

Mixed Perceptions of Business-to-Government *Guanxi* in Tendering and Bidding for Infrastructure Projects in China

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Abstract: *Guanxi* is the Chinese word for personal relationships or connections. Infrastructure project procurement in China is dominated by the government, and the entire tendering and bidding process is subject to administrative control in which business-to-government (B2G) *guanxi* is thought to have a significant impact. To date, however, little is known of its impact and perception in infrastructure procurement. This paper aims to bridge this research gap through a questionnaire survey of 149 contractors' and consultants' perceptions of B2G *guanxi* in terms of its importance, mode of establishment, and impact on infrastructure bidding in China's eastern coastal cities. The results indicate that over half of the respondents surveyed consider B2G *guanxi* to have important benefits for current practice whereas others hold different perceptions. Four groups of perspectives are identified by K-means cluster analysis, ranging from a low/moderate perception of B2G *guanxi* (48%) to passive-high/positive-high (52%). A chi-square test suggests the differences between groups is attributable to the types of organizations involved, with contractors and quantity surveying consultant organizations placing significantly more emphasis on the benefits and establishment of B2G *guanxi*. Finally, the current informal tendering and bidding processes in China are questioned as a contributing factor and suggestions are made for increased government and legislative intervention, leading to a greater emphasis by bidders on improving their technical and management capacity in order to develop their competitive advantage in the market. DOI: 10.1061/(ASCE)EI.1943-5541.0000325. © 2017 American Society of Civil Engineers.

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Introduction

Infrastructure investment in China currently accounts for 8.5 percent of its gross domestic product (GDP) (Dobbs et al. 2013). During the Twelfth Five-Year Plan (2011–2015), the total infrastructure investment was over Chinese Yuan Renminbi (CNY) 31 trillion (equivalent to US\$4.79 trillion in April 2016), which is an increase of 1.44 times compared with the Eleventh Five-Year Plan (2006–2010) (Xinhua Net 2012; Jiang and Zeng 2012). With the rapid development of the infrastructure industry, the number of construction companies in China increased rapidly to 81,141 nationally by 2014 (National Bureau of Statistics 2015).

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The growth of the infrastructure market has led to fierce competition among architectural, engineering, and construction (AEC) firms (Li and Ling 2013). Considering most infrastructure projects are funded by the government or government agencies, the informal relationships or ties between business managers and government officials, in the form of business-to-government (B2G) *guanxi* (Bu and Roy 2015; Qin and Deng 2016), is ranked as one of the most important factors for their survival and expansion (Fang et al. 2004; Lu et al. 2008a). As a result, although not all successful bidders need B2G *guanxi*, it is widespread in China, and its use in obtaining infrastructure projects has become an implicit necessity. As is commonly said, no B2G *guanxi*, no project contracts.

Overall, B2G *guanxi* is a complex social construct with mixed perceptions. For one thing, B2G *guanxi* provides a lubricant (Gold and Guthrie 2002; Hui and Graen 1997; Standifird and Marshall 2000) that helps businessmen conduct operations to get through life, and is even called *guanxi* capitalism (Lu et al. 2008b). As a result, many construction participants believe that B2G *guanxi* is vital in the tendering and bidding process involved in infrastructure projects (Zhang and Song 2013). On the other hand, due to its generally private nature, B2G *guanxi* has a notorious reputation in China, as it is often associated with the unethical abuse of authority to obtain benefits. Consequently, B2G *guanxi* has a negative, as well as positive influence, and different people have different opinions of its nature and extent (Zhuang et al. 2008).

Thus, conducting tendering and bidding for infrastructure projects in China is different from the West, especially considering the underdeveloped nature of legal institutions in China. Therefore, B2G *guanxi* should not just be treated as a single phenomenon simply adjudged by western standards. Nevertheless, due to lack of documented records, its role and people's perceptions remain largely unknown to date. This paper focuses on relationship-related matters with government officials in China and aims to provide a thorough understanding of bidders' attitudes toward B2G *guanxi* in the tendering and bidding process of infrastructure projects.

The findings reveal the different perceptions of different parties to B2G *guanxi*, which help in understanding its mechanism in relation to the tendering and bidding law in China and identifying future improvements.

