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Research Article

Empirical Study on the Obstacles to the Success of Joint Ventures in Construction Projects

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As an effective way of completing technically complex buildings or large-scale infrastructure projects, a joint venture contracting approach has recently been widely used in the construction industry. However, numerous unfavorable results can occur in practice when undertaking construction joint ventures (CJVs). The contribution of this paper is its exploration of the potential obstacles to CJV practices and identification of the root causes of failure. First, through a literature review, semistructured interviews, and a questionnaire survey, seventeen variables were identified; the top three obstacle variables were (1) inconsistent management styles, (2) incompatible organizational cultures, and (3) organizational policy differences. Second, four grouped factors were extracted: (1) unfair and noneffective management; (2) lack of communication, understanding, and mutual trust; (3) policy, management style, and organizational cultural differences; and (4) potential conflicts beyond the CJV partnership. Finally, several strategies were proposed. The research findings could not only contribute to knowledge of CJVs but also provide valuable insights into promoting broader, better applications of CJV projects and contributing to their success.

1. Introduction

It is important to generate intercompany alliances and cooperation in the construction industry, as such cooperation could increase efficiency and productivity, reduce costs, improve technical capabilities, enhance competitiveness, share financial and organizational risks, and maximize project value [1]. Construction joint ventures (CJVs) are a form of collaborative contracting, and project partners can obtain many benefits through cooperation among different parties [2–4]. Joint ventures have helped enhance the competitive effects of centralized procurement [5]. Moreover, for large infrastructure projects, CJVs are an effective and convenient way to gather expertise from joint venture partners [6]. The underlying problems and risks of construction projects have made it necessary for contractors to cooperate with each other in the form of joint ventures.

There were many benefits to using joint ventures in construction projects, in terms of technology transfer, financial advantages, risk sharing, and resource integration [1, 3, 7]. Developing countries have especially benefited from CJVs, such as through the enhancement of global competitiveness, development of the local construction market, and improvement of domestic construction technology skills and the project management level [8, 9]. Although many advantages of CJVs exist and many construction projects have used this mode, industrial practice records show unsatisfactory results [10]. While some scholars have revealed the problems and challenges in CJV practice, most of them have provided descriptive interpretations regarding influential factors or success factors. Systematic empirical research on the potential obstacles to applying CJVs is essential, as it could help better understand the root causes of the success or failure of CJVs and help decision makers adopt appropriate and effective strategies to overcome potential difficulties and achieve ultimate success.

This paper presents a systematic empirical study focusing on the potential obstacles to applying CJVs. The

detailed objectives are as follows: (1) to identify the critical variables of the obstacles to success in CJVs and explore their relative importance and (2) to interpret the underlying factors related to the obstacles to CJV success. To achieve these two objectives, a literature review, semistructured interviews, and a questionnaire survey were conducted to elicit the opinions of experts and professionals in both academic and industrial fields on the obstacles to success around the world.

This research expands the literature on factors related to CJV practices by analyzing the obstacles of CJVs. Meanwhile, it provides CJV practitioners with a deep understanding of the obstacles to success. As the foundation for further work of developing a collaborative framework, this paper makes a significant contribution to the body of knowledge on joint venture projects in the construction industry.

2. Literature Review

Previous research on CJVs related to the obstacles of CJVs can be divided into three perspectives: (1) risk, (2) factors, and (3) challenges.

2.1. Risk Assessment or Risk Management of CJVs. A relatively large amount of research has focused on the risk related to CJVs. Despite the obvious benefits of joint ventures and some examples of their successful application, joint ventures always eventually show deviation and create a series of problems. The risks faced by joint ventures mainly stem from antitrust, sovereign conflict, lack of autonomy and control, and loss of competitive advantage due to strategic inflexibility [11]. Akhund et al. [12] revealed the risks of CJVs from the perspectives of community, ecology, politics, legislation, and economy in Pakistan. The risks of Sino-foreign CJVs were divided into six categories: management risk, market risk, legal risk, financial risk, technical risk and policy, and political risk [13]. Industrial disputes, power and water shortages, and partner practices were the most important components of technology risk in construction projects [14].

Meanwhile, the influence of external risks on the success factors of time, cost, and quality standards in international construction joint venture (ICJV) projects in Pakistan has been investigated from political, economic, legislative, social, and environmental perspectives [15]. Political instability was revealed to be the greatest challenge or risk of ICJVs between Singapore and developing countries [16]. Deng et al. [17] conducted an in-depth study of political risk management in international construction projects by identifying both microvariables and macrovariables in China. Do et al. [18] evaluated the risk factors of Vietnam's ICJV projects from three performance stages, namely, starting, operating, and dismantling, and revealed that language barriers, different social cultures, architect/engineer issues, financial and organizational problems of the parent company, bureaucracy, corruption and bribery, and the economic conditions of the startup stage were most concerning. From a risk assessment approach, a management model of ICJVs was developed that included eight factors: partner selection, agreement, subcontract, engineering contract, employment, good relations, control, and renegotiation [3, 19]. Zhang and Zou [20] proposed the fuzzy analytic hierarchy process as a risk assessment method for China's CJV projects.

2.2. Influential Factors and Success Factors of CJV Practices. Morledge and Adnan [21] noted that contract agreements, commitments and cooperation, management control, trust among partners, and financial stability were critical factors for success in Malaysian CJV projects. Munns et al. [22] argued that communication, collaboration, and partner selection as well as cultural homogeneity were the critical success factors of CJVs. Ho et al. [23] proposed culture, trust, procurement autonomy, learning motivation, and organizational governance structure as the major determinants of CJVs. Alashwal et al. [24] suggested that project success always depends on three criteria, namely, function, management, and organization. They argued that the critical success factors included team professionalism, resource availability, external environment, and organizational ability. Marie and Justus [10] highlighted nine success factors that significantly affected the achievement of CJVs: collaboration, communication, trust, understanding, the commitment of the partners, contract management, management control, fair and full written agreements, and contract execution.

The influence of culture, interpartner fit, host country conditions, and project characteristics on ICJV projects was explored by Ozorhon et al. [25–27]. Partners with compatible skills, resources, and cultures were expected to make greater ICJV achievements [28]. Girmscheid and Brockmann [7] noted that both interorganizational and intraorganizational trust should be important success factors in ICJVs as well. In addition to reputation and trust, Adnan et al. [29] emphasized the personal knowledge, skill, and commitment of managers as success criteria for ICJV projects.

