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RESEARCH ARTICLE

Designing the transition to operations in large inter-organizational projects: Strategy, structure, process, and people

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Abstract

The transition from projects to operations requires a spanning from more temporary, goal-oriented, and evolving organizational forms to more permanent, routine, and ongoing organizational forms. A question of practical and theoretical significance is how to organize the transition to operations in large inter-organizational projects. To answer this question, we conducted a longitudinal case study of Beijing Daxing International Airport, which is the largest transportation hub in China to date, and provides rich evidence for successfully managing the transition to operations. By analyzing the organizational design strategy, structures, processes, and management of people in the transition, we provide a synthetic framework for designing the transition to operations in large inter-organizational projects. The framework provides a set of considerations to design organizational boundaries that build connections, emphasize coordination, and achieve continuity between projects and operations. This study contributes to the nexus of operations management and project management and the organizational design of large inter-organizational projects.

KEYWORDS

large infrastructure projects, organizational design, owners and operators, project transitions, temporary-permanent organizing

Highlights

- The transition should be designed to achieve continuity between projects and operations, emphasizing coordination, information exchange, and reconciling temporary and permanent organizational forms.
- Ad hoc integrated organizations should be designed to manage transitions, emphasizing concurrent leadership, and job rotation in temporary (project) and permanent (operations) organizations.

- The framework moves from capabilities to actions by providing strong owners with the building blocks for designing the transition of large projects to operations (strategy, structure, process, people).

1 | INTRODUCTION

Large infrastructure systems are built and managed by a complex network of organizations, which can be divided into two distinct phases: project and operations (Ramasesh & Browning, 2014; Shenhar & Dvir, 2007). The activities and objectives of the project phase of these large inter-organizational projects are inherently different from the operations phase of the asset after its transition (Davies et al., 2009; Mishra & Browning, 2020). Projects involve unique, one-time activities to plan, design, and construct new systems or refurbish established ones. Operations entail repetitive, ongoing activities in providing infrastructure services to users (Dodgson et al., 2015). While projects have traditionally been seen as vehicles for delivering specific outputs for a predefined scope, they are now increasingly being conceptualized as tools for value creation (Browning, 2010; Laursen & Svejvig, 2016). Projects unlock value and realize investment in long-term operational outcomes by delivering project outputs (Morgan et al., 2008; Zerjav, 2021). Without a successful transition in transforming project outputs into operational outcomes, the resources spent on projects might be wasted, as changes must be made to suit the requirements or preferences of the organizations operating the asset (Locatelli et al., 2020; Morgan et al., 2008).

The delivery of large inter-organizational projects is replete with examples where projects have failed to meet the basic operational and usage expectations after handover (Al-Mazrouie et al., 2021). For example, London Heathrow Terminal 5 experienced a series of problems on its opening day, resulting in numerous canceled flights and thousands of missing and misplaced suitcases. Its owner admitted afterward that the main cause of such problems was their failure to work closely with multiple organizations involved in operations during the transition (Brady & Davies, 2010). Similarly, numerous problems after the commissioning of Hong Kong Chek Lap Kok Airport, such as IT, baggage, cargo, air conditioning, and water supply failures, have been attributed to inadequate coordination in the transition (Lee, 2000). More recently, Berlin-Brandenburg Airport opened almost a decade later than expected (Winch et al., 2022), with continuing reports of operational problems affecting the passenger experience.

The transition can be a key challenge when hardware, software, and people must come together as a functioning operational system (Zerjav et al., 2018), but it also provides a window of opportunity for project organizations to work alongside operations organizations (Whyte et al., 2016). Although the importance of transition is widely acknowledged (Artto et al., 2016; Brady & Davies, 2010; Morris, 2013; Winch & Leiringer, 2016), a recent review of the project management literature shows that few studies examine the transition from projects to operations (Locatelli et al., 2020). The few existing studies have focused on specific processes and mechanisms in organizing the transition phase, for instance by emphasizing the importance of testing and operational readiness (Davies et al., 2009), explaining digital asset handover (Whyte, 2019; Whyte et al., 2016), and describing transitions through ritualized practices (Van Den Ende & Van Marrewijk, 2014). We build upon the growing call for research on the organizational design of transitions in large inter-organizational projects (Davies et al., 2019; Denicol et al., 2020), emphasizing that projects and operations often involve distinct organizational forms (Bakker et al., 2016; Brookes et al., 2017). In their future research recommendations, Zerjav et al. (2018) highlighted that organizational design is an important tool for addressing the challenges of adaptation, coordination, and alignment between projects and operations. Whyte and Nussbaum (2020) argued that it is critical to understand how different organizational forms meet in the transition between projects and operations. When synthesizing the studies featured in a special issue on project delivery models, Davies et al. (2019) identified organizational design as a significant area of future delivery research. In a recent special issue on transitions, Locatelli et al. (2020) also drew attention to the different organizational forms of projects and operations.

The transition from projects to operations requires a spanning from more temporary, goal-oriented, and evolving organizational forms to more permanent, routine, and ongoing organizational forms (Davies et al., 2009; Grabher, 2004; Lundin & Söderholm, 1995; Morris, 2013; Whyte & Nussbaum, 2020). During the project phase, some organizations interact on a one-off basis, with organizations from construction constantly moving in and out of the project as different expertise is required to build the asset (Morris, 2013). In contrast, during operations, there is often more stability and the potential to

engage supply chain partners with more regularity, which would bring benefits from repetition (Davies et al., 2009). Transition is where the two worlds of projects and operations collide, and where the two forms of organization coexist (Locatelli et al., 2020). Although the strategic intent may be distinct—the intent of "building" in projects as compared with the intent of "using" in operations—smooth transitions necessitate that these two forms of organizing need to be connected in organizational design aspects such as structure, process, and people. Transition is a phase that unfolds over time, involving the joining and leaving of organizations, people, and knowledge (Whyte & Nussbaum, 2020). The transition phase is often not properly organized in practice, as project organizations are disbanded at the end of the project, and operations organizations are not properly engaged, often arriving too late to influence the project. Therefore, managers face significant challenges to reconcile the tensions between organizations with distinct logics (build vs use), and effectively manage the transition of the infrastructure asset from projects to operations. The organizational design of transitions in large inter-organizational projects is even more important and challenging, as these projects are delivered through the collaboration of multiple organizations (Artto et al., 2016). Participants from a large number of project and operations organizations work together in the transition, participating in both relatively temporary and permanent organizational forms at the same time (Stjerne et al., 2019).

Previous studies suggest organizational frameworks that highlight the location of transitions (Denicol et al., 2021; Winch, 2014; Winch & Leiringer, 2016; Zwikael & Meredith, 2018), yet such contributions are not specifically addressing the challenges of how to organize the transition. The discussions often emphasize the structural aspects at capability level, neglecting to consider a more granular and systemic exploration of the dimensions involved in the transition to operations. We build upon recent calls for action (Davies et al., 2019; Locatelli et al., 2020) and adopt the organizational design as the theoretical lens for a more systemic consideration. This context and research problem inspired us to explore the following research question: How to organize the transition to operations in large inter-organizational projects? To answer this question, we analyzed the organizational design literature and conducted a longitudinal case study of Beijing Daxing International Airport (hereinafter, Daxing Airport). We contribute with a synthetic framework to design the transition of large inter-organizational projects to operations, considering the dimensions of strategy, structure, process, and people.

2 | THEORETICAL BACKGROUND

2.1 | Organizational design

Organizational design—the shaping of organizational forms—is a core activity of managers and has always been the focus of management research (Gulati et al., 2012; Mintzberg, 1989; Puranam et al., 2014; Romme, 2003). Organizational design refers to the systematic configuration of structures, roles, and relationships, enabling organizations to divide, coordinate, and control tasks and responsibilities (Mintzberg, 1989). Scholars have developed multiple organizational design frameworks to help managers with the task of organizational analysis, such as the star model (Galbraith & Kates, 2010), the McKinsey 7-S framework (Waterman & Peters, 1982), Nadler and Tushman's congruence model (Nadler & Tushman, 1999), and Mintzberg's framework (Mintzberg, 1989). Different models suggest different dimensions of organizational design. For instance, Nadler and Tushman's congruence model (Nadler & Tushman, 1999) emphasized strategy, organizational structure and modularity, conflict management processes, organizational coherence, and people. Mintzberg's framework (Mintzberg, 1989) focused on superstructure design, position design, lateral linkage design, and vertical and horizontal decision-making system design. A common feature of these frameworks is that they include similar individual components that relate to strategy, structure, process, and people (Miterev et al., 2017; Turner & Miterev, 2019). This study builds upon these shared dimensions to develop its conceptual framework. Strategy dictates organizational choices and sets the organization's direction (Nadler & Tushman, 1999). Structure, process, and people are seen as vehicles for realizing strategy: The structure dimension refers to the way an organization is composed, the arrangement of departments, levels, and inter-organizational relationships formed to achieve organizational strategy (Mintzberg, 1989; Waterman & Peters, 1982); the process dimension refers to a series of connected activities that allow information to flow within and between organizations in achieving organizational strategy (Galbraith & Kates, 2010; Mintzberg, 1989); and the people dimension refers to the human resource policies for selecting staff and developing them to achieve organizational strategy (Galbraith & Kates, 2010; Waterman & Peters, 1982).

2.2 | Organizational design for projects and operations

Large inter-organizational projects are arenas in which a variety of organizations temporarily work together to achieve a complex, highly-customized goal (Bakker, 2010;

Jones & Lichtenstein, 2008; Ligthart et al., 2016). The core characteristic of large inter-organizational projects is their temporary nature, with specific start and end dates (Lundin & Söderholm, 1995). Another characteristic is that, since projects are one-off unique endeavors, they involve many non-routine and irregular tasks. Large inter-organizational projects often have the goal or strategy of delivering project outcomes that meet specific requirements through inter-organizational collaboration (Grabher, 2004; Morris, 2013). To achieve such strategies, in terms of organizational structure, the project management literature mainly discusses the following aspects: Setting up project organizations such as project management offices that are disbanded at the end of the project (Aubry et al., 2007; Aubry & Hobbs, 2010); the relationship between project organizations and permanent organizations that provide them with resources, such as project-based organizations (Sydow et al., 2004); connections of projects to the broader organizational context and the project ecosystem (Engwall, 2003); and adaptive changes of project organizational forms under uncertainty (Davies & Brady, 2016). Regarding organizational processes, the project management literature discusses coordination and information exchange mechanisms between various project organizations (Eriksson & Kadefors, 2017). In terms of people-related aspects, the project management literature discusses the formation of project teams (Merrow, 2011); core project roles, such as sponsor, client, and champion (Zwikael & Meredith, 2018); and the selection of project managers (Bredillet et al., 2015).

In contrast, operations are activities of managing the resources devoted to the creation and delivery of services and products (Slack & Brandon-Jones, 2019). Unlike projects, operations do not have a predetermined end date, and the operations management organizations are generally considered permanent entities (Zerjav et al., 2018). Compared to projects, the characteristics of operational activities are more continuous, regular, routine, and repetitive (Whyte & Nussbaum, 2020). Specific to the operations of infrastructure assets, the strategic goal is to deploy resources more effectively to provide higher levels of customer service and reliability while optimizing returns and balancing financial objectives (Too, 2010). To achieve such strategies, in terms of organizational structure, the operations management literature mainly discusses the following aspects: The design of the structure and relationships in a more fixed hierarchy, such as the U-shaped, M-shaped, and N-shaped structure (Slack & Brandon-Jones, 2019); the design of supplier networks and coordination of supply chain partners (Gao et al., 2015); and the configuration of broader business ecosystems (Fuller et al., 2019). Regarding organizational processes, the operations management literature discusses lateral coordination mechanisms, as well as vertical integration across the hierarchy (Galbraith, 2014). In terms of people-related organizational design, the operations management literature focuses on job design, such as the configuration of operations managers (Hald & Mouritsen, 2013).

The project management literature highlights the consideration of the temporary dimension and the complexity of the coalition assembled to deliver large inter-organizational projects. Yet, the literature on the temporary domain is relatively silent regarding what happens during the transition when the temporary gives way to the permanent, and it often neglects features of permanent forms of organizing and the involvement of operators in the transition. The operations management literature emphasizes more hierarchical, stable structures and processes, and also pays little attention to the organizational design concerns as projects transition to operations.

2.3 | Organizational design for the transition between projects and operations

Transition is a process of changing from one state or condition into another (Gersick, 1988). Transition is defined as the activities associated with taking integrated, functionally tested outputs from projects and putting them into operational use to achieve the benefits described in the project business case (Locatelli et al., 2020; Whyte & Nussbaum, 2020). As argued, the characteristics and strategies of large inter-organizational projects are inherently different from the operations of infrastructure assets. Transition is where the two worlds of projects and operations collide. The transition from projects to operations requires moving from temporary to permanent, from uncertain and evolving to repetitive and regular (Whyte & Nussbaum, 2020).

One promising framework for summarizing organizational design research on transitions is Winch et al.'s (2022) framework on project organizing, which takes into account the owner, delivery, and supplier domains. At the interface between the delivery domain and supplier domain, research has explored the organizational forms to enable collaboration during specific phases of the temporary space, such as Integrated Project Delivery (IPD) (Kent & Becerik-Gerber, 2010) and project alliance (Walker & Lloyd-Walker, 2014). Such configurations explore the coordination of project-based organizations across organizational boundaries to deliver projects collaboratively. Yet, the literature largely fails to consider the organizations involved in the operations phase and their requirements.

The interface between the owner domain and the supplier domain is where owners/operators have the challenge of integrating the asset that was delivered by a coalition of project-based organizations (Denicol & Davies, 2022). In the transition, facilities are handed over, project-based organizations leave, the temporary coalition is disbanded, and operations organizations take over, which create organizational separation and the disconnect between projects and operations (Whyte & Nussbaum, 2020). The focus of the literature is on owners and operators as purchasers of project delivery services through different approaches (e.g., design-build, turnkey), rather than as strategic actors involved in the transition (Boyd & Chinyio, 2008).

