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Wang, Dan; Huang, Ruopeng; Li, Kaijian; Shrestha, Asheem

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Organizational structure and dynamic capabilities on business model innovation in project-driven enterprises: evidence from the construction industry

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Dan Wang
School of Public Policy and Administration, Chongqing University, Chongqing, China
Ruopeng Huang
School of Management Science and Real Estate, Chongqing University, Chongqing, China and
Delft University of Technology, Delft, The Netherlands
Kaijian Li
School of Management Science and Real Estate, Chongqing University, Chongqing, China, and
Asheem Shrestha
School of Architecture and Built Environment, Deakin University - Geelong Waterfront Campus, Geelong, Australia

Abstract

Purpose – Flexibility and efficiency are dual attributes of the organizational structure that are crucial for project-driven enterprises to achieve sustainable development in a dynamic environment. However, there is a lack of research on the patterns by which the dual attributes of a project-driven enterprise's organizational structure affect business model innovation. Employing organizational theory, this study aims to assess the mediating mechanisms and dynamic capabilities through which the dual attributes of the organizational structure influence business model innovation in project-driven enterprises.

Design/methodology/approach – Data were collected from 242 employees from four project-driven companies across 26 cities (e.g. Beijing, Tianjin, Guangzhou and Shenzhen) in China. Structural equation modeling revealed the relationship between organizational structure's dual attributes and business model innovation.

Findings – The findings show that the dual attributes (flexibility and efficiency) of the organizational structure have positive impacts on business model innovation. Moreover, dynamic capabilities mediate the relationship between the dual attributes and business model innovation in project-driven enterprises.

Originality/value – This study provides contributions to innovation research in the context of project-driven enterprises by revealing the influence of organizational structure on business model innovation through the firms' dynamic capabilities. Such knowledge can enable managers of project-driven enterprises to develop effective interventions to promote business model innovation.

Keywords Business model innovation, Dynamic capabilities, Organizational efficiency, Organizational flexibility, Project-driven enterprise

Paper type Research paper

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Introduction

Construction enterprises are typical project-driven businesses that adapt their organizational culture, organizational practices and norms and overall strategies to meet the demands of managing their projects (Huemann *et al.*, 2007). These enterprises are now confronted with unprecedented challenges in the areas of operation and development, resource capacity and production technology as a result of the combined effects of emerging technologies and supply-side structural reforms (Duhovnik *et al.*, 2009). Particularly in recent years, as the construction sector has embraced digital transformation, there has been a fundamental shift in how a construction business operates (Teisserenc and Sepasgozar, 2021). This has led to a growing number of studies exploring business model innovation in the construction industry (Liu *et al.*, 2017).

Business model innovation is a key source of value creation for businesses since it facilitates higher revenue generation compared to innovations in single products or services, thus providing construction enterprises with sustained competitive advantages (Clauss, 2016; Geissdoerfer *et al.*, 2018). Previous studies on business model innovation have mainly focused on firms in emerging industries such as information technology (Brestschneider *et al.*, 2020), biotechnology (Niosi and McKelvey, 2018) and new energy (Rohrbach *et al.*, 2019). However, regardless of the industry studied, previous research on business model innovation has presumed organizational structures to be universally consistent for any type of enterprise, and there has been no consideration of whether or not the industry is project-driven or intelligence-driven. This has led to ambiguous research boundaries in business model research (Foss and Saebi, 2016).

Project-driven enterprises have complex organizational structures. For instance, a construction enterprise, being a typical project-driven enterprise, will have two types of organizational hierarchies: project-based structure and function-based structure, and these two will interact with each other (Jalal and Koosha, 2015). Such complexity in the organizational structure impacts the development and implementation of their business model innovations. So, business model innovation in a project driven enterprise would be very different from that in a typical functional organization (Kim *et al.*, 2009).

With the construction industry undergoing a period of strategic transformation and industrial upgrading, business model innovations will likely play a significant role in this process. However, there is currently little research into how project-driven businesses may encourage business model innovation to deal with environmental shifts and uncertainty. Researchers in the field of organizational design have already established that business model innovation is a dynamic process closely related to the organizational change process. Many studies on this topic have emerged that link organizational design, dynamic capabilities and business model innovation (Lin *et al.*, 2020; Zhao *et al.*, 2021). For construction enterprises operating in a complex and dynamic environment, organizational design can enable them to recognize external opportunities in a timely manner, mobilize resources and enhance their development (Foss and Saebi, 2016).

Dynamic capabilities, which enable enterprises to adapt swiftly to changes, are an important resource for designing, enhancing and transforming their business models to sustain competitive advantages (Teece, 2017). Burns and Stalker (1961) proposed that a flexible organizational structure is more conducive to achieving breakthrough innovation in an unpredictable environment. The newly emerged school of thought contends that construction enterprises operating in a dynamic environment need to consider both the flexibility and efficiency of their organizational structure (Sun *et al.*, 2020). That is to say, organizational flexibility allows construction enterprises to adapt in a dynamic environment, while organizational efficiency facilitates decision-making and enhances the enterprises' chances of achieving sustainable development (Schreyoegg and Sydow, 2010; Lieftink *et al.*, 2019). Davis *et al.* (2009) added to the discourse by demonstrating that it is possible to

combine organizational flexibility and efficiency in light of varying development opportunity scenarios. Therefore, the organizational structure is a key resource for supporting business model innovation, which in turn creates a sustainable competitive advantage for the enterprise. However, there is currently a lack of empirical evidence differentiating the impacts of organizational flexibility and efficiency on business model innovation for project-driven enterprises.