2.3. Challenges and Difficulties of CJV Practices. Large-scale infrastructure projects are very complex, and it is difficult to select the most suitable joint venture contractors [30]. Dispute resolution in CJVs is another challenge in CJV projects. One Sino-foreign joint venture international project was reported to have settled disputes through arbitration [31]. In a study of CJV projects, Allen [32] showed that more than 30 percent of the projects involved disputes, nearly half of which were caused by inappropriate behavior of the project managers or engineers. Lack of understanding of the contract process and favoritism toward the employer were two of the most serious mistakes a project manager or engineer made. In Singapore, although technology transfer was reported to be achieved through joint ventures, there were many problems within the process [33]. In practice, joint ventures are not always the most effective way to conduct technology transfer, as some previous studies have shown. Some research has highlighted the largest problem of

technology transfer in the construction industry to be the lack of incentives for transferors to promote mobility, which results in stronger local competitors. In other research, culture has been cited as the main reason for the failure of CJVs [3, 34]. Conflicts in a joint venture are often caused by the differences between partners, which can be more serious as a result of the different cultural backgrounds [22].

It is not easy to manage international joint ventures (IJVs) because the cultural differences among partners have a significant impact on alliance performance. Ozorhon et al. [26] found that the impact of differences in organizational culture was more significant than the differences in national and host country culture. There has also been some research on knowledge management and knowledge sharing in this field. Dulaimi [35] found that ICJVs did not actually create an environment conducive to knowledge sharing as expected because it was difficult to integrate the foreign culture and local culture. Risk allocation was another challenge for ICJVs, as it was difficult to conduct because of the "unclear division of responsibilities and risks" and "differences in culture and working styles" [16]. David et al. [36] explored safety management challenges for ICJV workforces through a case study in the UK and revealed that different legislation and standards, different working practices, different national cultures, and poor worker welfare were the problems that workers on ICJV projects faced.

In summary, the above literature review shows that it is more and more popular and complex in the field of CJVs, including research on aspects of risk, factors, and challenges. However, it also reveals some limitations in both the academic and industrial fields. Although an increasing number of scholars have focused on risk assessment and factor identification, there is an absence of research on the obstacles to the formation and operation of CJVs and the root causes of failure. The increasing complexity and associated risks of construction projects, especially large-scale projects, make it essential to adopt joint ventures as an ideal project delivery approach [3]. From a practical point of view, the obstacles to the success of the CJVs should also be systematically investigated and appropriately identified before using joint venture contracts, based on which potential strategies to promote the proper adoption of joint ventures could be developed.

3. Research Methodology

3.1. Overall Research Framework and Methodology. This paper presents a systematic empirical study focusing on the underlying obstacles to applying CJVs. It will lay the foundation for selecting and implementing effective response strategies to overcome the difficulties and challenges of CJVs and avoid undesirable results. To achieve this aim, the first objective is to identify the obstacles to CJVs and analyze their relative importance and then explain the underlying grouped factors related to the obstacles to the success of CJVs based on which corresponding strategies can be proposed. The methodology of this study included a literature review, semistructured face-to-face interviews, and a questionnaire survey. Figure 1 shows the research flow with the methods and outcomes.

First, a comprehensive review of the literature on the difficulties in and obstacles to the practical application of CJVs in different countries and regions was conducted. In this paper, obstacles to the success of CJV included, but were not limited to, the factors leading to the failure of CJVs and the underlying risks of and barriers to the formation of CJVs. The research framework was improved from the work developed by Hong [3]. Table 1 shows the potential obstacles to CJV success as reported in previous research.

Second, six semistructured face-to-face interviews in pilot study were conducted to solicit experts' perceptions towards the obstacles to CJV success. Meanwhile, this paper adopted interviews to validate the initial variable list from the literature. Because the study considers both theoretical and practical aspects, both industry practitioners and academicians were selected as potential interviewees [3]. Table 2 provides the background information of the six interviewees involved in this research. The content of the interview questions was generally about the CJVs but were not specific to domestic CJVs or ICJVs. The interviewees' perceived that obstacles to CJV success corresponded directly to the obstacles identified in previous research. Experts totally pointed out 14 obstacles to the success of CJV. The items of organizational cultural differences and lack of mutual trust played key roles in determining the failure or success of CJVs [3]. Three experts believed that conflicts in distribution of authority were an important reason for the failure of CJV. Table 3 shows the results of the underlying obstacles to the success of CJV from interviews.

Third, according to the literature review and the results of the semistructured interviews, a pilot survey questionnaire was designed and then reviewed by the six selected experts. From October 2018 to December 2018, an industry-wide structured survey of construction joint ventures was conducted in several regions around the world. A purposive sampling approach was adopted. All respondents had direct practical experience in at least one CJV project. A five-point Likert scale was used to score the degree of agreement on the identified CJV obstacles.

This paper adopted purposive sampling techniques, which were used when the researcher wants to select a purposive sample that represents a broader group of cases as closely as possible [41]. In the snowball sampling process, the potential respondents were required to have direct CJV project experience. Participants were adoptable only if the CJV project was almost done; otherwise, those with previous experience in other CJV projects were considered as valid respondents [3]. A total of 123 questionnaires were returned to the managers and technique/site professionals who had practical experience with CJV projects, and the distribution of effective responses is shown in Table 4. There were 109 valid responses, including 18.35% from project managers ($N = 20$), 9.17% from contract managers ($N = 10$), 47.71% from engineers ($N = 52$), 16.51% from surveyors ($N = 18$), and 8.26% from other types of affiliated professionals ($N = 9$), such as subagents, labor officers, and security officers. The effective rate of 88.62% was acceptable and adequate for data analysis. The respondents included all the project members at the management level who directly participated in the daily work of the CJV