At the interface between the delivery domain and owner domain is the transition between temporary and permanent boundaries (Winch, 2014). There are two main types of organizational design studies at this interface, which can be identified based on whether the owner has in-house project management capabilities. Previous research has explored cases where the owner had in-house project capabilities and acted as a strong owner (Morris & Hough, 1987; Winch & Leiringer, 2016), as in the case of London Heathrow Terminal 5 (Davies et al., 2009). Conversely, there are instances where owners set up a new independent entity to deliver the project, as evidenced by the London 2012 Olympics (Davies & Mackenzie, 2014; Grabher & Thiel, 2015) and Crossrail (Denicol et al., 2021; Dodgson et al., 2015). Yet, in both models there is growing evidence of the challenges to organize the transition with examples of successive failures, as exemplified by London Heathrow Terminal 5 and more recently Berlin-Brandenburg Airport.

Of all the aforementioned organizational design research on transitions, there are four main areas most relevant to this study and which provide the theoretical framework for the discussion of our findings. Related studies of the strong owner provide strategies for organizational design (Merrow, 2011; Morris & Hough, 1987; Winch & Leiringer, 2016; Zerjav, 2021). In this study, a strong owner is defined as one who has in-house project management capabilities, but is also able to think strategically and bring an operational mindset to the project (Morris, 2013; Winch & Leiringer, 2016). The literature streams related to the strong owner have raised the possibility that owners can internalize project and operational capabilities, but this field has not yet moved from theory to practice, and related research remains at the capability level (Maytorena-Sanchez & Winch, 2022; Winch & Leiringer, 2016). It remains to be explored how strong owners should design the organization for smooth transitions. In terms of organizational structure, the Project System Organization (PSO) model developed by Denicol et al. (2021) provides a holistic canvas of organizational design for large inter-organizational projects, presenting a multi-level, multi-phase model of organizational structure. However, this model emphasizes the macro and meso levels and does not address the specific organizational design of the transitions between projects and operations. Relevant studies on the design of temporary project delivery organizations have also contributed to the organizational design for transitions (Davies et al., 2009; Gil & Beckman, 2009). Notably, Winch et al. (2022) developed a conceptual model for strategic project organizing, the Project Star Model (PSM), which identified key parameters in the design of a project delivery organization. This model provides a set of organizational design considerations, but its focus is on the temporary organization that delivers the project, not addressing in detail the design aspects of the transition phase, where organizations from operations are involved. Regarding organizational processes, current research has focused on inter-organizational coordination and asset handover during the transition (Whyte, 2019; Whyte et al., 2016; Whyte & Nussbaum, 2020). Yet, the literature remains largely silent about a more granular exploration of the routines and actions to design continuity within and across organizational boundaries. Regarding people, the Project Zoo framework provides insights into selecting suitable project managers, operations managers, and other key roles (Zwikael et al., 2019; Zwikael & Meredith, 2018). Extant research might be enriched by studies exploring the interdependencies and concurrency of leadership roles in the transition phase. Additionally, while providing definitions of these key roles and their associated performance criteria, these conceptual studies remain abstract and lack pragmatic guidance for organizational designers regarding job design for the transition phase.

In summary, organizational design considerations for transitions between projects and operations are scattered in the project and operations management literature, elaborating only partially on the organizing aspects of the transition. The literature still lacks an organizational design framework for transitions, integrating the multiple dimensions (strategy, structure, process, and people) to effectively plan and coordinate the transition from projects to operations (temporary to permanent). The transition practices of Daxing Airport, to be presented next, provide specific contexts to bridge the gap. In this study, we explore the transition phase through the organizational design lens, building upon mainstream dimensions (strategy, structure, process, and people) to develop a synthetic framework to organize the transition of large inter-organizational projects. As shown in Table 1, we summarize the above organizational design literature of projects, transitions,

TABLE 1 Organizational design of projects, transitions, and operations.

	Projects	Transitions	Operations
Strategy	Build the asset (temporary, one-off, irregular) (e.g., Jones & Lichtenstein, 2008)	From projects to operations (moving from temporary to permanent) (e.g., Winch & Leiringer, 2016)	Operate the asset (permanent, routine, regular) (e.g., Too, 2010)
Structure	1. Project organizations (e.g., project management office). 2. Relationship between project and permanent organizations (e.g., project-based organizations, strong owner). 3. Connections of projects to broader organizational context (e.g., project ecosystem). Representative literature: Aubry et al. (2007), Engwall (2003), Morris and Hough (1987), Sydow et al. (2004), Denicol and Davies (2022)	1. Interface between the owner domain and supplier domain: Project-based organizations leave, and operators take over. 2. Interface between the delivery domain and supplier domain: Temporary delivery coalitions. 3. Interface between the owner domain and delivery domain: a. Owners do not have in-house project management capabilities: Hire delivery partners. b. Strong owner: PSO, building owner-driven delivery organizations. Representative literature: Denicol et al. (2021)	1. Structure and relationships in a fixed hierarchy. 2. Design of supplier networks. 3. Configuration of broader business ecosystems. Representative literature: Cruz and Marques (2011), Fuller et al. (2019), Gao et al. (2015), Slack and Brandon-Jones (2019)
Process	Coordination and information exchange mechanisms between various project organizations (e.g., Eriksson & Kadefors, 2017)	Coordination and asset transfer in the transitions between projects and operations (e.g., through artifacts and soft landing) (e.g., Whyte & Nussbaum, 2020)	Lateral coordination mechanisms and vertical integration across the hierarchy (e.g., Galbraith, 2014)
People	1. Formation of project teams (e.g., Merrow, 2011) 2. Selection of core project roles (e.g., project manager) (e.g., Zwikael & Meredith, 2018)	Project Zoo framework (e.g., owner, project manager, operations manager) (e.g., Zwikael & Meredith, 2018; Zwikael et al., 2019)	Selection of core roles (e.g., operations manager) (e.g., Hald & Mouritsen, 2013)

and operations in the dimensions of strategy, structure, process, and people.

3 | RESEARCH DESIGN

The organizational design literature provides theoretical frameworks for both temporary and permanent settings, yet it remains largely silent regarding the transition settings of large inter-organizational projects. We explore the transition practices of Daxing Airport to investigate the following question: How to organize the transition to operations in large inter-organizational projects? To answer the research question, based on the selected organizational design framework, we conducted a single case study for theory elaboration (Ketokivi & Choi, 2014). The post factum theoretical interpretation of empirical observations of this single case can provide mid-range theoretical insights into the organizational design of the transition (Merton, 1968) and have implications for managerial practice. The advantage of the single-case study design is the potential in-depth understanding and elaboration of the context (Flyvbjerg, 2006); conversely, the disadvantage is its limited generalizability to other contexts (contingency issues are discussed in the conclusion). As our goal is to obtain organizational design considerations in transition contexts, rather than statistical generalizations, we are willing to make this tradeoff (Ketokivi, 2006).

The transition of Daxing Airport is the case we chose because the specific setting of Daxing Airport is particularly well suited to address the research question for several reasons. Most large infrastructure transitions are similar to Daxing Airport, with multiple organizations involved, highly complex transition tasks, and different objectives and activities of the project and operations organizations; and thus, the Daxing Airport case is representative of the overall domain (Dul & Hak, 2007). Similar to London Heathrow Terminal 5, which has often been used as a case to study the delivery and transition of large inter-organizational projects (e.g., Davies et al., 2009; Whyte & Nussbaum, 2020), Daxing Airport also has a strong owner. Both the owner of London Heathrow Terminal 5 and the owner of Daxing Airport

(Capital Airport Holdings Limited, hereinafter, CAH) have in-house project management capabilities (Davies et al., 2009). However, they had different delivery outcomes. Heathrow Terminal 5 has not escaped the fate of the opening disaster of most large airports (Al-Mazrouie et al., 2021), facing severe operational disruptions when it opened (Zerjav et al., 2018). In contrast, Daxing Airport was put into operation 6 months earlier than originally planned and was awarded status of best airport by the Airports Council International for two consecutive years after it was put into operation.

Most importantly, we consider Daxing Airport as a suitable case for studying our research question (organizational design for transitions) because, unlike Heathrow Terminal 5 and most large inter-organizational projects, Daxing Airport developed a strategy for the integration of projects and operations before the planning, and took a series of measures in organizational design to achieve this strategy. In particular, for the Beijing 2008 Olympic Games, CAH built Beijing Capital Airport Terminal 3. However, the transition between its project and operations was not smooth, with additional costs spent to renovate it before the handover and a series of problems in the early phase of operations, including traffic paralysis in front of the terminal, elevator congestion, and baggage system failures. Coincidentally, Beijing Capital Airport Terminal 3 and Heathrow Terminal 5 were opened in March 2008 (26th and 27th, respectively), and both had terrible operational outcomes. CAH deeply reflected on the worldwide airport construction paradigm at that time and proposed to implement the "integration of projects and operations" strategy in Daxing Airport. To this end, CAH has conducted surveys of 15 airports around the world, developed the "Guidelines for the Integration of Projects and Operations," created a special organization (Project and Operations Integration Committee), held a series of special meetings, and issued a series of documents for this strategy (Table A1 in Appendix A).

3.1 | Case context

Daxing Airport spans two provincial administrative regions, Beijing and Hebei, and, with a total project area of about 27 square kilometers and a total investment of about $63 billion (CNY450 billion), it is the largest transportation hub in China to date. Daxing Airport started planning in the 1990s, followed by the construction phase, which began in December 2014, and officially entered the operations phase on September 25, 2019. The Daxing Airport project includes 45 sub-projects, including: (1) main airport building projects (a single terminal building with 104 boarding bridges; flight areas with four runways, 223 parking spaces); (2) civil aviation supporting projects (air traffic control system with two control towers, and surveillance, navigation, communication, meteorological facilities; aviation fuel system including 196 km of oil pipelines through three provincial administrative regions and eight refueling stations; airline bases including 10 functional areas and 85 individual buildings), and (3) peripheral supporting projects (including the construction of subways, high-speed railways, highways; changing the land use occupied by 34 villages, leading to the resettlement of more than 23,000 people, river diversion, water source relocation, high-voltage line relocation, and floodplain adjustment).

In Figure 1, the complexity of the organization of Daxing Airport during the transition is illustrated. The Daxing Airport project involves 12 government departments, 24 investment entities, and countless participating entities, with approximately 74,000 people involved at the peak of the transition. In Appendix B (Figures B1–B3), we also provide the organizational structure of Daxing Airport during the planning phase, early construction phase, and operations phase to reflect the evolution of the organizational structure and the differences between the project and operations phases.

3.2 | Data collection

Data for this study were collected from (1) participant observation; (2) interviews at different stages; and (3) documents such as internal files, meeting minutes, and summative materials (Figure 2). Triangulation of data sources provides more accurate information, helps construct insightful theories, and improves the robustness of the resulting theories (Eisenhardt, 1989).

Data collection relied on participant observation. Commissioned by the Civil Aviation Administration of China and CAH, our team completed two assignments for Daxing Airport as engaged scholars (Van de Ven, 2007; van Marrewijk & Dessing, 2019): First, to provide project schedule management services for the transition period, and second to observe and summarize the airport transition experience to support airport transition practices in China. From the end of April 2018 to the end of September 2019, our team was on site at the Daxing Airport project for a total of 17 months, observing the entire process of the transition between project and operations. During this phase, we collected rich data in a highly flexible manner to capture the dynamic change processes (Langley et al., 2013). Participation allowed us to access all the routines and activities of the project, and we observed daily work routines, and meetings at each organizational

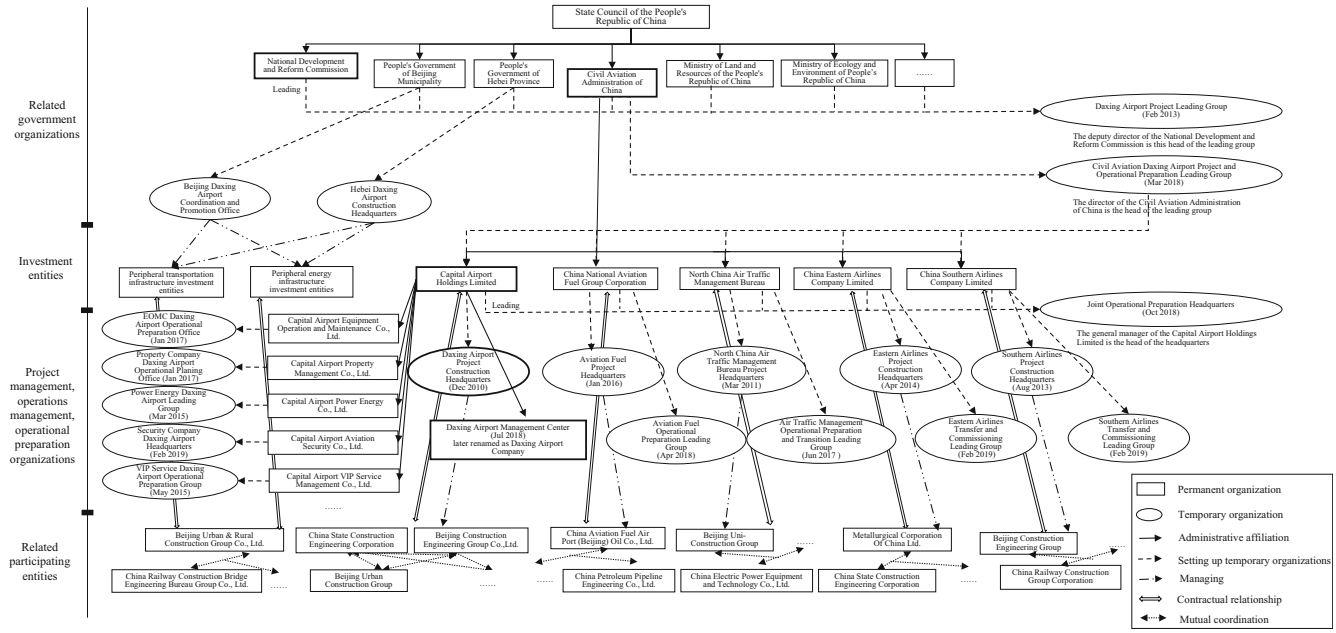

FIGURE 1 Organizational structure of Daxing Airport during the transition.

