Project managers' focus on cost and schedule control may limit their
116 capacity to address evolving owners' needs, and conversely, their prioritizing continuously
117 updated needs could result in cost and schedule overruns (Nwajei et al., 2022).

118
119 To manage this tension, studies propose strategies to bridge the interest divergences between
120 project owner and manager by blurring their inter-organizational boundary (Locatelli et al.,
121 2020), for example, the inter-organizational boundary-spanning (Stjerne et al., 2019; Whyte &
122 Nussbaum, 2020), value management (Lee et al., 2023), and value co-creation process (Fuentes
123 et al., 2019). For implementing these strategies, social control based on trust and relational
124 norms is also emphasized to complement formal controls based on contracts (Ning & Zwikael,
125 2022), such as through long-term inter-organizational collaboration, consensus, and
126 identification (Krane et al., 2012; Pisotska et al., 2022).

127
128 Prior studies focus on the inter-organizational owner-manager boundary in external projects,
129 but ignore the intra-organizational owner-manager boundary in internal projects. Intra- and
130 inter-organizational boundaries result in differentiated owner-manager decision rights
131 distribution (Badewi, 2022; DeFillippi & Sydow, 2016), different communication channels
132 (Felin & Zenger, 2014), and diverse sanctions available to enforce authority (Walker, 2015).
133 For example, in contrast to the inter-organizational boundary, the intra-organizational owner-
134 manager boundary grants more authority to the project manager, providing them with greater
135 access to the internal workings of the owner (Walker, 2015). These attributes may influence
136 the project manager's preference and capabilities, whereby the balance between project
137 management success and operation success differs (Turner, 2020; Zwikael et al., 2019).

138

139 *2.2 Organizational boundary*

140 *2.2.1 Organizational boundary perspective*

141 The concept of organizational boundary focuses on demarcations between departments within
142 an organization or between different organizations (Bigdeli et al., 2021). These boundaries are
143 often formed as a result of “firm or market” or “make or buy” decisions, where organizations
144 decide whether to internally produce goods or services or acquire them from external sources.
145 In the “firm or market” decision on acquiring PM service, project owners have two boundary
146 options, which are (1) the intra-organizational boundary between different departments of the
147 project owner organization, and (2) the inter-organizational boundary between the project
148 owner and external project manager (Zwikael & Meredith, 2018; Ning & Zwikael, 2022).

149

150 Several theories have been used to explain organizational boundary selection. One stream is
151 the economic approach, which aims to promote information coordination and reduce
152 transaction costs, such as Transaction Cost Economics (TCE) (Coase, 1937; Williamson, 1975,
153 1985), agency theory (Holmstrom & Milgrom, 1991), and institutional economics (Klein et al.,
154 2019). For example, TCE examines the efficiency of transactions between parties, considering
155 factors such as costs, information coordination, uncertainties and risks, incentives, and controls,
156 associated with market exchanges versus hierarchical control (Zenger et al., 2011). The other
157 stream is the strategic approach focusing on resources and capabilities, such as Resource-Based
158 View (RBV) (Barney, 1991) and dynamic capability theory (Enkel & Sagmeister, 2020). RBV
159 emphasizes possession versus deployment of firm resources including assets, capabilities,
160 knowledge, skills, and relationships for value creation (Barney, 2018).

161

162 Synthesizing sights from TCE and RBV is considered crucial for understanding and depicting
163 organizational boundaries (Holcomb & Hitt, 2007; Mcivor, 2009). This integrated

164 organizational boundary perspective has been applied in construction projects (Ma et al., 2022)
 165 and other contexts, such as the outsourcing of information technology (IT) (Alvarez-Suescun,
 166 2010) and maintenance service (Gulbrandsen et al., 2009).

167
 168 From the organizational boundary perspective, the differences between various organizational
 169 boundaries manifest themselves in information processing and integration, adaptation to
 170 market changes, information sharing and interface coordination, incentive intensity, controls,
 171 and resources, see **Table 2**.

Table 2. Differences between the intra- and inter-organizational boundaries

Aspects	Differences between the intra- and inter-organizational boundaries
Information processing and integration	<ul style="list-style-type: none"> • The intra-organizational boundary centralizes information structures for efficient delivery of managerial fiats and expedited information processing (Hennart, 2013; Zenger et al., 2011). • The inter-organizational boundary related to market is remarkable in assembling and aggregating idiosyncratic information (Felin & Zenger, 2011).
Adaptation to market changes	<ul style="list-style-type: none"> • Hierarchy in the intra-organizational boundary needs to undergo layers of internal processes and decision-making, leading to a gradual adaptation to changes (Williamson, 1996). • Market actors in the inter-organizational boundary have the advantage of responding to price changes autonomously.
Information sharing and interface coordination	<ul style="list-style-type: none"> • Hierarchy within the intra-organizational boundary has an enhanced ability to shape social identity, knowledge exchange, and complex coordination (Williamson, 1996). Interface conflicts in the intra-organizational boundary may be mitigated by overarching common objectives for the whole organization’s development (Fellows & Liu, 2012). • Market actors in the inter-organizational boundary face coordination difficulties due to complex inter-organizational interfaces and limited initiative in knowledge sharing (Zenger et al., 2011).
Incentive intensity	<ul style="list-style-type: none"> • Hierarchical governance in the intra-organizational boundary provides weaker performance incentives (Felin & Zenger, 2014; Leiblein, 2003). Its stochastic state facilitates adaptability in uncertain environments, although some cost excesses or even degradation may appear (Williamson, 1985). • In the inter-organizational boundary, introducing prices to facilitate exchange creates highly powered incentives for market actors to pursue goals agreed upon through written or oral agreements for income, reputation, and competition (Chang, 2013; Zeng et al., 2018; Zenger et al., 2011).
Controls	<ul style="list-style-type: none"> • Hierarchy in the intra-organizational boundary grants access to authority, enabling effective decision-making and accountability (Zenger et al., 2011). • Hierarchical and clan controls are applied within an organization (Li et al., 2021; Ning & Zwikael, 2022). • The utilization of contracts in the inter-organizational boundary could induce higher transaction costs due to incomplete contracts, renegotiations, and control (Williamson, 1985). • Formal and social controls are used between organizations (Li et al., 2021; Ning & Zwikael, 2022). Yet, social control is more difficult to employ without a long-term collaborative relationship and repeated interactions between partners (Ning, 2017; Stordy et al., 2021).
Resources	<ul style="list-style-type: none"> • The intra-organizational boundary uses internal resources to produce goods or services.

	<ul style="list-style-type: none">• The inter-organizational boundary could efficiently match heterogeneous external resources to firms, such as human capital which refer to a firm’s KSAOs (i.e., knowledge, skills, abilities, and other characteristics) (Zenger, 1992), activities, resources, and assets (Argyres & Zenger, 2012).
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173

174 *2.2.2 Organizational boundary study in project management*

175 In the construction project management context, how organizational boundaries influence
176 project success has been studied between the contractor and subcontractors (Brahm & Tarzijań,
177 2014; Ma et al., 2022; Ranasinghe et al., 2022). For example, a more favorable project impact
178 on “money, time, quality, and value” is perceived in in-house Building Information Modeling
179 (BIM) implementation than outsourcing BIM (Fountain & Langar, 2018, p. 116).

180

181 Other studies focus on the organizational boundary between project owner and contractor. Hui
182 et al. (2008) proposed that outsourcing multiple contractors would pose coordination and
183 control challenges and lead to higher cost overruns in complex project context. Attalla et al.
184 (2004) suggested using in-house resources rather than external contractors for small
185 reconstruction projects when faced with high urgency and ambiguous owners’ needs.
186 Furthermore, poor understanding of owners’ needs and more project changes occur when
187 public project owners outsource with Design-Build mode rather than Design-Bid-Build mode
188 (Ling & Poh, 2008; Perkins, 2009). Differently, El Asmar et al. (2013) evidenced that
189 outsourcing with the integrated project delivery mode could realize higher “quality, schedule,
190 project changes, communication among stakeholders, environmental, and financial
191 performance” compared with Design-Build and Design-Bid-Build modes (p. 1).

192

193 Only a few studies focus on the organizational boundary between the project owner and the
194 owner’s project manager. Some researchers posit the internal project manager as contributing
195 to overall project success (Sato & Gnanaratnam, 2014; Walker, 2015), whereas others consider
196 the external project manager more proficient in controlling project cost, schedule, and quality,

197 leading to PM success (Liu et al., 2022). Given the inconsistent viewpoints, it is warranted to
198 investigate how public project managers balance project management success and operation
199 success in inter- and intra-organizational boundaries.

200

201 **3. Research methods**

202 *3.1 Empirical setting and research design*

203 *3.1.1 Empirical setting*

204 This study takes public projects in Jiangsu province, China, as the empirical setting for two
205 main reasons. First, China has a huge market for public projects, and various owner-manager
206 boundaries have been developed in public projects, yet many related issues are under-
207 researched. Jiangsu Province is representative of China's national construction industry with
208 the largest provincial construction market share. Second, intra- and inter-organizational owner-
209 manager boundaries examined in this study are prevalent in public projects within Jiangsu
210 province. Hence, it can provide rich data to examine different owner-manager boundaries in
211 the same institutional context.

212

213 Various intra- and inter-organizational boundaries between project owners and their project
214 managers could be observed throughout Chinese history. Following the year 1949, most
215 Chinese public projects were managed internally by project owners that contracted out the
216 construction and design tasks. As the 21st century unfolded and China entered the WTO, some
217 project owners began entrusting PM to external market-oriented PM agencies through
218 contractual arrangements.

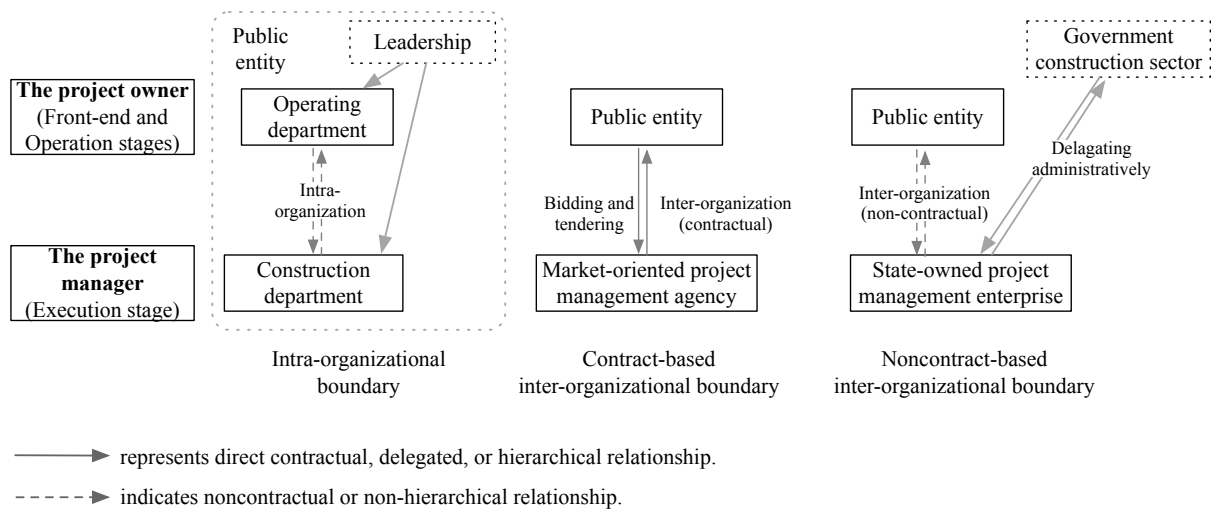
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220 In the subsequent years, the governments of several developed cities in China began delegating
221 specific types of local public projects, such as hospitals, to state-owned PM enterprises through

222 administrative orders (Ling et al., 2014). For example, in 2018, a state-owned PM enterprise
 223 was established in Jiangsu Province, designated to manage all province-level non-profit public
 224 projects. The state-owned PM enterprises were designated and governed by government
 225 regulations without contractual relationships with project owners.