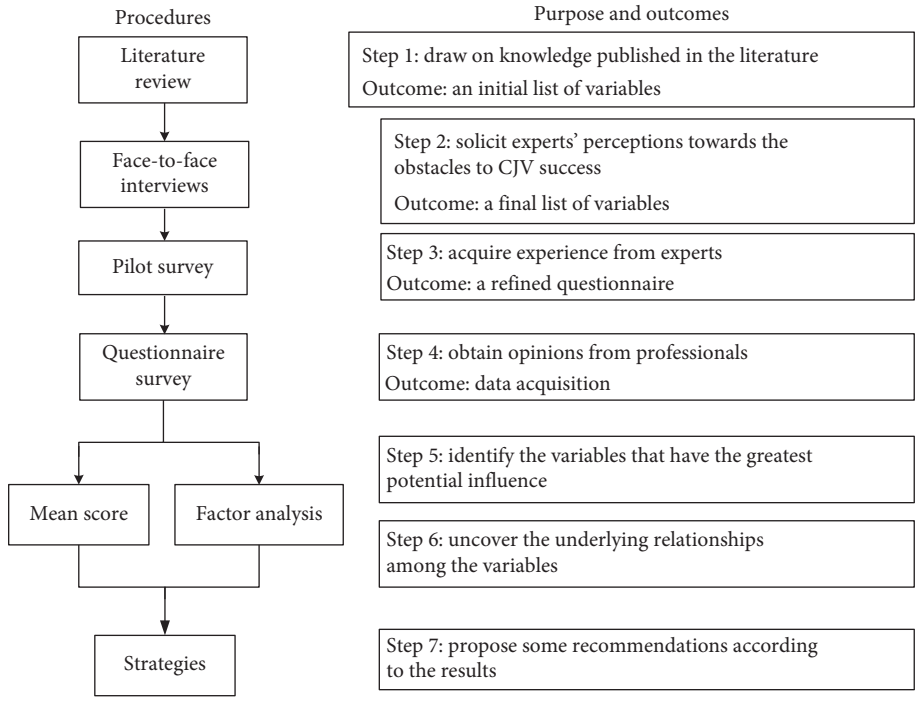

Figure 1: Flow chart of research process.

Table 1: Variables identified in the literature.

No.	Variables (potential obstacles)	Munns et al. [22]	Shen et al. [13]	Hung et al. [37]	Mohamed [38]	Walker and Johannes [6]	McIntosh and McCabe [39]	Zhang and Zou [20]	Ozorhon et al. [9]	Kim et al. [40]
V1	Lack of knowledge about the joint venture contracting method	N	N	N	N	N	N	N	Y	N
V2	Conflicts of interest among the parties outside the CJV agreement	N	Y	N	N	N	Y	Y	N	Y
V3	Inconsistent project objectives among CJV team members	N	Y	Y	N	N	N	N	N	Y
V4	Lack of mutual understanding among CJV team members	N	N	N	N	Y	N	N	N	N
V5	Lack of mutual trust among CJV contracting parties	Y	Y	Y	N	Y	N	Y	N	N
V6	Lack of communication among CJV contracting parties	Y	N	Y	N	N	Y	Y	N	N
V7	Incompatible organizational cultures among CJV contracting parties	N	Y	Y	Y	Y	Y	Y	Y	N
V8	Inconsistent management styles among CJV contracting parties	N	N	Y	N	N	N	N	N	N
V9	Differences in organizational policies among CJV contracting parties	N	N	Y	N	Y	N	N	N	N

Table 1: Continued.

No.	Variables (potential obstacles)	Munns et al. [22]	Shen et al. [13]	Hung et al. [37]	Mohamed [38]	Walker and Johannes [6]	McIntosh and McCabe [39]	Zhang and Zou [20]	Ozorhon et al. [9]	Kim et al. [40]
V10	Inflexibility of JV organizational operations	N	N	Y	N	N	N	N	N	N
V11	Unfair gain share/pain share among CJV contracting parties	N	N	N	N	N	Y	N	Y	N
V12	Lack of mutual agreement on conflict resolution mechanisms among CJV contracting parties	N	N	N	Y	N	N	N	N	N
V13	Lack of entire management control over CJV partners	N	Y	N	Y	N	N	N	N	Y
V14	Lack of strategic planning for CJV operation	N	N	Y	N	N	N	N	N	N
V15	Difficulties with CJV financial administration	N	N	N	Y	N	N	N	N	N
V16	Lack of top management support for creating the right work atmosphere throughout the CJV contracting process	N	N	N	Y	N	N	N	N	N
V17	Conflicts in the distribution and execution of authority	N	N	N	N	Y	N	Y	N	Y

Table 2: Personal information of the interviewees.

Interviewee	Profession	Working years	Location	Number of publications about CJVs	Number of CJV projects
1	Academia	32	Hong Kong	1	3
2	Academia	30	Mainland China	3	0
3	Practice	15	Hong Kong	0	3
4	Academia	34	Hong Kong	6	0
5	Practice and academia	29	Mainland China	0	3
6	Practice	12	Mainland China	0	4

Table 3: Results of the underlying obstacles to CJV success from interviews.

No.	Underlying obstacles to CJV success	I1	I2	I3	I4	I5	I6
1	Organizational cultural differences	Y	Y	Y	Y	Y	Y
2	Inconsistent project objectives	Y	N	N	Y	N	Y
3	Lack of mutual trust	Y	Y	Y	Y	Y	Y
4	Conflicts in inputs and profit distribution	Y	N	N	N	N	Y
5	Conflicts in authority distribution and execution	Y	N	Y	N	Y	Y
6	Incompatible management styles	N	Y	N	N	Y	N
7	Corporate standard differences	N	Y	N	N	N	Y
8	Conflicts in working procedures	N	Y	N	N	Y	N
9	Lack of effective communications	N	N	Y	N	N	N
10	Difficulty in the integration of CJV members	N	N	Y	N	N	N
11	Lack of problem solving mechanism	N	N	N	Y	N	N
12	Lack of dispute resolution mechanism	N	N	N	Y	N	N
13	Lack of employee training programs	N	N	N	Y	N	N
14	Lack of mutual understanding among different parties	N	N	N	Y	N	N

Table 4: Distribution of the effective responses in the survey.

Region of the respondents	Number of valid responses	Percentage
Mainland China, Hong Kong, and Taiwan	39	35.78
Southeast Asia	28	25.69
Australia	9	8.26
North America	19	17.43
Europe	14	12.84
Total	109	100

projects; therefore, the data analysis in this study can be considered representative and valid.

4. Results Analysis

To identify the obstacles to CJV success, the descriptive statistics, the mean scores, Kendall's concordance test, Spearman's rank correlation test, a one-way ANOVA test, and factor analysis were used for data analysis.

4.1. Ranking of the Obstacles. The results (Table 5) showed that the mean values of all the respondents were higher than 3.00, which indicated that the consistency existed in the 17 potential obstacles.