Literature Review

Guanxi is a very ancient tradition embedded in the Confucian concept of life in China (Zhang and Zhang 2006). It is an informal personal contact that is unique in Chinese society (Standiford and Marshall 2000), its essence being a set of interpersonal connections facilitating the exchange of favors between people (Bian 1997). *Guanxi* plays an important role in Chinese society (Lin and Ho 2010), with beneficial effects on business (Hwang et al. 2009). It is identified as one of the most important success factors in doing business in China, and regarded as a source of sustainable competitive advantage (Fan 2002a, b). As a consequence, business people in China strive to establish business *guanxi* with potential business partners knowing that business transactions will follow (Hwang et al. 2009).

Business *guanxi* can be generally classified into business-to-business (B2B) *guanxi* and business-to-government (B2G) *guanxi* (Peng and Luo 2000). Compared with B2B *guanxi*, B2G *guanxi* has attracted widespread public attention and is regarded as a key determinant of business success in China (Luo 2007; Ren et al. 2009). According to the resource-based view, it is also regarded as a relationship-special asset (Qin and Deng 2016), with some researchers believing that it can provide a comparative advantage. As a result, B2G *guanxi* can help firms generate larger monopoly rents, institutional exemptions, resource privileges, and similar advantages. (Luo et al. 2012). Furthermore, these financial-based benefits to firms from B2G *guanxi* can improve economic and operational outcomes (Chen et al. 2015), making B2G *guanxi* one of the most powerful regulators in the Chinese economy. In this way, business managers can increase predictability in business deals, thwart the advances of business rivals, gain access to public projects, and preempt the high costs of arbitration (Li et al. 2011). In short, with the long tradition in China referred to as rule by man instead of rule by law, having good B2G *guanxi* is inevitably of vital importance (Fan 2002a, b; Qin and Deng 2016).

At the same time, however, the somewhat covert operation of B2G *guanxi* can make it of dubious legal and ethical status. Because of government officials' control on massive resources and the lack of formal institutions (Qin and Deng 2016), business people have to cultivate and maintain close ties with government officials in China (Hwang et al. 2009), which requires a significant investment in effort, time, and money (Fock and Woo 1998; Luo and Chen 1997; Park and Luo 2001; Wang 2007). As a result, business managers make gifts to government officials to establish B2G *guanxi* (Qin and Deng 2016) and invest effort into people who can have an important influence on their business (Seligman 1999). Thus B2G *guanxi* has been classified into rent-seeking and utilitarian relationships, and many consider it a defensible practice to passively mitigate the risks of market uncertainty, albeit by unethical, or related to unethical, behaviors (Beckman et al. 2004; Fan 2002a, b).

B2G *guanxi* exists in all aspects of business, including the creation and approval of projects, exporters and importers, fines and taxes, and similar areas (Warren et al. 2004). The cultivation and maintenance of B2G *guanxi* is an integral part of doing business, especially in the tendering and bidding process of infrastructure projects (Tsang 1998), where it has long been recognized as one of the major factors for success. The development and maintenance of

B2G *guanxi* has become a priority for many construction companies and their managers (Zhang et al. 2017) to prevent risks in winning projects and enable smooth transactions (Hwang and Blair Staley 2005; Luo et al. 2012; Warren et al. 2004; Yen et al. 2011). Hence B2G plays an important role in the bidding and tendering process of infrastructure projects (Fan 2002a, b), Ren (2012) even claims that B2G *guanxi* has become an unwritten rule for winning projects.

Overall, extensive literature indicates a remarkable divide in perceptions. Some believe B2G *guanxi* should be viewed as a panacea as it is rooted in the traditional attitudes, beliefs, and values of Chinese society, whereas others consider its influence may be reduced with the development of a market economy (Fan 2002a, b). Because there is a lack of studies examining B2G *guanxi* in the construction industry in China, especially in tendering and bidding for infrastructure projects, a more detailed account is needed to fully understand its influence and classification (Zhang et al. 2015). This paper aims to bridge the research gap by deepening the understanding of B2G *guanxi* through a survey of its perceptions by people most concerned with the tendering and bidding processes involved in infrastructure projects in China.