This study's relevance lies in its contribution to understanding how project-driven enterprises, such as construction enterprises, can achieve sustainable development in a complex environment through business model innovation. Using data from four project-driven construction enterprises, this study analyzes the complex relationships between the organizational structure, dynamic capabilities and business model innovation. By using organizational theory, the study extends knowledge on how organizational resources can promote business model innovation in project-driven enterprises at a micro-organizational level. The study's findings provide valuable insights for managers of project-driven enterprises on how to optimize their organizational and dynamic management capabilities to promote business model innovation and enhance the sustainability of the firm.

Literature review and hypotheses development

Literature review

Dual attributes of project-driven organizations. As a social form, a project offers a remarkably versatile organizational structure that is built upon the management of time, tasks and resources to achieve predetermined unconventional objectives (Graan, 2022; Huang *et al.*, 2022; Liu *et al.*, 2022; Xie *et al.*, 2023). Project-driven organizations have evolved into a novel form of organizational structure (Bygballe *et al.*, 2021). Although some scholars have distinguished the concepts of "project-driven organization" and "project-based organization," most scholars define project-driven organization in a broad sense (Pemsel and Wiewiora, 2013), where it is often seen as a form of permanent organization that sells and delivers projects to external customers for a profit and conducts projects as its principal economic activity (Dalcher, 2011).

Project-driven organizations differ from general organizations due to their unique features: temporary project-level structure and permanent functional-level structure (Parchamijalal *et al.*, 2023). Studies focusing on organizational design have explored the flexibility provided by the project-level structure and the efficiency of the functional-level structure. Scholars emphasizing organizational flexibility generally argue that project-driven organizations are more capable of adapting to volatile and complex market environments (Sun *et al.*, 2018) Project-driven organizations rely on temporary project teams and flexible organizational arrangements to maximize organizational flexibility and manage the uncertainties of changing markets and technology (Lim *et al.*, 2011). Therefore, successful project-driven organizations benefit from the efficiency advantages brought on by the division of labor, standard procedures and consistent rules, but they also gradually rely on the flexibility advantages arising from the autonomy of project-based work (Chatterjee and Mariani, 2022).

However, the view of prioritizing flexibility while ignoring efficiency has raised some doubts among many scholars who adhere to institutional theory. They believe that the organizational system of a project-driven organization is based on selected institutions and conventions that can reduce internal complexity. Ling *et al.* (2021) argue that advocating flexibility in an environment of continuous change ignores other essential attributes of organizational system establishment, such as organizational development and survival.

For project-driven organizations, temporary projects are quickly disbanded after the implementation of an enterprise's innovative tasks, with the project team members being

reassigned to new tasks (Wang *et al.*, 2022). The enterprise, with its permanent organizational structure, then integrates the developed knowledge, products, or services through centralized decision-making and standardized management processes to develop "repeatable solutions" (Willems *et al.*, 2020). In this case, the innovation can be transferred and sustained in other projects, which extends the "lifespan" of innovations, allowing short-lived innovations to persist (Soderlund and Sydow, 2019). Therefore, the organizational efficiency brought on by the functional structure of a project-driven organization is also important for the continuation and diffusion of organizational innovation.

Considering the aforementioned perspectives, it is evident that striking a balance between the pursuit of flexibility and the preservation of efficiency is a significant challenge for project-driven enterprises. Construction enterprises are inherently project-oriented, basing their organizational structure on project goals (Berteaux and Javernick-Will, 2015; Safapour *et al.*, 2019). This ensures efficiency within the construction enterprises' structure. However, these enterprises also face the need to mitigate various potential risks and swiftly adapt their organizational structure in response to environmental changes. This necessitates a high degree of flexibility within the construction enterprises. In other words, the project-driven nature of construction enterprises presents them with the inherent dual attributes of efficiency and flexibility. However, it is important to note that the purpose of these organizational attributes is to enhance the capabilities of the enterprise. Only by transforming these organizational attributes into organizational capabilities can the maximum value of the organizational structure be realized. This is also crucial for driving business model innovation in construction enterprises (Jang *et al.*, 2020). However, previous studies have primarily focused on internal factors within the organization, overlooking the mediating role of construction enterprise capabilities in shaping organizational attributes (Lim *et al.*, 2012; Zhao *et al.*, 2014). Hence, this study aims to address this gap by conducting an analysis of the influence of the dual attribute organizational structure on the construction enterprises' dynamic capabilities and its ability to foster business model innovation.

Antecedents of business model innovation. A business model is a logical expression of an enterprise's proposition of customer value, together with a profit model and cost structure to obtain this value (Foss and Saebi, 2018). Business model innovation refers to the discovery of entirely new business models within existing businesses (Zhang *et al.*, 2021) or the search for a new business logic for the firm and new ways to create and capture value for firm stakeholders (Chesbrough, 2010). The research stream on business models and business model innovation has changed from being a supplementary part of corporate strategy research to being the focus of industry and academia (Zott *et al.*, 2011).

Business model innovation is influenced by the enterprise's internal capability, its resource base and the external environment (i.e. technological advancements, new customer expectations and the regulatory environment) (Wirtz *et al.*, 2016; Pieroni *et al.*, 2019). According to Bocken and Geradts (2020) and Willemstein *et al.* (2007), the dynamic capability of an enterprise is one of the most important factors for promoting the efficient innovation of the enterprise's business model. Zott and Amit (2010) theoretically deduced and analyzed the relationship between an enterprise's ability for dynamic adjustment and business model innovation. They found that even in the same industry, the impacts of innovation vary between companies owing to different innovation capabilities. Therefore, the dynamic capability of enterprises to promote the efficient innovation of business models has been confirmed in many fields.