As shown in Table 5, the top three greatest obstacles impeding CJV success were V8, V7, and V9 from the perspective of management styles, organizational cultures, and organizational policies, respectively; the finding regarding the first two obstacles were consistent with the research findings of previous literature [3, 6, 36, 42]. In Norwood and Mansfield's [45] research, cultural homogeneity was considered a key factor that threatened CJV success. In joint ventures, serious cultural conflicts often exist; for example, partners with different cultural backgrounds and perspectives have different ways to address problems [37]. Due to organizational differences, a "lack of mutual understanding among CJV project members" was considered another obstacle to the success of CJVs. The scope of mutual understanding included the overall situation of the joint venture partners in terms of their social reputation and financial ability [3]. In some cases, serious problems are often due to the partners' misunderstandings of political and historical pressures [6]. For instance, joint venture partners might bear the risk of corruption and/or illegal activities associated with the joint venture project by their partners. For the last three obstacles, the results showed that a clear understanding of the CJV approach was foundational to establishing a joint venture relationship. Therefore, previous participation in joint venture partnerships had a positive effect on the success of joint ventures.

4.2. Agreement of Respondents. Based on a global sample, it is essential to reveal the general issues from the perspective of project participants and explore whether they hold consistent view of the obstacles to CJV success. Table 5 shows that the respondents in each group were reasonably consistent in their ranking of obstacles. Chi-square test was used to test the agreement among respondents. The results showed that all the actual chi-square values were higher than the critical chi-square value of 26.30; therefore, the null hypothesis that ranking variables were independent with each other was rejected.

Furthermore, this paper did a comparison research between different groups using Spearman's rank correlation test. The statistical findings also showed that any two survey groups were consistent in their rankings of the obstacles to CJV success. Pairwise comparison revealed the significant correlations between any two groups, as 0.004, 0.023, and 0.000 were all below the critical level of 0.05 (Table 6). The results of the one-way ANOVA revealed that there were no statistically significant differences in the mean values of each obstacle at a significance level of five percent. The lowest mean value of all obstacles was 0.086, which was greater than 0.05 (Table 5); thus, the agreement of the three respondent groups was consistent for each of the 17 obstacles.

4.3. Factor Analysis. Further analysis was conducted to reveal the underlying interrelations among the identified obstacles. Principal component analysis and Promax rotation method were used to extract the factors for the 17 variables.

The KMO index (0.856) was above 0.50, and the Bartlett test of sphericity yielded an approximate chi-square value of 798.053, which indicated principal component analysis was applicable [44]. The output alpha value of 0.853 was larger than 0.80, indicating that the reliability was acceptable. The measurement scale adopted was reliable, and there was a high degree of reliability in the correlations among the 17 obstacles. The factor analysis showed good reliability and validity that were suitable for the analysis of survey data.

According to the latent root criterion, four components were extracted using principal component analysis. A four-component solution was produced with up to 63.897% of the variance explained, which was above the level of 60 percent advocated by Malhotra [45]. The variance of each component and the factor structure are shown in Table 7. All the variables were entered into the analysis because the factor loading of each variable of the component was above 0.40, which was used by Hon et al. [46] in their research.

4.3.1. Factor 1: Unfair and Noneffective Management. Seven variables were grouped into Factor 1 and summarized management issues. V13, V14, V16, and V17 focused on unfair and noneffective management for planning, operation, and control, while V11, V12, and V15 were related to

Table 5: Results of statistical analysis.

Variables (potential obstacles of CJV success)	Senior management group (group 1)		Project management group (group 2)		Technical/site group (group 3)		All respondent group		Result of ANOVA	
	Mean value	Rank	Mean value	Rank	Mean value	Rank	Mean value	Rank	F	Sig.
V8	3.92	2	3.98	1	3.68	1	3.91	1	1.560	0.215
V7	3.92	2	3.86	2	3.59	2	3.79	2	1.157	0.319
V9	3.67	6	3.83	3	3.51	4	3.71	3	1.354	0.263
V4	3.75	4	3.74	5	3.59	2	3.69	4	0.373	0.690
V3	3.58	8	3.81	4	3.43	8	3.65	5	2.287	0.107
V5	3.75	4	3.72	6	3.49	5	3.64	6	0.937	0.395
V6	4.00	1	3.60	7	3.41	9	3.58	7	1.963	0.146
V2	3.42	12	3.52	9	3.46	6	3.49	8	0.093	0.911
V13	3.67	6	3.57	8	3.24	13	3.47	9	1.443	0.241
V10	3.50	11	3.48	11	3.38	11	3.45	10	0.166	0.847
V16	3.42	12	3.43	13	3.46	6	3.44	11	0.012	0.988
V12	3.25	15	3.48	11	3.41	9	3.43	12	0.340	0.713
V14	3.17	17	3.52	9	3.30	12	3.40	13	0.971	0.382
V17	3.58	8	3.33	14	3.24	13	3.33	14	0.565	0.570
V11	3.42	12	3.26	15	3.19	15	3.25	15	0.269	0.765
V1	3.25	15	3.26	15	3.14	16	3.21	16	0.315	0.731
V15	3.58	8	3.22	17	2.95	17	3.19	17	2.497	0.086
Number of survey responses	12		59		38		109			
Kendall's coefficient of concordance (W)	0.146		0.074		0.067		0.065			
Actual calculated chi-square value	28.043		68.985		39.831		111.595			
Critical chi-square value from the table	26.30		26.30		26.30		26.30			
Asymptotic level of significance	0.031		0.000		0.001		0.000			

Table 6: Correlation test results between any two respondent groups.

Pairwise comparison	r_s	Significance level
Group 1 vs group 2	0.676	0.004[a]
Group 1 vs group 3	0.544	0.023
Group 2 vs group 3	0.847	0.000

[a]Significant correlation at the 5% significance level.

the conflicts and difficulties that might be encountered in the management process.