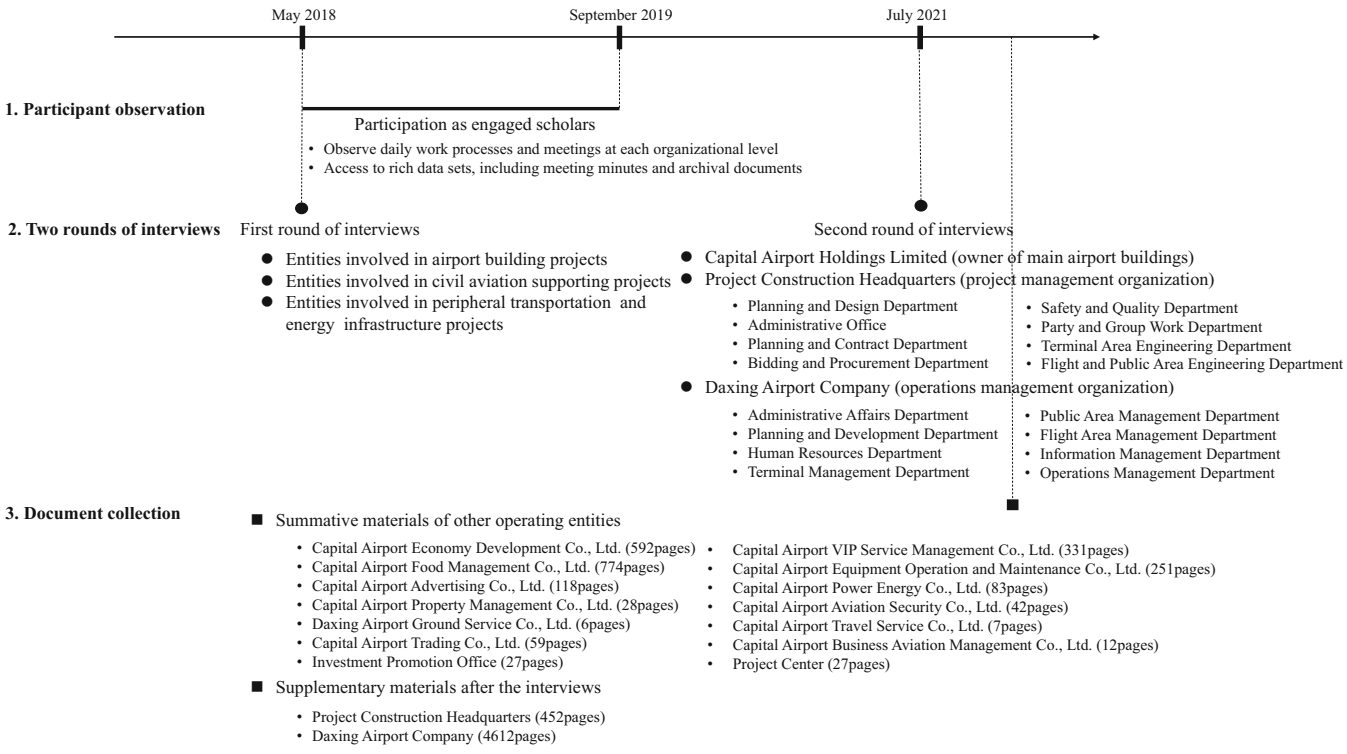

FIGURE 2 Data collection.

level. In addition to real-time observation, we were granted access to a rich dataset that provided minutes and related archival documents of the organizations at all levels of the Daxing Airport project. Such data are critical to capturing how organizational design reconfigures and evolves over time (Bakker, 2016).

Being engaged scholars meant that we needed to be aware of potential bias, as we oscillated between the emic (insider) role of the consultant and the etic (outsider) role of the scholar to ensure that we avoided the possibility of interviewees "embellishing" their experience (van Marrewijk & Dessing, 2019). In addition, when

analyzing the data, we ensured that our analytical perspectives corroborated an inside view from two authors directly involved in the Daxing Airport project practice with an outside view from two others who were not.

In addition to participant observation, we conducted two rounds of interviews. The first round of interviews was conducted at the beginning of the transition phase (May 2018). The purpose of this round of interviews was to know the organizational structure of the whole Daxing Airport project and the responsibilities of each entity. We interviewed 56 entities that were at the Daxing Airport project site at that time (Table C1 in Appendix C). The second round of interviews was conducted in July 2021, almost 2 years after the Daxing Airport project entered its operations phase. The purpose of the second round of interviews was to document and understand how Daxing Airport was organized to achieve the strategy of "integration of projects and operations." For this purpose, we interviewed the owner of main airport buildings (CAH) and all departments of the project management organization (Project Construction Headquarters) and operations management organization (Daxing Airport Company) (Table D1 in Appendix D). This round of interviews consisted of three parts. First, we invited interviewees to share their experiences and stories of the Daxing Airport transition. We then focused the questions on specific organizational design dimensions, asking interviewees to elaborate on the organizational design strategy, organizational structure, organizational coordination, information exchange, design of leadership positions, responsibilities and authority, and staff assignments. These dimensions are extracted from classic organizational design frameworks (Galbraith & Kates, 2010; Mintzberg, 1989; Nadler & Tushman, 1999; Waterman & Peters, 1982). Finally, we asked the interviewees to share their perspectives and explain important but often sketchy details gathered in the participant observations. Such interview structure allowed us to collect open-ended narrative data as well as specific factual information. Two rounds of interviews at different stages enabled us to collect real-time as well as retrospective longitudinal data. This combination is ideal as retrospective data can effectively capture global observations beyond the minutiae, while real-time data can provide a sense-check on retrospective rationalization (Leonard-Barton, 1990).

The collection of archival documents complemented the participant observation and interviews. In order to summarize the experience of the transition, CAH asked the operational entities to provide us with their transition summative materials. Furthermore, after the interviews, we contacted the Project Construction Headquarters and Daxing Airport Company to provide additional information (Figure 2).

3.3 | Data analysis

Based on the participant observation notes, interview records, and materials collected, we analyzed the data following the Gioia method (Gioia et al., 2012). The Gioia method is a systematic approach to theory development and elaboration that is designed to bring "qualitative rigor" to the conduction and presentation of case studies (Gioia et al., 2012). In the first step, we organized and categorized the raw data into first-order empirical concepts. Initially, there was an explosion of countless informant terms (e.g., "the director of the Project Construction Headquarters and the general manager of Daxing Airport Company are the same person" and "the head of the planning and design department of the Project Construction Headquarters and the head of the planning and development department of Daxing Airport Company were initially the same person"). When analyzing, we tried to adhere faithfully to the informant terms, and we made little attempt to extract categories. As the analysis progressed, we began to look for similarities and differences between these categories, and this process eventually reduced the categories to a more manageable number, which we then labeled with short descriptions (e.g., the same executive serves in both project management organization and operations management organization). The second step was the identification of second-order themes. At this step, we consciously identified the similarities and differences between first-order empirical concepts and moved to axial coding (Corbin & Strauss, 2014) to merge first-order empirical concepts into second-order themes. For example, from the first-order empirical concepts of "the same executive serves in both project management organization and operations management organization," and "the same executive serves in both permanent organizations and temporary organizations," we developed a second-order theme labeled "concurrent leadership." Finally, these second-order themes were further aggregated into theoretical dimensions. For example, "concurrent leadership" and "job rotation" are aggregated into the "people" dimension.

Figure 3 illustrates our coding process and data structure, which provides examples of first-order empirical concepts, second-order themes, and theoretical dimensions. In Appendix E (Table E1), we present more representative interview transcripts, observation notes, and archival materials.

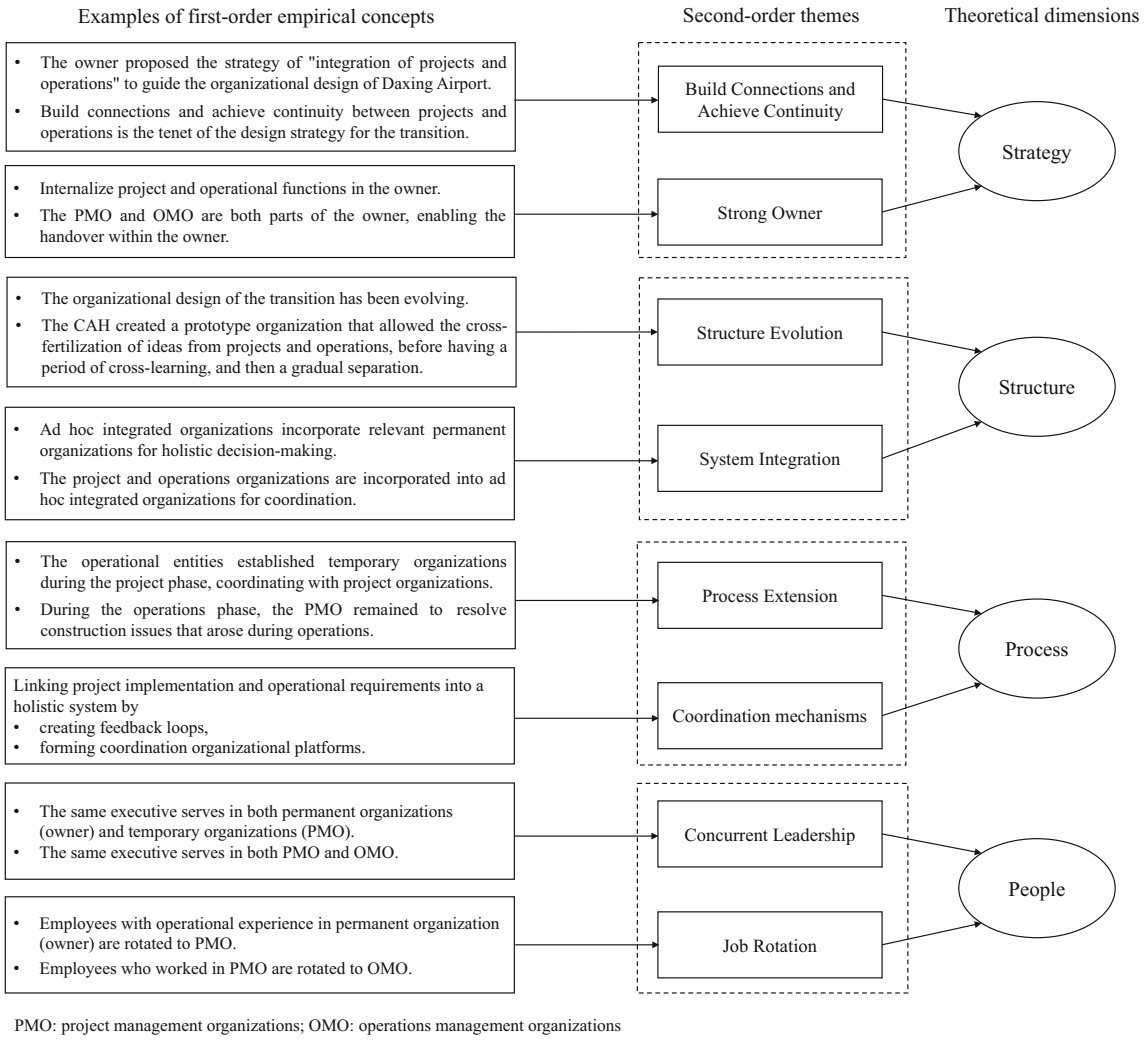

FIGURE 3 Data structure.

4 | FINDINGS

4.1 | Strategy for organizational design in the transition from projects to operations

4.1.1 | Build connections and achieve continuity

Having an explicit strategic intent that acknowledges the need to connect the project organization with the operations organization is a critical consideration in designing the organization of the transition, aiming to achieve continuity between them. During the planning stage of Daxing Airport, CAH proposed the strategy of "integration of projects and operations" to guide the airport's organizational design.

> Daxing Airport needs to follow the strategy of "integration of projects and operations," which is a profound lesson in the civil aviation industry over the years. In the past, the airport was constructed by one group of people, and when the construction work was completed, the airport was handed over to another group of people to operate. As a result, the day when the new airport was completed was the beginning of the renovation.
>
> (Part of the transcript of a speech by the general manager of CAH at the inaugural meeting of Daxing Airport Project Construction Headquarters, December 23, 2010)

The strategy recognizes the continuity between project development and asset management. It also emphasizes the connections between projects and operations. Such continuity and connections were achieved through the following findings about structure, process, and people.

4.1.2 | Strong owner

In order to achieve the tenet of connecting projects and operations, CAH kept its project and operations management functions in-house. In practice, CAH established Project Construction Headquarters and Daxing Airport Company, authorizing them to carry out project management and operations management of the main airport buildings, respectively. By doing so, the project and operations management organizations were set up within the framework of the same permanent organization, enabling the handover within the owner.

> The coordination of projects and operations is actually a coordination within CAH, and the transition between projects and operations is actually a change in tasks within CAH.
>
> (R2-P6)

Strong owners can plan their internal structures, processes, and people to connect projects and operations. Such organizational design also enhances continuity between projects and operations, as strong owners have the ability to design their internal organization and configure their human resources to fit the changing transition tasks from projects to operations.

4.2 | Designing structures to build connections and achieve continuity

4.2.1 | Organizational structure evolution

The strategy of "integration of projects and operations" emphasizes the continuity between projects and operations. Accordingly, the organizational design of its transition has been evolving.