Research Methods

The focus of this paper is on understanding bidders' perceptions of B2G *guanxi* in tendering and bidding for infrastructure projects. A combination of qualitative and quantitative approaches was used, including semistructured interviews and questionnaire surveys (Heinen 2010; Tan and Snell 2002). The research process consisted of four steps. First, a thorough literature review was conducted aimed at identifying a list of potential measures. Second, semistructured in-depth interviews were performed to collect opinion-based data from target respondents having sufficient tendering and bidding knowledge and extensive hands-on experience with infrastructure projects, which could be refined and developed into questionnaire measurement items. Third, a questionnaire survey was conducted to solicit views and experiences of both contractors and consultants. Finally, both cluster analysis and a chi-square test were used to analyze the survey data.

Semistructured Interviews

The open nature of the semistructured interview allows the introduction of new ideas (Horton et al. 2004; Rose 1994), which is needed due to the lack of guidance and data in the existing literature. Semistructured interviews were conducted with experienced construction infrastructure bidders including consultants, e.g., architects, engineers, project managers, and supervisors, who all have to bid for public work in China, to identify the measures needed. At the beginning of each interview, the interviewees were provided with prepared briefing questions and findings from the literature review. Then they were asked to identify suitable measures based on their knowledge and experience. After the interviews were completed, content analysis was used to identify all the key points and the main ideas that had emerged. Similar points were assembled, rephrased, and then categorized based on different themes.

The interviews were conducted with nine interviewees comprising chief executive officers (CEOs), vice CEOs, and project managers (Table 1). All hold senior positions, have more than 10 years working experience, and have been involved in more than 3 infrastructure projects in the last 5 years. The reason for the combination of experts from different positions was to provide balanced views and obtain a range of insights into B2G *guanxi*.

Finally, a total of 10 items were identified to measure opinions of B2G *guanxi* in terms of its importance, mode of establishment,

Table 1. Background of Interview Experts

Experts	Organization	Position	Years of experience
A	Contractor	CEO	23
B	Consultant	CEO	17
C	Contractor	Vice CEO	11
D	Contractor	Vice CEO	13
E	Consultant	Vice CEO	12
F	Contractor	Project manager	10
G	Contractor	Project manager	36
H	Consultant	Project manager	25
I	Consultant	Project manager	11

and impact on bidding. These formed the basis of the questionnaire survey.

Questionnaire Survey

Questionnaire surveys are widely used to collect professional views in construction management and *guanxi* research (Deng et al. 2014; Lin 2011; Shan et al. 2015). The questionnaire comprises two parts. Part one contains questions regarding personal profiles whereas part two contains questions aimed at eliciting the respondents' perceptions of B2G *guanxi*. Respondents were asked to evaluate their perceptions on a Likert scale, ranging from 1 (fully disagree) to 7 (fully agree).

To maximize the number of respondents, candidates were selected with the assistance of the Shanghai Construction Consultants Association and Tongji University's Research Institute of Complex Engineering and Management, both of which have extensive contacts with a variety of construction enterprises. In order to ensure the reliability of the results, the target respondents were those who had been involved in the tendering and bidding activities (for construction or consultant work) for a number of infrastructure projects for at least the last three years. All respondents were treated as anonymous.

A total of 211 questionnaires were distributed on-site and by e-mail and 183 were returned. Of these, 34 were discarded due to incomplete information or obvious contradictions (Fang et al. 2006). The remaining 149 valid responses, representing a very satisfactory response rate of 71%, were used for the analysis.

Survey Results and Data Analysis

Table 2 provides the detailed and summarized information on the respondents' backgrounds and profiles. All respondents are working for contractor or consultant organizations and are actively involved in tendering and bidding for public infrastructure projects. All are from five big cities of the east coast China, comprising Shanghai, Jinan, Hangzhou, Wuxi, and Yangzhou, where there are many infrastructure projects under construction. In addition, more than 70% of the respondents have more than five years of experience in the construction industry, nearly 40% hold senior positions, and 90% have a college degree or above. This represents a reasonable cross section of qualified respondents for a perception study of this nature.

Statistical analysis is used to provide descriptive statistics of the respondent's perception of B2G *guanxi* and reveal any distinct groups of respondents providing similar answers. This involves the use of cluster analysis, which is a method for grouping a set of objects in such a way that objects in the same group are more similar to each other than to those in other groups.