Scholars focusing on the firm's organizational structure argue that business model innovation is a dynamic process that is closely related to the process of organizational change, and the attributes of the organizational structure affect the firm's business model innovation. Many studies have clearly established that the structure of an organizational system can serve as a key resource underpinning business model innovation to create a

sustainable competitive advantage (Kafetzopoulos *et al.*, 2023). Drawing from this argument, this paper applies organizational theory to explore the impact of project-driven enterprises' business model innovation.

Organizational theory is commonly used to describe and explain the complex interactions between organizations and their external environment (Birken *et al.*, 2017). It has been widely applied in various fields such as education (Stacy *et al.*, 2022), healthcare services (Nembhard *et al.*, 2020; Sofaer, 1994) and public management (Walker, 2021). Haveman and Wetts (2018) reviewed the literature on the implementation of organizational theory and found that prior studies have examined both the macro and micro levels of the organization. And research on the micro level has mostly concentrated on individuals and small groups within organizations such as enterprises (Haveman and Wetts, 2019). Prior research that utilized organizational theory has placed greater emphasis on population interaction and power structures. Most studies have focused on how the population distribution of an organization may be optimized for better power distribution and social interaction (Gibson and Gibbs, 2006). As mentioned earlier, project-driven enterprises are characterized by organizational structures that changes with the production and dissolution of projects (Yaghootkar and Gil, 2012). Moreover, organizational personnel are often drawn from other departments to form project teams. The power structure of the project department is also often reorganized, and personnel interaction rules are reconstructed. The purpose of this restructuring is to make the enterprise organization more efficient in completing project tasks and more adaptable to the constantly changing project environment (Kwak and LaPlace, 2005). Therefore, compared to other types of enterprise organizations, the uniqueness of power and personnel interactions in project-driven enterprises makes them more unique in terms of organizational efficiency and flexibility (Liu *et al.*, 2023). Considering that the applicability of organizational theory at the micro level is well established in the literature, and since it has apparent relevance to our study, we employ organizational theory to provide theoretical support for our investigation of project-driven organizational attributes.

There are studies that have examined the organizational structure of construction enterprises. And while some studies have explored the role of organizational theory in construction enterprise organizations (Lee *et al.*, 2015; Zulu and Saad, 2023), there are only a small number of studies that have looked at the relationship between organizational structure, dynamic capabilities and business models (Foss and Saebi, 2016). As already discussed, these aspects are unique to construction organizations, and understanding their relationships can assist project-driven companies in designing business models based on their organizational structure and capabilities.

Hypotheses development

Organizational structure and business model innovation of project-driven enterprises. Project-driven enterprises treat the project as the basic production unit of the enterprise, allow low-cost innovation activities and provide a practical platform for the trial-and-error learning advocated by the evolutionary learning concept of business model innovation (Szambelan *et al.*, 2020). Compared with the organization of traditional enterprises, the organizational flexibility resulting from project autonomy provides more favorable conditions for innovation (Teece, 2010). Moreover, the structure of temporary decentralization arising from organizational flexibility hardly poses a threat to the company's vested interests, thus loosening the resource lock-in impact and conflict of interests that business model innovation may face. This makes it conducive to the realization of innovation (Lim *et al.*, 2011). Meanwhile, "repeatable solutions" in project-driven enterprises enable the successful innovation of projects to be reproduced in multiple environments of the organization, thus promoting a larger scale of innovation in the enterprise. This kind of experience-sharing

demonstrates the effects of organizational efficiency on the sustainability of business model innovation (Ren *et al.*, 2019). However, some scholars believe that when an enterprise—as a complex adaptive system—pursues efficiency too much, it may experience resource lock-in impacts and path dependence, a weakened ability to adapt to the environment and limited development and innovation activities (Wei *et al.*, 2014). Therefore, the following hypotheses are proposed:

H1. Project-driven enterprise's organizational flexibility is positively associated with business model innovation.

H2. Project-driven enterprise's organizational efficiency is positively associated with business model innovation.

Mediating role of project-driven enterprises' dynamic capabilities. Dynamic capabilities are the abilities of enterprises to perceive opportunities and integrate internal and external resources to respond quickly to environmental changes. In this study, dynamic capabilities are divided into two dimensions: *opportunity identification and resource integration* (Amit and Zott, 2012).

The opportunity identification capability view holds that opportunities are driven by exogenous forces such as technological changes (Wang *et al.*, 2017), policy and institutional changes (Barney, 1991) and consumer preference changes (Sirmon and Hitt, 2003). According to Davies and Brady (2016), organizational attributes can contribute to the dynamic abilities of organizations. In terms of organizational flexibility, the smooth horizontal communication channels brought about by organizational flexibility promote communication among functional departments within an organization. Through information exchange, the sources of information for decision makers are broadened and the ability to make opportunity-based decisions is effectively enhanced (Liu *et al.*, 2009). Additionally, elements of organizational efficiency, such as a specialized division of labor and standardized processes, can facilitate the flow and dissemination of knowledge. Furthermore, the integration of past experiences by decision makers can improve their awareness of opportunities and enhance their ability of decision-makers to identify opportunities and collect effective information. In terms of organizational efficiency, some scholars believe that the accumulation of past successful experiences and the pursuit of static efficiency may lead to core rigidity (Eisenhardt *et al.*, 2010); that is, organizational efficiency makes it difficult for organizations to adapt and change in a dynamic environment and limits the enterprises' ability to respond to emerging business opportunities. Hence, the following hypotheses are proposed:

H3a. Organizational flexibility is positively associated with opportunity identification capability.

H3b. Organizational efficiency is positively associated with opportunity identification capability.

For project-driven enterprises, the ability to identify opportunities can also impact business model innovation. With efficient information search and screening capabilities, enterprises can perceive opportunities arising from external changes (Mitchell and Coles, 2003), which in turn strengthen the potential for innovation. In fact, the starting point of business model innovation is usually a new value proposition. To realize a new value proposition, enterprises need to design and adjust the business model elements in a novel way (Zott *et al.*, 2011). This idea can be hypothesized as follows:

H4. Opportunity identification capability is positively associated with business model innovation.