> The operational preparation office of the Project Construction Headquarters is the prototype of the current Daxing Airport Company. Somewhat like a way of incubation, the operational preparation office continued to absorb personnel and gradually grew, and, in 2018, this office was split from the Project Construction Headquarters to establish the Daxing Airport Management Center, which is at the same level as the Project Construction Headquarters. But at that time, there was a lot of overlap between the project and operations sides, and almost all department heads were working on both sides, which we called "one set of people, two institutions.' After the airport was put into operation, the two sides of personnel gradually separated. Only after the renaming to Daxing Airport Company, were the two organizations completely cut apart and started to operate as a normal company.
>
> (R2-O8)

CAH created a prototype organization that allowed the cross-fertilization of ideas from projects and operations, before having a period of cross-learning, and then a gradual separation (with some degree of continuity on both sides). In this way, the organizational design of the transition actually crossed three stages: Stage 1, creating an operations prototype organization; Stage 2, learning to live together; and Stage 3, parting ways amicably with benefits on both sides—learning gained by project organization and smooth transition for the operations organization.

4.2.2 | Organizational system integration

The findings above are limited to the owner of the main airport buildings, but Daxing Airport, as a large inter-organizational project, also includes other supporting projects (e.g., peripheral energy and transportation infrastructure). These projects have different investment entities, and project and operations management organizations. Delivering Daxing Airport required the collaboration of all these organizations. For this purpose, ad hoc integrated organizations have been established at different organizational levels to serve as platforms for coordination and holistic decision-making.

> The National Development and Reform Commission jointly established the Daxing Airport Project Leading Group with all government departments related to the planning, construction, and operations of Daxing Airport. CAH established the Joint Operational Preparation Headquarters in conjunction with all other investment, construction, and operational entities. This Headquarters serves as an integrated platform to coordinate the specific tasks of operational preparation (e.g., operational tests, delivery and acceptance).
>
> (Summary Report on Construction and Operations of Daxing Airport by Civil Aviation Administration of China)

These ad hoc integrated organizations are platforms for coordination across organizational boundaries. By

holistically organizing all project and operational tasks, these ad hoc integrated organizations coordinate inter-organizational relationships to deliver projects collaboratively.

4.3 | Designing processes to build connections and achieve continuity

4.3.1 | Organizational process extension

To achieve continuity between projects and operations in Daxing Airport, operations organizations extended to the project phase, and project organizations extended to the operations phase. During the project phase, operational entities successively established a series of temporary operational preparation organizations. These operational preparation organizations provided opinions on the scheme design and specific construction from the operational perspective, avoiding numerous problems caused by the separation of projects and operations.

> The earlier and deeper the integration of projects and operations, the greater the benefits to future delivery and operations. Because the project and operational personnel have different mindsets and management experience, we have more ideas and better thoughts after discussing together.
>
> (R2-O3)

> In previous projects that I've worked on, their operations organizations just confirmed the drawings we gave them, and they were not involved in the construction phase for the next few years. When it was about to be completed, they went to the site and said they were not satisfied and wanted to make major changes. The operations organizations of Daxing Airport always accompany the construction team, and can find problems and negotiate changes at any time. When it is actually put into operation later, there is no need to make major adjustments.
>
> (R2-P4)

In addition, project organizations were extended to the operations phase, the Project Construction Headquarters has not been disbanded so far. After the completion of the project, it was mainly responsible for the maintenance of assets, and, currently, it serves the planning for the expansion of Daxing Airport. In this way, the extension of the project and operations organizational processes makes the two systems overlap and promotes a smoother transition. However, unlike these positive voices, the manager of the operations management department of Daxing Airport Company raised various inconveniences in operations, emphasizing that the operations organizations still did not get involved early enough.

> The operations team is still involved late, the Project Construction Headquarters was established in 2010, and our operations management team was established in 2016. From an operational perspective, the terminal building configuration is good-looking and is convenient for passengers, but this configuration forms four harbors, which makes it very difficult to operate... Aircraft runway configurations are also problematic... these affect the allocation of resources and operational efficiency. I always wonder if I could have been involved earlier, these problems might have been avoided.
>
> (R2-O6)

4.3.2 | Organizational coordination mechanism

In the Daxing airport practice, the project and operations management organizations established an array of organizational coordination mechanisms to create feedback loops between the two systems. These coordination mechanisms covered equipment and facilities procurement, installation and commissioning, problem resolution, resource scheduling, operational rehearsal, and so forth. Coordination meetings were organized regularly to ensure that the Project Construction Headquarters grasped the needs of the operational entities and maximized the closeness or even overlap between project construction and operational needs.

> CAH has proposed the concept of "management beyond organizational boundaries." Although we are the management agency of Daxing Airport, many related organizations, such as air traffic control, airlines, customs, and rail transit, are not our subordinate organizations and need to be coordinated across organizational boundaries. Organizations must consider not only the interface between them, but also the coordination between their own project construction and

operations.

(R2-O3)

CAH has also established several committees to serve as platforms for coordination and information sharing (e.g., Safety Management Committee, Passenger Service Promotion Committee, and Operations Management Committee).

> The advantage of the various platforms we have established is that you know what other organizations are doing, and the information between organizations is interoperable and shared.
>
> (R2-O3)

4.4 | Designing people to build connections and achieve continuity

4.4.1 | Concurrent leadership

When asked about the key to the successful transition between projects and operations, more than one interviewee immediately said the organizational design of concurrent leadership. Such leadership configurations connect projects and operations and ensure continuity between them.

> I think the core of the integration of projects and operations is the fusion of key leadership positions. At that time when Daxing Airport Company was still called Management Center, all functional department leaders served on both sides of the project and operations. We call this kind of leadership position configuration "double span mechanism." The head of the department on both sides is the same person, so there will be no shifting of responsibilities. It is also helpful for the transfer of assets and data during the transition period.
>
> (R2-O8)

In the practice of Daxing Airport, some individuals not only assumed the leadership roles of both project and operations organizations, they also served in the permanent organizations at the same time. The deputy general manager of the CAH, the director of the Project Construction Headquarters, and the general manager of the Daxing Airport Company are the same person. The previously mentioned ad hoc integrated organizations at different levels are served concurrently by the deputy director of the National Development and Reform Commission, and the chairman of CAH, respectively. Their different roles are considered to function as a bridge for cooperation between temporary and permanent organizations.

> What makes these temporary organizations work efficiently? The leaders of these temporary organizations are top leaders in governments and CAH. Their power and resources in the permanent organizations are brought to the project organizations.
>
> (R2-P1)

4.4.2 | Job rotation

In the transition practice of Daxing Airport, we observed that the organizational design of job rotation was adopted to enhance connections between temporary and permanent, and continuity between projects and operations. The functions of the project management organization involve not only construction management, but also setting operational goals, and coordinating the facility construction of other operational entities. To this end, CAH has conducted extensive investigations within CAH and carefully selected a group of key personnel with rich airport construction and operational experience to form the Project Construction Headquarters. From the perspective of personnel configuration, a significant number of the leaders, functional department heads, and even general management personnel have experience in airport operations management. In particular, it is worth mentioning that CAH has a large number of employees with airport project and operational experience, which provides the basis for such personnel configuration.

> Such a team represents a collision and fusion of project and operational knowledge, experience, and ideas.
>
> (R2-O1)

In addition, there are also job rotations between the Project Construction Headquarters and Daxing Airport Company. During the project phase, many operations staff were rotated from Daxing Airport Company to the Project Construction Headquarters to be involved in the construction. And, after the project was completed, a large portion of the employees involved in the project were transferred to Daxing Airport Company for operations management.

> Job rotation is a very wise approach. On the one hand, because they knew they would return to operations in the future, they took special initiative to manage the construction from an

operations perspective. On the other hand, because they are involved in the construction process, they know everything about the project, they know which components and devices are supplied by which manufacturer and who their contacts are, they now manage it with ease.

(R2-P7)

5 | DISCUSSION

5.1 | Organizational design framework for transitions: Linking projects and operations

The findings of this research inform the development of an organizational design framework for the transitions between projects and operations in large inter-organizational projects. We link the two different organizational forms of projects and operations by designing the strategy, structure, process, and people of the transition. A combination of organizational design literature from both sides (project and operations) informs the design considerations of such hybrid temporary and permanent spaces (Aubry & Lavoie-Tremblay, 2018; Slack & Brandon-Jones, 2019). As shown in Figure 4, the framework provides considerations for managing the strategic tensions between projects and operations, and spanning the organizational forms of structure, process, and people between projects and operations.

The strategic transition from building to operating assets requires managing the tensions between the temporary, one-off, and irregular nature of projects and the permanent, routine, and regular nature of operations. This study finds that building connections and achieving continuity between projects and operations is the tenet of the design strategy for the transition. Internalizing project and operational functions within the owner are an effective way to achieve this tenet. In fact, relevant theories about the strong owner and the relationship between project organizations and their permanent organizations inform this design strategy (e.g., Morris & Hough, 1987; Winch, 2014). In terms of organizational structure, our findings emphasize the evolution of organizational structures and the creation of ad hoc integrated organizations to deal with system complexity (Denicol et al., 2021;

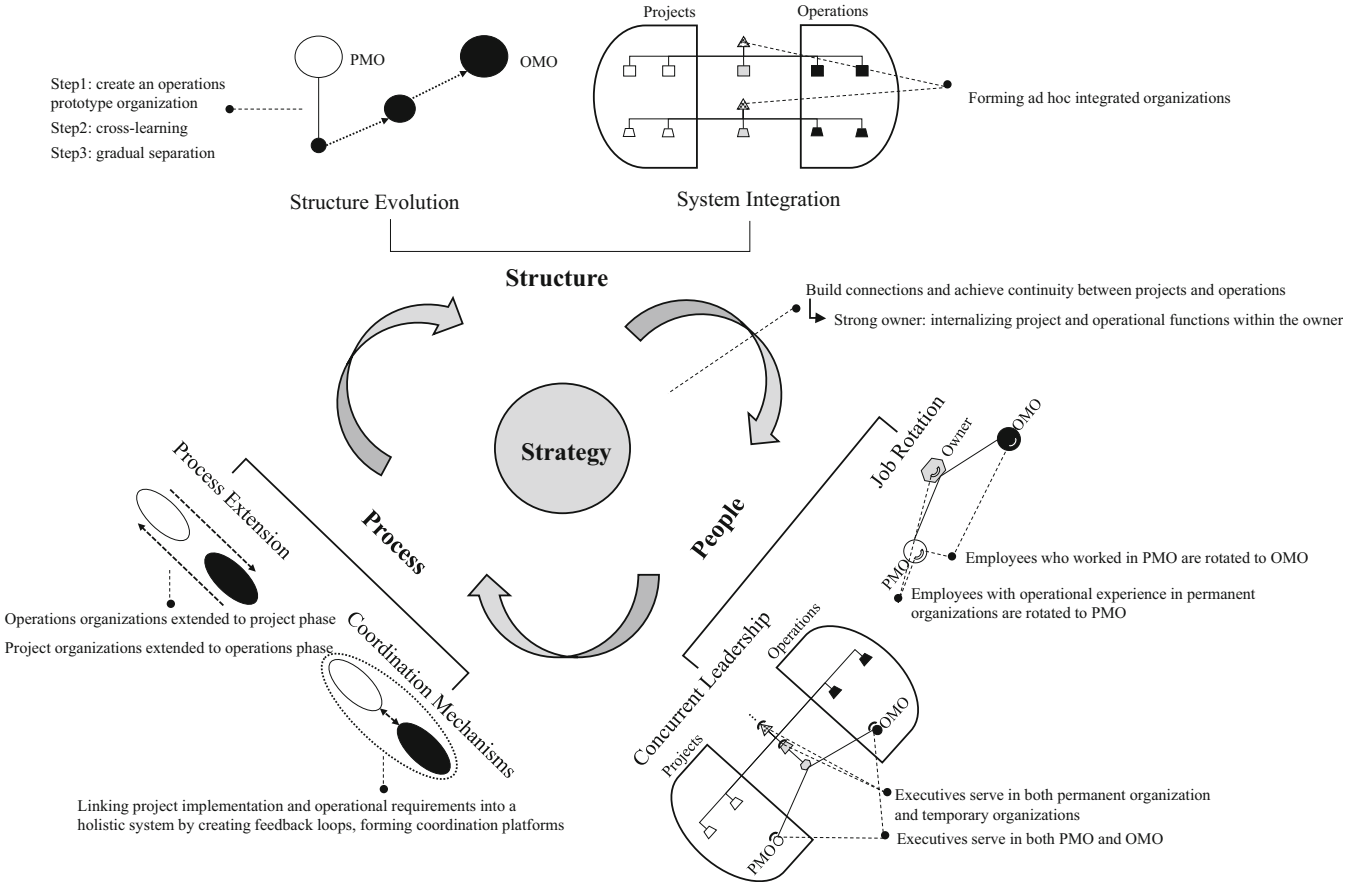

FIGURE 4 Organizational design framework for transitioning large inter-organizational projects to operations. PMO, project management organization; OMO, operations management organization.

Zerjav et al., 2018). The literature on structural adaptive change (Davies & Brady, 2016) and system integration (Davies et al., 2009; Whyte & Davies, 2023) in project organizations inform these structure design considerations. In terms of organizational process, we emphasize the extension of organizational processes and organizational coordination mechanisms. Here, organizational process extension means that operations organizations extended to the project phase, and project organizations extended to the operations phase. The organizational coordination mechanism means linking project implementation and operational requirements into a holistic system by creating feedback loops (Whyte & Nussbaum, 2020) and establishing information exchange organizational platforms. The literature on inter-organizational and interphase design (Gulati et al., 2012; Ligthart et al., 2016) informs these process design considerations. Regarding the dimension of people, we emphasize concurrent leadership and job rotation. Here, concurrent leadership refers to executives serving in both project and operations management organizations, or even in permanent organizations simultaneously. Job rotation means that individuals with operational experience in permanent organizations join the project organizations, and those individuals involved in the project construction are transferred to the operations management team after the project is completed. In the field of project and operations management, the literature on team formation (Merrow, 2011) and key role selection (Zwikael & Meredith, 2018) informs design considerations for the transitions.