Table 2. Demographic Profile of Respondents

Profile	Categories	Frequency	Percent
Experience	1–5 years	40	27.3
	5–10 years	48	32.0
	10–15 years	31	20.7
	Over 15 years	30	20.0
Position	Staff	91	61.3
	Project manager level	36	24.0
	Department manager level	11	6.7
Education	Top manager level	11	8.0
	High school or below	15	10.0
	Junior college	43	30.0
	Bachelor's degree	60	40.0
	Master's degree or over	31	20.0
Organization	Contractor	33	23.3
	Quantity surveying	14	9.3
	Supervision	43	28.7
	Project management	59	39.3

Typically, reliability analysis is the first step with questionnaire data. Likert-scale data are often averaged in order to obtain an overall subscale score, and working with overall subscale scores assumes that each item of the scale measures the underlying attribute to a similar extent (Lust et al. 2013). The reliability analysis in this case refers to the stability and reliability of the data, which is to test the extent to which multiple measurements of the same item are consistent. This provides a Cronbach alpha (α) of 0.890 which, being larger than 0.6, indicates that the survey data are sufficiently reliable (Carmines and Zeller 1979).

The mean values of each question response are provided in Table 3. The scores are all larger than 4.0, which indicate the importance of B2G *guanxi* for business and the positive role of B2G *guanxi* in tendering and bidding. In particular, Q1 (having good B2G *guanxi* is important), Q3 (having B2G *guanxi* makes tendering and bidding activities easier), and Q4 (having B2G *guanxi* can avoid risks) have the highest average values of all the questions, indicating the general importance of B2G *guanxi* in the construction industry.

Cluster Analysis of B2 G Guanxi Perceptions

Existing research suggests that it is possible to distinguish different types of *guanxi* (Fan 2002a, b) and a more detailed classification is necessary for a better understanding B2G *guanxi* (Zhang et al. 2015); thus this paper classifies B2G *guanxi* by K-means cluster analysis. K-means cluster analysis is a popular data clustering algorithm that can be run separately specifying k-cluster solutions in identifying significant differences between clusters with respect to the clustering variables for selecting the appropriate number of clusters (Lord et al. 2015).

Of the several measures available for selecting the number of clusters, k is chosen to be prespecified within a range from 3 to 4 according to Farh et al. (1998), and the appropriate number of clusters is found from the data (Pham et al. 2005). The result is provided in Table 4, which indicates a four-group solution, with the ANOVA test showing that there are statistically significant differences ($p < 0.05$) between the clusters. Table 5 provides the number of cases (respondents) within each cluster.

According to the cluster center values in Table 4, four mixed perceptions including both passive and positive aspects are identified, comprising low perception of B2G *guanxi*, moderate perception of B2G *guanxi*, passive-high perception of B2G *guanxi*, and positive-high perception of B2G *guanxi*, respectively. Of these,

Table 3. Summary Statistics of Each Item

Dimension	Question	Mean	Standard deviation
Importance	Q1: Having good B2G <i>guanxi</i> is important	5.872	1.264
	Q2: Investing to establish and sustain B2G <i>guanxi</i> is worthwhile	5.436	1.337
	Q3: Having B2G <i>guanxi</i> makes business easier	5.779	1.251
	Q4: Having B2G <i>guanxi</i> can avoid risks	5.564	1.204
Mode of establishment	Q5: Establishing <i>guanxi</i> through government officials' family and good friends	4.987	1.236
	Q6: Establishing <i>guanxi</i> through working together on infrastructure projects	5.557	1.042
	Q7: Establishing <i>guanxi</i> through an intermediary	4.933	1.417
Impact on bidding	Q8: Determining whether or not to bid	4.919	1.383
	Q9: Obtaining bidding opportunities mainly because of the B2G <i>guanxi</i>	5.054	1.283
	Q10: It is important to cultivate and operate B2G <i>guanxi</i> in the tendering and bidding process	5.463	1.177

Note: Cronbach's $\alpha = 0.890$.