The capability for resource integration, as another dimension of dynamic capabilities, has a significant influence on business model innovation of project-driven enterprises (Toma and

Ghinoi, 2021). Similarly, the resource integration capability of project-driven enterprises is also affected by organizational flexibility and organizational efficiency. First, the close cross-functional communication brought about by organizational flexibility is helpful for coordinating information sources with the corresponding recipients. It can effectively reduce information communication barriers, and promote the flow of knowledge within an enterprise and the integration of resources (Hock *et al.*, 2015). Second, as for the elements of organizational efficiency, functional structure, standardization and centralization are all conducive to promoting resource integration. Gemünden *et al.* (2018) pointed out that permanent organizations can have a comprehensive understanding and control over resources such as manpower, technology and equipment, and can allocate them to the required development activities. Hence, the following hypotheses are proposed:

H5a. Organizational flexibility is positively associated with resource integration capability.

H5b. Organizational efficiency is positively associated with resource integration capability.

The capability for resource integration emphasizes the efficiency and timeliness of the reallocation of resources by enterprises (Hart and Dowell, 2011). With this capability, enterprises can promote the development of new opportunities by efficiently applying high-quality resources to the matching opportunities, thereby facilitating business model innovation. Therefore, the following hypothesis is proposed:

H6. Resource integration capability is positively associated with business model innovation.

The dynamic capabilities of enterprises can be used to connect organizational structure and business model innovation. Regarding the capability for opportunity identification, Guo *et al.* (2017) proposed that opportunity recognition is at the heart of entrepreneurship. This study suggests that opportunity identification capability can mediate the effect of organizational structure on business model innovation. Organizational flexibility allows information exchange between different levels and different departments of an enterprise, which is critical for recognizing valuable business opportunities (Wang *et al.*, 2017). Moreover, with organizational efficiency, information delivery can be improved, which can help in filter high-quality information and empower an enterprise to identify and capture opportunities quickly. In addition, opportunity identification capability allows an enterprise to reinvent a novel business model by way of new value propositions and new value-capturing mechanisms (George and Bock, 2011). Taking all these points together, the following hypotheses are proposed:

H7a. Opportunity identification capability mediates the relationship between organizational flexibility and business model innovation.

H7b. Opportunity identification capability mediates the relationship between organizational efficiency and business model innovation.

Regarding resource integration capabilities, Zhao and Jie (2018) suggested that business model innovation relies on the effective integration of internal and external resources. In addition, the efficiency of an organization allows managers to integrate, build and reconfigure the enterprise's resources available within its business environment (Lim *et al.*, 2011). Furthermore, in a rapidly changing environment, enterprises need to enhance their organizational flexibility in operation management to overcome low resource availability, which is a valuable capability for business model innovation (Liu *et al.*, 2009). Therefore, this study proposes the following hypotheses:

H8a. Resource integration capability mediates the relationship between organizational flexibility and business model innovation.

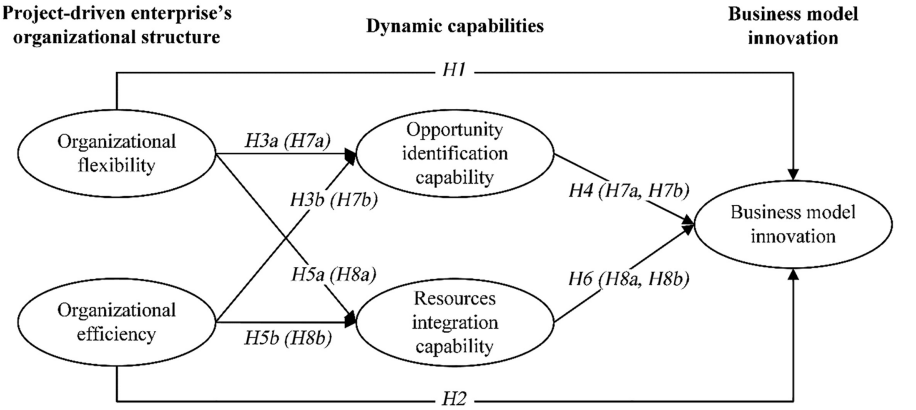
H8b. Resource integration capability mediates the relationship between organizational efficiency and business model innovation.

Putting together all the hypotheses proposed above, a conceptual model is developed (see Figure 1). This model illustrates the impact of a project-driven enterprise's organizational flexibility and organizational efficiency on business model innovation, as well as the mediating role of opportunity identification capability and resource integration capability within these relationships.

Research method

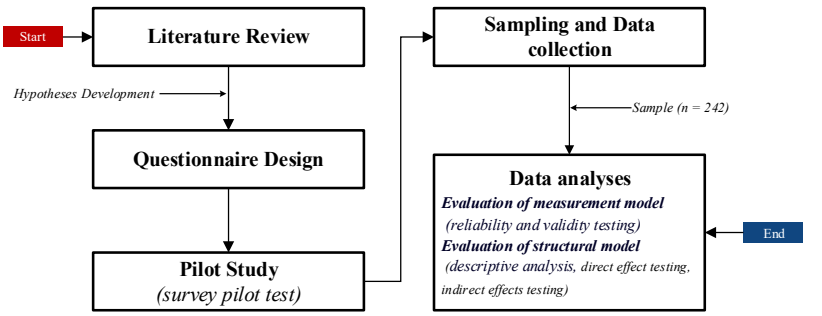
Research methodology

This research consists of four phases (see Figure 2). In the first phase, the problem statement, literature review and research hypotheses were presented. In the second phase, a research questionnaire was designed based on the measurement items found in the existing literature. In the third phase, a pilot was conducted to assess the quality and clarity of the questionnaire design. After some minor modifications, the questionnaires were then distributed to the



Source(s): Authors' own work

Figure 1.
Research methodology flowchart



Source(s): Authors' own work

Figure 2.
Research framework

survey participants in construction enterprises, such as managers and technical experts. In the fourth phase, data analysis is conducted. In this phase, the measurement and structural models are evaluated.

