

## Research Article

# The Moderating Effect of Guanxi on the Dynamic Capacity and Competitive Advantage of Chinese International Contractors

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With the active support of the national policy “One Belt and One Road” Initiative, Chinese contractors seized this historic opportunity to accelerate strategic globalization, and they gradually stood out in international construction projects owing to their low-cost advantage. However, despite China having large-scale contractors and wide-range business, compared to developed countries, a considerably large gap still exists. China is confronted with complex and changeable international projects filled with increasing competition. Thus, it is both a focus issue and a major task for Chinese international contractors, and many scholars, to consider how Chinese contractors can obtain and maintain long-term competitive advantages to improve their capabilities in response to dynamic environmental changes. Therefore, the objectives of this study are (1) to study the influence of the dynamic capability of Chinese contractors on competitive advantage in a project and (2) to explore the moderating effect of Chinese guanxi on the dynamic capability and competitive advantage of Chinese international contractors. This study primarily aimed at researching the impact of dynamic capacity of Chinese contractors on competitive advantage and the moderating effects of Chinese guanxi. The findings suggest that the environmental perception capability and the integration and coordination capability of the dynamic capability have a significant positive effect on the project competitive advantage; business guanxi positively moderates the relationship between the environmental perception capability and the competitive advantage. Business guanxi also negatively moderates the relationship between learning ability and competitive advantage, while political guanxi negatively moderates the relationship between the environmental perception capability and competitive advantage. This paper contributes to the construction management literature not only by providing empirical evidence on the dynamic capability and competitive advantage of Chinese contractors but also by expanding guanxi research. The results may also help Chinese contractors by providing strategic reform guidance and sustainable development in international construction projects.

## 1. Introduction

In September 2013, the president of China, Xi Jinping, proposed the “One Belt and One Road” (OBOR) initiative. With the active support of the national policy, Chinese contractors seized this historic opportunity to accelerate strategic globalization, and they gradually stood out in international construction projects owing to their low-cost

advantage. Promotion of the OBOR not only mitigated the problem of overcapacity of the Chinese civil construction industry but also provided a competitive advantage to Chinese contractors. The number of overseas engineering contracts increased steadily with the development of improved relations with overseas businesses. According to a report in the Engineering News-Record (ENR), the number of Chinese contractors is the highest of the top 250

international contractors since 2008. A total of 65 Chinese contractors were listed in 2016, which was identical to that in the previous year. The total international revenue reached \$93.67 billion USD, which was again the highest, and exceeded that earned in the previous year by 4.5%. Even in an environment where the overall revenue from the overseas market was decreasing, Chinese contractors maintained stable growth, demonstrating the gradually increasing strength of Chinese international contractors [1, 2]. However, despite China having large-scale contractors and wide-range business, compared to developed countries, a considerably large gap still exists. China is confronted with complex and changeable international construction projects filled with increasing competition. Thus, it is both a focus issue and a major task for Chinese international contractors, and many scholars, to consider how Chinese contractors can obtain and maintain long-term competitive advantages to improve their capabilities in response to dynamic environmental changes.

Traditional research on business capabilities emphasizes the application of current resources and abilities. However, traditional theories gradually prove to be lacking in explanatory power under the revolution of the market environment [3–5]. Typically, with the pronounced change of the market and thriving new technology, more companies realize the importance of gaining advantages over the competition through the improvement and revolution of their abilities. The theory of dynamic capability was created considering the above background [6], which thoroughly explains how businesses could gain advantages in competition in dynamic environments, and it has become the dominant theory in the research of competitive advantages in the field of strategic management. Therefore, further exploration of the relationship between dynamic capacity and competitive advantage of Chinese international contractors is needed.

Additionally, research has discovered that it is not the ability of the Chinese contractors which is to blame for the failure of completing many international construction projects smoothly, but the disoperation in managing relationships among stakeholders [7, 8]. During the process of market development, it is common practice for Chinese contractors to improve their operations by building external relationships when faced with various difficulties in the international environment, such as excessive prices. As a unique character of the Chinese society, the Chinese *guanxi*, which has increasing broad influence, is already a new tool for contractors in solving problems and promoting competitive advantages [9]. On the contrary, according to Forbes, the Chinese *guanxi* has been overestimated, and blindly taking it as a shortcut will lead to nothing but failure [10]. Based on the above discussion, how the Chinese *guanxi* affects the advantages of competition of Chinese contractors deserves further research.

Many scholars believe that dynamic capabilities are the key to competitive advantage [11–14], while some argue that dynamic capabilities do not manifest characteristics of heterogeneity and, thus, cannot be a source of competitive advantage [15]. They believe that the role of dynamic

capabilities is limited [16] and indirect [17]. In response to such paradoxes in the impact of dynamic capabilities on competitive advantage, researchers have not yet provided a compelling explanation for the effect of the Chinese *guanxi* on the relationship between dynamic capabilities and competitive advantage. The gaps in the extant literature on dynamic capacity and competitive advantage of Chinese international contractors may stem from a failure to develop a theoretical model that enables the exploration of how dynamic capacity's influence on competitive advantage is integrated with Chinese *guanxi*'s competitive advantage. Many researchers claim that the Chinese *guanxi* plays an important moderating role between firm capabilities and performance in China [18]. *Guanxi* has been identified as part of Chinese culture, related to the management of firms [9]. Gu [19] and Luo [20] argue that the Chinese *guanxi* is a lasting social relationship and network, profoundly influencing the competitive advantages of firms. Moreover, the Chinese *guanxi* is considered to be a type of social capital and network, which creates benefits like information, influence, control, and power [19, 20].

The significant effects of the Chinese *guanxi* on competitive advantage have been substantially discussed in the literature, but there is limited understanding of how it affects Chinese contractors' abilities to gain dynamic capacity and competitive advantage. This is because most prior research has investigated dynamic capacity as a single-independent variable and associated it with competitive advantage without considering its process-dependent nature. Previous researchers have not fully understood how Chinese *guanxi* could gain dynamic capacity from different host country contexts. Hence, we integrated the Chinese *guanxi* as a moderator and investigated its interactions with dynamic capacity and competitive advantage.

Therefore, in view of the turbulent and changing international competition environment faced by Chinese contractors and the unique social and cultural background of China [10], the objectives of this study are (1) to study the influence of the dynamic capability of Chinese international contractors on competitive advantage in a project and (2) to explore the moderating effect of Chinese *guanxi* on the dynamic capability and project competitive advantage of Chinese international contractors.

## 2. Literature Review

*2.1. Dynamic Capability and Competitive Advantages.* The concept of dynamic capability was first proposed by Teece and Pisano [21], pointing out that the dynamic capability is the ability of an enterprise to carry out the construction, integration, and reconstruction of internal and external abilities in order to quickly respond to changes of the environment [22]. Protogerou et al. [23] proposed that dynamic capability is the behavior guidance of the transformation, upgrading and reconstructing the core competence for an enterprise, and is an important source of sustainable competitive advantage. This paper argues that dynamic capability is a strategic practice, in which firms can integrate and restructure resources and capabilities

within and outside the enterprise in order to gain sustainable competitive advantage.

The theory of dynamic capabilities is developed based on the original theory of the competitive advantage [11–14]. It is capable of combining the external environment with internal resources, emphasizing the dynamic improvement of resources and the ability of the enterprises responding to the environment. It can also fully explain the source of the competitive advantage of enterprises and adapt to the complicated and dynamic environment, fully and effectively guide the enterprises to obtain in the current dynamic environment, and maintain a competitive advantage. Therefore, this paper adopts the theory of dynamic capabilities as the main theoretical basis.

There are many theories and empirical studies on the relationship between dynamic capabilities and competitive advantages, but the perspectives, methods, samples, and conclusions of different researches vary from each other. Many studies have shown that dynamic capabilities and competitive advantage are correlated [11, 12, 24], among which most scholars believe that the dynamic capability has a positive effect on the relationship between the direct competitive advantages [13, 14].