226

227 Nowadays, public project owners could assign an internal project manager, or delegate an
 228 external project manager through contractual (e.g., market selection) or noncontractual
 229 outsourcing (e.g., administrative delegation). The role of external public project manager is
 230 fulfilled by professional third-party PM organizations, unlike the Western practice where the
 231 responsibility might rest with the designer or the general contractor. Different owner-manager
 232 boundaries in Chinese public projects can be seen in **Fig. 1**.



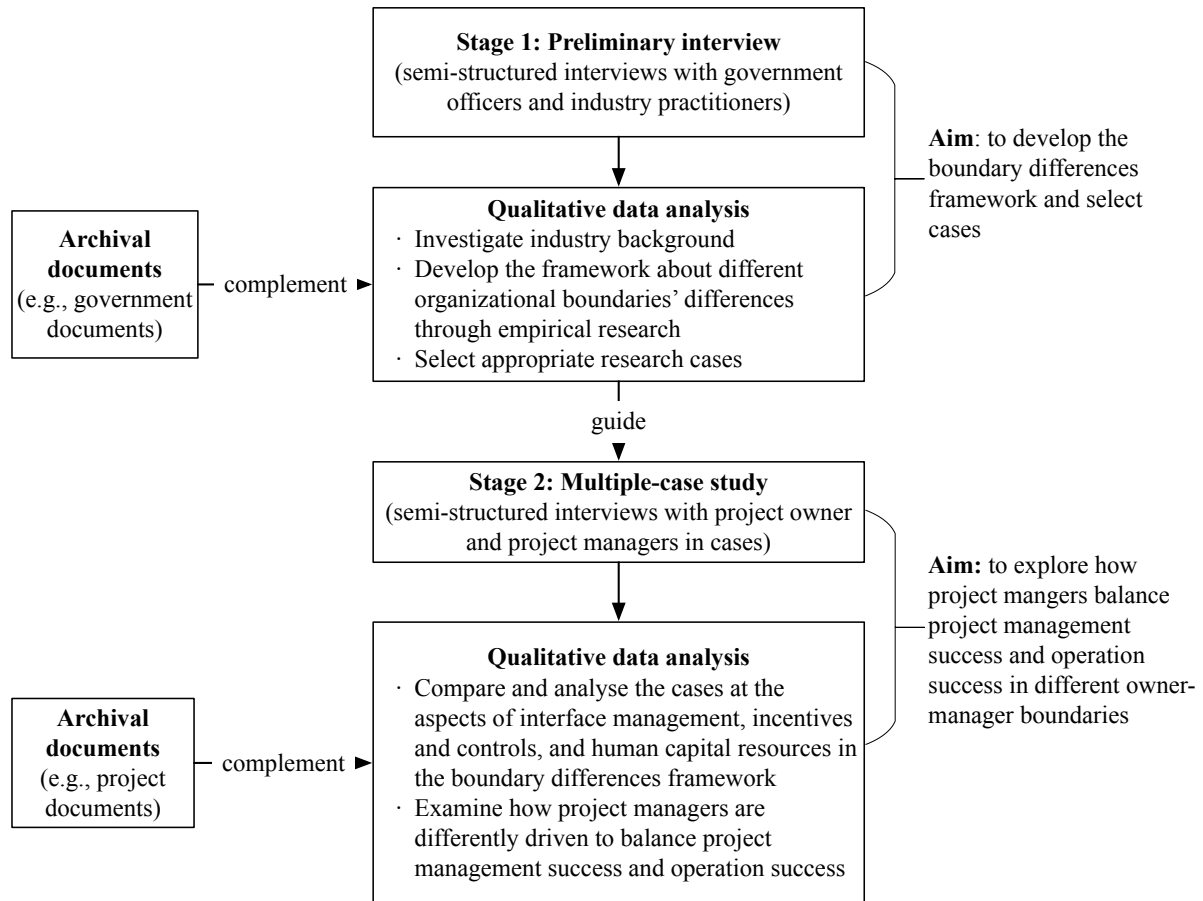
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234 **Fig. 1.** Different owner-manager boundaries in Chinese public projects

235 *3.1.2 Research design*

236 To understand the influence of owner-manager boundaries on project success, a qualitative
 237 study approach is considered appropriate (Yin, 2018). Considering the benefits of allowing
 238 interviewees to elaborate adequately on each topic (Castelblanco et al., 2022), two-stage semi-
 239 structured interviews were conducted by the first and second authors, who contributed to the

240 interview protocol and recorded notes independently. Archival documents were gathered as a
 241 complement. Then, data analysis was led by the first author, with ongoing coding discussions
 242 involving the second and third authors. The integrated research design is shown in **Fig. 2**.



243

244

Fig. 2. Research design

245 3.2 Stage 1: Preliminary interview

246 Preliminary interviews were carried out in the first stage. This stage aims to understand the
 247 industrial background, identify the differences between different organizational boundaries,
 248 and select appropriate cases for the in-depth multiple-case study. Interviewees are practitioners
 249 from government departments, and PM departments and firms (see **Table 3**) who are familiar
 250 with public project practices, industrial backgrounds, and intra- and inter-organizational
 251 boundaries between project owners and project managers. The interviews with 53 respondents

252 ensured the generality of the boundary differences framework between different owner-
 253 manager organizational boundaries.

254
 255 Convenience sampling was initially used to identify a group of practitioners from the authors’
 256 social network. Then, snowball sampling was employed to expand the sample by obtaining
 257 additional participants through referrals from the initial group. Interview questions were
 258 designed to ask respondents’ views on the industrial background, the PM execution in different
 259 organizational boundaries, and the interaction between the project owner and manager. During
 260 the interviews, with the interviewees’ consent, audio recordings were made and later
 261 transcribed for analysis. Also, government documents about PM were collected for a
 262 comprehensive understanding of local PM policy and organizations’ responsibility distribution.

263 **Table 3.** Profile of interviewees

NO.	Position	Organization	Boundary	Date	Duration (min)
1	Project manager	State-owned project management firm	3	4/16/2019-6/11/2019	165
2	Government official	Government Construction Department	1,2,3	10/15/2019-9/28/2020	489
3	Government official	Government Construction Department	1,2,3	11/27/2019-9/28/2020	150
4-6	Project manager	Enterprise of state-subsidized housing	3	8/19/2020	90
7-10	Project manager	State-owned project management firm			
11-13	Project manager	Enterprise of urban construction			
14-16	Project manager	State-owned project management firm	3	9/4/2020	110
17-19	Project manager	State-owned project management firm	3	9/10/2020	95
20-23	Government official	Government Construction Department	1,2,3	10/20/2020	45
24-29	Project manager	State-owned project management firms from five cities	3		
30-39	Government official	Government Construction Department	1,2,3		
40-49	Project manager	State-owned project management firms from nine cities	3		
50	Government official	Government Construction Department	1,2,3	9/28/2020	32
51	Project manager	State-owned project management firm	3	5/28/2021	86
52	Project manager	State-owned project management firm			
53	Project owner	Construction department of a Women’s and Children’s Hospital	1, 3	12/15/2021	87
54*	Project manager	Construction department of a Women’s and Children’s Hospital (case 1)	1	1/5/2018	65

55*	Project owner	Construction department of a Dental Hospital (case 2)	2	12/27/2017	52
56*	Project owner	Construction department of a Dental Hospital (case 2)	2	1/9/2018	67
57*	Project owner	Construction department of a Dental Hospital (case 2)	2	5/25/2021	87
58*	Project manager	Project management firm (case 2)	2	12/28/2021	82
59*	Project owner	Construction department of an Institution Hospital (case 3)	3	5/27/2021	52
60*	Project manager	State-owned project management firm (case 3)	3	5/27/2021	51

Notes: 1) *2nd stage interviews.

2) Some of the interviews are multi-person interviews.

3) Boundaries 1, 2, and 3 correspond to intra-organizational, contract-based inter-organizational, and noncontract-based inter-organizational boundaries respectively.

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269 To develop a framework about the differences between different organizational boundaries,
270 this study adopted an inductive analysis approach. This approach allows the emergence of
271 concepts from the data and facilitates theory development (Corbin & Strauss, 1990; Langley,
272 1999). The unit of analysis is the relationship between the project owner and the project
273 manager.

274

275 During data collection, we continually reviewed the interview, archival data, and field notes.
276 Based on the grounded theory (Corbin & Strauss, 1990), the first step of data analysis was open
277 coding, grouping conceptually similar events/actions/interactions to form first-order concepts.
278 Through the constant interplay between data collection and analysis, interview descriptions of
279 different organizational boundaries' differences, which would produce different influences on
280 project success, were collated into first-order concepts when they were mentioned by multiple
281 respondents. An example of the first-order concept is that, the requirements discussion within
282 the intra-organizational boundary involves the owner's operating and construction departments,
283 while in the inter-organizational boundary, it extends to the operating and construction
284 departments and the external PM firm, impacting communication efficiency and project
285 schedule, which was labeled as "requirement collection and negotiation".

286

287 The next step is axial coding. By linking and comparing first-order concepts, we examined the
288 relationships between concepts, such as causal, part-whole, and similar relationships. When the
289 relationship was supported by multiple data evidence, relevant concepts were then organized
290 into a second-order category. The second-order categories were supplemented through
291 continuous connection and categorization. Then, through selective coding, second-order
292 categories with commonalities were aggregated into a core category representing the
293 organizational boundary differences that impact project success. These second-order categories
294 consistently relate to the core category as action/interactional strategies. Four aggregated
295 dimensions included interface management, incentives, controls, and human capital resources
296 (see **Fig. 3**). We considered data saturation when no new concepts and categories emerged from
297 the data in a row (Suddaby, 2006). This boundary differences framework (see **Fig. 4**) would
298 further guide the in-depth investigation of organizational boundaries' influence on project
299 management success and operation success through multiple-case study in stage 2.