Particularly in the fourth phase, a two-stage analytical procedure (Anderson and Gerbing, 1988) was conducted to test the hypotheses using SPSS 20.0 and Amos 24.0. First, confirmatory factor analysis (CFA) was used to examine the validity of all variables (Huang *et al.*, 2023). Second, structural equation modeling was performed to test the hypothesized mediation model (Li *et al.*, 2021). The significance of the indirect impacts was examined using the bootstrapping method, with 2,000 bootstrap samples and a confidence interval (CI) of 95% (Shrout and Bolger, 2002). It should be noted that in empirical research utilizing structural equation modeling (SEM), covariance-based structural equation modeling (CB-SEM) and partial least squares structural equation modeling (PLS-SEM) are the most commonly applied methods. Tang *et al.* (2022) indicate that CB-SEM is more suitable for theory testing due to its stability and effectiveness, while PLS-SEM is more suitable for the early stages of theoretical development. Additionally, Yuan *et al.* (2020) and Marcoulides and Saunders (2006) also point out that PLS-SEM and CB-SEM are complementary rather than competitive. Considering that the hypotheses in this study are not exploratory but rather confirmatory, CB-SEM was adopted for subsequent estimation in this study.

Sample and data collection

A questionnaire survey was administered to senior decision-makers, managers and technical experts of construction enterprises across 26 cities (e.g. Beijing, Tianjin, Guangzhou and Shenzhen) in China. The selection criteria for this study required a construction enterprise to be: (1) project-driven; and (2) mature to a certain scale (that have projects in more than one province), to ensure that the enterprise has sufficient experience in the flexible or efficient design of an organizational structure and that it has had success in business model innovation. A pilot study was conducted with five professionals from construction enterprises who were invited to ensure that all constructs in the questionnaire were clear and appropriate. The feedback required some minor changes to the wording and structure of some questions. The questionnaire was then modified according to the respondents' feedback.

The purpose of this study was clearly indicated on the first page of the questionnaire to ensure the reliability of the responses. The survey respondents provided their responses voluntarily and were assured of their identities would be kept confidential. Furthermore, according to previous research, it is recommended that the sample size be greater than 10 times the number of measurement items (Bentler and Chou, 1987). Therefore, the target sample size for this study would need to be 20*10 = 200. For this study, a total of 315 questionnaires were distributed for the survey, and 242 questionnaires were received, resulting in a response rate of 76.83%. According to Baruch (1999), response rates for studies targeting senior administrators should fall within the range of 23%–49%, while response rates for studies targeting middle to lower-level managers, employees and the general population should range from 40% to 80%. The response rate of this study meets the minimum requirement. Table 1 shows the demographic information of the respondents.

Measurements

The scales used in this study were developed from well-established scales used in the extant literature in relevant fields. The items were translated into Chinese, and the descriptions were modified to confirm to the construction industry. According to the study conducted by Wakita *et al.* (2012) and Preston and Colman, (2000), the five-point Likert scale is deemed suitable for measurement purposes, and it is recommended to use the five-point Likert scale

Characteristic	Category	Percentage (%)
Length of employment	< 1 year	11.57
	1–3 years	23.55
	3–5 years	25.62
	> 5 years	39.26
Scale of enterprise (Number of employees)	< 500	20.25
	500–1,000	20.66
	1,000–5,000	35.95
	> 5,000	23.14
Type of enterprise	State-owned enterprises	48.76
	Private enterprises	49.17
	Sino-foreign joint enterprises	0.83
	Others	1.24

Table 1. Demographic information of respondents ($N = 242$)

Source(s): Authors' own work

when respondents have limited time. Considering that the majority of participants in this study are experts or managers in the construction field, who often experience high work pressures and may have limited spare time, this study employed a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Organizational structure. The organizational structure of the selected project-driven enterprises was assessed using six items that capture organizational flexibility and organizational efficiency (Robbins and Coulter, 2012) (see Table 2). Examples were "The organization has fewer organizational management levels and a flat structure" and "There is efficient interaction within the company's departments and emphasis is placed on strengthening professional skills."

Construct	Indicator	Factor loading	Cronbach's α	CR	AVE
Organizational flexibility	Flattening	0.630	0.755	0.755	0.509
	Flexibility	0.793			
	Decentralization	0.710			
Organizational efficiency	Professionalization	0.786	0.820	0.823	0.609
	Standardization	0.826			
	Centralization	0.726			
Opportunity identification capability	Demand identification	0.835	0.897	0.899	0.641
	Policy identification	0.749			
	Technology identification	0.829			
	Competition identification	0.817			
	Usefulness identification	0.771			
Resources integration capability	Resource access	0.845	0.898	0.901	0.646
	Resource consolidation	0.766			
	Resource convergence	0.757			
	Resource realignment	0.865			
	Resource application	0.779			
Business model innovation	New transaction	0.752	0.883	0.876	0.641
	New combination	0.811			
	New partners	0.862			
	New profit	0.808			

Table 2. Reliability and validity test results for the variables

Source(s): Authors' own work

Dynamic capabilities. Respondents assessed the dynamic capabilities of their organization using 10 items for opportunity identification capability (Ozgen and Baron, 2007) and resource integration capability (Wiklund and Shepherd, 2009). Examples were "Companies can quickly understand changes in customer demand and identify opportunities" and "Companies are constantly seeking new resources for future expansion."