*2.2. Chinese Guanxi.* Guanxi, as a kind of special Chinese culture [9], is closely related to the management of the enterprise, especially for the international construction project, and the importance of the Chinese guanxi penetrates into various stages of the project. The Chinese guanxi, as an informal system, compared with the formal system, such as law and policy, has an impact on the performance of enterprises and then affects the competitive advantage of enterprises [18]. Therefore, this paper introduces the Chinese guanxi into the study of competitive advantage.

There are many definitions about the Chinese guanxi, but so far there is no uniform standard. Davies et al. [25] define the Chinese guanxi as an interaction between social networks and members of society, which is equivalent to an infinitely repetitive reciprocal activity among groups of people who know it. Fan [26] points out that the Chinese guanxi is a way of using personal relationships to seek potential economic benefits. The Chinese guanxi refers to interpersonal relationships, whereas Western style relationships refer to the relationship among organizations [27]. Li Xin [28] believes that the Chinese guanxi is limited not only to personal contacts, but also among enterprises. The Chinese guanxi is a mutually beneficial responsibility relationship between an enterprise and its partners, which enables the enterprise to obtain resources and information through continuous cooperation and mutual communication [29]. Gu et al. [19] and Luo et al. [20] argue that the Chinese guanxi is a lasting social relationship and network that enterprises use to exchange support for organizational goals and exerts certain influence on competitive advantages. To sum up, the Chinese guanxi is a unique feature of Chinese social culture, which penetrates all aspects of personal and organizational communication, and social interaction, and it has

become a way for Chinese enterprises to conduct business, handle problems, and obtain information.

There are many theories of the Chinese guanxi, and scholars in many fields, such as economics, sociology, and management, have explored the theory of Chinese style relations in their respective fields. Among them, the common ones are transaction cost theory, social exchange theory, social capital theory, institutional theory, resource dependence theory, and so on [30]. Transaction cost theory holds that reduction of transaction costs is the most fundamental motive force for interorganizational cooperation and relationship building [31, 32]. The resource dependence theory believes that the survival and development of the organization and the competitive advantages depend on the external environment and organizational resources, and the long-term close relationship is an important means to solve environmental uncertainty and the lack of resources [33, 34]. For the development of overseas market of international contractors, in order to obtain and maintain sustainable competitive advantages, they should, on one hand, reduce costs and improve efficiency and acquire and master more unique resources, and on the other hand, they should fit the transaction cost theory [31, 32] and resource dependence theory [30]. Therefore, the transaction cost theory and resource dependence theory are here to explain the influence of the Chinese guanxi on the competitive advantage.

Through the search and reading of a large number of relevant literature at home and abroad, it can be found that none deals with the relationship between dynamic capabilities, Chinese guanxi, and competitive advantages. As a result, this paper will introduce the Chinese guanxi into the study of competitive advantage, as a moderator of dynamic capability and competitive advantage, which is of pioneering significance.

### 3. Research Hypotheses and Theoretical Model

#### 3.1. Dynamic Capacity and Competitive Advantage.

According to a wide range of existing literature, different scholars choose different dimensions to study dynamic capacity. Teece [35] divides dynamic capacity into three dimensions from the angle of opportunity: the ability to perceive opportunities and threats, the ability to seize opportunities, and the ability to reconstruct assets. Protogerou et al. [23] measure dynamic capacity considering coordination/integration capability, learning ability, and the capability to cope with strategic competition. Wilden and Gudergan [36] examine dynamic capacity from the two dimensions of opportunity perception and opportunity reconstruction. They consider Chinese internal contractors' resources, businesses, and strategy in response to changes in the international market, and the learning of advanced construction technology and management experience, so that Chinese internal contractors can overcome the threat of competitors.

This research will measure the dynamic capacity of contractors from three aspects: environmental perception ability, learning ability, and integration and coordination capability.

*3.1.1. Environmental Perception Ability and Competitive Advantage.* Environmental perception ability is the ability of enterprise decision-makers and ordinary employees to discern market opportunities and risks by searching, merging, and filtering information, which is unable to create the market value directly but is a prerequisite for creating the value [37]. Some empirical studies have proven that environmental perception ability enables enterprises to better respond to changes in market needs and expectations, to obtain long-term competitive advantage and super profit [38], and to quickly perceive and discern the nature of, and opportunities arising from, market environmental changes so as to provide enterprises with a potential sustainable advantage [39]. Under the circumstances of a fickle international engineering market, to maintain a sustainable competitive advantage, keen environmental perception ability is essential for rapidly discerning opportunities and risks resulting from environmental changes, managing to seize opportunities, and dealing with threats. Thus, we propose the following hypothesis:

Hypothesis 1: Chinese international contractor's environmental perception ability has a positive impact on project competitive advantage.

*3.1.2. Learning Ability and Competitive Advantage.* Referring to the ability of an enterprise to acquire external and new knowledge, to integrate external and new knowledge with internal and existing knowledge, and to create new knowledge, learning ability is one of the main measures ensuring the renewal and evolution of enterprise capacity [17]. Chinese international contractors can learn advanced construction techniques and managerial experience from competitors or partners and the development model and business strategy from top-notch international contractors. Presently, as Chinese contractors are confronting a rapidly changing international engineering market, their initial accumulated experience and knowledge may become out of date and lose competitiveness. However, a quick yet efficient learning ability enables them to update and advance enterprise strategies, organizational structures, and so on. Thus, we propose the following hypothesis:

Hypothesis 2: Chinese international contractor's learning ability has a positive influence on project competitive advantage.

*3.1.3. Integration and Coordination Capability and Competitive Advantage.* Integration and coordination capability constitutes an integral part of dynamic capacity. Using internal integration and external coordination of resources, enterprises can enhance the strategic value of existing resources and capabilities and promote strategic decision-making and reform to cope with changes in the external environment [40]. The construction process of a project is in effect a process of resource integration and coordination, during which the smooth advance of each link relies on the effective integration and coordination of various resources and tasks, and the internal and external resources need to be

readjusted once the reality deviates from the plan. To establish and maintain a competitive edge, it is indispensable for enterprises to make timely and accurate judgments of a situation based on environmental changes. Subsequently, they must effectively integrate resources and actively adjust strategies and, finally, develop products and services satisfying market demand. Thus, we propose the following hypothesis:

Hypothesis 3: Chinese international contractor's integration and coordination capability has a positive effect on project competitive advantage.

*3.2. The Moderating Effects of Chinese Guanxi.* The Chinese guanxi is a mutually beneficial responsibility relationship between an enterprise and its partners, which enables the enterprise to obtain resources and information through continuous cooperation and mutual communication [29]. The Chinese guanxi is a lasting social relationship and network that enterprises use to exchange support for organizational goals and exerts a certain influence on competitive advantages [19, 20]. Dynamic capacity enables contractors to compete by comprehending client preferences and creating and managing long-lasting relationships with owners, designers, and suppliers. The process of acquiring and comprehending owners' needs requires firm boundary agents to have empathetic orientation, that is, the ability to view a situation from an owner's perspective. Empathy is valuable in nurturing guanxi, and members in the guanxi network should exhibit empathy toward one another [41]. Thus, contractors with a high dynamic capacity are likely to have competent personnel who are good at developing close guanxi with key stakeholders. At the same time, the process of creating and managing long-lasting relationships entails that boundary personnel have more communication, negotiation, and coordination skills, which may also be helpful for cultivating interpersonal connections. Therefore, in the international construction project in which guanxi is important for project success, contractors with greater dynamic capacity are better able to exploit guanxi networks and, thus, obtain a competitive advantage.

Regarding the dimensions of the Chinese guanxi, Peng and Luo [42] divide the Chinese guanxi into business guanxi and political guanxi based on the particularity of the Chinese society and differences among external entities. The distinction between these two types of relations is that business guanxi is horizontal (equal relations), yet political guanxi is vertical (the leader-member relations, that is, the relations between superior and subordinate). This manner of division has been recognized by many scholars [9, 20, 43] and has been widely adopted. This research also adopts this manner of division and divides Chinese guanxi into the two dimensions of business guanxi and political guanxi. When it comes to the specific research background of the construction projects studied, business guanxi mainly refers to the relations with owners, supervisors, and suppliers, while political guanxi refers to the relations with government leaders, the relevant government departments, and government officials.