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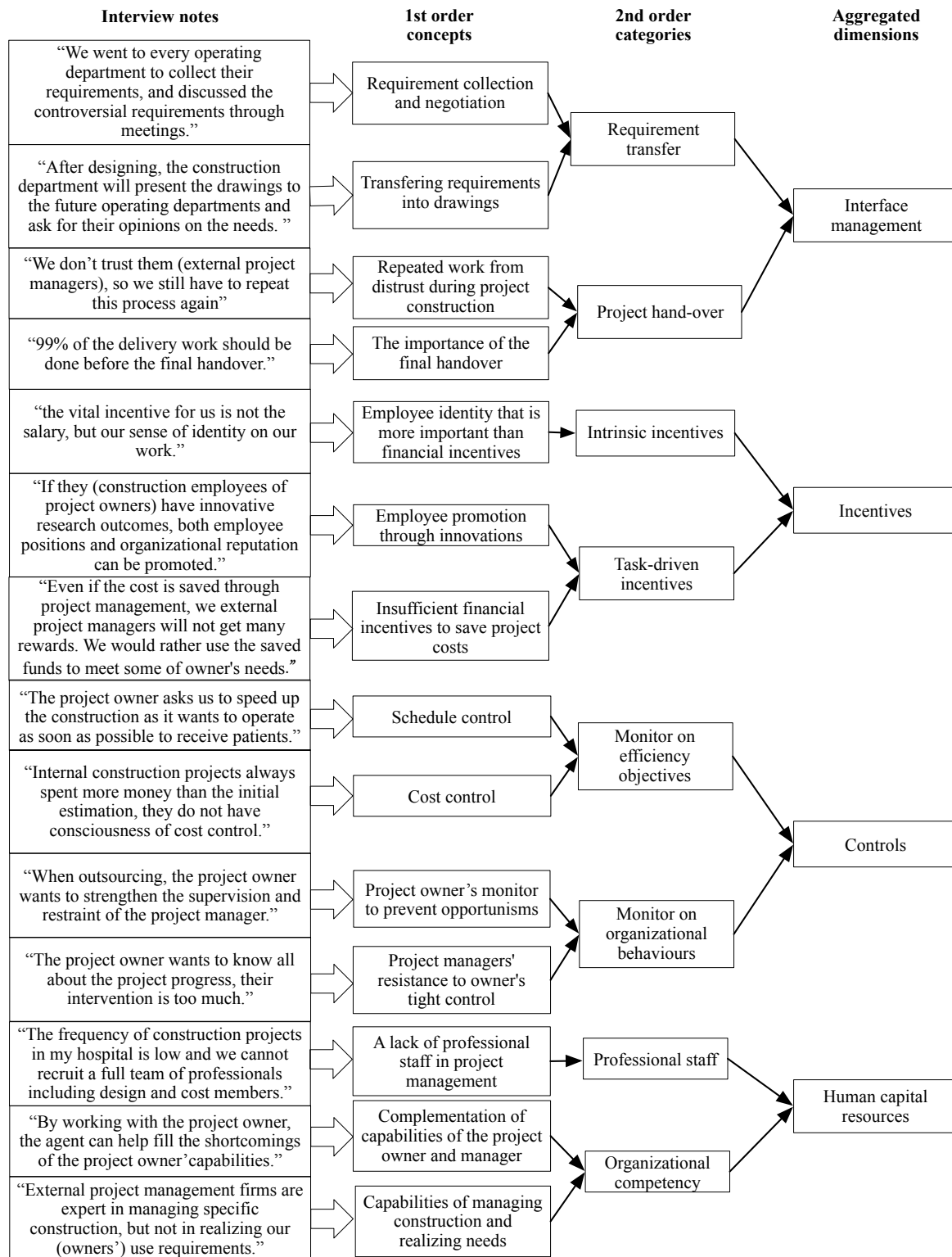
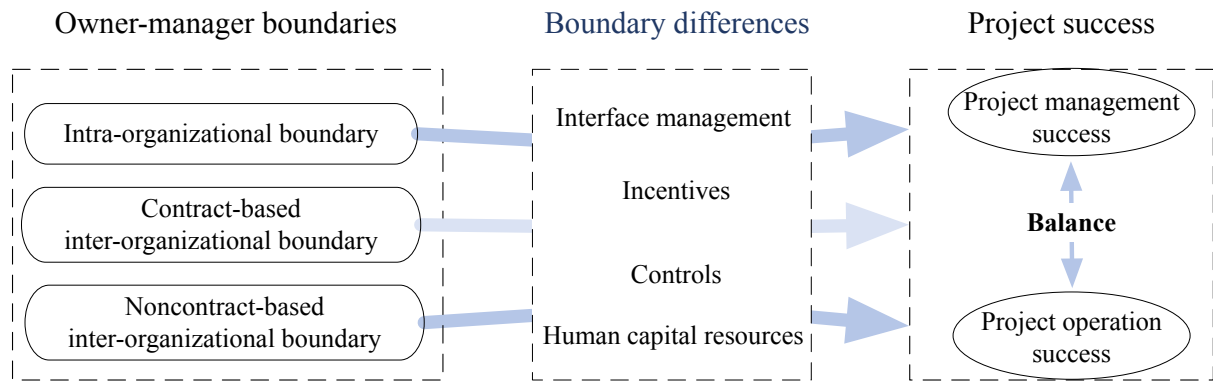


Fig. 3. Data structure

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Fig. 4. Boundary differences framework in owner-manager organizational boundaries

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3.3 Stage 2: Multiple-case study

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In the second stage, a multiple-case study on the three selected public hospital projects was carried out. The multiple-case study offers an opportunity to conduct in-depth and contextually comprehensive data analysis within each case and across different cases through interviews and documents (Yin, 2018). Simultaneously, it contributes to the enhancement of the external validity of the results (Castelblanco et al., 2022). This stage aims to investigate how project managers balance project management success and operation success when facing different organizational boundaries.

313

314

Three cases were chosen due to recommendations from the preliminary interviews. They are all public hospital projects with three different owner-manager boundaries, see **Table 4**. In these cases, project owners maintained ongoing involvement throughout the project life cycle and interacted with project managers, albeit to varying degrees. This differs from transportation projects, where operational project owners engage after project manager's output handover, involving less direct owner-manager interaction (Whyte & Nussbaum, 2020).

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Furthermore, unlike projects (e.g., school dormitory and housing projects) that were perceived as highly standardized by interviewees, hospital projects were featured by technical complexity

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323 connected to future medical, technological, and demographic development. This complexity
 324 poses significant challenges in balancing project management success and operation success
 325 (Samset & Volden, 2016). These required increased interactions across the owner-manager
 326 boundary. The variations in different owner-manager boundaries' effects on project
 327 management success and operation success could be more pronounced and distinguishable.

328 **Table 4.** Characteristics of projects

Cases	Owner-manager boundaries	Construction contents	Execution schedule	Planned and final cost
1.Extended medical complex project	Intra-organizational boundary (Owner: Women's and children's hospital; Manager: The internal construction department of the hospital)	The medical and technical part and wards of all departments; and the basement level	Planned: 2 years Actual: 5 years (2013-2018)	Planned: RMB 420 million, funded by the Treasury funds and the hospital's own funds (1:3); Final: RMB 638.56 million
2.Extended medical complex project	Contract-based inter-organizational boundary (Owner: Dental hospital; Manager: One state-owned, for-profit PM firm signing a contract with the hospital and participating in PM during construction)	Outpatient, medical technology, purification operating theatre, wards, offices	Planned: 3 years (2013-2015), Actual: 4 years (2013-2017).	Planned: RMB 250 million, funded by the hospital's own funds; Final: essentially the same as planned.
3.Renovation of medical complex project	Noncontract-based inter-organizational boundary (Owner: Institution hospital; Manager: A state-owned, not-for-profit firm, administratively delegated after the project proposal)	Decoration of ward, outpatient, office area; and renovation of multiple systems of new technologies	Planned: 30 months (2018.09-2019.06 for planning; 2019.07-2021.02 for construction). Actual: 39 months (2018.09-2020.06 for planning; 2020.07-2021.12 for construction)	Planned: RMB 63.29 million, fully funded by the Treasury funds; Final: RMB 62 million

329
 330 These cases have some commonalities in circumventing interference from factors other than
 331 the owner-manager boundary. First, all three projects were built after 2012 in Jiangsu Province
 332 with the same regulation background. Second, all these project owners had a relatively
 333 complete management team, which makes analysis independent of organizations' capabilities
 334 across the cases. Third, except for case 1 of the intra-organizational boundary, there was no
 335 previous collaboration between project owners and project managers in cases of the inter-

336 organizational boundary. Interference from inter-organizational relational experiences could
337 be eliminated.

338

339 These three cases corresponded to intra- and inter-organizational owner-manager boundaries.
340 In case 1, the project was managed by the internal project manager (i.e., intra-organizational
341 boundary). Case 2 used the contract-based inter-organizational boundary. An external project
342 manager was chosen by bidding and signed a contract with the project owner. In case 3, the
343 project manager was a state-owned PM enterprise, delegated by the local government to
344 manage all local public projects (i.e., noncontract-based inter-organizational boundary).

345

346 Seven participants, including employees of project owners and project managers in three cases,
347 were interviewed (**Table 3**). Initially, respondents were invited to share their experiences
348 regarding the interaction between project owner and manager over the project life cycle, and
349 their potential impact on project success. After the development of the boundary differences
350 framework in **Fig. 4**, respondents were asked to elaborate on their interface communication,
351 incentives, controls, and human capital resources, as well as their influence on project success.
352 The first-stage interview data, from interviewees #1-#53 with diverse PM backgrounds across
353 different types of owner-manager boundaries, provided additional support and validation to the
354 second-stage interviews, enhancing the reliability and credibility of this study.

355

356 To assess the project success, we focused on information about project cost, schedule, and
357 quality, functional requirements defined by owners, and relevance to users' needs. Project
358 management success was judged based on the objective data related to the project's planned
359 and final costs, planned and actual schedules, and quality issues that adhered to industry
360 standards. These were presented in **Table 4** and no quality issues were observed in all three

361 cases. Whether the project operation was successful would depend on the interviewees'
362 perception and description of how well the project met the needs of owners and users.
363 Furthermore, asking for further elaboration on any owner dissatisfaction helped validate the
364 description and gain a deeper understanding of potential issues or areas for improvement. These
365 assessment indicators are consistent with previous studies by Lines et al. (2021) which focus
366 on cost, schedule, and the owner's satisfaction.

367
368 Additional data were sourced from archival documents, including some contracts and research
369 reports from project owners and project managers in three cases. They could assist in depicting
370 projects' backgrounds and dynamic process development.

371
372 The multiple-case study included within-case and cross-case analyses. Based on the boundary
373 differences framework, the within-case analysis focused on interface management, incentives,
374 controls, and human capital resources of each case. How these drove project managers to
375 balance project management success and operation success was also investigated. Then,
376 through cross-case analysis, the differences between the three types of owner-manager
377 boundaries in interface management, incentives, controls, and human capital resources and
378 their effects on project success were explored.

379

380 **4. Findings**

381 As depicted in **Fig. 3** and **Fig. 4**, the owner-manager boundary could be presented through four
382 primary dimensions, which are interface management, incentives, controls, and human capital
383 resources. It is found that these four dimensions could influence the balance of project
384 management success and project operation success.

385

386 *4.1 Interface management*

387 **Requirement transfer:** Requirements referred to expectations about the future utilization of
388 projects. They were determined by project owners during the early stages before project
389 managers got involved. After the project manager's involvement, they acted as the owner's
390 representative. Effective transfer of the requirements between owners and managers could
391 mitigate potential problems, such as misunderstanding of project goals, frequent changes,
392 delays, budget overruns, and inadequate realization of functions. Unlike the requirement
393 transfer between owners and service suppliers (e.g., designers, contractors, etc.), the owner-
394 manager relationship was a form of "surrogate implementation". Different owner-manager
395 boundaries affected the extent to which the project manager understood and realized the
396 owner's requirements on their behalf.

397

398 In the intra-organizational boundary, clear communication of objectives between construction
399 and operation departments promoted the balance between project management success and
400 operation success. Construction departments, as project managers, collected requirements from
401 operating departments at the project front-end. Regular medical knowledge training for internal
402 project managers in the hospital enabled them to effectively internalize the operating
403 departments' requirements. Additionally, working in the same organization promoted informal
404 communication, enabling the formation of a shared organizational culture and common
405 language, and fast information sharing. All of these benefited the overall project success. For
406 example, requirement changes requested by operating departments could be handled through
407 face-to-face communications.

408

409 *“We have about a dozen departments in the hospital. We went to each department, in turn,*
410 *to communicate and collect data, such as detailed functional requirements. We do our*
411 *best to meet their needs.” (#54, project manager, case 1)*

412

413 In both contract-based and noncontract-based inter-organizational boundaries, ambiguity and
414 inefficiency in transferring requirements between organizations occurred, which hindered the
415 attainment of project management success and operation success. These barriers were
416 manifested as technical information gaps and geographical separation. For instance, technical
417 requirements in specialized hospital projects often exceeded the knowledge capacity of project
418 managers. Furthermore, geographical separation constrained prompt responses to owner
419 inquiries or needs. The communication of the requirements could be further complicated by
420 intricate administrative procedures. To prevent corruption on the project site, some matters
421 required approval from multiple departments within the PM parent organization. These
422 departments, such as contract, finance, and construction departments, might have divergent or
423 even competing views. This might slow down the progress.