In CJVs, importance should be given to both project planning and strategic planning to avoid risk and potential conflicts [13, 37]. A lack of coordination in strategic planning between parent companies might have an adverse impact on the implementation of the joint venture and could slowly become exacerbated. There is not enough time to substantially revise the parent company's conflict strategy because of the time limitations of CJV projects. Joint venture operations should be flexible enough to meet the changing requirements that professionals establish for projects [47]. A rigid organizational structure makes it difficult to adapt to environmental changes and midterm adjustments in project implementation, which always leads to dissatisfaction from CJV partners [37]. Flexible joint venture operations should take action immediately to solve any unexpected problems, which could help enhance the efficiency of the CJV team in the long run. If one of the partners dominates the joint venture agreement, the project could have a great risk of failure or of being taken over by the partner [22]. A lack of complete management and financial control over the joint venture is one of the reasons for failure [45]. In addition to an effective management mechanism for planning, operation, and control, a conflict resolution mechanism that all partners agree with is also critical for CJV success. Partners from different countries or regions have many differences in culture, policy, management, and other aspects; thus, conflicts inevitably occur in the process of the operation procedure of CJVs. A lack of a mutually agreed-upon conflict resolution mechanism would impede normal operation and ultimately lead to the failure of the joint venture relationship [3]. Finally, financial management is another key factor. Without a solid financial administrative mechanism, a successful CJV project is difficult to achieve [48]. To avoid unclear financial matters related to any partner, it is necessary to perform mutual inspection and show the records of financial inputs and benefits. Therefore, a lack of fair and effective management mechanisms for planning, operation, and control could be regarded as a main obstacle factor to CJV success [3].

4.3.2. Factor 2: Lack of Communication, Understanding, and Mutual Trust. This factor mainly described the lack of communication, understanding, and mutual trust in CJV relationships and included five variables. V4, V5, and V6 were directly related to Factor 2. Although V1 and V3 were not directly related to this factor, they were closely related to these three behavioral aspects. A lack of understanding of the formation and operation process reduces understanding among partners in joint ventures, while inconsistent goals impede the formation of trust and the

Table 7: Results of the factor analysis.

Components and variable groupings	Factor loading	Eigenvalue	Percentage of the variance explained	Cumulative percentage of the variance explained
Factor 1: unfair and noneffective management		6.481	38.131	38.131
V17	0.794			
V16	0.784			
V11	0.736			
V13	0.693			
V14	0.691			
V15	0.653			
V12	0.614			
Factor 2: lack of communication, understanding, and mutual trust		1.776	10.454	48.585
V4	0.817			
V6	0.774			
V5	0.769			
V1	0.556			
V3	0.402			
Factor 3: policy, management style, and organizational cultural differences		1.541	9.071	57.652
V9	0.847			
V10	0.681			
V7	0.646			
V8	0.604			
Factor 4: potential conflicts beyond CJV partnerships		1.062	6.242	63.897
V2	0.921			

promotion of communication [3]. These five variables form the basis of joint venture collaboration.

A lack of mutual trust among different parties has been identified as a major obstacle to the performance of CJVs [3, 22, 37]. To maintain a good business relationship, the trust and commitment of different partners are essential and significant [6]. Mutual trust among CJV contracting parties can bring multiple benefits in terms of promoting the consistency of partners' interests, improving the satisfaction of stakeholders, and increasing business opportunities from collaboration [49, 51]. The communication intensity among partners is positively correlated with the overall satisfaction of the CJV project. Meanwhile, a lack of communication among partners can undermine the effectiveness of the joint venture and ultimately lead to the failure of CJV projects [22]. To meet the changing demand of joint ventures, negotiation-based communication is essential to ensure the corresponding strategy adjustments to solve management problems in the operation of CJV projects. In an integrated joint venture, mutual understanding among different partners is a prerequisite for effective work. Mutual understanding includes, but is not limited to, a complete understanding of a partner's culture, work style, and professional field. Serious problems arise when a joint venture partner does not understand the culture that affects his or her partner [3, 6]. A lack of mutual understanding leads to inefficiency, which poses a potential threat to the success of the CJV project. In this context, mutual trust, communication, and understanding among partners are the preconditions for the success of CJVs [3].

4.3.3. Factor 3: Policy, Management Style, and Organizational Cultural Differences. Four variables associated with organizational differences constituted the third factor. V7, V8, and V9 described organizational differences from the perspective of culture, policy, and management style. V10 concerned the detailed management procedures and work style resulting in inefficient operation of the joint venture.

Incompatible organizational culture leads to the failure of CJV [22]. The influence of culture on the joint venture organization is invisible but is manifested through cultural conflicts [3, 52]. The underlying conflicts in a joint venture have been shown to be due to differences among partners, and different cultural backgrounds definitely lead to the intensification of such differences [22]. In ICJVs, cultural diversity often makes working relationships weak, and different management styles might lead to pressures and conflicts and damage the original working relationship [53]. If one company is used to a centralized management style while another company adopts an autonomous, decentralized management style, the two companies will have difficulty integrating. The previous empirical study also revealed that inconsistent management styles might be a critical factor in the failure of CJV projects. Differences in organizational policies, such as differences in corporate quality standards, could make joint ventures difficult to implement [37]. Research on the British construction industry has also revealed that organizational policy differences include many aspects of standards and norms. If these differences are not properly solved, they might increase the risk of failure of the CJV project [54]. Hence, interorganizational differences,

including policies, management, and cultures, are the third obstacle factor that affects CJV project outcomes.

4.3.4. Factor 4: Potential Conflicts beyond CJV Partnerships. Factor 4 contained only V2, which was termed "conflicts of interest among the parties outside the CJV agreement." This factor was not closely related to the other three factors because it did not focus on the behavioral processes of CJVs. This paper did not specify the scope of study only in behavioral aspects during the formation and operation of CJVs. Therefore, in order to show a comprehensive understanding of the obstacles to CJV success, even if only one variable reflects one factor, it should be retained.

In previous studies, conflicts among parent companies outside joint venture agreements have also been shown to lead to negative outcomes [54]. Regardless of the joint venture relationship formed in a particular project, the parent company participating in the joint venture project might be the competitor of his or her partner's parent company [3]. The CJV team, which is composed of different companies, is usually not completely independent of the partner's parent organization. In this case, if the strategy of a parent company is not consistent with that of the CJV project, it might impede the project's normal operation. The strategy of a parent company might have a negative impact on the smooth operation of the CJV project. Therefore, conflicts beyond the joint venture partnership agreement could be a potential obstacle factor to CJV success.