Thus, we suggest that the impact of dynamic capacity (environmental perception ability, learning ability, integration, and coordination capability) on competitive advantage is contextually moderated by the Chinese guanxi (business guanxi and political guanxi).

*3.2.1. The Moderating Effect of Business Guanxi.* Establishing and sustaining business guanxi allow enterprises to have more comprehensive access to information and to perceive the trend of the changing market environment better. In this way, timely measures can be taken to avoid risks and reduce losses amid environmental changes. As the transaction cost theory states, the higher the transaction uncertainties are, the higher the transaction cost is [44]. However, business guanxi can significantly reduce the impact of environmental uncertainties, thereby reducing transaction costs, increasing profits, and enhancing competitive advantage. The resource dependence theory states that an organization must interact with the environment it depends on to hold the initiative over its competition [45]. Establishing business guanxi provides enterprises with an interactive relations network, and those holding the initiative can gain a higher competitive advantage.

Establishing and sustaining business guanxi promote exchange and communication among different enterprises and facilitates the establishment of a good learning atmosphere, in which one makes progress by drawing upon another's experience, thus laying a solid foundation for the future growth of enterprises. In line with the transaction cost theory, relations are transferable, long term, and intangible assets [46] that enable enterprises to enhance learning abilities and gain competitive advantage. According to the resource dependence theory, relations enable organizations to bring forth new ideas, contribute to the transfer and overflow of knowledge, and promote cooperation among organizations in exerting external control over other organizations and, thus, enhance a unique competitive advantage.

Establishing and sustaining business guanxi allow enterprises to have more resources indirectly and promote enterprises to optimize the allocation of existing and potential resources. Based on the transaction cost theory, the higher the asset specificity is, the higher the transaction cost is [44], but business guanxi reduces the difficulty in acquiring specific assets and, therefore, significantly decreases transaction costs and increases competitive advantage. Considering resource dependence theory, the survival and growth of organizations need to draw on resources from surroundings [47], while business guanxi happens to afford effective access to resources.

Thus, we propose the following hypotheses:

Hypothesis 4a: the positive relationship between environmental perception ability and competitive advantage is stronger when business guanxi is at a higher level.

Hypothesis 4b: the positive relationship between learning ability and competitive advantage is stronger when business guanxi is at a higher level.

Hypothesis 4c: the positive relationship between integration and coordination capability and competitive advantage is stronger when business guanxi is at a higher level.

*3.2.2. The Moderating Effect of Political Guanxi.* In the view of transaction costs theory, because of the chronicity and reciprocity of a relation, an enterprise requires a relatively high cost to establish and maintain relations [48]. However, it is difficult to determine the actual effects of such a relation on competitive advantages. According to Luo et al. [49], a high-degree of political guanxi has substantial hidden danger to the subsequent progress of a project. To maintain a high level of political guanxi, the project leader or the one in charge of the enterprise may have less time and energy to pay attention to the changes in the external environment. Thus, they may somewhat ignore whether the development of the enterprise can adapt to the changes in the external environment, consequently reducing the abilities of the enterprise or project to resist risks. Resource dependence theory believes that acquiring resources from the external environment, being interdependent with the environment and striving for the balance of relations, can avoid dependence on the opportunities brought by markets and technologies [19]. Excessive pursuit of political guanxi may have the opposite effect—losing opportunities brought by the acquisition of markets and technologies.

Transaction costs theory demonstrates that relations are transferable, long term, and invisible assets [46]. However, political guanxi has features of being personal and untransferable. Once there are changes in the political party, an enterprise may, in a very short time, lose their political guanxi network established by prior hard work. Resource dependence theory indicates that establishing a good relationship with resource providers allows us to analyze and control the external environment with initiative rather than passively adapting to the environment, which can reduce dependence on the environment. However, political guanxi cannot be controlled by enterprises. Very often the government will, through an interrelationship, encourage the enterprise to invest in some projects which are very important for it, such as construction aid projects, which are of very high opportunity cost for contractors and do not conform to their development strategies. To maintain good relations, contractors often, regardless of profits and costs, devote much time and effort to establishing a stable political guanxi network, which may come at the cost of giving up self-development [29, 50].

Transaction costs theory states that the higher the transaction frequency is, the higher the transaction cost will be [29, 50]. The maintenance of political guanxi requires a higher deal cost, which will affect one's competitive position. To maintain a high level of political guanxi, the person in charge of a corporation and project is likely to spend less time and energy in focusing on the development strategies and management standards of corporations, which will affect the plan and implementation of the resource integration of a corporation or project. Resource dependence

theory states that the survival and development of organizations requires the consumption of resources from the surrounding environment. Although political guanxiship has provided a way to gain resources, contractors are likely to be forced to receive some unwanted material for the maintenance of the mutual benefits from political guanxi, which has dramatically increased the operating costs of corporations. Thus, we propose the following hypotheses:

Hypothesis 5a: the negative relationship between environmental perception ability and competitive advantage is stronger when political guanxi is at a lower level.

Hypothesis 5b: the negative relationship between learning ability and competitive advantage is stronger when political guanxi is at a lower level.

Hypothesis 5c: the negative relationship between integration and coordination capability and competitive advantage is stronger when political guanxi is at a lower level.

**3.3. Theoretical Model.** Based on the above assumptions, we can construct the theoretical model of this study, as shown in Figure 1. The model constructed in this paper is a trans-level regulation model, in order to examine how the relationship between high-level constructs (dynamic ability) and low-level outcome variables (competitive advantages) can be regulated by another low-level construct (Chinese guanxi).

## 4. Research Method and Design

**4.1. Econometric Model.** In this study, the multivariate linear regression analysis and the multivariate regulatory regression analysis are used as the primary research methods [51]. The multivariate regulatory regression analysis is suitable for the model in which both the main effects and regulatory effects exist simultaneously. Moreover, it can analyze whether the model is better than the one with the main effects after adding adjustment effects [52]. To ensure that our hypothesized relationships were under better-controlled environments, the study included six variables to control for potential factors that might correlate with the hypothesized determinants or dependent variable. This study includes the state-ownership of the contractor, the size of the contractor, the firm age, the project type, the contract budget of the project, and the GDP of the host country as control variables.

Accordingly, this paper establishes the following regression equation:

$$\begin{aligned} \text{Com} = & \alpha + \gamma_1 \text{state} + \gamma_2 \text{size} + \gamma_3 \text{age} + \gamma_4 \text{tran} + \gamma_5 \text{budget} \\ & + \gamma_6 \text{gdp} + \beta_1 \text{Env} + \beta_2 \text{Lea} + \beta_3 \text{Int} + \beta_4 \text{Bus} + \beta_5 \text{Pol} \\ & + \beta_6 \text{Env} * \text{Bus} + \beta_7 \text{Lea} * \text{Bus} + \beta_8 \text{Int} * \text{Bus} \\ & + \beta_9 \text{Env} * \text{Pol} + \beta_{10} \text{Lea} * \text{Pol} + \beta_{11} \text{Int} * \text{Pol} + \varepsilon, \end{aligned} \quad (1)$$

where the dependent variable, Com, is the competitive advantage of the project;  $\alpha$  is a constant;  $\gamma_1 - \gamma_6$  are the coefficients of the controlled variable;  $\beta_1 - \beta_3$  are the

coefficients of the independent variable;  $\beta_4 - \beta_5$  are the coefficients of the moderator;  $\beta_6 - \beta_{11}$  are the coefficients of the cross item; and  $\varepsilon$  is a disturbance variable. The first independent variable, Env, is the environmental perception ability; the second independent variable, Lea, is the learning capability; the third independent variable, Int, is the integrating and coordinating capability. The first moderator, Bus, is the business guanxi; the second moderator, Pol, is the political guanxi. To prevent spurious regression and to ensure that the tests are better controlled for the environment, the state-own of the contractor, the size of the contractor, the age of the contractor, the project type, the contract budget of the project, and the GDP of the host country, six variables were thus employed as control variables in our research.