424

425 Case 3 provided a typical example of this challenge. Despite the project manager investing an
426 additional 12 months to translate the owner’s requirements into agreed-upon design drawings,
427 the owner still expressed dissatisfaction with the realized functionality. The project was
428 delayed, and poorly aligned with the owner’s and users’ needs.

429

430 ***Project handover:*** Another interface was the handover of physical assets from project
431 managers to project owners. Unlike other suppliers (e.g., designers, contractors) delivering
432 interim deliverables (e.g., drawings, models, and constructs), project managers handed over
433 complete physical assets to project owners.

434

435 In the intra-organizational boundary, internal project managers could realize project operation
436 success at the project handover phase. They assumed the project life-cycle responsibilities to
437 their parent owner organization. Owner-manager buck-passing for quality problems and post-
438 occupancy changes decreased as a result. Project long-term maintainability and operation
439 performance could thus be increased.

440

441 *“Throughout the past 3-5 years, this project, spanning from inception to operation, stands*
442 *as the most significant venture we have undertaken within the hospital. Any issues that*
443 *arise during the operation are associated with us, leading to blame.” (#53, project owner).*

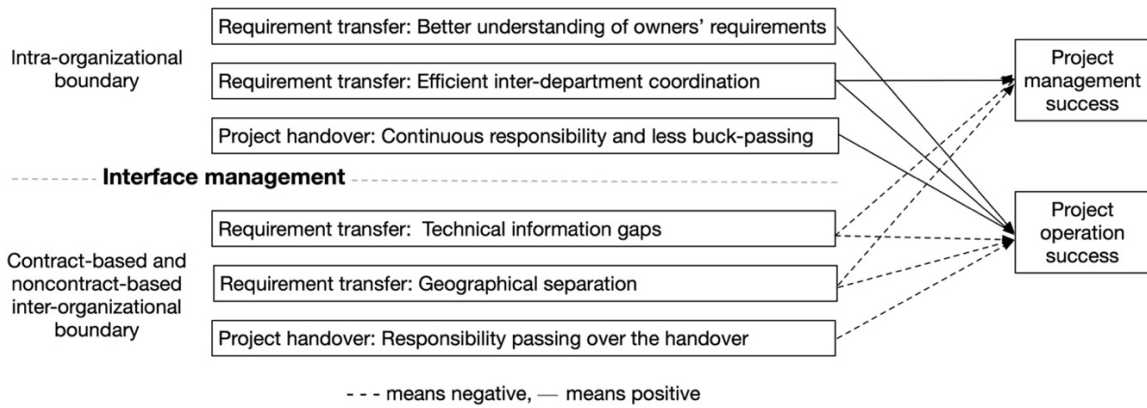
444

445 In contract-based and noncontract-based inter-organizational boundaries, project managers’
446 focus on the project execution stage resulted in unbalanced project operation success. External
447 project managers were responsible for project execution. After the project, the project manager
448 switched to managing another project for a different owner. Project owners were responsible
449 for operating projects, providing service, and delivering value to the public. The lack of joint
450 responsibility drove project managers to allocate less attention to the project operation success.

451

452 *“Once the project manager hands over the project, it means the transfer of responsibility,*
453 *resulting in that some flaws cannot be traced back to the project manager’s responsibility.”*
454 *(#2, government official, #53, project owner)*

455



456

457

Fig. 5. Interface management of different types of owner-manager boundaries

458

Fig. 5 shows how different owner-manager boundaries affected project management success

459

and operation success. The following proposition is proposed:

460

461

Proposition 1: Intra-organizational boundary, enabled by efficient inter-departmental

462

requirements delivery and project managers' continuous lifecycle responsibility, fosters the

463

balance between project management success and operation success. In contrast, technical gaps,

464

geographic separation, and a lack of joint responsibility over the inter-organizational boundary

465

hamper this balance.

466

467

4.2 Incentives

468

Incentives referred to mechanisms stimulating project managers to invest in achieving project

469

objectives. The incentives comprised individual gains (i.e., individual income and career

470

development) and collective gains (i.e., the collective's reputation or competitive advantage).

471

These incentives varied between intra- and inter-organizational boundaries (see **Table 5**),

472

leading to distinct effects on project managers' pursuit of project management success and

473

operation success.

474

Table 5. The level of incentives to project managers

Incentives to project managers		Individual income	Individual career development	The collective's development
Intra-organizational boundary	for project management success	Weak	Strong	Weak
	for project operation success	Weak	Strong	Strong
Contract-based inter-organizational boundary	for project management success	Weak	Weak	Medium
	for project operation success	Weak	Weak	Medium
Noncontract-based inter-organizational boundary	for project management success	Weak	Weak	Weak
	for project operation success	Weak	Weak	Weak

475

476 In the intra-organizational boundary, internal public project managers placed more emphasis
477 on project operation success than management success. Public project managers' employees
478 had relatively fixed salary levels with limited performance-based increases. Despite this, they
479 were incentivized to advance their careers based on satisfactory project performance and
480 industry reputation, which drove the use of innovative approaches to enhance quality, control
481 cost, plan schedule, and optimize operational function. Also, as a permanent department,
482 internal project managers aimed to address owners' concerns and mitigate the risk of negative
483 feedback. Nevertheless, the overall institutional environment weakened the incentives for
484 project management success. Widespread cost and schedule overruns in public projects have
485 become commonplace for the government. Project managers faced little threat to their industry
486 reputations in the event of such overruns.

487

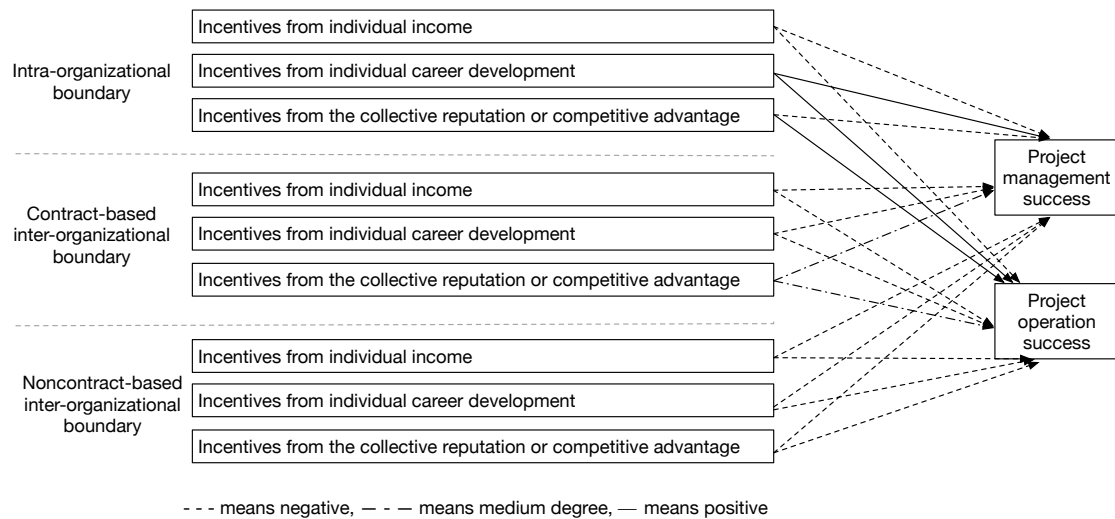
488 *"They have a staffing of government-affiliated institutions, which gives them a fixed salary*
489 *as long as they do not get fired."* (# 51, project manager) *Internal project managers spent*
490 *public funds from governments, and prioritized project functionality over cost savings*
491 *(#41, project manager).*

492

493 In the contract-based inter-organizational boundary, project managers had moderate collective
494 incentives and weak individual incentives for project success. Despite adhering to PM contracts

495 mandating “ensuring project quality, safety, and schedule” and “delivering project outputs to
 496 the satisfaction of project owners”, project managers were rarely rewarded with public funds
 497 for cost saving or early completion. These moderate project-based incentives were only applied
 498 to PM firms for remuneration, reputation, and competitive advantage, but not to individuals.
 499 Individual salaries and promotions followed the firms’ internal policies, with a focus on
 500 avoiding major safety accidents; however, PM firms rarely implemented individual incentive
 501 structures tied to project success.

502
 503 In the noncontract-based inter-organizational boundary, project managers received few
 504 incentives for both project management success and operation success. On the one hand, no
 505 contracts were in place to motivate project managers to optimize PM for higher returns.
 506 Respondents (#2 and #3, government officials, and #51, project manager) highlighted the
 507 impact of manager rewards, indicating that fixed salaries led to employee demotivation
 508 regarding project success.



509

510 **Fig. 6.** Incentives of different types of owner-manager boundaries

511 In terms of incentives, **Fig. 6** illustrates the impact of distinct owner-manager boundaries on
 512 project management success and operation success. As such, we propose:

513

514 **Proposition 2:** In contrast with the moderate incentives within the intra-organizational
515 boundary, project managers in inter-organizational boundaries focus on risk aversion and
516 receive weaker individual and collective incentives for achieving project management success
517 and operation success.

518

519 *4.3 Controls*

520 The controls were used to align the behaviors of project managers to project objectives, such
521 as hierarchical control over internal project managers and contractual control over external
522 project managers.

523

524 In the intra-organizational boundary, hierarchical control within the organization was
525 conducive to project operation success. Administrative order transition along the hierarchy
526 facilitated decision-making, coordination, and dispute resolution among departments. This
527 approach prioritized project long-term operation success since the high-ranking positions
528 considered the organization as a long-term whole rather than focusing solely on individual
529 departments. However, on the other side of the hierarchical control with a stochastic state was
530 the risk of budget overruns, delays, and scope creep.

531

532 *“When facing a dilemma from project change, we report it to our common leaders. They*
533 *will make decisions from the perspective of organizational long-term development, rather*
534 *than any specific department or individual... Hospitals always purchase as better*
535 *materials and equipment as possible, so the amount of post-maintenance is small.” (#54,*
536 *project manager, case 1)*

537

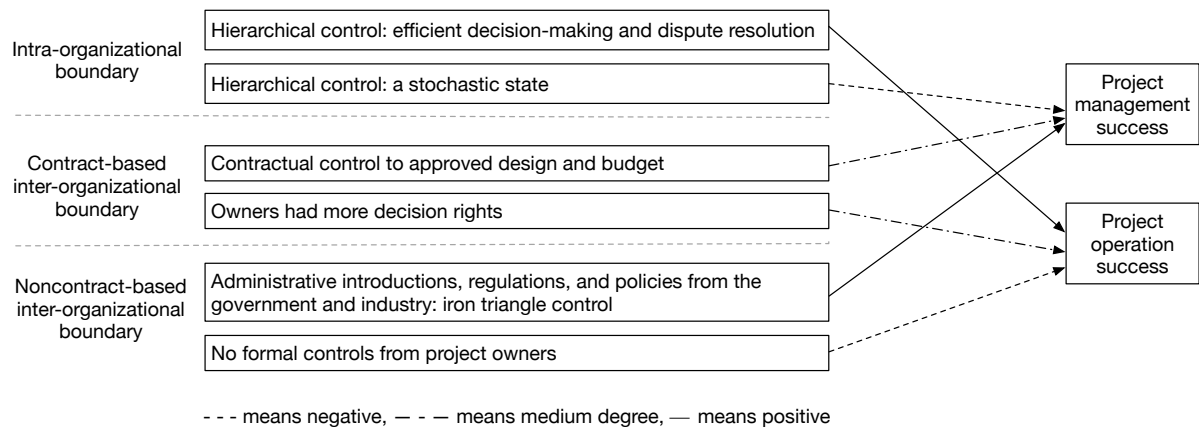
538 In the contract-based inter-organizational boundary, contractual control benefited both project
539 management success and operation success. Project managers were obligated to adhere to
540 approved designs and budgets specified in the contract, delivering projects to project owners.
541 Project management success criteria, explicitly outlined in contracts, received heightened
542 attention from project managers. Nevertheless, project owners retained the final decision-
543 making rights and could approve changes in scope, standards, and design options to improve
544 operation success, even if it led to increased costs.