5.2 | Strategy: Unpacking the strong owner concept

The strategic aspects of organizational design theory emphasize organizational objectives and organizational capabilities (Galbraith & Kates, 2010), and this study further elaborates on these aspects in the transition to operations of large inter-organizational projects. Internalizing the project and operational functions to the owner is an effective way to achieve the strategy of building connections and achieving continuity between projects and operations. When considering only the main airport buildings of the Daxing Airport project, the entities responsible for delivery and operations are both parts of the same owner (CAH). Therefore, the owner has the potential to plan its intra-organizational structures and internalize functions and capabilities, playing the role of a strong owner. In this context, Daxing Airport is similar to Heathrow Terminal 5, with the owner internalizing the project management and coordination roles (Davies et al., 2009). And it is different from the traditional approach of setting up a special purpose vehicle (or independent delivery organization) outside the boundaries of the existing permanent organization, and disbanding it after achieving the project objectives (Sainati et al., 2017). Transport for London (TfL) adopted this strategy in the case of the Elizabeth Line, creating Crossrail limited as an independent organization to deliver the project. This organization was autonomous from the permanent organization (TfL), although it was primarily funded by TfL and the Department for Transport (DfT). Despite degrees of autonomy during the lifecycle, the final railway will be operated as part of TfL's network, therefore the transition and integration into the system of assets of the permanent organization are challenging and crucial to value creation (Denicol et al., 2021). However, in Daxing Airport, the project and operations management organizations were set up within the framework of the owner organization, enabling the handover to operations within the owner. The owner took advantage of its strong in-house project management capabilities and extensive supply chain knowledge, and played the role of owner, operator, project management organization, and delivery organization simultaneously. Such organizational design likewise enhances continuity between projects and operations, as the owner can develop its organizational structure and human resource configurations internally to fit the changing transition tasks from projects to operations.

Unpacking the concept of strong owner within Winch et al.'s (2022) framework on project organizing, at the interface between the owner domain and delivery domain, strong owners internalize the project and operations functions (Davies et al., 2009). At the interface between the owner domain and supplier domain, strong owners act as strategic actors involved in the transition, not just as purchasers of project delivery services (Boyd & Chinyio, 2008). At the interface between the delivery domain and supplier domain, strong owners coordinate project-based organizations across organizational boundaries to deliver projects collaboratively.

From the introduction of the concept of the strong owner (Morris & Hough, 1987), to Morris's (2013) emphasis on in-house project management capabilities, to Winch and Leiringer's (2016) identification of the capabilities required for strong owners, the field of the strong owner has remained at the level of capabilities. Our research findings move from capabilities to actions by providing strong owners with specific considerations in designing the process of transitioning projects to operations. For instance, our findings provide theory elaborations of the governance capabilities emphasized by Winch and Leiringer (2016) (e.g., project coordination, system integration, and integrating assets created by projects into operations) with

specific organizational design considerations. Recently, Maytorena-Sanchez and Winch (2022) deconstructed the concept of the strong owner into six capabilities; our findings can provide pragmatic organizational design tactics for their identified capability of "articulating the voice of operations."

5.3 | Structure: Advancing structural complexity frameworks

This study further elaborates on structure aspects that shape organizations, articulating the vertical and horizontal distribution of power in the hierarchy in the organizational design theory (Galbraith, 2014). The PSO framework works as a canvas to design and prototype inter-organizational relationships; it charts the multi-level and multi-phase organizational structure of megaprojects (Denicol et al., 2021). This study advances the PSO framework in three aspects. First, our findings provide more granular and practicable organizational design considerations for the transition between projects and operations in this framework. The PSO framework is a relatively static framework, and the organizational structure evolution found in the Daxing Airport case reflects more adaptive characteristics. As Whyte and Nussbaum (2020) describe organizational transition as "soft landings," the transition process is a gradual transition from one organizational form to another. Our findings relating to Daxing Airport show that to achieve continuity between projects and operations, the organizational design of the transition is constantly evolving. Such structural evolution spans three key stages, starting with the creation of a prototype organization that includes both project and operational voices, to mutual learning, and gradual separation.

Second, this study identifies more complex interactions between organizations than the PSO framework. The PSO framework only reflects the structural aspects of permanent and temporary layers of organizations in megaprojects, such as owners, sponsors, and clients. Similar frameworks in the literature are informative (Eriksson & Kadefors, 2017), yet are equally concerned with structural challenges and without the necessary depth to unpack the organizational design dimensions. Our findings from Daxing Airport emphasize the need for a more granular consideration of dimensions. Our framework highlights the importance of establishing multi-layered ad hoc integrated organizations for a smooth transition. These ad hoc organizations are established specifically to coordinate inter-organizational relationships. Further, these ad hoc organizations form a multi-layered governance system to handle the complexity of the entire system. In addition, findings regarding process (see section 5.4 for details) also identify more complex interactions between organizations. These findings further elaborate on the delivery model of the system suggested by the PSO framework.

Third, the PSO and similar frameworks are tools to discuss macro and meso structural relationships and do not include the individual level, or incorporate past impact into the current organizational structure. Given our findings related to individual level and historical influences (see section 5.5 for details), this study provides the granularity and associated dimensions to evolve the PSO framework from a canvas to a more operational planning tool with underpinned pillars.

5.4 | Process: Revealing coordination mechanisms

The process dimension of organizational design theory emphasizes the processes of information exchange and organizational coordination (Galbraith, 2014). Research on inter-organizational coordination and information exchange mechanisms for projects, operations, and transitions has focused on two types: Common organizational coordination mechanisms (formal and informal communication; Eriksson & Kadefors, 2017), and information sharing tools (e.g., digital information systems; Whyte & Nussbaum, 2020). From an organizational design perspective, the findings of this study regarding organizational process extension and establishing coordination and information sharing organizational platforms contribute to the transition mechanism literature. Inter-phase studies generally emphasize that the spanning of temporal boundaries must align and bridge the boundaries of organizations in different phases (Reinecke & Ansari, 2014; Stjerne et al., 2019). In traditional practices, project organizations are disbanded at the end of the project, and operations organizations are rarely involved in the project phase. Such mode of facility handover, project team departure, and operations team takeover creates organizational separation and the inevitable disconnect between projects and operations (Whyte & Nussbaum, 2020). It is enlightening that, in Daxing Airport, the operational entities joined in advance during the project phase, and the project organizations were extended to the operations phase, making the two systems overlap, promoting coordination and information sharing between project and operations organizations. Furthermore, by establishing several committees with different objectives, in which related organizations are incorporated, Daxing Airport has made inter-organizational coordination and information sharing more effective. Such ways of establishing committees to coordinate different organizations have been mentioned in the operations management literature (Galbraith, 2014).

Whyte et al. (2016) made an insightful analogy of the transition between projects and operations as "passing the baton," emphasizing the coordination of the transition process. We further suggest the analogy of a "three-legged race" to frame the transition to operations of Daxing Airport, as requirements from project and operations should be considered together throughout the life cycle. Our findings suggest that the operations processes extended to the project phase, incorporating operations' people, knowledge, and experience in the project team as early as the project planning phase. Its project processes extended to the operations phase for the ongoing maintenance of the asset and the development of expansion projects.

5.5 | People: Transparency for playing multiple roles

The people-related aspects of organizational design theory focus on the design of leadership positions and staff assignments (Galbraith, 2014); we further articulate on these dimensions in the context of transitions. In our common perception, projects are one-off structures and activities (Lundin & Söderholm, 1995). Once the project teams complete their current project, they usually move on to the next project immediately (Zerjav et al., 2018). After taking over the project, the operations management organizations carry out regular and ongoing operational activities (Lundin & Söderholm, 1995). The project and operations teams are two completely different teams with different responsibilities and work, which often leads to passing the baton in the handover. Unlike traditional practices, during the transition of Daxing Airport, the same individual assumed the leadership roles of both project and operations organizations, and the dual roles forced them to juggle a series of responsibilities associated with both roles, thus completing the coordination of both organizations. Such organizational design relies on strong owners who internalize the project and operational functions, building upon their in-house project management capabilities (Davies & Brady, 2016). The Project Zoo framework suggests the best candidates for operations manager (Zwikael et al., 2019), and proposes some roles can be combined and undertaken by the same person (Zwikael & Meredith, 2018). Such organizational design of concurrent leadership in project and operations organizations demonstrates best practices theorized in the Project Zoo framework.

At Daxing Airport, several individuals assumed leadership roles in both project and operations organizations, as well as serving in the permanent organization. Individuals serving in permanent organizations have administrative power, which can be extended to the temporary organizations when they are assigned to serve on both sides simultaneously. It allows temporary organizations to quickly acquire the ability to coordinate heterogeneous participants to accomplish the goals of the current project. We find that such organizational designs in which individuals play multiple roles are vital organizational resources (Zwikael & Meredith, 2018). When individuals span the boundaries between different roles, the different role functions can interpenetrate each other, enabling inter-organizational coordination or rapid configuration of organizational functions. For instance, the principal shareholder of the owner of the Berlin-Brandenburg Airport project is the government, and its supervisory board is chaired jointly by the mayor of Berlin and the premier of Brandenburg, but the owner management commented that "we solve problems here among professionals. They [represent] politics. We keep them out of it (Winch et al., 2022)." The Berlin-Brandenburg Airport is similar to Daxing Airport in terms of organizational design, with senior government leaders serving as project-coordinating organization leaders. But they had distinct project outcomes (Berlin-Brandenburg Airport was put into operation almost a decade later than originally planned), not only for technical reasons, but also for organizational design, which deserves our reflection. The government officials involved in Berlin-Brandenburg Airport are considered to represent politics, while, in Daxing Airport, these government leaders are considered a powerful tool for coordination between different entities. Their functions and powers in government are extended to the project to help the project achieve better coordination.

In the practice of Daxing Airport, we also observed that the organizational design of job rotation was adopted to enhance the connections and continuity between projects and operations. On the one hand, employees with project and operational experience are selected from permanent organizations to work in the project organizations. This implements the best practice of project team formation, where a fully integrated project team includes representatives from operations (Merrow, 2011). Furthermore, projects are seen as embedded in permanent organizations, with extensive and tight links between them (Engwall, 2003; Sydow et al., 2004). Through the job rotation of the project organizations and the permanent organizations, between these two systems, the knowledge of a single project is transferred to the permanent organizations, and the permanent organizations then select personnel to form the next project team. By doing so, "economies of repetition" are achieved between projects (Davies & Brady, 2000). On the other hand, after the project was completed, a large portion of the employees involved in it were transferred to Daxing Airport Company for operations management. As members move between project

and operations organizations, shared knowledge, values, and experience are linked together, enhancing the connections and continuity between projects and operations.

6 | CONCLUSIONS

The transition from project to operations is a key challenge in practice, but it also provides a window of opportunity to link projects and operations. The organizational design literature provides the theoretical framework, but there remains a lack of systemic theory elaboration of transition contexts. Through a longitudinal case study of the Daxing Airport transition, we ultimately developed a synthetic framework for organizational design of large inter-organizational project transitions that is both enlightening and universal, through which this study can transcend its immediate empirical context.

This framework provides a set of organizational design considerations for the transition contexts to create organizational forms that coordinate projects and operations well. However, in order to discuss the implications of this framework more precisely, we need to specify in what contexts this framework works. The possibilities and limitations of generalizing our findings from this specific case to the transitions between projects and operations in other types of asset development and management projects are discussed next. All the findings of this study can be generalized to other types of transportation infrastructure, such as airports, high-speed railways, subways, bridges, and comprehensive transportation hubs. Owners of transportation infrastructure projects, whose core businesses include the construction and operations of infrastructure assets, are more than just investors and operators; they have in-house project management capabilities. Such in-house project management capabilities stem in part from the repetitive characteristic of transportation infrastructure projects, with these owners often developing and managing multiple projects. For instance, CAH has built and operates 53 airports in China, and Shentong Metro Group has developed and manages 20 metro lines. The in-house project management capabilities of these owners have gradually increased with the construction of one project after another, achieving a transfer from temporary project organizations to permanent owner organizations (Davies et al., 2019). When the owner has in-house project management capabilities and sets up the corresponding project management organization internally, the transition between its projects and operations is actually an internal structural adjustment and resource allocation within the owner. All the findings of this study are applicable in such cases. Moreover, another characteristic of transportation infrastructures is their systemic openness, with numerous subsystems and countless participating entities (e.g., comprehensive transportation hubs involve different types of infrastructure; high-speed railways cross different administrative regions; ports require different operators for different functions such as storage and loading). Such projects can only achieve complete operational functions when all subprojects and participating entities are systematically integrated. Our findings are particularly useful for such asset development and management projects that require projects to be delivered across organizational boundaries.

The findings of this study are partially not applicable to owners who do not have in-house project management capabilities, such as temporary owners (event-based infrastructure, e.g., Olympics, World Expos) and permanent owners whose asset construction is not their core business (e.g., energy infrastructure). Owners of event-based infrastructure projects are formed temporarily for the event and dissolved after the end of the event. Such owners are themselves temporary organizations and do not have in-house project management capabilities (Davies et al., 2019). The core business of energy infrastructure project owners is to provide energy to customers, rather than to build power stations or transmission networks (Engwall, 2003). Owners often engage in major asset acquisition when they wish to expand or upgrade their ability to provide energy to customers. Some findings of this study do not apply to such owners who do not have in-house project management capabilities, such as organizational design strategies that internalize project and operational functions, concurrent leadership, and job rotation. Nevertheless, there are some findings, such as the establishment of ad hoc integrated organizations, the extension of project and operational processes, and the establishment of organizational platforms for project and operational communication, that can provide insights for these asset development and management projects.