This equation can not only test the impact of the dynamic capability of Chinese international contractors on the project's competitive advantages but also involve the moderating effect of guanxi on the dynamic capability and competitive advantage of Chinese international contractors.

**4.2. Data.** This study used a literature review, in-depth interviews, and a questionnaire survey for data collection [53]. Data collection was conducted in two stages. First, in-depth interviews were conducted with six senior project managers, market managers, contract managers, purchase managers, contract consultants, and general managers from Chinese international contractors between March 2016 and June 2016. The interviews served as an a priori test, and we designed and pretested a questionnaire including all constructs of interest for measuring the model variables. Second, we applied a cross-sectional survey to collect primary data from questionnaires which were sent to Chinese international contractors.

According to the study's needs, the respondents were middle or senior managers who had been working in the same projects for over one year to ensure a full understanding of the project, which helped to enhance data quality. The questionnaire was completed by the students of MEM (Master of Engineering Management), alumni who have experience with international contractors. In China, MEM students are incumbents in management positions in firms who work in firms on weekdays and receive on-the-job training during weekends, so they are quite familiar with what happens in their projects. Questionnaires were sent to the students of MEM and alumni through e-mail and the Internet. The MEM students and alumni were expanded by "snowball," that is, by drawing and organizing the sample gradually through the interviewee's recommendation and re-recommendation [54, 55]. Data collection was conducted from June 2016 to January 2017. In total, 88 questionnaires were returned with 57 being valid. The collection ratio of valid questionnaires is 64.77%.

The sampling frame included those international projects from the major construction projects conducted overseas during the past five years, such as transportation, building, petroleum, energy, and hydraulic engineering overseas. Nearly 93% of the respondents were male, and

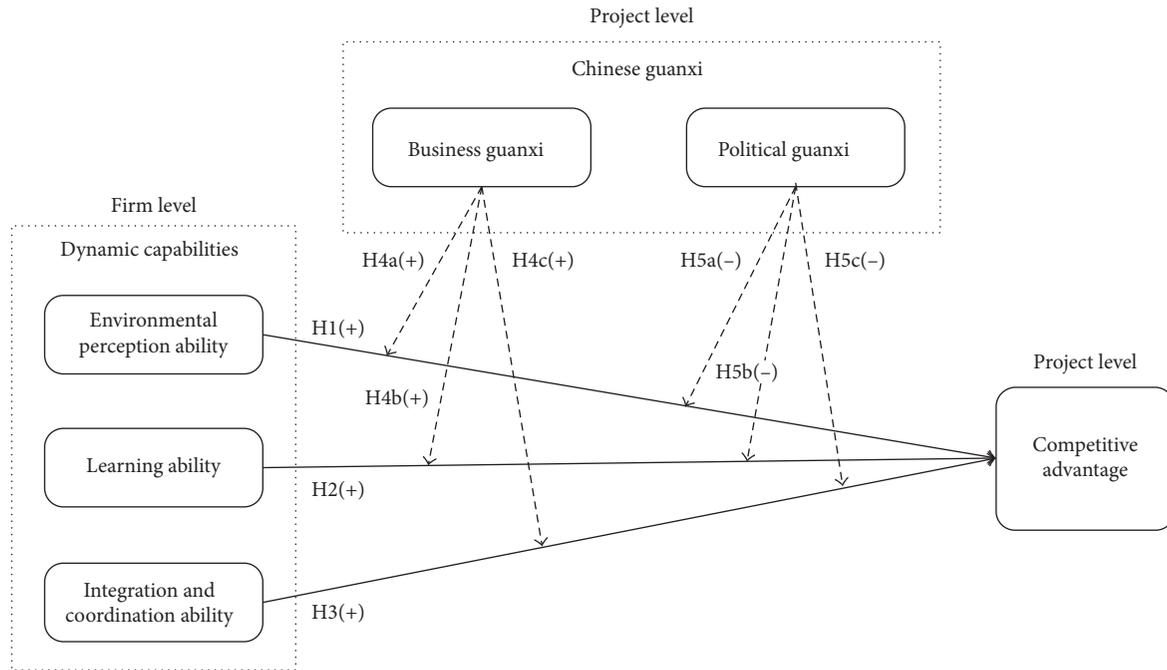


FIGURE 1: Theoretical model of the study.

approximately 50.9% were between 31 and 40 years old, about 52.6% of respondents had worked on international construction projects for a period of four to ten years, and almost 31.6% hold a postgraduate qualification. Among the respondents, senior managers accounted for 47.4% of the respondents and project level managers accounted for 38.6%. As data acquisition in international projects is somewhat difficult, the literature sample in similar research in the field of international projects is only 45 [56], and regression analysis only requires a minimal sample of 30 [57–59]; although the sample is not very large, the number of valid questionnaires has met the requirements of research.

After sorting out the valid questionnaires, the study classified the basic information of the sample into enterprises, projects, and people who filled out the questionnaire. The projects in the questionnaire were distributed in 32 nations or regions in Asia and Africa (over 90% of the total number of the sample), Europe, Oceania, and North America. There were a great variety of diverse projects, including transportation, housing, petrochemicals, energy, and water conservancy. Transportation and housing account for 64.9% of the total number of samples, which is more than half of the sample number. The sample information is shown in Table 1.

4.3. *Measurement of Variables.* Concerning previous studies, the authors developed a multiple-item scale of variables. Because the related literature is in English, we made an effort to translate the questionnaire comprehensively and critically.

In the context of Chinese international contractors, this study employs a survey method for data collection. An extensive literature review was the basis for developing an initial list of items to measure the components of the

TABLE 1: Descriptive statistical analysis of the sample distribution projects ( $N = 57$ ).

Item	Type	Frequency	Percentage
Country type of project	Low-income countries	3	5.3
	Low- and middle-income countries	15	26.3
	Middle and higher income countries	17	29.8
	High-income countries	22	38.6
Project area	Asia	34	59.6
	Africa	19	33.3
	Europe	1	1.7
	Oceania	2	3.5
	North America	1	1.7
Project type	Transportation	18	31.6
	Building	19	33.3
	Power	7	12.3
	Petroleum	7	12.3
	Hydraulic engineering	4	7.0
	Others	2	3.5
Project delivery method	EPC	26	45.7
	DB	10	17.5
	PPP	6	10.5
	PC/C	13	22.8
	Others	2	3.5
Project construction phase	Bidding	9	15.8
	Construction	35	61.4
	Completed	13	22.8

concepts. Then, to revise the measurement items, this study carried out a pretest with six project managers from six different contractors working in overseas construction projects. For the pretest, the study first chose six project managers from six different contractors working on

international construction projects. Moreover, the next step was to conduct a pilot study involving five contractors (each with one respondent) to determine the efficiency of the questionnaire. Finally, this study checked item-to-total correlations to refine measurements.

Responses were scored on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) [13, 60].

#### 4.3.1. Measurement of the Dependent Variable and Independent Variables

(1) *Competitive Advantage.* Most researches adopt public archive data to measure competitive advantage, among which ROA and Tobin's Q are popular proxies [13]. For construction contractors, on one hand, to get such series data is somewhat difficult for the lack of such database; on the other hand, construction contractors may not be willing to provide their financial data. According to the argument that competitive advantage can be measured by financial indicators and nonfinancial indicators [13], this study measures competitive advantage by questions, reflected by 3 indicators, including profit, technology, and social appraisal [61, 62].