Table 4. Final Cluster Centers and ANOVA

Question items	Cluster				ANOVA	
	1	2	3	4	F	Significant
Q1: Having good B2G <i>guanxi</i> is important	2.00	5.35	6.63	6.67	124.78	0.00 ^a
Q2: Investing to establish and sustain B2G <i>guanxi</i> is worthwhile	2.29	4.88	5.94	6.26	50.68	0.00 ^a
Q3: Having B2G <i>guanxi</i> makes business easier	2.14	5.28	6.31	6.59	95.12	0.00 ^a
Q4: Having B2G <i>guanxi</i> can avoid risks	2.43	5.17	6.13	6.20	49.32	0.00 ^a
Q5: Establishing <i>guanxi</i> through government officials' family and good friends	3.14	4.95	3.38	5.66	33.64	0.00 ^a
Q6: Establishing <i>guanxi</i> through working together on infrastructure projects	4.57	5.32	4.44	6.21	26.31	0.00 ^a
Q7: Establishing <i>guanxi</i> through an intermediary	3.43	5.03	2.56	5.62	40.42	0.00 ^a
Q8: Determining whether or not to bid	1.86	4.45	5.19	5.70	35.06	0.00 ^a
Q9: Obtaining bidding opportunities mainly because of the B2G <i>guanxi</i>	1.71	4.75	5.13	5.74	41.50	0.00 ^a
Q10: It is important to cultivate and operate B2G <i>guanxi</i> in the tendering and bidding process	2.57	5.11	5.50	6.16	43.16	0.00 ^a

Note: F = value of variation between sample means divided by variation within the samples.

^aSignificant at 99% level.

Table 5. Number of Respondents in Each Cluster

Cluster	Number	Percent
1	7	4.70
2	65	43.62
3	16	10.74
4	61	40.94
Total	149	100.00

almost 48% is accounted for by the low/moderate perception, and 52% is accounted for by the passive-high and positive-high perception of B2G *guanxi*.

The low perception cluster of B2G *guanxi*, accounting for 4.7% of the total sample, indicates that these respondents have a low-level recognition of B2G *guanxi*. They do not believe that B2G *guanxi* is very important in their business activities in avoiding business risk or promoting business development. Thus, they do not invest time and effort in establishing B2G *guanxi* either through government officials' family members, their friends, or in other ways. The respondents of this cluster pointed out that there is a limited effect of B2G *guanxi* on winning project contracts. Instead, winning contracts depends more on company capacity.

The cluster of moderate perception of B2G *guanxi* is the most common, encompassing 43.6% of the respondents, and indicates that these respondents recognize the importance of B2G *guanxi* for infrastructure business. They believe that people should pay more attention to *guanxi* especially B2G *guanxi*, because it is a part of the Chinese traditional culture. They prefer to establish and maintain B2G *guanxi* in the process of working together with government officials. Nevertheless, although they believe that B2G

guanxi is important, they do not perceive B2G *guanxi* as a decisive factor for success in tendering and bidding.

Both the passive-high and positive-high clusters of B2G *guanxi* perception show that those respondents think highly of B2G *guanxi* in the infrastructure construction industry. Compared with other factors such as technology capabilities, B2G *guanxi* is more prominent in the tendering and bidding process and has become a vital source of social capital that can be accessed when there is a need for help and support. In addition, respondents in these two cluster groups consider that B2G *guanxi* is almost the most important factor. They even believe that bidding results are determined by the government officials in advance and that the process of tendering and bidding activities is a mere formality. Thus, B2G *guanxi* becomes the tool for winning the contract and is regarded as a strategic mechanism to overcome disadvantages. The difference between the passive-high and positive-high cluster lies in the means of establishing *guanxi*. Unlike the passive-high cluster, respondents in the positive-high cluster strongly agree in establishing B2G *guanxi* through government officials' family and friends, intermediaries, and working together with officials on infrastructure projects.

Comparison of Different Clusters

Chi-square tests examine whether the distribution of clusters (perceptions) is affected by the respondent's profile. As some cells have fewer than five observations, the appropriate method of analysis is Fisher's exact test, because this can be used when sample sizes are small (Fisher 1954).

As provided in Table 6, there are no statistically significant differences between clusters according to respondents' working experience, position, or education. In other words, respondents with

Table 6. Comparison of Clusters Distribution

Profile	Categories	Cluster				Fisher's exact test	
		1	2	3	4	Value	Significant
Experience	1–5 years	1	17	5	17	10.005	0.319
	5–10 years	1	21	6	20		
	10–15 years	1	14	5	11		
	Over 15 years	4	13	—	13		
Position	Staff	2	43	11	35	9.672	0.299
	Project manager	2	14	5	15		
	Department manager	1	5	—	5		
	Top manager	2	3	—	6		
Education	High school or below	—	8	—	7	12.164	0.160
	Junior college	3	25	4	11		
	Bachelor's degree	3	20	10	27		
	Master's degree or over	1	12	2	16		
Organization	Contractor	—	9	6	18	27.425	0.000 ^a
	Quantity surveying	1	4	1	8		
	Supervision	—	31	1	11		
	Project management	6	21	8	24		

^aSignificant at 99% level.

different experience levels, positions, and education backgrounds have similar opinions across all four clusters.