5. Discussion and Recommendations

The above results show that the principal obstacles for CJVs are imperfect management mechanisms (operation and control), a lack of trust, and differences in organizational culture. Due to space limitations, this paper will not provide a detailed explanation of the potential conflicts beyond the CJV partnership agreement, but instead will pay more attention to internal project conflict, management, trust, and culture. According to the previous literature, the challenges and problems of CJVs include dispute resolution, division of responsibility, risk allocation, legislation and standards, culture, etc., all of which could result in unsatisfied project outcomes. All these specific elements can actually be summarized as difficulties with management, trust, and culture. The research gap in the area of CJV is due not only to a shortage of research about challenges and obstacles but also to a lack of systematic research to classify those obstacles. This paper is innovative because it responds to this gap. Compared with the literature on challenges and obstacles of CJVs, there is relatively more literature about the critical success factors of CJVs. Scholars have used different kinds of research methods to explore many success factors, such as contract and risk commitment, management control, financial stability, the environment, and human resources. Management control, interpartner trust, and cultural homogeneity as success factors correspond to the grouped obstacle factors in this study. These factors might represent the common problems of CJVs. It is important to focus on the principal obstacles to solving CJV problems in practice because consideration of only the success factors cannot reveal the reasons for poor project outcomes.

5.1. Management Mechanisms. Proper management could help partners coordinate project activities and lead to the acquisition of complementary resources and guarantee that the resources are used efficiently. Establishment of fair and effective management mechanisms is the most essential for CJV projects.

The operation of CJVs is a collaborative process from the perspective of management. A framework for the processes of planning, formation, operation, and control of CJV projects could be built to guarantee effective management mechanisms. With the reference of Bernold and AbouRizk's [55] idea of input-process-output (IPO), the collaborative process of Sino-foreign CJVs could be divided into four main stages: collaborative culture formation, collaborative input, collaborative processes, and collaborative output. The integrated management mechanism would be established according to the behavioral characteristics of each stage.

5.2. Trust and Communication. Joint venture partners must realize the importance of the establishment of trust relationships because trust will have a positive impact on knowledge exchange and the sharing of information and other resources between partners. Improvement of partnerships is a critical factor in maintaining the stability of joint ventures. In the research on risk control in joint ventures, trust and control have been considered two important factors affecting risk [16]. Relationship exchange theory holds that trust and similar values and beliefs among joint venture partners are elements of an effective governance strategy [56].

Trust is generated through many aspects, including previous project experience, the partners' cultural sensitivity and reputation, communication between partners, IJV life expectancy, interdependence, ownership share, and resource complementarity [56]. It is good for managers to build partnerships with collaborative parties who can provide complementary resources because under the circumstance of complementary resources, the partners will act in mutually beneficial ways. Rather than being opportunistic, partners will pay more attention to the overall viability and competitiveness of joint ventures and develop mutual trust among partners. For those companies with good reputations, timely and frequent communication among partners is a foundation for building trust. Within partnerships, communication allows for a clear understanding of the goals, roles, and responsibilities of all the participants [27]. A proper interorganizational relationship is a precondition for trust development [57]. Every interorganizational relationship is different and arises under its own conditions. A more successful partnership can be expected to show a higher level of communication quality and undertake more information sharing. A lack of collaborative communication and teamwork awareness inevitably leads to conflicts on site, which break down relationships [58].

5.3. Organizational Culture. Organizations should consider their choices of partners very carefully. Partners who have cultural similarities are more likely to perform well since they share common values that could reduce the risk of conflict during the formation and operation of IJVs [28]. It is also important for parties in the joint venture to share the same objectives and goals [59].

It is important to establish common values as a part of the organizational culture among partners. Common values can enhance staff cohesion and conflict resolution [60]. The role of managers is to integrate two different cultures. The bias caused by culture can be corrected only by adjusting culture [61]. The first step is to establish an integrated organizational culture and eliminate management conflicts. In the process of cultural integration, mutual respect, advantage enhancement, harmony and friendship, and common interests are the basic principles. Based on cultural integration, the policies, management style, and decisions of the partners can be united to create a unified moral ethic and code of conduct. Cross-cultural training for senior managers is an effective way to prevent or resolve cultural conflicts. Such training requires a group of highly qualified cross-cultural managers. Managers must not only have high-level technical knowledge and management ability but also accept different opinions and be good at collaborating with people from different cultures. The main contents of cross-cultural training include language learning, understanding different parties' cultural, conflict management, cross-cultural communication methods, regional environment simulation, etc.

6. Conclusion

For construction projects, a joint venture contracting approach is appropriate and useful due to its obvious benefits. In view of the unfavorable outcomes of CJVs, it is very valuable to investigate the major obstacles hindering CJV success, according to which decision makers could adopt relevant strategies. This study sheds light on the successful operation of joint ventures in the construction market.

This paper used mean scores to rank the relative importance of a catalog of seventeen potential obstacles of CJV success. Three items, namely, "inconsistent management styles," "incompatible organizational cultures," and "organizational policy differences," were the greatest impediments to the success of CJVs. Given that all the potential obstacles have been considered to be critical in the literature, factor analysis was adopted to determine the principal variable groupings that would empirically support research on the obstacles to CJV success. The statistical analysis results revealed four components of the obstacles to CJV success: unfair and noneffective management (Factor 1); lack of communication, understanding, and mutual trust (Factor 2); policy, management style, and organizational cultural differences (Factor 3); and potential conflicts beyond the CJV partnership (Factor 4). If these obstacles are effectively addressed, CJVs will operate successfully and have excellent performance.

This study contributed to the body of CJV knowledge through a systematic exploration of the obstacles to success. With an in-depth understanding of the degrees of importance of different obstacles, managers could allocate resources efficiently. Based on the identification of the key obstacles and grouped factors, strategies were proposed for the three aspects of management, culture, and trust, which constitute the foundation of successful operation for CJVs. Effective strategies to overcome obstacles would promote the ultimate success of CJVs.

Data Availability

The data generated and analyzed during the study are available from the corresponding author by request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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References

[1] D. H. T. Walker and B. M. Lloyd-Walker, "Understanding the motivation and context for alliancing in the Australian construction industry," *International Journal of Managing Projects in Business*, vol. 9, no. 1, pp. 74–93, 2016.

[2] D. W. M. Chan, A. P. C. Chan, and T. N. Y. Choi, "An empirical survey of the benefits of implementing pay for safety scheme (PFSS) in the Hong Kong construction industry," *Journal of Safety Research*, vol. 41, no. 5, pp. 433–443, 2010.

[3] Y. M. Hong, "An empirical study of collaboration in construction joint venture (CJV) projects and its impacts on project performance in Hong Kong," *Dissertation*, The Hong Kong Polytechnic University, Hung Hom Bay, Hong Kong, 2014.