545

546 *“The hospital’s leadership decided on changes impacting cost.” (#58, project manager,*
547 *case 2). “Although we recommended the project owner adopt the Engineering-*
548 *Procurement-Construction (EPC) mode, they still divided the contract into multiple*
549 *packages. Extensive cooperation efforts between packages resulted in cost and period*
550 *overruns... If the decision is agreeing to change, even if it exceeds the project investment,*
551 *the amount in excess is self-financed by the hospital.” (#57, project owner, case 2).*

552

553 In the noncontract-based inter-organizational boundary, external controls imposed strict
554 requisitions for PM success but little impetus for operation success. Project managers were
555 delegated by the government construction sector rather than project owners. They thus received
556 no formal controls from project owners, only strong administrative introductions, regulations,
557 and policies from the government and industry. These directives mandated project delivery
558 within budget, on time, and to specifications, but without provisions for meeting owners’ and
559 users’ needs. Consequently, project budget control took precedence as the main focus for
560 project managers, even in the face of limited incentives. Meanwhile, project operation success
561 received relatively less attention, coupled with reduced owner involvement and limited control
562 opportunities, causing dissatisfaction among project owners.



563

564

Fig. 7. Controls of different types of owner-manager boundaries

565 **Fig. 7** presents the influence of different owner-manager boundaries on project management

566 success and operation success. As such, we propose:

567

568 **Proposition 3:** Due to varying hierarchical, contractual, or administrative controls, intra-

569 organizational project managers prioritize project operation success over management success;

570 contract-based inter-organizational project managers can ensure a balance between both; while

571 noncontract-based inter-organizational project managers tend to prioritize project management

572 success over operation success.

573

574 4.4 Human capital resources

575 Human capital resources focused on the knowledge, skills, abilities, and other characteristics

576 (KSAOs) of project managers to perform various activities toward project success. KSAOs of

577 project managers were reflected in PM (e.g., skilled in cost and quality management) and

578 project operation (e.g., proficient at achieving medical and health care facility functions).

579

580 In the intra-organizational boundary, project managers had rich KSAOs of project operation

581 but few in PM. This asymmetry made achieving success in project operation more

582 straightforward than in PM. With medical knowledge training and day-to-day experience,

583 internal project managers could gain a deep understanding of the project’s operational
584 functions. However, they had fewer KSAOs in PM due to limited professional staff and
585 construction experience compared to external project managers.

586

587 *“We have a team of 7-8 people... but we need to communicate with contractors, designers,*
588 *other consultants, and maintenance department by ourselves... the number of staff is still*
589 *not enough... Our hospital, built in 1998 and extended in 2013, is not expected to undergo*
590 *any new construction in the next 20-30 years.” (#54, project manager, case 1)*

591

592 In contract-based and noncontract-based inter-organizational boundaries, project managers
593 held ample KSAOs in PM but few in project operation. Their abundant management experience,
594 gained through scale economy, contributed to PM success realization.

595

596 *“As a professional PM firm, we have staff responsible for front-end cooperation,*
597 *specialists managing site execution, designers responsible for drawing, and cost*
598 *engineers accountable for financial management.” (#52, project manager, #60, project*
599 *manager, case 3)*

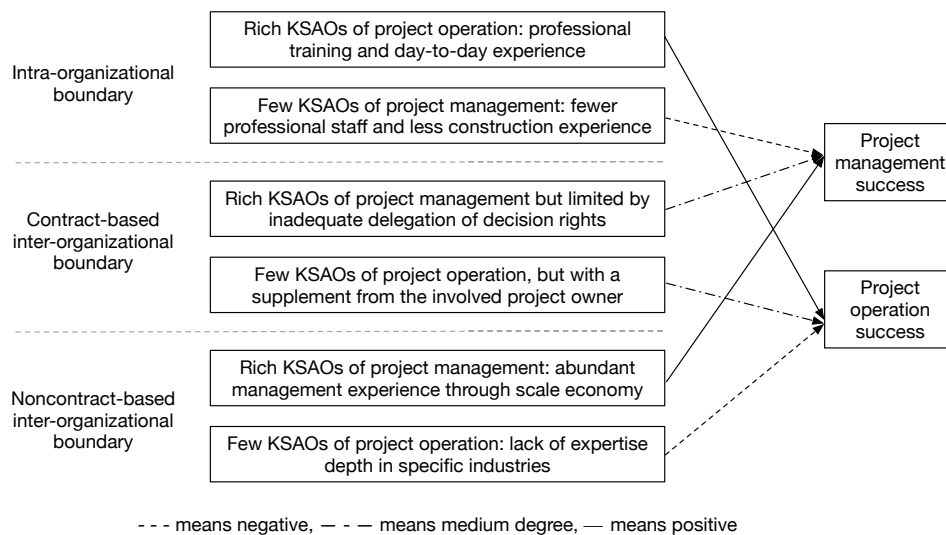
600

601 Despite their extensive experience in managing projects across various industries, their
602 expertise breadth did not necessarily guarantee depth in specific sectors. For instance, PM firms
603 in cases 2 and 3 handled a variety of projects, including healthcare, education, prison, and
604 sports facilities. However, their proficiency was deemed insufficient for highly technical
605 projects, especially in the medical and healthcare sectors. This inadequacy became particularly
606 apparent in infrequent complex projects where the costs of adaptation, learning, and
607 coordination were substantial. In essence, the pursuit of standardization could prove

608 counterproductive when projects presented unique or innovative requirements, leading to
 609 inferior operation success.

610

611 In contrast to noncontract-based boundaries, the contract-based inter-organizational boundary
 612 engaged owners more actively in project execution. This involvement supplemented the
 613 essential KSAOs needed for project operation, thereby enhancing the project manager's
 614 performance. However, it's crucial to note that the KSAOs of PM and project operation
 615 continued to remain separate across different organizations, ultimately leading to only a
 616 moderate balance of project success.



617

618 **Fig. 8.** Human capital resources of different types of owner-manager boundaries

619 Based on different human capital resources, how different owner-manager boundaries affect
 620 project management success and operation success is shown in **Fig. 8**. Based on these findings,
 621 we can put forward:

622

623 **Proposition 4:** While internal project managers possess great KSAOs of project operation,
 624 external project managers are more proficient in PM. Actively involving the project owner in

625 the project execution across the contract-based inter-organizational boundary can moderately
 626 promote the balance of project management success and operation success.

627

628 **Table 6** and **Fig. 9** summarize how public project managers balance project management
 629 success and operation success among different owner-manager boundaries.

630

631 **Table 6.** Balance of project management success and operation success in different owner-
 632 manager boundaries

Attributes	Boundary	Balance of project management success and operation success		
		Project management success	Project operation success	Balance
Interface management	1	+++(*)	+++(*)	YES
	2	+	+	NO
	3	+	+	NO
Incentives	1	++	+++(*)	YES
	2	+	+	NO
	3	+	+	NO
Controls	1	+	+++(*)	NO
	2	++	++	YES
	3	+++(*)	+	NO
Human capital resources	1	+	+++(*)	NO
	2	++	++	YES
	3	+++(*)	+	NO

633 Notes: Boundaries 1, 2, and 3 refer to intra-organizational, contract-based inter-organizational, and noncontract-
 634 based inter-organizational boundaries respectively.

635 More “+” means better realization of one specific target. The “+++” is marked with an “*” to emphasize significant
 636 enhancements.

637

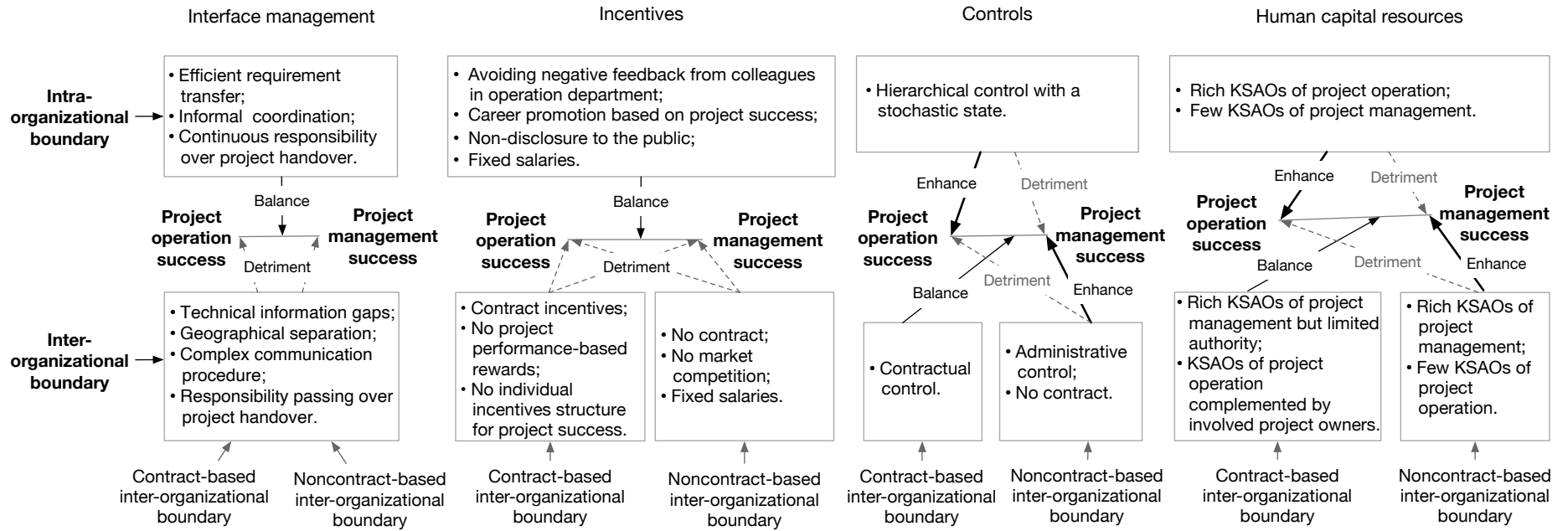


Fig. 9. Influence of organizational boundaries on the balance of project success

641 **5. Discussion**

642 Public projects encounter great tensions between project management success and operation
643 success. This research examined how owner's project manager, situated within different
644 organizational boundaries, achieves the balance of project management success and operation
645 success. Through an organizational boundary perspective, the research developed a framework
646 encompassing interface management, incentives, controls, and human capital resources. This
647 framework offers a holistic understanding of the impact of owner-manager boundaries on
648 balancing project management success and operation success (Sato & Gnanaratnam, 2014;
649 Walker, 2015).

650

651 *5.1 Interface management*

652 The focus on the intra- and inter-organizational owner-manager interface complements prior
653 studies on the inter-organizational owner-designer interface (Yu & Shen, 2015) and the owner-
654 contractor interface (Suprpto et al., 2015). The public hospital project cases show that project
655 success balance is positively and negatively affected at intra- and inter-organizational
656 boundaries, respectively, due to opposite manifestations in communication efficiency and
657 responsibility continuity. Communication efficiency could be influenced by geographical
658 distance, information gaps, and communication procedures. Besides, isolated responsibilities
659 occur in the inter-organizational boundary because of project managers' responsibilities limited
660 to the project execution stage. Although the PMBOK has extended project managers'
661 responsibility to deliver "intended outcomes" rather than simple "outputs" (PMI, 2021),
662 external project managers, in practice, still prioritize output-related PM objectives over
663 outcome-related operation objectives.

664

665 *5.2 Incentives*

666 Incentives for project managers to achieve project success are manifested in salary and
667 promotion, colleague feedback, and reputation. Although the intra-organizational boundary
668 receives more incentives for project success balance, the use of public funds still weakens the
669 incentives for project management success. This is consistent with Volden (2018a) and Volden
670 and Welde (2022), who argue that funding from the government reduces the incentive to seek
671 cost-effective solutions. In the inter-organizational boundary case, project managers' risk-
672 averse attitudes and the absence of project-based incentives drive project managers to
673 deprioritize delivering exemplary service to the public.