Business model innovation. Respondents' perceived business model innovation of a project-driven enterprise was assessed using a four-item scale developed from Hock *et al.* (2015) and Zott *et al.* (2011). An example was "The innovative business models of enterprises improve the level of resource utilization and expand the scope of transactions (e.g. synergistic industry chain, reduction of intermediary links, and optimization of resource allocation)."

Data analysis and results

Evaluation of measurement model

The quality of the measurement model was assessed based on reliability, convergent validity and discriminant validity. Table 3 shows the constructs all demonstrated good reliability, as their Cronbach's alpha values were all higher than the accepted threshold of 0.8 (Nunnally, 1967). The convergent validity was examined using three indices: item reliability (factor loading: FL), construct reliability (CR) and average variance extracted (AVE). Table 2 also illustrates the results of the convergent validity for the variables. The FLs were all above 0.5, the CR values were higher than 0.7 and the AVE values were higher than 0.5 (Fornell and Larker, 1981). Therefore, the convergent validity is acceptable.

The discriminant validity can be verified by investigating the correlations between the variables and the square root of average variance extracted (AVE). The square root of a variable's AVE should be higher than the correlation coefficients involving that variable (Fornell and Larker, 1981). Table 3 reveals that the discriminant validity is acceptable.

Evaluation of structural model

Descriptive analysis. The result shows that the hypothesized five-factor model had a good fit to the data ($\chi^2(160) = 442.639$, $p < 0.001$; RMSEA = 0.079; CFI = 0.915; TLI = 0.900; SRMR = 0.043). To rule out concerns regarding common bias, a common factor analysis was conducted by loading all parceled items onto a single factor to represent a "methods factor." Results show that the single factor model had a bad fit to the data ($\chi^2(170) = 960.300$, $p < 0.001$; RMSEA = 0.139; CFI = 0.764; TLI = 0.736; SRMR = 0.079).

Inner model evaluation. According to Hair *et al.* (2014), inner model evaluation is the assessment of model quality based on the model's ability to predict endogenous variables. It includes the determination of the coefficient of determination (R^2), cross-validated redundancy (Q^2) and effect size (f^2). R^2 is used to evaluate the explanatory power of the model. According to Urbach and Ahlemann, (2010), R^2 values of 0.19, 0.33 and 0.67 represent

Variables	Mean	1	2	3	4	5
1. Organizational flexibility	3.325	*0.713*				
2. Organizational efficiency	3.551	0.191***	*0.780*			
3. Opportunity identification capability	3.520	0.534***	0.513	*0.801*		
4. Resource integration capability	3.544	0.618***	0.553***	0.638***	*0.804*	
5. Business model innovation	3.527	0.637***	0.592***	0.748***	0.799***	*0.801*

Note(s): The italic numbers are the square root of AVE; the remaining numbers are Pearson correlation coefficients. ***$p < 0.001$.
Source(s): Authors' own work

Table 3. The results of validity and descriptive statistics

small, medium and large effects, respectively. The Stone-Geisser test value (Q^2) is used to assess the model's ability to make out-of-sample predictions. If all values are greater than 0, it indicates that exogenous constructs have predictive relevance when explaining their specified endogenous constructs (Yim *et al.*, 2019). According to Rahi *et al.* (2021), f^2 values of 0.02, 0.15 and 0.35 represent small, medium and large effects, respectively. Based on the content in Table 4, this study's R^2, Q^2 and f^2 values meet the criteria.

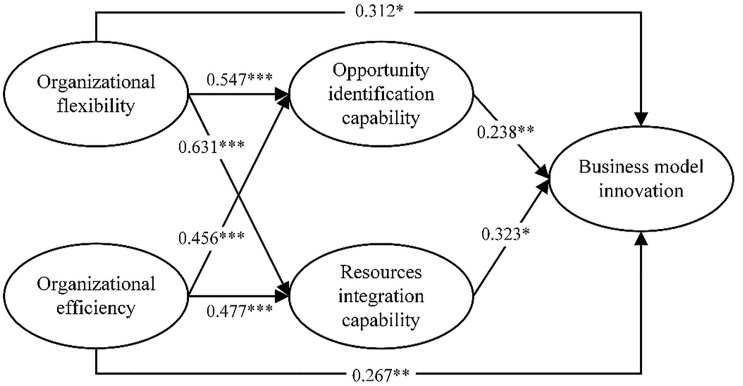
Direct effects. Figure 3 shows that both organizational flexibility and organizational efficiency have a significant impact on business model innovation, supporting H1 and H2. Organizational flexibility has a significant impact on both opportunity identification capability and resource integration capability, and organizational efficiency also has a significant impact on both opportunity identification capability and resource integration capability, supporting H3a, H5a, H3b and H5b. Consistent with H4 and H6, both opportunity identification capability and resource integration capability have a significant impact on business model innovation.