(2) *Environmental Perception Ability.* This variable is the ability of an enterprise to dig for market opportunities by acquiring external market information through a comprehensive analysis of its own development status and external environment. Environmental perception ability is a two-step process, that is, to search for market information and to analyze market information. Neill et al. [63] have proposed four measures of environmental perception, namely, competitor-oriented, customer-oriented, "product-oriented, and macroenvironment-oriented." Li and Liu [13] have proposed six design indicators for environmental perception ability, namely, to perceive environmental changes ahead of competitors, meet regularly to discuss market needs, agree on understanding of the impact on internal and external environment, understand the major potential opportunities and threats, have a sound information management system, and have a good observation and judgment abilities. Through the above analysis, we can see that the external environment the company is facing includes competitors, customers, industries, and so on, and it is even more so for international contractors who undertake overseas projects. Not only does the market environment cover a wide range of areas, it also involves a variety of stakeholders. Therefore, the environmental analysis for international contractors must be comprehensive and multidimensional. Based on this, this research divides the measurement indicators of the environmental perception ability for Chinese international contractors into the following five aspects.

(3) *Learning Ability.* This variable reflects the ability of an enterprise to use internal and external information, knowledge, and technology and apply to practice. The learning ability of Chinese international contractors mainly reflects in three levels, that is, individual level, project level,

and enterprise level. As a project-oriented enterprise, many of its knowledge and experience are accumulated during the implementation of the project. In order to cultivate the learning ability of the enterprise, it is necessary to create an atmosphere that encourages employees to learn, secondly, to be able to accomplish effective knowledge sharing among employees, and the most important is to effectively apply the acquired knowledge to practical work and play a role in internal management and external services. Todorova and Durisin [64] pointed out that learning ability is the ability of an enterprise to discover new knowledge, exchange and share new knowledge, and apply it to commercial activities. Therefore, the measurement of learning ability is mainly consistent with the above description. Combined with the studies of Zahra and George [65] and Li [66] on the measurement of learning ability, this paper designed five indicators.

(4) *Integration and Coordination Ability.* This variable is the ability of an enterprise to reconstruct internal and external resources and capabilities. It reflects in all aspects of the enterprise's daily operations, such as new products' development, strategic decision-making, strategic cooperation, and strategic transformation, and it has an irreplaceable role for the development and even survival of enterprises [67]. Li and Liu [13] measured the integration and coordination ability from the aspects of decision-making and implementation and designed the following indicators, namely, "to make strategic decisions in time, effectively implement strategic changes, and have good cooperation with other enterprises." Hao [62] believes that the integration and coordination ability is divided into internal integration and external coordination and designs the following indicators "awareness of consensus among various departments on strategic objectives, frequent cooperation with other enterprises in developing markets, and so on." This paper believes that except effectively reshaping of internal and external resources, it should also be able to make adjustments quickly and in time and maintain adjustability at all times to respond to environment changes. Based on this, this paper has designed the following six indicators, as shown in Table 2.

(5) *Business Guanxi.* In recent years, researches on the Chinese guanxi have emerged in an endless stream, and many scholars have also attempted to conduct in-depth studies on guanxi empirically. As mentioned in the previous literature review, most scholars classify it into two dimensions, business guanxi and political guanxi. Wu and Chen [68] designed the indicators of business guanxi as "good interpersonal relationships with suppliers, customers, and distributors." Liu et al. [69] designed the indicators of business guanxi as "to have strong capabilities to build good relationships with customers, suppliers, and competitors." Wang [70] divided business guanxi into relationships with suppliers, customers, research institutes, and other stakeholders, and each type of relationships includes "the establishment of long-term trust and ability to communicate information in time." Based on

TABLE 2: Measurement of variables.

	Item	Cronbach's $\alpha$	KMO
<i>Dependent variable</i>			
Competitive advantage	(i) Compared with projects of the same type, the profit of this project margins higher	0.507	0.577***
	(ii) Compared with projects of the same type, this project meets with more technical difficulties		
	(iii) Compared with projects of the same type, this project wins higher social appraisal		
<i>Independent variables</i>			
Environment perception ability	(i) The company can grasp the newest information of competitors	0.723	0.781***
	(ii) The company spends a lot of efforts and time in gathering bidding information		
	(iii) The company can detect and grasp industry trends timely		
	(iv) The company is ignorant about the development of new technology in international market (inverse problem)		
	(v) The company can detect and seize market opportunity properly		
Learning ability	(i) The company encourages employees to acquire knowledge through various means	0.689	0.739***
	(ii) The company does not encourage sharing knowledge among employees (inverse problem)		
	(iii) The company can apply new knowledge to work quickly and effectively		
	(iv) The company cannot provide innovative services to meet the needs of owners (inverse problem)		
	(v) The company has taken a reform in its management		
Integration and coordination	(i) Each department of the company has agreement on the company's strategic goal	0.864	0.852***
	(ii) Each department of the company cooperates frequently		
	(iii) The company often makes strategic alliance with other companies		
	(iv) The company can adapt its development to changes in international environment		
	(v) The company changes its strategy slower than its competitors (inverse problem)		
	(vi) The company can adjust its role accurately according to the environmental change in international project market		
Business guanxi	(i) The company has a bad relationship with owners (inverse problem)	0.831	0.839***
	(ii) The company can communicate well with owners		
	(iii) The company builds a good relationship with supervisors		
	(vi) The company can communicate well with supervisors		
	(v) The company has a good relationship with suppliers		
	(vi) The company does not communicate well with suppliers		
Political guanxi	(i) The company maintains a good relationship with the host country	0.753	0.688***
	(ii) The company can obtain the information in relation to the project timely		
	(iii) The company does not receive financial support or preferential policies from the government of the host country (inverse problem)		
	(iv) The staffs of the company have a good interpersonal relationship in their personal life with government officers in the host country		

\*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$  (two-tailed).

the above points of view and taking into account the large number of stakeholders, this paper selected three major stakeholders, that is, the owner, supervisor, and supplier, and included them into the design of the questionnaire. Based on this, this paper has designed the following six indicators.

(6) *Political Guanxi*. There are also many indicators designed for political guanxi. Wu and Chen [68] designed the indicators of political guanxi as "good interpersonal relationships with government officials and relevant government departments." Fan [71] designed the indicators of political guanxi as "to establish good relations with influential government officials and project-related government officials and to take actions to maintain good relations with government officials." Wang [70] designed such items as "Enterprises can timely obtain government information related to business operations, maintain good relations with

relevant government departments, and acquire government support or funds." In summary, this paper designed four indicators.

Based on the previous research as well as the actual situation of this study, the results of the measurement for the three dimensions of dynamic capacity, the two dimensions of guanxi, and the competitive advantage are shown in Table 2.

Cronbach's alpha measures the reliability of the measurement. A higher value of Cronbach's alpha indicates a higher degree of reliability. The result of the measurement is not reliable and thus unacceptable if the value of Cronbach's alpha is less than 0.5; the result is acceptable if the value is greater than 0.5. When the value is greater than 0.7, the measurement is very reliable [72–74].

The structural validity of the measurement is tested by the exploratory factor analysis (EFA). Specifically, the measurement is required to pass the KMO's sample test by

SPSS and Bartlett's spherical test. The KMO's sample test demonstrates the partial correlation between variables. Generally speaking, the result of the measurement will meet requirements if the value of KMO is greater than 0.5 [75, 76], and the result will be better if the value is greater than 0.6.

As the data in this table show, both the reliability and the structural validity of the measurement have met the requirement with the value of Cronbach's alpha being greater than 0.5 and the value of KMO being greater than 0.5.