However, the organizations of the respondents significantly affect the result. As provided in Table 6, the majority of respondents who are contractors belong to cluster 4, which strongly agrees with the importance and impact of B2G *guanxi*, whereas most respondents from supervision companies are in cluster 2 (i.e., important, but not essential). In short, project management and supervisor consultants are more likely to have low to moderate perception of B2G *guanxi* whereas contractors and quantity surveyors have a high perception of B2G *guanxi*. This is understandable given the industry variance and severe competition in the construction market of the infrastructure industry.

Compared with construction and quantity surveying, supervision and project management organizations have only come into existence since 1988 and 2003, respectively. In general, their personnel have rich construction project management experience and knowledge. There are only 14,210 companies in the two types of organizations, which rely very much on their reputation and capacity to win infrastructure projects, whereas the number of companies in construction and quantity surveying organizations is almost 420,000 (National Bureau of Statistics 2015). At the same time, establishing these organizations is comparatively easy. Under these circumstances, in addition to improving their management capacity and technical ability, relying on B2G *guanxi* to win infrastructure projects is one of the effective ways for a firm's survival and development. Furthermore, due to overly severe competition in tendering and bidding, construction and consultant organizations have to invest significantly in B2G *guanxi* in terms of gifts, entertainment, and similar means. For example, it is reported that the five largest construction companies spent CNY 2.23 billion (US\$350 million) in establishing and maintaining B2G *guanxi* in 2012 (Ye and Zhou 2013). One respondent even pointed out that, because of the competition, companies trying to win a CNY 100 million infrastructure project cannot succeed without spending more than CNY 7 to 8 million on B2G *guanxi*.

Conclusions

In China, infrastructure procurement according to the national tendering and bidding law was enacted only as recently as 2000.

Informal institutions such as B2G *guanxi* still play an important role in tendering and bidding activities, in addition to laws and other formal institutions. Some even claim that B2G *guanxi* is still the quickest way to win infrastructure projects even with the increasing robustness of the Chinese legal system. However, despite the ample literature relating to B2G *guanxi*, little is known about infrastructure bidders' perceptions of B2G *guanxi*. The focal point of this paper is therefore to understand and compare these different perceptions.

The findings indicate that bidders generally recognize the importance of B2G *guanxi* for their business and the positive role of B2G *guanxi* in tendering and bidding. In particular, they strongly agree that having good B2G *guanxi* is important, making tendering and bidding easier and helping avoid risks. Additionally, the perception of B2G *guanxi* can be classified into four clusters, ranging from the low to positive-high, with 52% of respondents belonging to the passive-high and positive-high clusters. Finally, compared with project management and supervision consultants, contractors and quantity surveying organizations place significantly more emphasis on the importance of B2G *guanxi* in bidding and tendering and working hard to establish B2G *guanxi*.

The research findings have a number of implications. First, the higher emphasis on the importance of B2G *guanxi* by the contractor and quantity surveying respondents suggest that the different perceptions of B2G *guanxi* among different organizations are mainly due to the amount of competition involved and industry development level, especially the quality of professional personnel. Second, given that the tendering and bidding laws have yet to be effectively implemented, B2G *guanxi*, as social capital, is a substitute for formal tendering and bidding institutional support, and resorting to B2G *guanxi* to win infrastructure instead of improving the core competitiveness of companies is an effective solution for companies to survive. Third, B2G *guanxi* is not just a mere value attitude; it reveals the complex relationship between government officials and business managers.

Meanwhile, B2G *guanxi* may cause companies to overly concentrate on establishing and maintaining B2G *guanxi* at the expense of paying attention to improving their core competitiveness. This situation can be rectified through the cultivation of a fairer competitive environment. Future research tracking such changes in infrastructure tendering and bidding would help support this process.

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