674

675 *5.3 Controls*

676 The findings illustrate how controls on owners' project managers affect project success,
677 expanding the control literature's scope beyond its traditional focus on contractors and
678 consultants (Li et al., 2021; Tang et al., 2020). Intra-organizational hierarchical, inter-
679 organizational contract-based, and external administrative controls serve the interests of project
680 owners, both owners and managers, and project managers respectively. The realization of
681 project management success and project operations success is therefore polarized or
682 moderately balanced. Considering the inadequacy of an individual control mechanism for
683 balancing project success, the complementary roles of different control mechanisms in project
684 management success and operation success suggest the need for their integrated application.
685 This control combination within an owner-manager context is consistent with prior studies on
686 control combination in owner-consultant and owner-contractor contexts (Ning and Zwikael,
687 2022).

688

689 *5.4 Human capital resources*

690 Results indicate that project managers in both intra- and inter-organizational boundary cases
691 face the same challenge of insufficient human capital resources, which causes troubles in
692 balancing project management success and operation success. Furthermore, this research
693 reveals that active owner involvement in project execution, joint decision-making, and
694 information sharing positively influences external project managers' performance. This aligns
695 with the recommendations of Gil and Fu (2022) who argue that sharing decision rights does
696 not lead to a zero-sum game, but instead allows for the unlocking of additional stakeholder
697 resources to increase the value created jointly. Nevertheless, the case study indicates that the
698 contract-based owner-manager collaboration falls short of integrating human resources,
699 leading to an insufficient balance of project success.

700

701 **6. Implications for research and practice**

702 *6.1 Theoretical contributions*

703 This study contributes to the extant literature in two ways. First, it complements the project
704 success literature by exploring the balance between project management success and operation
705 success from an organizational boundary perspective. While it is widely recognized that project
706 management success and operation success have intricate relationships, the evidence of how
707 they are prioritized is still piecemeal. Through a comparative study, this research reveals how
708 the balance between project management success and operation success is affected by the
709 attributes of interface management, incentives, controls, and human capital resources among
710 different owner-manager boundaries.

711

712 Second, we contribute that balancing project management success and operation success
713 requires effective configuration of interface management, incentives, controls, and human

714 capital resources. This research reveals that achieving efficient and effective requirement
715 transfer and project handover requires a blurred owner-manager interface, fostering seamless
716 collaboration. Furthermore, balancing project success depends on comprehensive incentive and
717 control mechanisms. It should reconcile task-driven and intrinsic incentives, and intra- and
718 inter-organizational controls. Human capital resources of project management and operation
719 should be integrated for the balance of project management success and operation success.

720

721 *6.2 Implications for practice*

722 First, to tackle the obstacles from the inter-organizational interface, we recommend the co-
723 action of external project managers and project owners, such as co-involvement, collaboration,
724 joint decision-making, and information sharing.

725

726 Second, a configuration of intrinsic and task-driven incentives is recommended, especially for
727 the project managers' intrinsic motivation such as the identity in organizational culture. Intra-
728 and inter-organizational controls can be integrated to drive managers' pursuit of both project
729 management success and operation success.

730

731 Third, project managers should integrate KSAOs of project management and operation. Last,
732 improvement in interface management, incentives, controls, and human capital resources
733 should be aligned and strategically employed for overall project success.

734

735 **7. Conclusions**

736 The multiple-case study reveals differences in interface management, incentives, controls, and
737 human capital resources between intra- and inter-organizational boundaries, and how managers
738 are affected differently in balancing project success.

739

740 One of the limitations of this study is that only public hospital cases are analyzed. Given the
741 context sensitivity, generalizing the findings to the broader context of public construction
742 projects should be approached with caution. Future research is suggested to extend the scope
743 to a wider range of public projects, such as transportation infrastructures. Furthermore, research
744 findings shed light on the influence of the owner-manager boundaries on project success. The
745 influence of other partners such as consultants, contractors, and other suppliers, was not taken
746 into account. Additional research is suggested to examine how multiple stakeholders co-create
747 value in public projects for both realizations of project management success and operation
748 success.

749

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752 72301103) and the Fundamental Research Funds for the Central Universities (JKN02232203).

753

754 **Data Availability Statement**

755 Some or all data, models, or code that support the findings of this study are available from the
756 corresponding author upon reasonable request.

757

758 **References**

759 Alvarez-Suescun, E. (2010). Combining transaction cost and resource-based insights to explain IT implementation
760 outsourcing. *Information Systems Frontiers*, 12, 631-645. <https://doi.org/10.1007/s10796-010-9237-1>

761 Andersen, E. S. (2012). Illuminating the role of the project owner. *International Journal of Managing Projects in*
762 *Business*, 5(1), 67-85. <https://doi.org/10.1108/17538371211192900>

763 Angus, G. Y., Flett, P. D., & Bowers, J. A. (2005). Developing a value-centred proposal for assessing project
764 success. *International Journal of Project Management*, 23(6), 428-436.
765 <https://doi.org/10.1016/j.ijproman.2005.01.008>

766 Argyres, N. S., & Zenger, T. R. (2012). Capabilities, transaction costs, and firm boundaries. *Organization Science*,
767 23(6), 1643-1657. <https://doi.org/10.1287/orsc.1110.0736>

-
- 768 Attalla, M., Hegazy, T., & Elbeltagi, E. (2004). In-house delivery of multiple-small reconstruction projects.
769 *Journal of Management in Engineering*, 20(1), 25-31. [https://doi.org/10.1061/\(ASCE\)0742-](https://doi.org/10.1061/(ASCE)0742-)
770 597X(2004)20:1(25)
- 771 Baccarini, D. (1999). The Logical Framework Method for Defining Project Success. *Project Management Journal*,
772 30(4), 25-32. <https://doi.org/10.1177/875697289903000405>
- 773 Badewi, A. (2016). The impact of project management (PM) and benefits management (BM) practices on project
774 success: Towards developing a project benefits governance framework. *International Journal of Project*
775 *Management*, 34(4), 761-778. <https://doi.org/10.1016/j.ijproman.2015.05.005>
- 776 Badewi, A. (2022). When frameworks empower their agents: The effect of organizational project management
777 frameworks on the performance of project managers and benefits managers in delivering transformation
778 projects successfully. *International Journal of Project Management*, 40(2), 132-141.
779 <https://doi.org/10.1016/j.ijproman.2021.10.005>
- 780 Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of management*, 17(1), 99-120.
781 <https://doi.org/10.1177/014920639101700108>
- 782 Barney, J. B. (2018). Why resource-based theory's model of profit appropriation must incorporate a stakeholder
783 perspective. *Strategic Management Journal*, 39(13), 3305-3325. <https://doi.org/10.1002/smj.2949>
- 784 Bigdeli, A. Z., Kapoor, K., Schroeder, A., & Omidvar, O. (2021). Exploring the root causes of servitization
785 challenges: an organisational boundary perspective. *International Journal of Operations & Production*
786 *Management*, 41(5), 547-573. <https://doi.org/10.1108/IJOPM-08-2020-0507>
- 787 Brahm, F., & Tarziján, J. (2014). Transactional hazards, institutional change, and capabilities: Integrating the
788 theories of the firm. *Strategic Management Journal*, 35(2), 224-245.
789 <https://doi.org/https://doi.org/10.1002/smj.2094>
- 790 Candel, M., Karrbom Gustavsson, T., & Eriksson, P.-E. (2021). Front-end value co-creation in housing
791 development projects. *Construction Management and Economics*, 39(3), 245-260.
792 <https://doi.org/10.1080/01446193.2020.1851037>
- 793 Castelblanco, G., Guevara, J., Mesa, H., & Hartmann, A. (2022). Social legitimacy challenges in toll road PPP
794 programs: Analysis of the Colombian and Chilean cases. *Journal of Management in Engineering*, 38(3),
795 05022002. [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0001010](https://doi.org/10.1061/(ASCE)ME.1943-5479.0001010)
- 796 Chang, C.-Y. (2013). A critical review of the application of TCE in the interpretation of risk allocation in PPP
797 contracts. *Construction Management and Economics*, 31(2), 99-103.
798 <https://doi.org/10.1080/01446193.2012.726365>
- 799 Coase, R. H. (1937). The nature of the firm. *Economica (N.S.)*, 4(16), 386-405.
- 800 Cooke-Davies, T. (2002). The "real" success factors on projects. *International Journal of Project Management*,
801 20(3), 185-190. [https://doi.org/10.1016/S0263-7863\(01\)00067-9](https://doi.org/10.1016/S0263-7863(01)00067-9)
- 802 Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria.
803 *Qualitative sociology*, 13(1), 3-21. <https://doi.org/10.1007/BF00988593>
- 804 De Wit, A. (1988). Measurement of project success. *International Journal of Project Management*, 6(3), 164-170.
805 [https://doi.org/10.1016/0263-7863\(88\)90043-9](https://doi.org/10.1016/0263-7863(88)90043-9)
- 806 DeFillippi, R., & Sydow, J. (2016). Project networks: Governance choices and paradoxical tensions. *Project*
807 *Management Journal*, 47(5), 6-17. <https://doi.org/10.1177/875697281604700502>
- 808 El Asmar, M., Hanna, A. S., & Loh, W.-Y. (2013). Quantifying performance for the integrated project delivery
809 system as compared to established delivery systems. *Journal of construction engineering and*
810 *management*, 139(11), 04013012. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0000744](https://doi.org/10.1061/(ASCE)CO.1943-7862.0000744)

-
- 811 Enkel, E., & Sagmeister, V. (2020). External corporate venturing modes as new way to develop dynamic
812 capabilities. *Technovation*, 96, 102128. <https://doi.org/10.1016/j.technovation.2020.102128>
- 813 Felin, T., & Zenger, T. R. (2011). Information aggregation, matching and radical market–hierarchy hybrids:
814 Implications for the theory of the firm. *Strategic Organization*, 9(2), 163-173.
815 <https://doi.org/10.1177/1476127011408250>
- 816 Felin, T., & Zenger, T. R. (2014). Closed or open innovation? Problem solving and the governance choice.
817 *Research Policy*, 43(5), 914-925. <https://doi.org/10.1016/j.respol.2013.09.006>
- 818 Fellows, R., & Liu, A. M. M. (2012). Managing organizational interfaces in engineering construction projects:
819 addressing fragmentation and boundary issues across multiple interfaces. *Construction Management and*
820 *Economics*, 30(8), 653-671. <https://doi.org/10.1080/01446193.2012.668199>
- 821 Fountain, J., & Langar, S. (2018). Building Information Modeling (BIM) outsourcing among general contractors.
822 *Automation in Construction*, 95, 107-117. <https://doi.org/https://doi.org/10.1016/j.autcon.2018.06.009>
- 823 Fuentes, M., Smyth, H., & Davies, A. (2019). Co-creation of value outcomes: A client perspective on service
824 provision in projects. *International Journal of Project Management*, 37(5), 696-715.
825 <https://doi.org/10.1016/j.ijproman.2019.01.003>
- 826 Gil, N. (2022). Megaprojects: a meandering journey towards a theory of purpose, value creation and value
827 distribution. *Construction Management and Economics*, 40(7-8), 562-584.
828 <https://doi.org/10.1080/01446193.2021.1946832>
- 829 Gil, N., & Fu, Y. (2022). Megaproject Performance, Value Creation, and Value Distribution: An Organizational
830 Governance Perspective. *Academy of Management Discoveries*, 8(2), 224-251.
831 <https://doi.org/10.5465/amd.2020.0029>
- 832 Gulbrandsen, B., Sandvik, K., & Haugland, S. A. (2009). Antecedents of vertical integration: Transaction cost
833 economics and resource-based explanations. *Journal of Purchasing and Supply Management*, 15(2), 89-
834 102. <https://doi.org/10.1016/j.pursup.2008.12.003>
- 835 Hennart, J.-F. (2013). Internal and external hybrids and the nature of joint ventures. In A. Grandori (Ed.),
836 *Handbook of economic organization* (pp. 481-500). Edward Elgar Publishing.
837 <https://doi.org/10.4337/9781849803984.00037>
- 838 Holcomb, T. R., & Hitt, M. A. (2007). Toward a model of strategic outsourcing. *Journal of Operations*
839 *Management*, 25(2), 464-481. <https://doi.org/10.1016/j.jom.2006.05.003>
- 840 Holmstrom, B., & Milgrom, P. (1991). Multitask principal–agent analyses: Incentive contracts, asset ownership,
841 and job design. *The Journal of Law, Economics, and Organization*, 7(special_issue), 24-52.
842 https://doi.org/10.1093/jleo/7.special_issue.24
- 843 Hui, P. P., Davis-Blake, A., & Broschak, J. P. (2008). Managing interdependence: The effects of outsourcing
844 structure on the performance of complex projects. *Decision Sciences*, 39(1), 5-31.
845 <https://doi.org/10.1111/j.1540-5915.2008.00180.x>
- 846 Ika, L. A. (2009). Project Success as a Topic in Project Management Journals. *Project Management Journal*, 40(4),
847 6-19. <https://doi.org/10.1002/pmj.20137>
- 848 Ika, L. A., & Pinto, J. K. (2022). The “re-meaning” of project success: Updating and recalibrating for a modern
849 project management. *International Journal of Project Management*, 40(7), 835-848.
850 <https://doi.org/10.1016/j.ijproman.2022.08.001>
- 851 Joslin, R., & Müller, R. (2016). The relationship between project governance and project success. *International*
852 *Journal of Project Management*, 34(4), 613-626. <https://doi.org/10.1016/j.ijproman.2016.01.008>
- 853 Klein, P. G., Mahoney, J. T., McGahan, A. M., & Pitelis, C. N. (2019). Organizational governance adaptation:

-
- 854 Who is in, who is out, and who gets what. *Academy of Management review*, 44(1), 6-27.
855 <https://doi.org/10.5465/amr.2014.0459>
- 856 Krane, H. P., Olsson, N. O. E., & Rolstadås, A. (2012). How Project Manager–Project Owner Interaction Can
857 Work within and Influence Project Risk Management. *Project Management Journal*, 43(2), 54-67.
858 <https://doi.org/10.1002/pmj.20284>
- 859 Lam, E. W., Chan, A. P., & Chan, D. W. (2010). Benchmarking success of building maintenance projects. *Facilities*,
860 28(5/6), 290-305. <https://doi.org/10.1108/02632771011031529>
- 861 Langley, A. (1999). Strategies for theorizing from process data. *Academy of Management review*, 24(4), 691-710.
862 <https://doi.org/10.5465/amr.1999.2553248>
- 863 Lee, K.-T., Jekal, J.-W., & Kim, J.-H. (2023). Client Briefing for Introducing Value Management to Establish
864 Daycare Center Guidelines for the Republic of Korea. *Journal of Management in Engineering*, 39(3),
865 04023011. <https://doi.org/10.1061/JMENEA.MEENG-5090>
- 866 Leiblein, M. J. (2003). The choice of organizational governance form and performance: Predictions from
867 transaction cost, resource-based, and real options theories. *Journal of management*, 29(6), 937-961.
868 [https://doi.org/10.1016/S0149-2063\(03\)00085-0](https://doi.org/10.1016/S0149-2063(03)00085-0)
- 869 Li, Y., Ning, Y., & Rowlinson, S. (2021). Interaction of Interorganizational and Intraorganizational Controls in
870 Shaping Professionals' Behaviors in Outsourced Architectural and Engineering Design Consulting
871 Projects. *Journal of Management in Engineering*, 37(6), 05021006.
872 [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000956](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000956)
- 873 Lim, C. S., & Mohamed, M. Z. (1999). Criteria of project success: an exploratory re-examination. *International*
874 *Journal of Project Management*, 17(4), 243-248. [https://doi.org/10.1016/S0263-7863\(98\)00040-4](https://doi.org/10.1016/S0263-7863(98)00040-4)
- 875 Lines, B. C., Nguyen, P. H., & Kakarapalli, R. (2021). An empirical analysis of project performance outcomes for
876 best-value procurement in design–bid–build projects. *Journal of Management in Engineering*, 37(3),
877 04021005. [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.000089](https://doi.org/10.1061/(ASCE)ME.1943-5479.000089)
- 878 Ling, F. Y. Y., Ong, S. Y., Ke, Y., Wang, S., & Zou, P. (2014). Drivers and barriers to adopting relational contracting
879 practices in public projects: Comparative study of Beijing and Sydney. *International Journal of Project*
880 *Management*, 32(2), 275-285. <https://doi.org/10.1016/j.ijproman.2013.04.008>
- 881 Ling, F. Y. Y., & Poh, B. H. M. (2008). Problems encountered by owners of design–build projects in Singapore.
882 *International Journal of Project Management*, 26(2), 164-173.
883 <https://doi.org/https://doi.org/10.1016/j.ijproman.2007.04.001>
- 884 Liu, M., Zhu, Y., Wei, J., Le, Y., & Zhang, X. (2022). Impact of Institutional Pressures on External Program
885 Manager Involvement: Evidence from Large Projects in China. *Journal of construction engineering and*
886 *management*, 148(9), 04022079. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0002306](https://doi.org/10.1061/(ASCE)CO.1943-7862.0002306)
- 887 Locatelli, G., Zerjav, V., & Klein, G. (2020). Project transitions—navigating across strategy, delivery, use, and
888 decommissioning. *Project Management Journal*, 51(5), 467-473.
889 <https://doi.org/10.1177/8756972820953976>
- 890 Ma, D., Chen, Y., Fu, Y., & Meng, C. (2022). Influencing factors of outsourcing in construction projects: a holistic
891 perspective. *International Journal of Managing Projects in Business*, 15(2), 396-422.
892 <https://doi.org/10.1108/IJMPB-04-2021-0107>
- 893 Marnewick, C., & Marnewick, A. L. (2022). Benefits realisation in an agile environment. *International Journal*
894 *of Project Management*, 40(4), 454-465. <https://doi.org/10.1016/j.ijproman.2022.04.005>
- 895 McHugh, O., & Hogan, M. (2011). Investigating the rationale for adopting an internationally-recognised project
896 management methodology in Ireland: The view of the project manager. *International Journal of Project*
897 *Management*, 29(5), 637-646. <https://doi.org/https://doi.org/10.1016/j.ijproman.2010.05.001>

-
- 898 Mcivor, R. (2009). How the transaction cost and resource-based theories of the firm inform outsourcing evaluation.
899 *Journal of Operations Management*, 27(1), 45-63. <https://doi.org/10.1016/j.jom.2008.03.004>
- 900 Musawir, A. u., Abd-Karim, S. B., & Mohd-Danuri, M. S. (2020). Project governance and its role in enabling
901 organizational strategy implementation: A systematic literature review. *International Journal of Project*
902 *Management*, 38(1), 1-16. <https://doi.org/10.1016/j.ijproman.2019.09.007>
- 903 Ning, Y. (2017). Combining formal controls and trust to improve dwelling fit-out project performance: A
904 configurational analysis. *International Journal of Project Management*, 35(7), 1238-1252.
905 <https://doi.org/10.1016/j.ijproman.2017.06.002>
- 906 Ning, Y., & Zwikael, O. (2022). Effective Combinations of Control Strategies in Inter-Organizational Projects.
907 *IEEE Transactions on engineering management*. <https://doi.org/10.1109/TEM.2022.3200990>
- 908 Nwajei, U. O. K., Bølviken, T., & Hellström, M. M. (2022). Overcoming the principal-agent problem: The need
909 for alignment of tools and methods in collaborative project delivery. *International Journal of Project*
910 *Management*, 40(7), 750-762. <https://doi.org/10.1016/j.ijproman.2022.08.003>
- 911 Perkins, R. A. (2009). Sources of changes in design–build contracts for a governmental owner. *Journal of*
912 *construction engineering and management*, 135(7), 588-593. [https://doi.org/10.1061/\(ASCE\)0733-](https://doi.org/10.1061/(ASCE)0733-9364(2009)135:7(588))
913 [9364\(2009\)135:7\(588\)](https://doi.org/10.1061/(ASCE)0733-9364(2009)135:7(588))
- 914 Pinto, J., Davis, K., Ika, L., Jugdev, K., & Zwikael, O. (2021). Call for papers for special issue on project success.
915 *International Journal of Project Management*, 39(2), 213-215.
916 <https://doi.org/10.1016/j.ijproman.2021.01.007>
- 917 Pinto, J. K., & Slevin, D. P. (1987). Critical factors in successful project implementation. *IEEE Transactions on*
918 *engineering management*, EM-34(1), 22-27. <https://doi.org/10.1109/TEM.1987.6498856>
- 919 Pisotska, V., Winch, G., & Sergeeva, N. (2022). Project governance interface and owner organizational identity:
920 The Venice Biennale case. *International Journal of Project Management*, 40(6), 658-670.
921 <https://doi.org/10.1016/j.ijproman.2022.07.001>
- 922 PMI. (2021). *A Guide to the Project Management Body of Knowledge (7 th ed.)*.
- 923 Ranasinghe, N., Perera, B. K. S., & Dilakshan, R. (2022). Drivers of decisions behind outsourcing of quantity
924 surveying services in construction projects. *International Journal of Construction Management*, 22(2),
925 292-304. <https://doi.org/10.1080/15623599.2019.1622199>
- 926 Samset, K. (2013). Strategic and tactical performance of mega-projects—between successful failures and
927 inefficient successes. In H. P. B. V. Wee (Ed.), *International handbook on mega-projects* (pp. 11-33).
928 Edward Elgar Publishing. <https://doi.org/10.4337/9781781002308.00008>
- 929 Samset, K., & Volden, G. H. (2016). Front-end definition of projects: Ten paradoxes and some reflections
930 regarding project management and project governance. *International Journal of Project Management*,
931 34(2), 297-313. <https://doi.org/10.1016/j.ijproman.2015.01.014>
- 932 Santos, F. M., & Eisenhardt, K. M. (2005). Organizational boundaries and theories of organization. *Organization*
933 *Science*, 16(5), 491-508. <https://doi.org/10.1287/orsc.1050.0152>
- 934 Sato, C. E., & Gnanaratnam, A. (2014). The differences between an internal and external project manager. *Revista*
935 *de Gestão e Projetos-GeP*, 5(2), 01-23. <https://doi.org/10.5585/gep.v5i2.264>
- 936 Serrador, P., & Turner, R. (2015). The relationship between project success and project efficiency. *Project*
937 *Management Journal*, 46(1), 30-39. <https://doi.org/10.1002/pmj.21468>
- 938 Silvius, G., & Schipper, R. (2016). Exploring the relationship between sustainability and project success-
939 conceptual model and expected relationships. *International Journal of Information Systems and Project*
940 *Management*, 4(3), 5-22. <https://doi.org/10.12821/ijispm040301>