**4.3.2. Control Variables.** The study included six variables to control for potential factors, which are as follows:

- (1) *The nature of enterprise:* The nature of enterprise refers exclusively to the ownership of enterprise. In terms of the ownership, China's international contractors can be divided into two categories, namely, the state-own enterprise and the private-run enterprise. Since Chinese government plays a prominent role in leading China's economy, many international engineering projects participated by Chinese enterprises are in fact the product of government's foreign activities. The government has assisted Chinese project industry with a lot of support and convenience, so enterprises of different ownership may have a different performance in acquiring project orders or undertaking project construction. Thus, this study takes the nature of enterprise as a variable into the measurement. In detail, the nature of enterprise is set as a dummy variable whose value ranges from 1, if the contractor is state-owned, to 0, otherwise [77, 78].
- (2) *The scale of enterprise:* The scale of enterprise is taken as determined by the number of its employees [13, 79]. It reflects the concentration of labor force, means of production, and operating status in an enterprise, and it is usually assessed by the number of full-time employees, total assets, annual operating income, and so on. In general, the large-scale enterprises have more abundant human and financial resource, have more advanced technology, and can undertake more larger projects with larger scale; consequently, they often share a dominant position in the project industry. In contrast, the small and medium enterprises receive less investment, have less resource, and are more vulnerable to environmental change. The scale of enterprise has a more distinct influence on the international contractors. In this paper, the natural logarithm of the number of full-time employees is used to measure the scale of enterprise.
- (3) *The enterprise's age:* The enterprise's age usually refers to the number of years after the enterprise was founded; namely, it refers to the enterprise's natural age [13, 79]. Generally, an enterprise may undertake more projects, have more experience, and hence have a better performance in undertaking new projects if it was established earlier and has operated longer.
- (4) *Project type:* The international engineer contracting market covers dozens of industries and consists of numerous types of projects. Overall, as the traditional dominant industries, house building, industrial/petrochemical, and transportation account for nearly 80% of the annual market share, making their role in the engineer contracting industry seemingly unshakeable. Among these three types, transportation has grown rapidly and is accountable for the most significant market share. Indeed, China's international contractors have performed better in transportation in recent years, compared with other types of projects. Thus, project type is used as a dummy variable in the measurement whose value ranges from 1, if the project is transportation, to 0 [79, 80].
- (5) *The contract amount of project:* The contract amount is the price of the project negotiated in the project contract. In addition to the type of project, the contract amount also indicates the scale and difficulty of the project [81]. In this paper, the value of the contract amount as a variable is the logarithm of the contract amount.
- (6) *The GDP of target country.* The economic condition of the country where the project is constructed will relatively affect the project in ways such as through resource allocation [81]. All data of GDP (2015) used in this paper are from the World Bank (World Bank Group, WBG) database and have been taken as a logarithm. Note that Iran's GDP data in 2015 are missing, as are their 2014 GDP data.

## 5. Results

**5.1. Robustness of OLS Regression Analyses.** OLS (ordinary least squares) multiple linear regression analysis was used to test our hypotheses. OLS estimators are the best linear unbiased estimators (BLUE) [82]. Several regression diagnostics were taken to ensure that major OLS assumptions were satisfied. Specifically, the study tested whether there were multicollinearity problems, specification errors, or heteroscedasticity.

First, since the suspected significant correlations were found among some regressors as shown in Table 3, variance inflation factor (VIF) tests against each regressor were performed to test the no-multicollinearity assumption for OLS. If the correlation coefficient between the two variables is higher than 0.6 in significance, there may be an existing issue of multiple collinearities between them, and the VIF test [83] is required. It can be seen from the table that the correlation coefficients between the variables are all smaller than 0.6. So, there is no issue of multiple collinearities.

Second, the Ramsey RESET test [84] was performed to test specification errors such as omitted variables and the nonlinearity of functional form. When the significance of the  $F$  value in the RESET test is greater than 0.05, this indicates that there is no missing variable in the model [85].

TABLE 3: Means, standard deviations, and correlations of regression variables.

Variable	Mean <sup>a</sup>	SD <sup>a</sup>	1	2	3	4	5	6	7	8	9	10	11	12
1 Com	3.28	0.80	1.00	—	—	—	—	—	—	—	—	—	—	—
2 Env	3.78	0.86	0.32**	1.00	—	—	—	—	—	—	—	—	—	—
3 Lea	3.95	0.87	0.02	0.29**	1.00	—	—	—	—	—	—	—	—	—
4 Int	3.86	0.76	0.19	0.16	0.50***	1.00	—	—	—	—	—	—	—	—
5 Bus	4.10	0.71	0.25*	0.25*	0.25*	0.48***	1.00	—	—	—	—	—	—	—
6 Pol	3.34	1.14	0.03	0.08	0.02	0.33**	0.32**	1.00	—	—	—	—	—	—
7 State <sup>b</sup>	0.88	0.33	0.03	-0.10	-0.14	0.05	0.10	-0.04	1.00	—	—	—	—	—
8 Size <sup>c</sup>	8.74	1.65	-0.05	0.18	0.02	-0.08	-0.11	0.14	0.17	1.00	—	—	—	—
9 Age	35.81	18.74	-0.10	-0.01	-0.22	0.03	-0.12	0.26**	0.38***	0.53***	1.00	—	—	—
10 Tran <sup>b</sup>	0.32	0.47	0.31**	0.14	-0.10	-0.11	-0.05	0.14	0.25*	0.17	0.12	1.00	—	—
11 Budget <sup>c</sup>	8.88	0.73	0.14	0.13	-0.11	-0.05	0.13	0.08	0.25*	0.26**	0.17	0.14	1.00	—
12 GDP <sup>c</sup>	11.20	0.67	-0.03	-0.07	0.09	-0.11	-0.02	-0.25*	0.20	-0.06	-0.14	-0.26*	0.05	1.00

Note. <sup>a</sup> $n = 57$ ; <sup>b</sup>dummy variable; <sup>c</sup>log-transformed, in 100 million RMB. \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$  (two-tailed).

In this paper, the RESET test for model 2 is conducted. Moreover, the test results show that the  $F$  value is 1.711 ( $p = 0.197$ ), with the significance being greater than 0.05. Therefore, it can be concluded that there is no missing item in model 2.

Third, a WHITE test [86] was performed to examine whether the sample met the homoscedasticity assumption of the OLS regression. When the significance of the  $F$  value in the WHITE test is smaller than 0.05, this indicates that heterogeneity exists in the data. In this situation, the heterorobust standard error needs to be calculated to reflect the significance of the regression coefficient [87]. The  $F$  value of model 2 in the WHITE test is 1.125 ( $p = 0.490$ ), and its significance is greater than 0.05, which indicates that the data of model 2 are not heterogeneous. Similarly, a RESET test on model 4 was conducted in this paper. According to the test results, the  $F$  value is 1.121 ( $p = 0.296$ ), with the significance greater than 0.05, indicating that there is no missing item in model 4. A WHITE test was then performed on model 4. The test results show that the  $F$  value of model 4 in the WHITE test is 2.021 ( $p = 0.026$ ) with the significance smaller than 0.05, indicating that the data of model 4 are heterogeneous and that the heterorobust standard error must be calculated to reflect the significant factor of the regression coefficient (as shown in Table 4).

In this paper, the four models are constructed by the method of the hierarchical regression test, as shown in Table 4.

It can be seen from Table 4 that the  $F$  value of the model 2 is significant at the level of 10%. The adjusted  $R^2$  is 0.138, obviously greater than the model 1, which indicates that the model's explanations for the dependent variable have been improved significantly after adding the independent variable. Among them, the Environmental perception ability is positively significant at the level of 5%; the Integrating and Coordinating Capability is positively significant at the level of 10%; and the  $p$  value of the Learning Capability regression result is greater than 0.1 and is not significant.

The  $F$  value of the model 4 is significant at the level of 5%, and the adjusted  $R^2$  is 0.237 and increased greatly with the comparison of the model 3, which indicates that the model's explanations for the dependent variable have been improved significantly after adding the cross item. In the part of the

TABLE 4: Hierarchical regression test.