Indirect effects. The result presents a summary of the hypothesized indirect effects based on the bootstrapped confidence intervals. The indirect effects of organizational flexibility ($\beta = 0.130$; SE = 0.044; 95% CI = [0.057, 0.225]) and organizational efficiency ($\beta = 0.109$;

Table 4.
Coefficient of determination, predictive relevance and effect size

Constructs	R^2	Q^2	f^2 Opportunity identification capability	f^2 Resources integration capability	f^2 Business model innovation
Organizational flexibility			0.382	0.670	0.100
Organizational efficiency			0.331	0.471	0.096
Opportunity identification capability	0.631	0.330			0.188
Resources integration capability	0.776	0.413			0.227
Business model innovation	0.912	0.559			

Source(s): Authors' own work



Source(s): Authors' own work

Figure 3.
Results of direct effects

SE = 0.038; 95% CI = [0.045, 0.190]) on business model innovation through opportunity identification capability are both significant. Hence, H7a and H7b are both supported. Therefore, opportunity identification capability partially mediates the relationship between organizational dual attributes (flexibility and efficiency) and business model innovation. The indirect effects of organizational flexibility (β = 0.204; SE = 0.093; 95% CI = [0.016, 0.389]) and organizational efficiency (β = 0.154; SE = 0.070; 95% CI = [0.012, 0.293]) on business model innovation through resource integration capability are both significant, supporting H8a and H8b. Therefore, resource integration capability partially mediates the relationship between organizational dual attributes (flexibility and efficiency) and business model innovation.

Discussion

Theoretical implications

This study empirically demonstrated the role of project-driven enterprises' dual organizational structure in business model innovation and clarified how project-driven enterprises' organizational structure can lead to enhanced business model innovation. We demonstrated that organizational structure is positively associated with business model innovation. This is consistent with Mihardjo *et al.* (2018). Notably, our findings differentiate these attributes' (organizational efficiency and organizational flexibility) impact on business model innovation. Specifically, organizational flexibility has a greater impact on project-driven enterprises' business model innovation than organizational efficiency. As shown in previous research, with the growth and development of traditional enterprises, their organization often drifts toward efficiency (Eisenhardt *et al.*, 2010). However, Sun *et al.* (2018) argued that the success of project-driven enterprises comes from the advantages arising from organizational flexibility, such as the flexibility, flattening and decentralization of the organization. Therefore, compared with traditional enterprises, the organizational flexibility of project-driven enterprises is more important for business model innovation.

Furthermore, this study found that organizational flexibility and organizational efficiency of construction enterprises as special organizational resources have a significant contribution to the dynamic capabilities of project-driven enterprises. This finding corroborates the findings of Saeed *et al.* (2020), suggesting that organizational structure may maximize the utilization of resources or improve a firm's opportunity exploitation. Furthermore, we found little difference in the impact of organizational efficiency on opportunity identification capability and resource integration capability, while organizational flexibility has a stronger positive impact on resource integration capability than on opportunity identification capability. A possible explanation is that for project-driven companies, opportunity identification requires more efficient information exchange than flexibility within the organization to meet the needs of a dynamic environment. Organizational flexibility allows for the adaptation of the organizational structure to environmental changes, which can help resolve conflicts that may arise during resource reallocation. On the other hand, organizational efficiency can enable knowledge exchange, sharing and integration among organizations, while organizational flexibility can enhance a firm's ability to access and utilize resources.

In addition, dynamic capabilities were found to mediate the relationship between the dual attributes of an organizational structure and business model innovation. Compared with the works of Basile and Faraci (2015) and Martinez (2022), this study investigated the role of the dynamic capabilities of project-driven enterprises in mediating the relationship between an organizational structure's dual attributes (flexibility and efficiency) and business model innovation. Specifically, this result confirmed the findings of Wang *et al.* (2017), which suggested that organizational attributes can impact the opportunity

identification abilities of enterprises and, subsequently, impact business model innovation indirectly. Compared with Wang *et al.* (2017), who focused on the impact of opportunity identification capabilities on organizational learning based on organizational structure from a functionalism perspective, our study investigated the mediating role of opportunity identification capabilities on an organizational structure's attributes from a structuralism perspective. Furthermore, Zhao and Jie (2018) suggested that resource integration capability can mediate the relationship between organizational structure and business model innovation. Our study emphasized that resource integration capability mediates the relationship between organizational flexibility and business model innovation more strongly than efficiency. While previous studies have recognized the direct links between organizational attributes, dynamic capabilities and business model innovation, the internal connections among these variables and the different mediating roles of opportunity identification capability and resource integration capability have not been well understood. By shedding light on the connections between organizational flexibility, efficiency and business model innovation, this study provides a comprehensive understanding of how project-driven enterprises can achieve business model innovation by leveraging their dual organizational attributes.

This study applies organizational theory to research business model innovation in project-driven enterprises. The theoretical implications of this study are mainly reflected in two aspects: Firstly, the application of organizational theory enriches the research perspective on business model innovation. Previous research has predominantly focused on the influence of organizational capabilities (Zhao *et al.*, 2021). In contrast, this study emphasizes the utilization of resources and the identification of opportunities as key capabilities of enterprises. Furthermore, this study focuses on the factors influencing resource integration and opportunity identification capabilities, with particular attention to the role of organizational structure. In other words, the organizational structure of an enterprise, to a certain extent, determines its ability to integrate resources and identify opportunities. However, this hypothesis has not been sufficiently tested and validated in previous research. This study confirms the impact of organizational structure attributes on dynamic capabilities and further on business model innovation. The role of organizational structure as a deeper influencing factor is verified in this study. Organizational theory supports the identification of the dual attributes of organizational structure in project-driven enterprises and provides theoretical support for measuring organizational attributes in this study. Therefore, the research findings and process of this study offer a new theoretical perspective for future research on business model innovation. Secondly, this study enriches the knowledge system of organizational theory through research on the organizational structure of project-driven enterprises. Project-driven enterprises differ from traditional enterprises in that their organizational structure needs to not only meet internal needs but also adapt to external environmental changes. The unique nature of project-driven enterprises determines their distinct organizational structure. Drawing on previous organizational theory and innovatively analyzing and discussing the dual attributes of the organization, this study expands the application scope of organizational theory.