The specific case of this study is embedded in the Chinese institutional context, and the possibilities and limitations of generalizing our findings to other institutional contexts are discussed below. Findings related to the government need to be discussed; other findings are not affected by the institutional context. Globally, due to the significant impact of large infrastructure projects, most of which are financed by governments, there are certain similarities in organizational configurations. For example, Berlin-Brandenburg Airport is financed by the government and government leaders are also serving as leaders in the project coordination organization (Winch et al., 2022). In the UK context, the Treasury and specific government departments (e.g., Department for Transport) usually jointly represent the owner. Specific government departments are responsible for establishing and empowering client organizations to liaise and manage interfaces with them throughout the project (Denicol

et al., 2021). From the above analysis, our findings of "establishment of ad hoc integrated organizations" and "concurrent leadership in temporary (project organizations) and permanent (government) organizations" are also applicable in other institutional contexts. But, discussing this more deeply, in China, the majority of participants in infrastructure projects are state-owned enterprises, and, going back to the source, all properties are owned by the state, and all participants are under the rule of administrative power. As shown in Figure 1, all participants are basically functional departments of powerful institutions. Although most infrastructure projects in the capitalist institutional context are also financed by governments, the projects are underpinned by free markets, independent property rights, and the legal infrastructure and cultures that legitimate them. On this basis, different organizations exist and come to work on the infrastructure as actors to be integrated. Therefore, the organizational boundaries in Daxing Airport and in the cases from capitalist institutional contexts are of different natures. The issue of "system integration" in the Daxing Airport case may be more about allocating resources under administrative power to meet changing tasks; while cases from other institutional contexts may be more about coordination of more independent economic entities and alignment of different interests (Whyte & Davies, 2021). The mechanisms of integration are different too, one made by administration power, the other by market logic. In summary, all our findings can be generalized to other institutional contexts, but the final effects may be influenced by the different institutional contexts.

Within these boundary conditions, this study holds several important theoretical contributions. First, this study contributes to the nexus of operations management and project management, temporary and permanent. Through developing an organizational design framework for transitions, this study provides insight into the understanding of how forms of organizing with different temporalities meet in the transition (Whyte & Nussbaum, 2020). Through elaborating the theory of the transition from more temporary, goal-oriented, and evolving organizational forms to more permanent, routine, and ongoing organizational forms, this work provides a starting point for such theorizing of organizational and temporal boundary spanning to ensure the connection and continuity of projects and operations. Second, the findings of this study advance the strong owner concept, revealing the role and dimensions that owner organizations might consider to plan the transition. The study builds upon the organizational design literature and frameworks and incorporates the dimensions of strategy, structure, process, and people in the transition. This advances previous literature and contributes to our understanding of the strong owner by providing a more granular and specific set of dimensions to plan the design of transitions. Third, regarding organizational structure, typically the PSO framework depicts a multi-level, multi-phase holistic framework for megaproject organizational structure (Denicol et al., 2021), and our findings provide more granular and operational organizational design considerations for the transition between projects and operations in this framework. Moreover, compared to the PSO framework, our framework is more dynamic, depicts more complex interactions between organizations, and covers the micro-level of organizational design. Fourth, the findings regarding organizational process extension and establishing coordination and information sharing organizational platforms contribute to the transition mechanism literature. Fifth, the Project Zoo framework theoretically recommends various configurations of key roles (Zwikael & Meredith, 2018), and many of the people-related findings of this study provide a demonstration of best practices in the Project Zoo framework, such as concurrent leadership in project and operations organizations, and in temporary (project delivery organizations) and permanent organizations (owners).

In addition to the theoretical contributions, this research brings management implications by explicitly linking to the practice of transitions between projects and operations in large inter-organizational projects. First, the organizational design framework we developed from the perspective of strategy, structure, process, and people can provide a holistic guide for future organizational design of large inter-organizational project transitions. Second, these findings can also be considered as optional organizational design building blocks. Depending on the specific conditions of the owner and the project, these findings can be used individually or in combination. This study provides implications for owners, project managers, and operations managers. Owners should be aware that projects and operations are two completely different activities with contradictory strategies and different organizational forms, so it is extremely important to organize the transition. When owners do not have in-house project management capabilities, they can choose to hire external delivery teams, but they should be aware that it is important to build connections and continuity between project and operations organizations. When owners do have in-house project management capabilities (strong owners), it is desirable for them to internalize the project and operations functions. Adopting the findings of this study regarding strategy, structure, process, and people will help to fully integrate the projects and operations. The implication for project managers is that they should realize that the value of the project is unlocked in operations, and they should be more proactive in communicating and coordinating with operations organizations. The ones designing the structure should recognize that, in practice, project managers often do not have the

motivation and incentives to coordinate with operations organizations and managers. When assembling the project team, it would be helpful to include professionals with operations experience or consider seconding people from the operations organization to participate in the project. The implication for operations managers is to recognize that the degree to which operations organizations are involved in projects will directly determine whether the final deliverables will meet their own usage requirements. Operations managers should be proactively involved in the project process and establish a series of mechanisms to coordinate and communicate with project managers and organizations.

The boundary conditions discussed above are the main limitations of this study. Additionally, participant observation provides access to the real world of the case, but being engaged scholars may have influenced the findings of the study. We encourage practitioners to apply or test our findings in different institutional settings and projects. Although we appreciate the limitations of using single case studies, Daxing Airport provides rich evidence of practices to successfully organize the transition to operations, a problem affecting multiple owners globally. We shed light upon the subject of organizational design in transition contexts, and hope to make a theory elaboration contribution to the field. Our findings provide hypotheses that can be systematically tested with more cases in the future. Such theory-testing studies can help to inform the external validity and generalizability of our findings in other types of asset development and management projects and other institutional contexts (Dul & Hak, 2007). Furthermore, we encourage research related to the transition between projects and operations in inter-organizational projects, such as from the perspective of value transfer, governance mechanisms, capabilities, technology, and so forth. Other stakeholders' roles in the transition, such as suppliers and contractors, can also be considered. Future research could further examine our findings, such as those regarding concurrent leadership, discussing the conflict and integration of different roles. Future researchers might be inspired to explore our discussions about public organizations and examine the role of government in the design of transitions. We argue that, with the spanning of organizational and temporal boundaries, the transitions between projects and operations are full of interactions, uncertainties, and complexities, providing the opportunity to observe novel and interesting findings to enrich the existing theories and practices.

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REFERENCES

Al-Mazrouie, J. R., Ojiako, U., Williams, T., Chipulu, M., & Marshall, A. (2021). An operations readiness typology for mitigating against transitional 'disastrous openings' of airport infrastructure projects. *Production Planning & Control*, *32*(4), 283–302.

Artto, K., Ahola, T., & Vartiainen, V. (2016). From the front end of projects to the back end of operations: Managing projects for value creation throughout the system lifecycle. *International Journal of Project Management*, *34*(2), 258–270.

Aubry, M., & Hobbs, B. (2010). *Project Management Office (PMO): A quest for understanding*. Project Management Institute.

Aubry, M., Hobbs, B., & Thuillier, D. (2007). A new framework for understanding organisational project management through the PMO. *International Journal of Project Management*, *25*(4), 328–336.

Aubry, M., & Lavoie-Tremblay, M. (2018). Rethinking organizational design for managing multiple projects. *International Journal of Project Management*, *36*(1), 12–26.

Bakker, R. M. (2010). Taking stock of temporary organizational forms: A systematic review and research agenda. *International Journal of Management Reviews*, *12*(4), 466–486.

Bakker, R. M. (2016). Stepping in and stepping out: Strategic alliance partner reconfiguration and the unplanned termination of complex projects. *Strategic Management Journal*, *37*(9), 1919–1941.

Bakker, R. M., DeFillippi, R. J., Schwab, A., & Sydow, J. (2016). Temporary organizing: Promises, processes, problems. *Organization Studies*, *37*(12), 1703–1719.

Boyd, D., & Chinyio, E. (2008). *Understanding the construction client*. John Wiley & Sons.

Brady, T., & Davies, A. (2010). From hero to hubris–reconsidering the project management of Heathrow's terminal 5. *International Journal of Project Management*, *28*(2), 151–157.

Bredillet, C., Tywoniak, S., & Dwivedula, R. (2015). What is a good project manager? An Aristotelian perspective. *International Journal of Project Management*, *33*(2), 254–266.

Brookes, N., Sage, D., Dainty, A., Locatelli, G., & Whyte, J. (2017). An Island of constancy in a sea of change: Rethinking project temporalities with long-term megaprojects. *International Journal of Project Management*, *35*(7), 1213–1224.

Browning, T. R. (2010). On the alignment of the purposes and views of process models in project management. *Journal of Operations Management*, *28*(4), 316–332.

Corbin, J., & Strauss, A. (2014). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage Publications.

Cruz, C. O., & Marques, R. C. (2011). Contribution to the study of PPP arrangements in airport development, management and operation. *Transport Policy*, *18*(2), 392–400.

Davies, A., & Brady, T. (2000). Organisational capabilities and learning in complex product systems: Towards repeatable solutions. *Research Policy*, *29*(7), 931–953.

Davies, A., & Brady, T. (2016). Explicating the dynamics of project capabilities. *International Journal of Project Management*, *34*(2), 314–327.

Davies, A., Gann, D., & Douglas, T. (2009). Innovation in megaprojects:Systems integration at London Heathrow terminal 5. *California Management Review*, *51*(2), 101–125.

Davies, A., MacAulay, S. C., & Brady, T. (2019). Delivery model innovation: Insights from infrastructure projects. *Project Management Journal*, *50*(2), 119–127.

Davies, A., & Mackenzie, I. (2014). Project complexity and systems integration: Constructing the London 2012 Olympics and Paralympics games. *International Journal of Project Management*, *32*(5), 773–790.

Denicol, J., & Davies, A. (2022). The megaproject-based firm: Building programme management capability to deliver megaprojects. *International Journal of Project Management*, *40*(5), 505–516.

Denicol, J., Davies, A., & Krystallis, I. (2020). What are the causes and cures of poor megaproject performance? A systematic literature review and research agenda. *Project Management Journal*, *51*(3), 328–345.

Denicol, J., Davies, A., & Pryke, S. (2021). The organisational architecture of megaprojects. *International Journal of Project Management*, *39*(4), 339–350.

Dodgson, M., Gann, D., MacAulay, S., & Davies, A. (2015). Innovation strategy in new transportation systems: The case of Crossrail. *Transportation Research Part A: Policy and Practice*, *77*, 261–275.

Dul, J., & Hak, T. (2007). *Case study methodology in business research*. Routledge.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550.

Engwall, M. (2003). No project is an Island: Linking projects to history and context. *Research Policy*, *32*(5), 789–808.

Eriksson, T., & Kadefors, A. (2017). Organisational design and development in a large rail tunnel project—Influence of heuristics and mantras. *International Journal of Project Management*, *35*(3), 492–503.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, *12*(2), 219–245.

Fuller, J., Jacobides, M. G., & Reeves, M. (2019). The myths and realities of business ecosystems. *MIT Sloan Management Review*, *60*(3), 1–9.

Galbraith, J. (2014). *Designing organizations: Strategy, structure, and process at the business unit and enterprise levels*. John Wiley & Sons.

Galbraith, J., & Kates, A. (2010). *Designing your organization: Using the STAR model to solve 5 critical design challenges*. John Wiley & Sons.

Gao, G. Y., Xie, E., & Zhou, K. Z. (2015). How does technological diversity in supplier network drive buyer innovation? Relational process and contingencies. *Journal of Operations Management*, *36*, 165–177.

Gersick, C. J. G. (1988). Time and transition in work teams: Toward a new model of group development. *Academy of Management Journal*, *31*(1), 9–41.

Gil, N., & Beckman, S. (2009). Introduction: Infrastructure meets business: Building new bridges, mending old ones. *California Management Review*, *51*(2), 6–29.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2012). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational Research Methods*, *16*(1), 15–31.

Grabher, G. (2004). Temporary architectures of learning: Knowledge governance in project ecologies. *Organization Studies*, *25*(9), 1491–1514.

Grabher, G., & Thiel, J. (2015). Projects, people, professions: Trajectories of learning through a mega-event (the London 2012 case). *Geoforum*, *65*, 328–337.

Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in interorganizational and community contexts. *Strategic Management Journal*, *33*(6), 571–586.

Hald, K. S., & Mouritsen, J. (2013). Enterprise resource planning, operations and management: Enabling and constraining ERP and the role of the production and operations manager. *International Journal of Operations & Production Management*, *33*(8), 1075–1104.

Jones, C., & Lichtenstein, B. B. (2008). *The Oxford handbook of inter-organizational relations*. Oxford Academic.

Kent, D. C., & Becerik-Gerber, B. (2010). Understanding construction industry experience and attitudes toward integrated project delivery. *Journal of Construction Engineering and Management*, *136*(8), 815–825.

Ketokivi, M. (2006). Elaborating the contingency theory of organizations: The case of manufacturing flexibility strategies. *Production and Operations Management*, *15*(2), 215–228.

Ketokivi, M., & Choi, T. (2014). Renaissance of case research as a scientific method. *Journal of Operations Management*, *32*(5), 232–240.

Langley, A. N. N., Smallman, C., Tsoukas, H., & Van de Ven, A. H. (2013). Process studies of change in organization and management: Unveiling temporality, activity, and flow. *Academy of Management Journal*, *56*(1), 1–13.

Laursen, M., & Svejvig, P. (2016). Taking stock of project value creation: A structured literature review with future directions for research and practice. *International Journal of Project Management*, *34*(4), 736–747.

Lee, E. W. Y. (2000). The new Hong Kong international airport fiasco: Accountability failure and the limits of the new managerialism. *International Review of Administrative Sciences*, *66*(1), 57–72.

Leonard-Barton, D. (1990). A dual methodology for case studies: Synergistic use of a longitudinal single site with replicated multiple sites. *Organization Science*, *1*(3), 248–266.

Ligthart, R., Oerlemans, L., & Noorderhaven, N. (2016). In the shadows of time: A case study of flexibility behaviors in an interorganizational project. *Organization Studies*, *37*(12), 1721–1743.

Locatelli, G., Zerjav, V., & Klein, G. (2020). Project transitions—Navigating across strategy, delivery, use, and decommissioning. *Project Management Journal*, *51*(5), 467–473.