Variables	Model 1	Model 2	Model 3	Model 4
<i>Control variable</i>				
State	-0.14	-0.16	-0.29	-0.26 (0.41) [0.35]
Size	-0.06	-0.04	-0.03	-0.02 (0.08) [0.09]
Age	-0.01	-0.01	-0.01	0.01 (0.01) [0.01]
Tran	0.58**	0.58**	0.64**	0.78*** (0.24) [0.26]
Budget	0.17	0.11	0.10	-0.01 (0.15) [0.16]
Gdp	0.05	0.13	0.13	0.19 (0.19) [0.17]
<i>Independent variable</i>				
Env	—	0.27**	0.24*	0.25* (0.14) [0.18]
Lea	—	-0.21	-0.22	-0.23 (0.15) [0.16]
Int	—	0.32*	0.32*	0.28 (0.19) [0.22]
<i>Moderator</i>				
Bus	—	—	0.17	0.21 (0.21) [0.21]
Pol	—	—	-0.11	-0.06 (0.11) [0.10]
<i>Cross item</i>				
Env * Bus	—	—	—	0.42** (0.20) [0.22]
Lea * Bus	—	—	—	-0.38** (0.17) [0.15]
Int * Bus	—	—	—	0.18 (0.23) [0.19]
Env * Pol	—	—	—	-0.26* (0.15) [0.16]
Lea * Pol	—	—	—	0.02 (0.15) [0.14]
Int * Pol	—	—	—	-0.21 (0.16) [0.16]
$F$ value	1.31	1.20*	1.75*	2.02**
$R^2$	0.14	0.28	0.30	0.47
Adj. $R^2$	0.03	0.14	0.13	0.24

OLS standard errors are shown in parentheses. Heterorobust standard errors are shown in square brackets. \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$  (two-tailed).

cross item, the interaction between the Environmental perception ability and the Business Guanxi is positively significant at the level of 5%; the interaction between the Learning Capability and the Business Guanxi is negatively significant at the level of 5%; the interaction between the Environmental perception ability and the Political Guanxi is

negatively significant at the level of 10%. In particular, the Business Guanxi positively adjusts the relationships with the Environmental perception ability and the Competitive Advantage; the Business Guanxi negatively adjusts the relationships with the Learning Capability and the Competitive Advantage; the Political Guanxi negatively adjusts the relationships with the Env and the Competitive Advantage, which means that H4a and H5a are verified, and an opposite conclusion has been drawn in H4b.

In Feng et al.'s [88] study on the Competitive Advantage, only the adjusted  $R^2$  of the controlled variable's model is 0.007, and the  $R^2$  of the model adding the independent variable is 0.097, far smaller than the results of this study. There are also many other studies in which the adjusted  $R^2$  is comparatively small [14, 89]. Therefore, the explanations of the model 2 are acceptable. In Chung's [9] study on the moderating effect of the Chinese Guanxi, the adjusted  $R^2$  of the model adding moderators and cross items is only 0.124, far smaller than the results of this study. Therefore, the explanations of the model 4 are acceptable.

## 5.2. Discussion

*5.2.1. The Influence of the Dynamic Capability on the Competitive Advantage.* According to the regression results, the positive effects of the Environmental perception ability on the Competitive Advantage of the project are under support, which means that the Environmental perception ability can significantly enhance the Competitive Advantage of the project. It is consistent with the current research results [13, 35, 36]. From a practical point of view, the biggest challenge that Chinese contractors face in undertaking overseas projects is the lack of full understanding and familiarity with the environment of the project host country or region. And the good Environmental perception ability can help those contractors anticipate all kinds of risks in advance.

In the circumstance that the actual environmental condition is unknown, contractors should plan to do the corresponding risk countermeasure and reduce the risk occurrence probability or reduce the loss as much as possible when it is unavoidable. The complexity of the project makes its construction risk higher. It is very important to estimate and prevent the unknown situation for the project progress and its smooth completion. It is more likely for a contractor who has a strong environmental perception ability to deal with the risk brought by the environmental change and thus enhance the competitive advantage of the project.

The influence of the Learning Capability on the Competitive Advantage is not significant, and H2 has not been verified. It contradicts with some existing research findings [17, 90], but there are also some scholars' researches which have not demonstrated the positive impact of the Learning Capability on the Competitive Advantage [91]. Crossan et al. [92] think that there is no direct relationship between the Learning Capability and the Competitive Advantage. Edmondson also suggests that there is no clear definition in how to gain the Competitive Advantage through the learning process [93]. The reasons

why it is not significant can be analyzed from the following three aspects: firstly, the research proves that the materials holding the opinions that the Learning Capability has a positive correlation with the Competitive Advantage are mainly about the enterprises which make high demands on technical standards and innovation levels, such as new ventures or high-tech enterprises. But in the current situation, the most important thing for the current project is not the technology but the management and the construction progress and quality. Secondly, as Chinese contractors have undertaken overseas projects for only over 30 years, most projects contracted abroad are those of infrastructure, such as housing and transportation. The projects are mainly located in Asia and Africa, and most of them are still in the low-to-middle end. Besides, the international recognition of the Chinese contractors is still under the gradual enhancement, so high-tech standards are not required in the projects undertaken by the Chinese contractors. Thirdly, the Learning Capability of the international contractors is a potential ability of the future development, which can influence the long-term competitive advantages of contractors but has few effects on the performance of the current projects. Although the Learning Capability does not have a significant impact on the current project's competitive advantages, it is undeniable that the Learning Capability is very important for the sustainable development of the international contractors in the future as well as the transformation into high-end contracts.

The positive effect of the integrating and coordinating capability on the competitive advantage of the project receives much support, which means that the integrating and coordinating capability could enhance the competitive advantage of the project. This is consistent with existing research results [23]. When contractors undertake overseas orders, they have to quickly integrate resources at home and abroad to bid for constructions, which is a great challenge for their integrating and coordinating capability. The integration of their own and external available resources, and the adjustment of their staffing at the appropriate time, greatly impact the competitive advantage of the project. Regardless of the perception or predictions of the market environment, or the creative application of practice after absorbing new knowledge, only when putting the capabilities, resources, activities, information, and many other aspects into good integration and coordination, it will generate the highest value. Only through efficient execution will contractors be more likely to achieve project objectives.

*5.2.2. The Moderating Effects of Chinese Guanxi on Dynamic Capacity and Competitive Advantage.* The regression results demonstrate that business guanxi can strengthen the relations between contractor's environmental perception ability and project competitive advantage, which is consistent with the research results of Birkin et al. [94]. This study proves that a high degree of business guanxi is useful, conforming to preceding hypotheses in this research. As regards long-term development, with the introduction of business connections and resources through business

guanxi, contractors will have easier access to the most cutting-edge information, fulfill owner's needs with better products and services, and win recognition of all sides in the industry; owners, supervisors, and suppliers will also prefer to further cooperate and communicate with contractors with good credit, and in turn, effective communication and cooperation will facilitate contractors to better achieve their project objectives.

To better illustrate the moderating effect of business guanxi on environmental perception and competitive advantage, this research takes advantage of a simple slope test to plot a moderating effect figure [95, 96]. The operation steps are as follows: set the values of business guanxi as low-level business guanxi (average value minus standard deviation) and high-level business guanxi (average value plus standard deviation), integrate the two values into the regression equation, draw the figure with a point plotting method, and then draw the moderating effect figure of business guanxi on environmental perception ability and competitive advantage, as shown in Figure 2.

The regression result suggests that political guanxi plays a negative role in regulating the relations between environmental perception ability and competitive advantage, which tallies with the initial hypothesis. Even if there has been no similar research result so far, certain studies have proven that political guanxi exerts a negative influence on dynamic capacity and competitive advantage [19, 97]. In accordance with unstable political situation, too close relations with the government may give rise to high risks. Since political guanxi often involves sensitive issues, the relations are highly likely to break off, and once the political situation changes, engineering orders attributed to preferential policies or led by the state also have to alter. Besides, market demand may conflict with government demand, in order to maintain political guanxi; even if contractors perceive the changes in the market environment, they have no other options but to choose between them, which may cause them to give up a part of interests and miss favorable opportunities for gaining market share and technology. In the meantime, the time and effort devoted to maintaining a high level of political guanxi are even more costly but less effective than those of competitors in obtaining resources and may even be counterproductive. Following the same operation principle, this research also plots the moderating effect figure of political guanxi on environmental perception ability and competitive advantage, as shown in Figure 3.