[4] J. F. Y. Yeung, A. P. C. Chan, and D. W. M. Chan, "Defining relational contracting from the Wittgenstein family-resemblance philosophy," *International Journal of Project Management*, vol. 30, no. 2, pp. 225–239, 2012.

[5] G. L. Albano and M. Spano, "Flexible strategies for centralized public procurement," *Review of Economics & Institutions*, vol. 1, no. 2, pp. 1–32, 2010.

[6] D. H. T. Walker and D. S. Johannes, "Construction industry joint venture behaviour in Hong Kong-designed for collaborative results?," *International Journal of Project Management*, vol. 21, no. 1, pp. 39–49, 2003.

[7] G. Girmscheid and C. Brockmann, "Inter- and intra-organizational trust in international construction joint ventures," *Journal of Construction Engineering and Management*, vol. 136, no. 3, pp. 353–360, 2010.

[8] S. R. Li, "China's construction industry in transition," *Building Research and Information*, vol. 29, no. 4, pp. 259–264, 2001.

[9] B. Ozorhon, I. Dikmen, and M. T. Birgonul, "Using analytic network process to predict the performance of international

construction joint ventures," *Journal of Management in Engineering*, vol. 23, no. 3, pp. 156–163, 2007.

[10] F. B. M. Marie and N. A. Justus, "Critical success factors influencing performance outcome of joint venture construction projects in South Africa: comparison of first and second order models," *Construction Economics and Building*, vol. 18, no. 3, pp. 74–93, 2018.

[11] K. R. Harrigan, *Joint Ventures, Alliances, and Corporate Strategy*, Beard Books, Washington, DC, USA, 2003.

[12] M. A. Akhund, A. R. Khoso, A. A. Pathan, H. U. Imad, and F. Siddiqui, "Risk attributes, influencing the time and cost overrun in joint venture construction projects of Pakistan," *Engineering Technology & Applied Science Research*, vol. 8, no. 4, pp. 3260–3264, 2018.

[13] L. Y. Shen, G. W. C. Wu, and C. S. K. Ng, "Risk assessment for construction joint ventures in China," *Journal of Construction Engineering and Management*, vol. 127, no. 1, pp. 76–81, 2001.

[14] A. Martin, Y. Wang, J. Li, and G. Mends, "Technical risk factors of international construction," *The Journal of Engineering*, vol. 2018, no. 3, pp. 138–146, 2018.

[15] A. Razzaq, M. J. Thaheem, A. Maqsoom, and H. F. Gabriel, "Critical external risks in international joint ventures for construction industry in Pakistan," *International Journal of Civil Engineering*, vol. 16, no. 2, pp. 189–205, 2018.

[16] B.-G. Hwang, X. Zhao, and E. W. Y. Chin, "International construction joint ventures between Singapore and developing countries," *Engineering, Construction and Architectural Management*, vol. 24, no. 2, pp. 209–228, 2017.

[17] X. Deng, S. P. Low, X. Zhao, and T. Chang, "Identifying micro variables contributing to political risks in international construction projects," *Engineering, Construction and Architectural Management*, vol. 25, no. 3, pp. 317–334, 2018.

[18] S. T. Do, V. Likhitruangsilp, T. T. Kiet, and P. T. Nguyen, "Risk assessment for international construction joint ventures in Vietnam," *International Journal of Advanced And Applied Sciences*, vol. 4, no. 6, pp. 104–114, 2017.

[19] B. Li and R. L. K. Tiong, "Risk management model for international construction joint ventures," *Journal of Construction Engineering and Management, ASCE*, vol. 125, no. 5, pp. 377–384, 1999.

[20] G. Zhang and P. X. Zou, "Fuzzy analytical hierarchy process risk assessment approach for joint venture construction projects in China," *Journal of Construction Engineering and Management*, vol. 133, no. 10, pp. 771–779, 2007.

[21] R. Morledge and M. Adnan, "Critical success factors in construction joint venture projects in Malaysia," *Journal of Construction Procurement*, vol. 12, no. 1, pp. 38–50, 2006.

[22] A. K. Munns, O. Aloquili, and B. Ramsay, "Joint venture negotiation and managerial practices in the new countries of the former Soviet Union," *International Journal of Project Management*, vol. 18, no. 6, pp. 403–413, 2000.

[23] S. P. Ho, Y. S. Lin, H. L. Wu, and W. Y. Chu, "Empirical test of a model for organizational governance structure choices in construction joint ventures," *Construction Management and Economics*, vol. 27, no. 3, pp. 315–324, 2009.

[24] A. M. Alashwal, N. F. Fareed, and K. M. Al-Obaidi, "Determining success criteria and success factors for international construction projects for Malaysian contractors," *Construction Economics and Building*, vol. 17, no. 2, pp. 62–80, 2017.

[25] B. Ozorhon, D. Arditi, I. Dikmen, and M. T. Birgonul, "Effect of host country and project conditions in international construction joint ventures," *International Journal of Project Management*, vol. 25, no. 8, pp. 799–806, 2007.

[26] B. Ozorhon, D. Arditi, I. Dikmen, and M. T. Birgonul, "Implications of culture in the performance of international construction joint ventures," *Journal of Construction Engineering and Management*, vol. 134, no. 5, pp. 361–370, 2008.

[27] B. Ozorhon, D. Arditi, I. Dikmen, and M. T. Birgonul, "Effect of partner fit in international construction joint ventures," *Journal of Management in Engineering*, vol. 24, no. 1, pp. 12–20, 2008.

[28] B. Ozorhon, D. Arditi, I. Dikmen, and M. T. Birgonul, "Performance of international joint ventures in construction," *Journal of Management in Engineering*, vol. 26, no. 4, pp. 209–222, 2010.

[29] H. Adnan, H. Y. Chong, and R. Morledge, "Success criteria for international joint ventures: the experience of Malaysian contractors in the Middle East," *African Journal Of Business Management*, vol. 5, no. 13, pp. 5254–5260, 2011.

[30] R. Liang, ZH. Sheng, and X. Y. Wang, "Methods dealing with complexity in selecting joint venture contractors for large-scale infrastructure projects," *Complexity*, vol. 2018, Article ID 8705134, 14 pages, 2018.

[31] E. H. W. Chan and H. C. H. Suen, "Legal issues of dispute management in international construction projects contracting," *Construction Law Journal*, vol. 21, no. 4, pp. 291–305, 2005.

[32] M. Allen, "Construction disputes on the rise," *Construction Law Journal*, vol. 27, no. 6, pp. 525–528, 2011.