Lundin, R. A., & Söderholm, A. (1995). A theory of the temporary organization. *Scandinavian Journal of Management*, *11*(4), 437–455.

Maytorena-Sanchez, E., & Winch, G. M. (2022). Engaged scholarship in project organizing research: The case of UK infrastructure. *Project Leadership and Society*, *3*, 100049.

Merrow, E. W. (2011). *Industrial megaprojects: Concepts, strategies, and practices for success*. John Wiley & Sons.

Merton, R. K. (1968). *Social theory and social structure*. Simon and Schuster.

Mintzberg, H. (1989). The structuring of organizations. In D. Asch & C. Bowman (Eds.), *The structuring of organizations BT—readings in strategic management* (pp. 322–352). Macmillan Education.

Mishra, A., & Browning, T. R. (2020). The innovation and project management department in the journal of operations management. *Journal of Operations Management*, *66*(6), 616–621.

Miterev, M., Mancini, M., & Turner, R. (2017). Towards a design for the project-based organization. *International Journal of Project Management*, *35*(3), 479–491.

Morgan, M., Malek, W. A., & Levitt, R. E. (2008). *Executing your strategy*. Harvard Business School Press.

Morris, P. W. G. (2013). *Reconstructing project management*. John Wiley & Sons.

Morris, P. W. G., & Hough, G. H. (1987). *The anatomy of major projects: A study of the reality of project management*. John Wiley & Sons.

Nadler, D. A., & Tushman, M. (1999). The organization of the future: Strategic imperatives and core competencies for the 21st century. *Organizational Dynamics*, *27*(1), 45–60.

Puranam, P., Alexy, O., & Reitzig, M. (2014). What's "new" about new forms of organizing? *Academy of Management Review*, *39*(2), 162–180.

Ramasesh, R. V., & Browning, T. R. (2014). A conceptual framework for tackling knowable unknown unknowns in project management. *Journal of Operations Management*, *32*(4), 190–204.

Reinecke, J., & Ansari, S. (2014). When times collide: Temporal brokerage at the intersection of markets and developments. *Academy of Management Journal*, *58*(2), 618–648.

Romme, A. G. L. (2003). Making a difference: Organization as design. *Organization Science*, *14*(5), 558–573.

Sainati, T., Brookes, N., & Locatelli, G. (2017). Special purpose entities in megaprojects: Empty boxes or real companies? *Project Management Journal*, *48*(2), 55–73.

Shenhar, A. J., & Dvir, D. (2007). *Reinventing project management: The diamond approach to successful growth and innovation*. Harvard Business Review Press.

Slack, N., & Brandon-Jones, A. (2019). *Operations management* (9th ed.). Pearson Education.

Stjerne, I. S., Söderlund, J., & Minbaeva, D. (2019). Crossing times: Temporal boundary-spanning practices in interorganizational projects. *International Journal of Project Management*, *37*(2), 347–365.

Sydow, J., Lindkvist, L., & DeFillippi, R. (2004). Project-based organizations, embeddedness and repositories of knowledge: Editorial. *Organization Studies*, *25*(9), 1475–1489.

Too, E. G. (2010). A framework for strategic infrastructure asset management. In J. E. Amadi-Echendu, K. Brown, R. Willett, & J. Mathew (Eds.), *Definitions, concepts and scope of engineering asset management* (pp. 31–62). Springer.

Turner, R., & Miterev, M. (2019). The organizational design of the project-based organization. *Project Management Journal*, *50*(4), 487–498.

Van de Ven, A. H. (2007). *Engaged scholarship: A guide for organizational and social research*. Oxford University Press.

Van Den Ende, L., & Van Marrewijk, A. (2014). The ritualization of transitions in the project life cycle: A study of transition rituals in construction projects. *International Journal of Project Management*, *32*(7), 1134–1145.

van Marrewijk, A., & Dessing, N. (2019). Negotiating reciprocal relationships: Practices of engaged scholarship in project studies. *International Journal of Project Management*, *37*(7), 884–895.

Walker, D. H. T., & Lloyd-Walker, B. M. (2014). The ambience of a project alliance in Australia. *Engineering Project Organization Journal*, *4*(1), 2–16.

Waterman, R. H., & Peters, T. J. (1982). *In search of excellence: Lessons from America's best-run companies*. Harper & Row.

Whyte, J. (2019). How digital information transforms project delivery models. *Project Management Journal*, *50*(2), 177–194.

Whyte, J., & Davies, A. (2021). Reframing systems integration: A process perspective on projects. *Project Management Journal*, *52*(3), 237–249.

Whyte, J., & Davies, A. (2023). Systems integration in construction: An open-ended challenge for project organising. In S. Addyman, & H. Smyth (Eds.), *Construction project Organising* (pp. 33–49). Wiley Online Library.

Whyte, J., Lindkvist, C., & Jaradat, S. (2016). Passing the baton? Handing over digital data from the project to operations. *Engineering Project Organization Journal*, *6*(1), 2–14.

Whyte, J., & Nussbaum, T. (2020). Transition and temporalities: Spanning temporal boundaries as projects end and operations begin. *Project Management Journal*, *51*(5), 505–521.

Winch, G. (2014). Three domains of project organising. *International Journal of Project Management*, *32*(5), 721–731.

Winch, G., & Leiringer, R. (2016). Owner project capabilities for infrastructure development: A review and development of the "strong owner" concept. *International Journal of Project Management*, *34*(2), 271–281.

Winch, G., Maytorena, E., & Sergeeva, N. (2022). *Strategic project organizing*. Oxford University Press.

Zerjav, V. (2021). Why do business organizations participate in projects? Toward a typology of project value domains. *Project Management Journal*, *52*(3), 287–297.

Zerjav, V., Edkins, A., & Davies, A. (2018). Project capabilities for operational outcomes in inter-organisational settings: The case of London Heathrow terminal 2. *International Journal of Project Management*, *36*(3), 444–459.

Zwikael, O., & Meredith, J. R. (2018). Who's who in the project zoo? The ten core project roles. *International Journal of Operations & Production Management*, *38*(2), 474–492.

Zwikael, O., Meredith, J. R., & Smyrk, J. (2019). The responsibilities of the project owner in benefits realization. *International Journal of Operations & Production Management*, *39*(4), 503–524.

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APPENDIX A

TABLE A1 Overview of documents related to the strategy of "integration of projects and operations."

Document	Time	Organization
Minutes of the first meeting of Daxing Airport Project Construction Headquarters (Proposed the strategy of "integration of projects and operations")	Dec 2010	Project Construction Headquarters
Report on the connotation and working model of the integration of projects and operations (Surveyed 15 airports worldwide)	Dec 2014	Capital Airport Holdings Limited
Guidelines for the integration of projects and operations	Jul 2015	Capital Airport Holdings Limited
Working mechanisms for the integration of projects and operations of Daxing Airport	Dynamic Revision	Project Construction Headquarters, Daxing Airport Company
Internal reports: Proposal and practice of integration of projects and operations	Mar 2021	Capital Airport Holdings Limited
Public reports: Summary report on Construction and Operations of Daxing Airport	Sept 2020	Civil Aviation Administration of China
Meeting minutes of the Project and Operations Integration Committee	First in Dec 2020, meeting monthly	Project and Operations Integration Committee
Supervisory list of issues for the integration of projects and operations of Daxing Airport	Dynamic Revision	Project and Operations Integration Committee
Project pool for the integration of projects and operations of Daxing Airport	Dynamic Revision	Project and Operations Integration Committee
Composite talent pool for the integration of projects and operations of Daxing Airport	Dynamic Revision	Project and Operations Integration Committee
Proposals and standards database for the integration of projects and operations of Daxing Airport	Dynamic Revision	Project and Operations Integration Committee

APPENDIX B

ORGANIZATIONAL STRUCTURE OF DAXING AIRPORT IN DIFFERENT PHASES

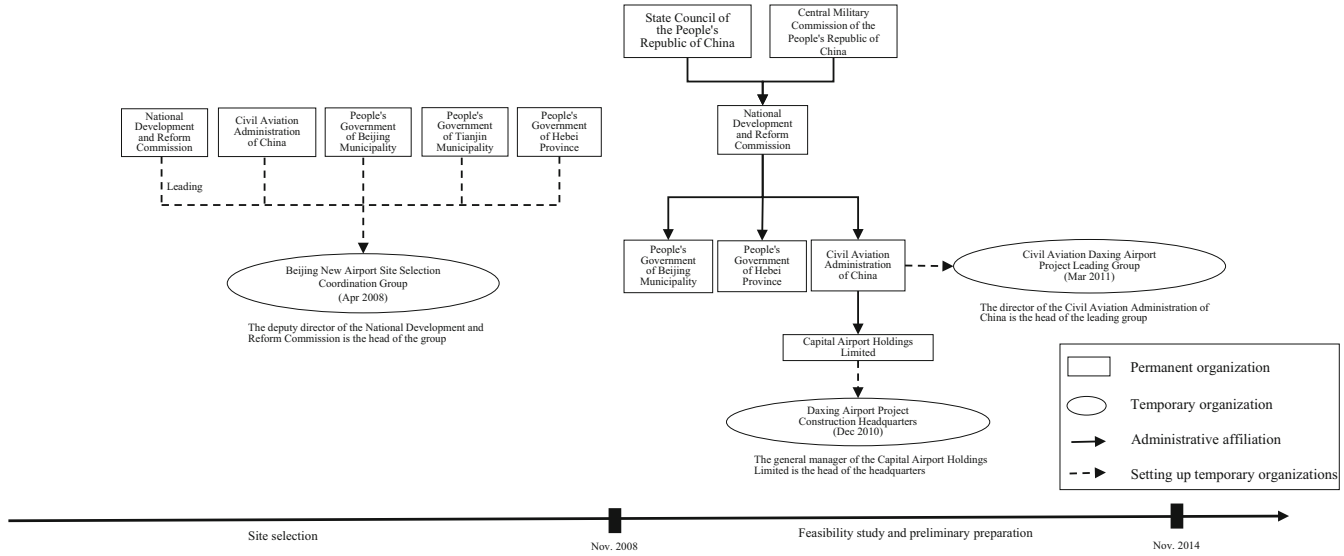

FIGURE B1 Organizational structure of Daxing Airport in the planning phase.

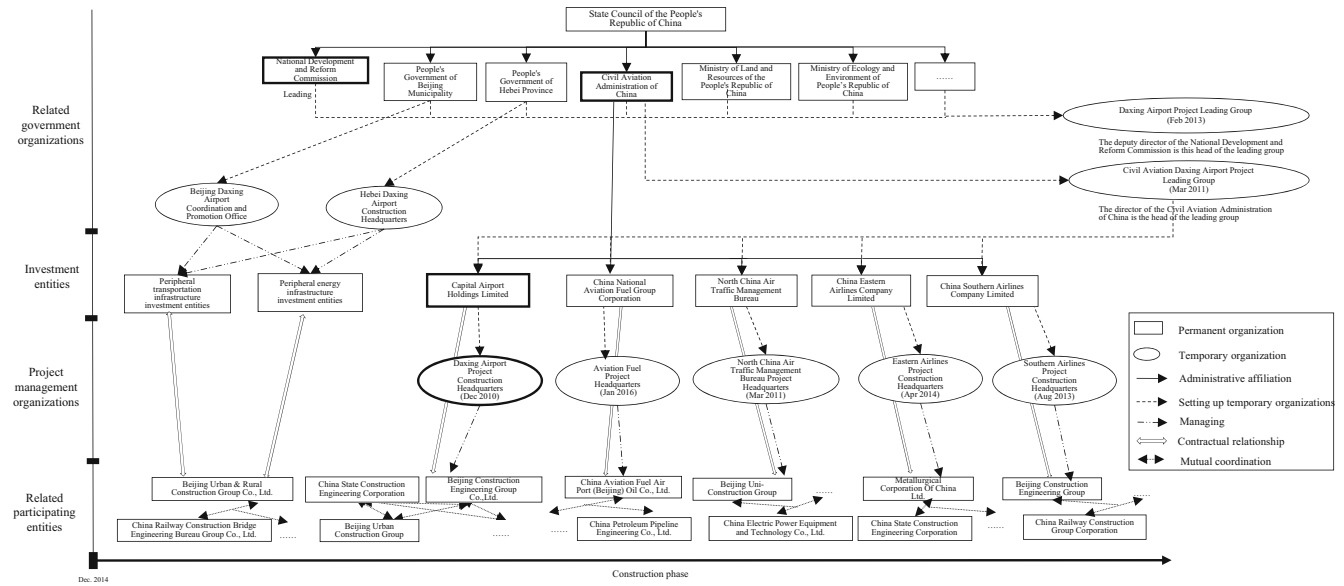

FIGURE B2 Organizational structure of Daxing Airport in the early construction phase.

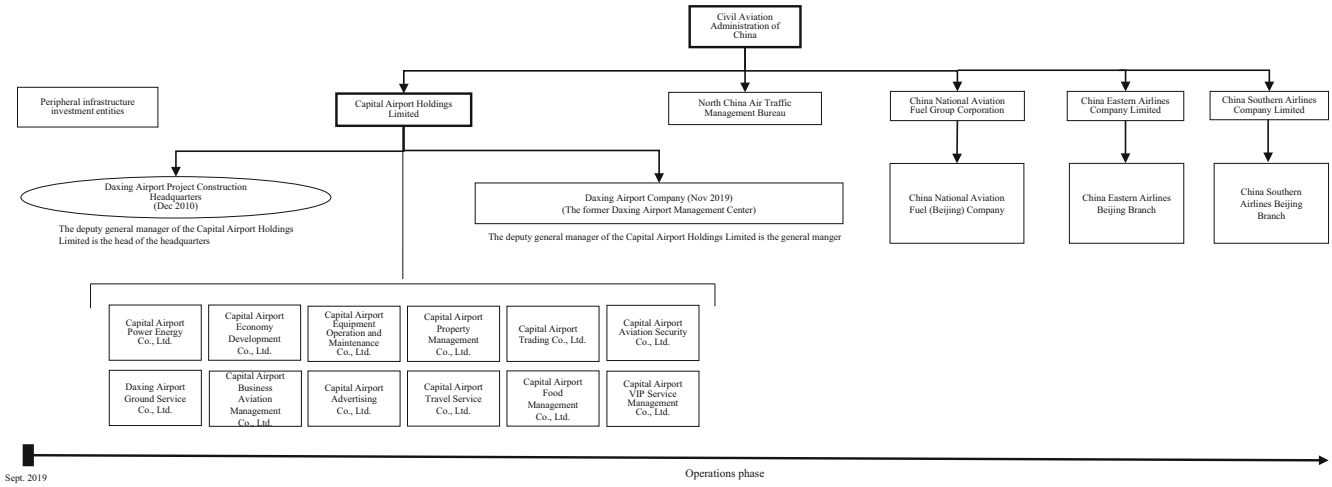

FIGURE B3 Organizational structure of Daxing Airport in the operations phase.