-
- 941 Silvius, G., & Schipper, R. (2020). Exploring variety in factors that stimulate project managers to address
942 sustainability issues. *International Journal of Project Management*, 38(6), 353-367.
943 <https://doi.org/10.1016/j.ijproman.2020.08.003>
- 944 Stjerne, I. S., Söderlund, J., & Minbaeva, D. (2019). Crossing times: Temporal boundary-spanning practices in
945 interorganizational projects. *International Journal of Project Management*, 37(2), 347-365.
946 <https://doi.org/10.1016/j.ijproman.2018.09.004>
- 947 Stordy, J., Zerjav, V., & Kanjanabootra, S. (2021). Owner capabilities in the project society: The setting of project-
948 supported organisations. *Project Leadership and Society*, 2, 100024.
949 <https://doi.org/10.1016/j.plas.2021.100024>
- 950 Suddaby, R. (2006). From the editors: What grounded theory is not. *Academy of management journal*, 49(4), 633-
951 642. <https://doi.org/10.5465/amj.2006.22083020>
- 952 Suprpto, M., Bakker, H. L., & Mooi, H. G. (2015). Relational factors in owner–contractor collaboration: The
953 mediating role of teamworking. *International Journal of Project Management*, 33(6), 1347-1363.
954 <https://doi.org/10.1016/j.ijproman.2015.03.015>
- 955 Tang, Y., Chen, Y., Hua, Y., & Fu, Y. (2020). Impacts of risk allocation on conflict negotiation costs in construction
956 projects: Does managerial control matter? *International Journal of Project Management*, 38(3), 188-199.
957 <https://doi.org/https://doi.org/10.1016/j.ijproman.2020.03.002>
- 958 Turner, R. (2020). How Does Governance Influence Decision Making on Projects and in Project-Based
959 Organizations? *Project Management Journal*, 51(6), 670-684.
960 <https://doi.org/10.1177/8756972820939769>
- 961 Volden, G. H. (2018a). Public funding, perverse incentives, and counterproductive outcomes. *International*
962 *Journal of Managing Projects in Business*, 12(2), 466-486. <https://doi.org/10.1108/IJMPB-12-2017-0164>
963
- 964 Volden, G. H. (2018b). Public project success as seen in a broad perspective. *Evaluation and Program Planning*,
965 69, 109-117. <https://doi.org/10.1016/j.evalprogplan.2018.04.008>
- 966 Volden, G. H., & Welde, M. (2022). Public project success? Measuring the nuances of success through ex post
967 evaluation. *International Journal of Project Management*, 40(6), 703-714.
968 <https://doi.org/10.1016/j.ijproman.2022.06.006>
- 969 Walker, A. (2015). *Project management in construction*. John Wiley & Sons.
- 970 Whyte, J., & Nussbaum, T. (2020). Transition and temporalities: spanning temporal boundaries as projects end
971 and operations begin. *Project Management Journal*, 51(5), 505-521.
972 <https://doi.org/10.1177/8756972820919002>
- 973 Wiewiora, A., & Desouza, K. C. (2022). Surfacing and responding paradoxes in megascale projects. *International*
974 *Journal of Project Management*, 40(3), 235-250. <https://doi.org/10.1016/j.ijproman.2022.01.009>
- 975 Williamson, O. E. (1975). *Markets and hierarchies: analysis and antitrust implications: a study in the economics*
976 *of internal organization*. Free Press.
- 977 Williamson, O. E. (1985). *The Economics Institutions of Capitalism: Firms, Markets, relational contracting*.
978 Simon and Schuster.
- 979 Williamson, O. E. (1996). Economic organization: The case for candor. *Academy of Management review*, 21(1),
980 48-57. <https://doi.org/10.5465/amr.1996.9602161564>
- 981 Winch, G., & Leiringer, R. (2016). Owner project capabilities for infrastructure development: A review and
982 development of the “strong owner” concept. *International Journal of Project Management*, 34(2), 271-
983 281. <https://doi.org/10.1016/j.ijproman.2015.02.002>

-
- 984 Winch, G. M. (2014). Three domains of project organising. *International Journal of Project Management*, 32(5),
985 721-731. <https://doi.org/10.1016/j.ijproman.2013.10.012>
- 986 Yin, R. K. (2018). *Case study research and applications: Design and methods*. Sage Books.
- 987 Yu, A. T., & Shen, G. Q. (2015). Critical success factors of the briefing process for construction projects. *Journal*
988 *of Management in Engineering*, 31(3), 04014045. [https://doi.org/10.1061/\(ASCE\)ME.1943-](https://doi.org/10.1061/(ASCE)ME.1943-)
989 5479.0000242
- 990 Zeng, W., Zhang, J., Wang, H., & Zhou, H. (2018). Supplier development and its incentives in infrastructure mega-
991 projects: A case study on Hong Kong-Zhuhai-Macao Bridge project. *Frontiers of Engineering*
992 *Management*, 5(1), 88-97. <https://doi.org/10.15302/J-FEM-2018077>
- 993 Zenger, T. R. (1992). Why do employers only reward extreme performance? Examining the relationships among
994 performance, pay, and turnover. *Administrative science quarterly*, 37(2), 198-219.
995 <https://doi.org/10.2307/2393221>
- 996 Zenger, T. R., Felin, T., & Bigelow, L. (2011). Theories of the Firm–Market Boundary. *The Academy of*
997 *Management Annals*, 5(1), 89-133. <https://doi.org/10.5465/19416520.2011.590301>
- 998 Zwikael, O., & Meredith, J. R. (2018). Who’s who in the project zoo? The ten core project roles. *International*
999 *Journal of Operations & Production Management*, 38(2), 474-492. <https://doi.org/10.1108/IJOPM-05->
1000 2017-0274
- 1001 Zwikael, O., Meredith, J. R., & Smyrk, J. (2019). The responsibilities of the project owner in benefits realization.
1002 *International Journal of Operations & Production Management*, 39(4), 503-524.
1003 <https://doi.org/10.1108/IJOPM-02-2018-0086>
- 1004 Zwikael, O., & Smyrk, J. (2012). A General Framework for Gauging the Performance of Initiatives to Enhance
1005 Organizational Value. *British Journal of Management*, 23, S6-S22. <https://doi.org/10.1111/j.1467->
1006 8551.2012.00823.x
- 1007 Zwikael, O., & Smyrk, J. (2015). Project governance: Balancing control and trust in dealing with risk.
1008 *International Journal of Project Management*, 33(4), 852-862.
1009 <https://doi.org/10.1016/j.ijproman.2014.10.012>
- 1010

1011 **Appendix A. Preliminary interview template**

1012

1013 ***Reform of project management modes***

1014 1. How is Jiangsu Province currently (during 2019 and 2020) reforming its public
1015 project management modes, from internal and contractual outsourcing to
1016 noncontractual outsourcing project management?
1017

1018 2. What benefits do you think this project management mode reform will bring?
1019

1020 3. What are the challenges in the project management mode reform process?
1021

1022 4. Among the public projects currently applying noncontractual outsourcing mode,
1023 which type of project (such as hospital, school, or prison projects) has more
1024 prominent problems? Could you give an example?
1025

1026 5. What are the responsibilities and rights of project owners and project managers in
1027 internal, contractual outsourcing, and noncontractual outsourcing project management
1028 modes?
1029

1030 6. What changes occurred in the responsibilities and rights of project owners and project
1031 managers during this project management mode reform?
1032

1033 7. Among the three project management modes, are project funds managed by project
1034 owners or by project managers? Did this cause any differences?
1035

1036 8. Among the three project management modes, how do stakeholders (including
1037 government construction departments, government finance departments, project
1038 managers, project owners, and users) interact during the project life cycle?
1039

1040 9. How does the project management mode reform affect the achievement of project
1041 goals (including project cost, schedule, quality, and the realization of owners' and
1042 users' needs)?
1043

1044 ***Project managers***

1045 Among the three project management modes:

1046 10. How do project managers charge money (e.g., project management service fee) or
1047 sustain their viability?
1048

1049 11. During interaction with project owners, do project managers generally tend to actively
1050 cooperate or rather exhibit a passive and perfunctory attitude?
1051

1052 12. What capabilities of project managers would promote the achievement of project
1053 goals (including project cost, schedule, quality, and the realization of owners' and
1054 users' needs)?
1055

1056 13. What additional capabilities should project managers acquire to better support the
1057 attainment of project objectives?
1058

1059 ***Project owners***

1060 Among the three project management modes:

1061 14. How can project owners adjust their organizational structure and strategies to cope
1062 with the project management mode reform?
1063

1064 15. How does the project owner perceive this project management mode reform,
1065 positively or negatively?
1066

1067 16. How do project owners maintain the asset and provide service for users during the
1068 project operation stage?
1069

1070 17. What capabilities of project owners are conducive to the achievement of project goals
1071 (including project cost, schedule, quality, and the realization of owners' and users'
1072 needs)?
1073

1074 18. What capabilities do project owners still need to add to facilitate the achievement of
1075 project goals?
1076

1077 ***Interactions between project owners and project managers***

1078 Among the three project management modes:

1079 19. How do project managers and project owners interact during the project front-end
1080 stage, such as the requirement transfer?
1081

1082 20. How do project managers and project owners interact during the project execution
1083 stage, such as negotiation when facing project changes?
1084

1085 21. How do project managers and project owners interact during the project operation
1086 stage, such as maintenance and repairs?
1087

1088 Notes: This is a complete and comprehensive interview outline. Actual interviews will be
1089 tailored to the background of the interviewees, with a focus on specific inquiries. For example,
1090 in some multi-person interviews (e.g., the group interviews #30 to #49), we only invited them
1091 to take turns introducing the benefits and challenges encountered in the current project
1092 management mode (i.e., questions 2 and 3).

1093 **Appendix B. Interview template based on cases**

1094

1095 In this interview, we call the project management firm/department as project manager and the
1096 hospital as the project owner.

1097

1098 ***Background of project cases***

1099 1. Please briefly introduce the hospital project you were responsible for before, such as
1100 the project name, construction contents, project budget, project schedule, funding
1101 source, etc.
1102

1103 ***The influence of organizational boundaries on project success***

1104 2. Organizational boundary type:

1105 • What type of organizational boundary was applied between the project owner and the
1106 project manager in this project (internal, contractual outsourcing, or noncontractual
1107 outsourcing)?
1108

1109 3. Involvement stage:

1110 • At what stage of the project did the project manager (project management
1111 firm/department) get involved in the project management?
1112 • Has the timing of the project manager's involvement affected the project cost,
1113 schedule, quality, and realization of owners' and users' needs?
1114

1115 4. Interface interactions:

1116 • How did the project manager interact with the project owner (hospital) over the
1117 requirement transfer and project handover?
1118 • How did their interaction influence the project cost, schedule, quality, and realization
1119 of owners' and users' needs?
1120

1121 5. Incentive mechanisms:

1122 • What incentives were implemented for project managers to encourage greater effort in
1123 project management? Examples could be salaries, promotions, rewards, and
1124 organizational reputation.
1125 • How did these incentives influence the project cost, schedule, quality, and owners'
1126 and users' needs realization?
1127

1128 6. Control mechanisms:

-
- 1129 • What types of control mechanisms were employed to oversee the project manager?
1130 Please describe the control or monitoring mechanisms utilized by the government, the
1131 project owner, the community, etc.
1132 • How did these control mechanisms influence the project cost, schedule, quality, and
1133 owners' and users' needs realization?
1134

- 1135 7. Capabilities:
1136 • How do you think the competencies of the project owner and the project manager are
1137 reflected in this project?
1138 • How did their capabilities affect the project cost, schedule, quality, and owners' and
1139 users' needs realization?
1140

- 1141 8. Learning:
1142 • Can the project manager effectively learn from the project management experiences
1143 in this project and apply them to new projects?
1144 • Will this accumulated experience be beneficial in optimizing cost, time, and quality
1145 management for new projects, as well as achieving improved cooperation with project
1146 owners and enhancing user satisfaction?
1147

- 1148 9. Is there anything else you would like to share with us?
1149

1150 Notes: The complete interview template covers multiple aspects related to the research topic.
1151 Here, we present only the interview template that supports this study. Furthermore, based on
1152 the specific projects and interviewees, we adjusted the questioning methods accordingly (such
1153 as differences in questions for project owners and project managers) and added corresponding
1154 questions.