The regression result shows that business guanxi has a negative influence on learning ability and competitive advantage; that is to say, a high level of business guanxi makes contractors of outstanding learning ability less likely to achieve competitive project advantage. Although the relevant literature has not verified this conclusion, one possible explanation for this unpredictable result is that contractors of outstanding learning ability make substantial investments in knowledge acquisition, information exchange, and the innovative application of technology and services. As for information gained through a business relations network, for the sake of the long-term development of enterprises, contractors may attach more importance to

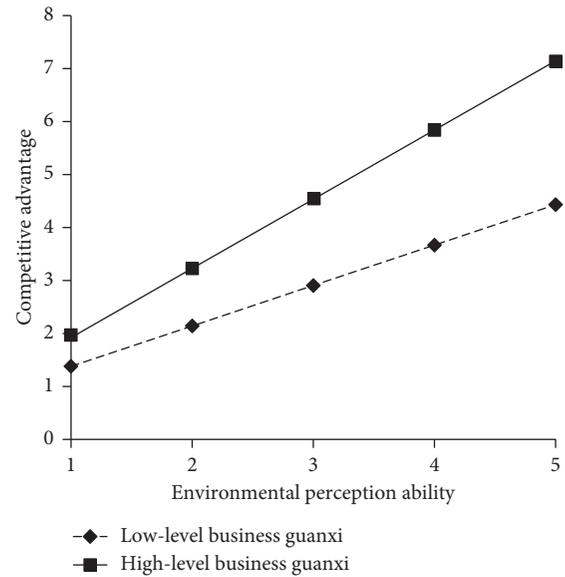


FIGURE 2: The interaction of environmental perception ability and business guanxi.

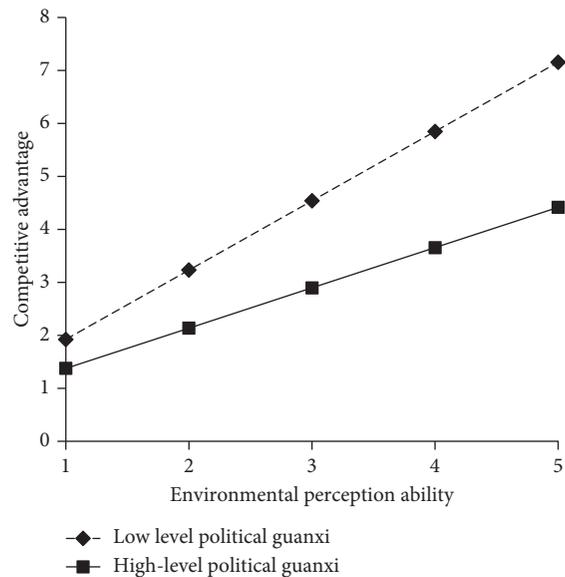


FIGURE 3: The interaction of environmental perception ability and political guanxi.

technology, products, and services newly emerging (or potentially of higher value in the future) so that they can take a leading position as early as possible. The innovation cost is extremely high and faces considerable uncertainties and risks. Once the market environment changes, the previous investment may come to naught, become lost expense, and result in a waste of resources. However, the resources an enterprise owns are limited. If too many resources are invested in a particular aspect, other aspects are bound to be severely affected. In other words, when too much energy is expended on technological products which can generate future value, input into projects under construction or in operation will be correspondingly lessened, which may

hinder competitive advantage being obtained from current projects.

Additionally, due to the reciprocal nature of relations [98], contractors are under an obligation to afford their business partners some knowledge and information [49] so that business partners may learn from successful experience, mature, and create useful technological products by imitation. Relations enable the partners to obtain knowledge of high value at a lower cost and, therefore, reinforce their strength. Where providing the same technical service, contractors pay a higher cost, and the project profitability will naturally decline as the contract amount is constant. Similarly, this research demonstrates the moderating effect figure of business guanxi on learning ability and competitive advantage, as shown in Figure 4.

## 6. Conclusion

This study primarily aimed to research the impact of dynamic capacity of Chinese international contractors on project competitive advantage and the moderating effects of Chinese guanxi. The findings suggest that the environmental perception capability and the integration and coordination capability of the dynamic capability have a significant positive effect on the project competitive advantage; business guanxi positively moderates the relationship between the environmental perception capability and the competitive advantage. Business guanxi also negatively moderates the relationship between learning ability and competitive advantage, while political guanxi negatively moderates the relationship between the environmental perception capability and competitive advantage.

The key contributions of this research are twofold. First, it makes a theoretical contribution by offering a new, integrative position of the relationship between dynamic capabilities, guanxi, and competitive advantage. This paper contributes to the construction management literature not only by providing empirical evidence on the dynamic capability and competitive advantage of Chinese international contractors but also by expanding guanxi research. Specifically, this research intends to reveal whether the environmental perception ability, learning ability, and integration and coordination capability of Chinese international contractors create a prominent impact on competitive advantage and whether business guanxi and political guanxi can dramatically regulate relations between them. This study complements existing research on dynamic capacity and competitive advantage [43, 99]. Previous research was mostly founded on manufacturing or high-tech enterprises, and very few considered contractors. Therefore, this study examined the applicability of research theories concerning Chinese international contractors exploring the overseas market, which shows that dynamic capacity theory is also applicable to Chinese international contractors. Furthermore, excluding learning ability, this study verified that environmental perception ability and integration and coordination capability exercise a positive influence on competitive advantage. Second, this study improves research on Chinese guanxi empirically and expands research on

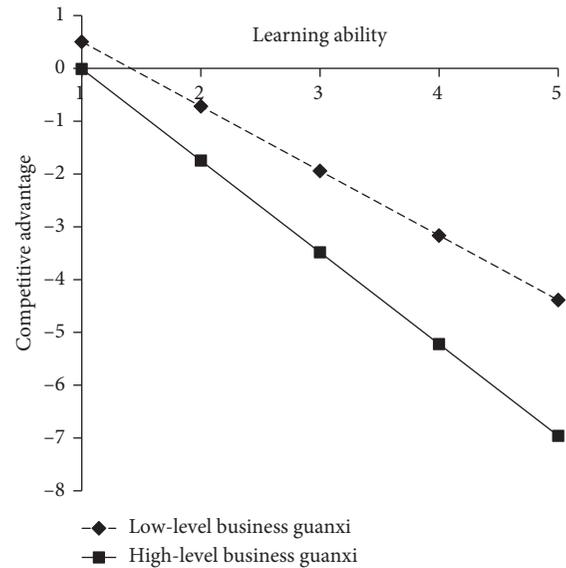


FIGURE 4: The interaction of learning ability and business guanxi.

Chinese guanxi in the international engineering field [100, 101]. The results may also help Chinese contractors by providing strategic reform guidance and sustainable development in international construction projects.

Some limitations of this study require future research. First, considering a lack of measurement of project competitive advantage in the existing literature, the discoveries this study build upon need to develop more indicators to more comprehensively measure the results. Despite this limitation, this study corresponds with previous findings on the impact of dynamic capacity and competitive advantage [12].

Second, even though much effort was devoted in this study to increasing the sample size of questionnaires, offering detailed explanations, and ensuring the proportion of valid questionnaires, the sample size is still very modest. In comparison with other studies on Chinese guanxi, for example, Park and Luo's study [43] with a sample size of 128 and Chung's [9] with 96, this study merely has 57, which is modest because a larger sample size can lessen possible deviations and increase the reliability and general adaptability of results [49, 76]. The conclusions of this research require reconfirmation before being widely applied. These issues will be addressed in the authors' future research.

## Data Availability

The authors worked with reputable contractors on a funded research project. In the agreement of their collaboration, any kinds of data are owned by the company and thus are confidential to anybody else. The authors thank the readers for understanding their collaboration agreement.

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

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