APPENDIX C

TABLE C1 Overview of interviewees in the first round.

No.	Project	Organization	Type	Number and role of interviewees
R1-1	Main airport building projects	Capital Airport Holdings Limited	A	13 department directors
R1-2		Project Construction Headquarters	B	8 department directors
R1-3		Daxing Airport Management Center	C	5 department directors
R1-4		Civil Aviation Administration of China	D	1 director and 2 staff
R1-5		Beijing Customs	D	1 Staff
R1-6		Beijing General Border Inspection Station	D	1 Staff
R1-7		Police	D	2 Staff
R1-8		Capital Airport Power Energy Co., Ltd.	E	1 Project manager of Daxing Airport
R1-9		Capital Airport Equipment Operation and Maintenance Co., Ltd.	E	1 Project manager of Daxing Airport
R1-10		Capital Airport Property Management Co., Ltd.	E	1 Director
R1-11		Capital Airport Economy Development Co., Ltd.	E	1 Staff
R1-12		Capital Airport Aviation Security Co., Ltd.	E	1 Staff
R1-13		Capital Airport VIP Service Management Co., Ltd.	E	1 Project manager of Daxing Airport
R1-14		China Construction Eighth Engineering Division Co., Ltd.	F	1 Staff
R1-15		Beijing Construction Engineering Group Co., Ltd.	F	1 Project manager of Daxing Airport
R1-16		Beijing Urban Construction Group	F	1 Staff
R1-17		Hebei Construction Group Limited	F	2 Staff
R1-18		China Aviation Port Construction Corporation	F	1 Staff
R1-19		Northwest Civil Aviation Airport Construction Group	F	1 Project manager of Daxing Airport

(Continues)

TABLE C1 (Continued)

No.	Project	Organization	Type	Number and role of interviewees
R1-20		China Railway Aviation Port Construction Group	F	2 Staff
R1-21		China Communications First Aviation Engineering Corporation	F	1 Staff
R1-22		Sinohydro Group Limited	F	1 Staff
R1-23		Beijing Sino-Aero Construction Engineering Co., Ltd.	F	1 Staff
R1-24		China Construction Third Engineering Bureau Co., Ltd.	F	1 Staff
R1-25	Civil aviation supporting projects	Air Traffic Management Operational Preparation and Transition Leading Group	G	1 Staff
R1-26		Aviation Fuel Operational Preparation Leading Group	G	1 Director
R1-27		Eastern Airlines Project Construction Headquarters	B	1 Project manager of Daxing Airport
R1-28		Southern Airlines Project Construction Headquarters	B	1 Project manager of Daxing Airport
R1-29		China Electric Technology Corporation	F	1 Project manager of Daxing Airport
R1-30		Beijing-Tianjin-Hebei Pipeline Transportation Company	F	1 Project manager of Daxing Airport
R1-31		China Aviation Fuel (Beijing) Airport Aviation Fuel Co., Ltd.	F	1 Staff
R1-32		China Aviation Fuel Air Port (Beijing) Oil Co., Ltd.	F	1 Staff
R1-33	Peripheral supporting projects	Beijing Daxing Airport Coordination and Promotion Office	D	1 Staff
R1-34		Daxing District Daxing Airport Headquarters	D	2 Staff
R1-35		Hebei Daxing Airport Construction Headquarters	D	1 Director
R1-36		Langfang Municipal Daxing Airport Office	D	1 Staff
R1-37		State Grid Beijing Electric Power Company Daxing Power Supply Company	A	1 Project manager of Daxing Airport
R1-38		State Grid Hebei Electric Power Co.	A	1 Project manager of Daxing Airport
R1-39		Beijing Water Supply Group	A	2 Staff
R1-40		Beijing Gas Group Co.	A	1 Staff
R1-41		China Railway Beijing Bureau Group Co.	A	1 Project manager of Daxing Airport
R1-42		China Railway Beijing Bureau Jingnan Project Management Department	B	1 Staff
R1-43		Beijing North China Investment Daxing Airport North Expressway Co.	A	1 Staff
R1-44		Beijing-Tianjin-Hebei Railway Investment Company	A	1 Staff
R1-45		Beijing Infrastructure Investment Co.	A	1 Project manager of Daxing Airport
R1-46		Beijing Rail Transportation Construction Management Co.	B	1 Staff

TABLE C1 (Continued)

No.	Project	Organization	Type	Number and role of interviewees
R1-47		Beijing Xinhangcheng Development and Construction Co., Ltd.	A	1 Project manager of Daxing Airport
R1-48		Beijing New Airport Bus Company	A	2 Staff
R1-49		Beijing Urban Construction Road and Bridge Construction Group	F	1 Staff
R1-50		Beijing Municipal Road & Bridge Corporation	F	1 Staff
R1-51		China Railway Construction Bridge Engineering Bureau	F	1 Staff
R1-52		China Metallurgical Transportation Construction Group	F	1 Project manager of Daxing Airport
R1-53		Beijing Uni-Construction Group	F	1 Project manager of Daxing Airport
R1-54		Beijing Municipal Construction Group	F	1 Staff
R1-55		China Railway Electrification Engineering Group	F	1 Staff
R1-56		Beijing Urban and Rural Construction Group	F	1 Staff

Note: Type: A Investment entity, B Project management organization, C Operations management organization, D Government, E Operational entity, F Construction organization, G Operational preparation organization.

APPENDIX D

TABLE D1 Overview of interviewees in the second round.

No.	Organization	Department	Number of interviewees	Role	Time
R2-C	Capital Airport Holdings Limited	All departments	26	All department directors	2 h 53 min
R2-P1	Project Construction Headquarters	Party and Group Work Department	2	Vice general manager of project construction headquarters, department director; deputy director	1 h 57 min
R2-P2		Terminal Area Engineering Department	5	Department director; deputy director; and staff	1 h 18 min
R2-P3		Flight and Public Area Engineering Department	8	Department director; deputy director; and staff	1 h 32 min
R2-P4		Planning and Contract Department	1	Department director	1 h 17 min
R2-P5		Planning and Design Department	1	Department director	1 h 22 min
R2-P6		Administrative Office	1	Department director	1 h 11 min
R2-P7		Safety and Quality Department	2	Department director; deputy director	2 h 08 min
R2-P8		Bidding and Procurement Department	1	Department director	54 min

(Continues)

TABLE D1 (Continued)

No.	Organization	Department	Number of interviewees	Role	Time
R2-O1	Daxing Airport Company	Planning and Development Department	5	Vice general manager of Daxing airport company, department director; deputy director; and staff	2 hr 28 min
R2-O2		Flight Area Management Department	4	Department director; deputy director; and staff	2 h 11 min
R2-O3		Public Area Management Department	8	Department director; deputy director; and staff	1 h 37 min
R2-O4		Terminal Management Department	1	Department director	1 h 21 min
R2-O5		Information Management Department	2	Department director; staff	2 h 03 min
R2-O6		Operations Management Department	5	Department director; staff	1 h 19 min
R2-O7		Administrative Affairs Department	1	Department director	1 h 07 min
R2-O8		Human Resources Department	1	Deputy department director	1 h 23 min

APPENDIX E

TABLE E1 Representative quotes.

Interview transcripts, observation notes, and archival materials	Second-order themes	Theoretical dimensions
"In an analogy, if I go to customize a dress, with a rough measurement, the tailor can make a dress that I can wear. Only when we have a particularly harmonious communication, will he especially understand what my needs are, my favorite color, button style, fabric, all the details. Finally, this dress can be a dress that I am very satisfied with. Furthermore, since the project cycle of the megaproject is very long and operational requirements are not static, it is very important that the project and operations organizations must maintain close communication, and both sides fully understand each other." (R2-O1)	Build connections and achieve continuity	Strategy
"In previous airport projects, project and operations were indeed two different teams. The planning, design, and construction of the project are not groundless things, they are based on operational requirements. All airport project organizations do extensive demand research and fully listen to the opinions of the operations organizations. But the fundamental task of the project organizations is to build the buildings under the construction specifications and then deliver them to the operations organizations. The project organizations are not too concerned with how the operations organizations use them later, whether they are used well or not." (R2-O1)		

TABLE E1 (Continued)

Interview transcripts, observation notes, and archival materials	Second-order themes	Theoretical dimensions
"The operations organizations, as the managers of the airports, do not look too much into the construction aspects; what they seek is to serve the passengers well, and make the airport operate efficiently. In many of the airports we have been involved in before, we asked the operations organizations to provide their requirements, but they could not provide any specific requirements during the investment phase; they even do not know what kind of airport they want. They were also barely involved during our construction phase. And, when we finish the construction, they are dissatisfied everywhere when they see the building." (R2-P2)		
"Both the Project Construction Headquarters and the Daxing Airport Company are affiliated organizations of the CAH. The coordination of projects and operations is actually a coordination within the CAH." (R2-P6)	Strong owner	
"The Project Construction Headquarters and Daxing Airport Company are brothers; we never look at Daxing Airport Company as an opposite side. Our starting point is to hope that they can operate as smoothly as possible. Many times they do not even ask for some details, and we take the initiative to help them think about it from an operational perspective." (R2-P2)		
On December 1, 2010, CAH established the Project Construction Headquarters and authorized it to carry out the construction management of Daxing Airport. On October 20, 2016, the Project Construction Headquarters established an operational preparation office to carry out operational readiness. On July 23, 2018, the administrative department approved the operational preparation office to evolve into the Daxing Airport Management Center, which is managed according to the standards of member companies of CAH. On November 29, 2019, the Airport Management Center was renamed Beijing Daxing International Airport and became a subsidiary of CAH, and was authorized to carry out the operations management of Daxing Airport. (Summary materials provided by CAH)	Structure evolution	Structure
"In 2016, CAH selected 40 operational cadres to join the Project Construction Headquarters and established the operational preparation office. The arrival of these people marked the formation of the core operational management team of Daxing Airport." (R2-P1)		
"These leading groups and headquarters involve different levels of governance. Coordination between projects and operations for main airport building projects is resolved at the CAH level. The coordination of civil aviation projects and peripheral projects, for example with rail transit, is resolved by the leading group at the National Development and Reform Commission level." (R2-P5)	System integration	
"By incorporating all relevant organizations into such ad hoc integrated organizations, it is very efficient to coordinate inter-organizational issues. For example, the Joint Operational Preparation Headquarters contains all the construction organizations involved in the airport and rail transit, and all the operations organizations such as airlines and commercial companies. After consultation, the Headquarters listed out a list of more than 3000 commissioning tasks, determining which organizations would be responsible for each task and when it would be completed." (R2-P4)		
"Not only Daxing Airport Company, but also many operational entities joined the construction phase in advance. They formed operational preparation teams, finalized technical solutions, equipment selection with the construction team, fully exchanged opinions. It took three months from the completion of the construction to the commissioning, which is unimaginable in such a short period of time. In fact, a lot of work has been completed in the front." (R2-P7)	Process extension	Process

(Continues)

TABLE E1 (Continued)

Interview transcripts, observation notes, and archival materials	Second-order themes	Theoretical dimensions
"No matter how well a project is completed, it cannot be without problems when it comes to operation. In general, the project management organizations are dissolved after the projects are delivered; however, our Project Construction Headquarters is not dissolved and has been accompanying the operations. Shanghai Airport has done a better job. They even turned our traditional project management organization into a construction management company, a permanent organization." (R2-P3)		
"Our Operations Management Committee includes airlines, air traffic control, aviation fuel, customs, railways, subways and other organizations. We raise issues at the committee meetings to discuss and solve them together, which I think is an effective mechanism for communication and information sharing." (R2-O6)	Coordination mechanisms	
"We discuss with the government, various project and operations organizations through regular meetings. We also communicate dynamically through correspondence or informal communication to resolve trivial issues." (R2-O3)		
"Project Construction Headquarters and Daxing Airport Company are two different organizations; if the two sides have different leaders, it is not easy to really make the two sides share the same goal. We have a good condition that we all belong to the CAH, and one leader balances both sides, so we have the same goal. If two sides have different leaders, it is a matter of inter-organizational coordination, and we two sides have the same leader, so it is a matter of intra-organizational coordination, and anything can be well negotiated." (R2-O1)	Concurrent leadership	People
"There are different leaders in Qingdao Airport project and operations organizations. Although they are all affiliated to the owner, they are not well integrated. The commissioning has been delayed for a long time. I had suggested that their personnel should be integrated, preferably with the same top leader, which is the key to an efficient organization. There are countless contradictions between projects and operations. As long as there is a leader on both sides, the contradictions can be resolved." (R2-P4)		
"Taking myself as an example, I relied on my experience in the operations management of the Capital Airport Terminal 3 to think about how Daxing Airport should be constructed. And now I have been transferred from the Project Construction Headquarters to Daxing Airport Company." (R2-O5)	Job rotation	
"After the commissioning of Daxing Airport, each department had some staff who were rotated to Daxing Airport Company from the Project Construction Headquarters. What these employees constructed before, is what they are currently operating. They are not starting from zero." (R2-O1)		