Practical implications

The findings of this study have important practical implications for project-driven enterprises in a dynamic environment. Primarily, within an environment of uncertainty, business model innovation of construction enterprises requires them to allocate their limited management resources toward the preservation of organizational flexibility. The present study has revealed that organizational flexibility holds a higher degree of influence over both

business model innovation and dynamic capabilities within construction enterprises. In essence, it is imperative for construction enterprises to ensure the adaptability, horizontal structuring and decentralization of their organizational frameworks. The design of construction enterprises should aim for a less hierarchical structure and the distribution of decision-making power to middle managers and employees, which can facilitate organizational flattening and decentralization. Managers can also optimize professionalization, standardization and uniformity within the organization to improve efficiency (Robbins and Coulter, 2012). In this regard, the study suggests implementing standardized systems and ordering processes while strengthening professional skills as effective methods.

Enhancing dynamic capabilities and exploring innovative business opportunities are essential for achieving business innovation objectives. Organizational flexibility and efficiency play crucial roles in facilitating business model innovation within construction enterprises, mediated by opportunity identification capability and resource integration capability. Managers are advised to consider their opportunity identification capability, encompassing aspects such as demand identification, policy identification, technology identification and competition identification. Additionally, resource integration capability, which includes resource access, consolidation, convergence, realignment and application, should be taken into account during the developmental process of the construction enterprise (Ozgen and Baron, 2007; Wiklund and Shepherd, 2009).

Furthermore, construction enterprises should place greater emphasis on their resource integration capabilities. With the ongoing digital transformation in the construction industry, an increasing number of enterprises perceive the industry as entering a new era. This new era brings forth new opportunities. Consequently, construction enterprises are compelled to explore potential avenues in this new era to achieve business model innovation (Rachinger *et al.*, 2018). The findings of this study indicate that resource integration capabilities exert a higher influence on business model innovation compared to opportunity identification capabilities. In other words, rather than solely focusing on identifying new opportunities, construction enterprises can enhance their internal capacity to integrate resources.

Social implications

The social significance of this study highlights the positive effects on economic development, industry resilience and talent attraction that stem from emphasizing business model innovation, organizational flexibility and dynamic capabilities in project-driven construction enterprises. Specifically, the study contributes to scholarly discourse in the following ways: Firstly, strengthening business model innovation in project-driven construction enterprises can foster economic growth. Leveraging their organizational structure attributes, these enterprises can adapt to dynamic project environments, enhance efficiency and identify new opportunities. Consequently, the development of innovative business models within the construction industry generates value, drives competitiveness and stimulates overall economic progress. Secondly, the research findings underscore the importance of organizational flexibility in project-driven construction enterprises. The ability to adjust and adapt their organizational structure enables these enterprises to effectively respond to external environmental changes. This flexibility empowers construction enterprises to tackle emerging challenges, capitalize on opportunities and contribute to the industry's resilience and advancement. Lastly, the study highlights the significance of dynamic capabilities in project-driven construction enterprises. By cultivating resource utilization and opportunity identification capabilities, these enterprises can enhance their overall competitive edge and innovation potential. This has positive academic implications for the labor market, as construction enterprises can attract and retain talent by providing opportunities for skill

development, learning and career advancement. In summary, the findings from this study can provide a positive contribution to economic development, industry resilience and talent attraction, contributing to the scholarly discourse in the field.

Limitation and future research

Although this study provides insights into the interaction between organizational structure's dual attributes, dynamic capability and business model innovation by project-driven enterprises, there are several directions that should be considered for future research. Firstly, the use of a cross-sectional research design warrants cautious causal inferences regarding the relationships under investigation. A longitudinal design could be adopted to draw more robust causal inferences from reverse causal relationships, with fewer proposed pathways than reverse causal explanations. In addition, since different construction enterprises have varying organizational structures, the data could exhibit a nested structure. Therefore, future research could employ multilevel structural equation modeling for further investigation. Furthermore, to conduct more conservative tests of the model, future studies should incorporate additional control variables.

Conclusions

Research on the pattern by which organizational structure influences business model innovation in project-driven enterprises is scarce. This study develops and examines an integrated model utilizing the dual attributes (flexibility and efficiency) of the organizational structure and business model innovation for construction enterprises. The findings show that the dual attributes of an organizational structure have positive impacts on business model innovation. Moreover, dynamic capabilities are shown to mediate the relationship between the dual attributes and business model innovation. Construction managers can utilize this knowledge to develop organizational structures that contribute to business model innovation.

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About the authors

Dan Wang is an assistant professor at School of Public Policy and Administration, Chongqing University. Her research interests are infrastructure and urban management and public-private partnerships. Her research has been published in peer-reviewed journals, such as *Accident Analysis and Prevention, International Journal of Project Management, Journal of Construction and Engineering Management, Safety Science, and Engineering, Construction and Architectural Management*.

Ruopeng Huang is a Ph.D. candidate at School of Management Science and Real Estate, Chongqing University. His research interests include business model innovation, construction project management and organization management. His research has been published in peer-reviewed journals, such as *Journal of Construction and Engineering Management and Engineering Applications of Artificial Intelligence*.

Kaijian Li is an associate professor at School of Management Science and Real Estate, Chongqing University. His research interests are infrastructure and urban management, public-private partnerships, business model innovation, construction project management and organization management. His research has been published in peer-reviewed journals, such as *Journal of Construction and Engineering Management, Journal of Management in Engineering, Building and Environment* and *Engineering Applications of Artificial Intelligence*. Kaijian Li is the corresponding author and can be contacted at: likaijian@cqu.edu.cn

Asheem Shrestha is a senior lecturer at School of Architecture and Built Environment, Deakin University. His research interests are public private partnerships, risk management, and sustainable built environment. His research has been published in peer-reviewed journals, such as *Journal of Construction and Engineering Management, Journal of Management in Engineering, Building and Environment* and *Engineering Applications of Artificial Intelligence*.