[33] G. Ofori, T. Pin, and C. Leong, "Effectiveness of joint ventures as construction technology transfer vehicles: the case of Singapore," *Journal of Construction Research*, vol. 2, no. 2, pp. 191–202, 2001.

[34] F. W. Swierczek, "Culture and conflict in joint ventures in Asia," *International Journal of Project Management*, vol. 12, no. 1, pp. 39–47, 1994.

[35] M. F. Dulaimi, "Case studies on knowledge sharing across cultural boundaries," *Engineering, Construction and Architectural Management*, vol. 14, no. 6, pp. 550–567, 2007.

[36] O. David, S. Fred, S. D. Smith, and R. H. Matthew, "Exploring safety management challenges for multi-national construction workforces: a UK case study," *Construction Management and Economics*, vol. 36, no. 5, pp. 291–301, 2018.

[37] A. L. W. Hung, G. M. Naidu, S. T. Cavusgil, and R. C. Yam, "An exploratory study of project based international joint ventures: the case of Chek Lap Kok Airport in Hong Kong," *International Business Review*, vol. 11, no. 5, pp. 505–522, 2002.

[38] S. Mohamed, "Performance in international construction joint ventures: modeling perspective," *Journal of Construction Engineering and Management*, vol. 129, no. 6, pp. 619–626, 2003.

[39] K. McIntosh and B. McCabe, "Risk and benefits associated with international construction-consulting joint ventures in the English-speaking Caribbean," *Canadian Journal of Civil Engineering*, vol. 30, no. 6, pp. 1143–1152, 2003.

[40] D. Y. Kim, S. H. Han, and H. Kim, "Discriminant analysis for predicting ranges of cost variance in international construction projects," *Journal of Construction Engineering and Management*, vol. 134, no. 6, pp. 398–410, 2008.

[41] C. Teddlie and F. Yu, "Mixed methods sampling," *Journal of Mixed Methods Research*, vol. 1, no. 1, pp. 77–100, 2007.

[42] E. G. Ochieng, A. D. F. Price, X. Ruan, C. O. Egbu, and D. Moore, "The effect of cross-cultural uncertainty and complexity within multicultural construction teams," *Engineering, Construction and Architectural Management*, vol. 20, no. 3, pp. 307–324, 2013.

[43] S. R. Norwood and N. R. Mansfield, "Joint venture issues concerning European and Asian construction markets of the 1990s," *International Journal of Project Management*, vol. 17, no. 2, pp. 89–93, 1999.

[44] A. P. Field, *Discovering Statistics Using SPSS for Windows: Advance Techniques for the Beginners*, Sage, London, UK, 2nd edition, 2005.

[45] N. K. Malhotra, *Marketing Research: An Apply Orientation*, Prentice-Hall, Upper Saddle River, NJ, USA, 2nd edition, 1996.

[46] C. K. H. Hon, A. P. C. Chan, and M. C. H. Yam, "Determining safety climate factors in the repair, maintenance, minor alteration, and addition sector of Hong Kong," *Journal of Construction Engineering and Management*, vol. 139, no. 5, pp. 519–528, 2013.

[47] R. H. Garb, "Joint venture in the construction industry," in *The Handbook of Joint Venturing*, J. D. Carter, Ed., Dow Jones-Irwin, Homewood, IL, USA, 1988.

[48] H. Li, D. Arditi, and Z. Wang, "Factors that affect transaction costs in construction projects," *Journal of Construction Engineering and Management*, vol. 139, no. 1, pp. 60–68, 2013.

[49] R. Atkinson, L. Crawford, and S. Ward, "Fundamental uncertainties in projects and the scope of project management," *International Journal of Project Management*, vol. 24, no. 8, pp. 687–698, 2006.

[50] I. Maurer, "How to build trust in inter-organizational projects: the impact of project staffing and project rewards on the formation of trust, knowledge acquisition and product innovation," *International Journal of Project Management*, vol. 28, no. 7, pp. 629–637, 2010.

[51] M. Bresnen and N. Marshall, "Building partnerships: case studies of client-contractor collaboration in the UK construction industry," *Construction Management and Economics*, vol. 18, no. 7, pp. 819–832, 2000.

[52] A. Kwarteng, S. A. Dadzie, S. Famiyeh, and A. M. K. Aklamanu, "Institutional dimensions and conflict resolution strategy in international joint ventures: an empirical examination," *Thunderbird International Business Review*, vol. 60, no. 4, pp. 591–604, 2018.

[53] K. F. Chow, *Construction Joint Ventures in Singapore: A Management Guide to the Structuring of Joint Venture Agreements for Construction Projects*, Butterworths, Singapore, 1985.

[54] G. Dalle and K. Potts, "Joint venture in the construction industry," in *Proceedings of the RICS Construction and Building Research Conference*, Salford, UK, September 1999.

[55] L. Bernold and S. AbouRizk, *Managing Performance in Construction*, John Wiley & Sons, Hoboken, NJ, USA, 2010.

[56] S. Khalid and T. Ali, "An integrated perspective of social exchange theory and transaction cost approach on the antecedents of trust in international joint ventures," *International Business Review*, vol. 26, no. 3, pp. 491–501, 2017.

[57] Y. L. Zhao, Y. B. Feng, and C. G. Li, "Effect of organizational cultural differences and mutual trust on contract management of nonequity construction project alliances," *Advances in Civil Engineering*, vol. 2018, Article ID 3534209, 9 pages, 2018.

[58] Y. Fu, Y. Chen, S. Zhang, and W. Wang, "Promoting cooperation in construction projects: an integrated approach of contractual incentive and trust," *Construction Management and Economics*, vol. 33, no. 8, pp. 653–670, 2015.

[59] I. Aguir and L. Misra, "Ownership level choice and value creation in international joint ventures: the role of investor protection," *International Review of Economics & Finance*, vol. 49, pp. 515–535, 2017.

[60] A. Chini, L. Ptschelinzew, R. E. Minchin, Y. X. Zhang, and D. Shah, "Industry attitudes toward alternative contracting for highway construction in Florida," *Journal of Management in Engineering*, vol. 34, no. 2, Article ID 04017055, 2018.

[61] B. Özorhon and H. Altun, "Uluslararası ortak girişimlerin başarısında kültürel uyumun etkisinin incelenmesi," *Teknik Dergi*, vol. 28, no. 2, p. 7845, 2017.