This is the Pre-Published Version.

This paper has been accepted for publication in the *International Journal of Construction Management*.
Submitted on 23 July 2020; Accepted on 10 November 2020.

Factors affecting international construction joint ventures: a systematic literature review

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Acknowledgment

This paper forms part of a Ph.D. study entitled "Determinants of success for international construction joint ventures in Ghana." The authors acknowledge that this paper shares a similar background and methodology with other related papers published by the author, but with different objectives/scopes. The authors acknowledge the Department of Building and Real Estate of The Hong Kong Polytechnic University for funding this research. Appreciation is finally due to the editors and anonymous reviewers who provided constructive comments and suggestions that helped to improve this paper.

Disclosure statement

No potential conflict of interest was reported by the authors

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Abstract

International construction joint ventures (ICJVs) have become an important way of exploiting business opportunities for construction companies worldwide. Yet, several barriers and risk factors contribute to their failure. This study aims to identify the barrier and risk factors affecting ICJVs through the lens of a systematic review methodology. Findings from 43 peer-reviewed articles showed an increasing publication trend for the past three decades (1990-2020). The bulk of the studies were conducted in Asia and Europe, particularly China and the UK, respectively. Overall, 37 barrier factors were identified, and these fall into six categories, namely, inter-organizational differences, lack of expertise and confidence, lack of effective planning and strategies, lack of knowledge of ICJV's fundamentals, conflicts, and management difficulties. Next, 53 risk factors were identified and grouped into six, namely, policy and political risks, legal risks, financial risks, management risks, project and technical risks, and market risks. More importantly, knowledge gaps in existing studies are highlighted and future research directions are then proposed. The list of failure factors creates a valuable frame of reference for researchers and practitioners to develop more reliable, comprehensive, and proactive management strategies for ICJVs.

Keywords: International construction joint ventures; barrier factors; risk factors; construction management; literature review

Introduction

International construction joint ventures (ICJVs) are a unique form of strategic alliance adopted worldwide for delivering large-scale and complex engineering projects (Walker and Johannes, 2003). Today, ICJVs have become popular and unanimously accepted as a highly beneficial practice (Ozorhon et al. 2007a; 2007b; Shen and Cheung, 2018; Tetteh and Chan, 2019; Chan

et al. 2020). ICJV represents a temporary marriage between at least two legally distinct construction companies (i.e., different locations of headquarters) who combine complementary resources in pursuit of Architectural, Engineering, and Construction (AEC) projects (Girmscheid and Brockmann, 2010; Ozorhon et al. 2010a; Hong and Chan, 2014). Research and practice pronounce that the adoption of ICJVs is an opportunity that can bring many potential benefits. To mention only a few, potential risks and barriers are reduced (Ozorhon et al. 2007b; 2010b; London and Siva, 2012), improved capabilities in terms of size and scope of work undertaken (Luo et al. 2001; Zhao et al. 2013), access to an international market and low-cost production factor (Chen and Messner, 2009; Sabug and Pheng, 2018), and overcome environmental deficiencies (Panibratov, 2016). A study by Chan et al. (2020) summarizes the benefits and opportunities associated with ICJVs. Many successful ICJV projects have been recorded in the literature. Typical examples include the expressway system in Bangkok, the channel tunnel between the United Kingdom and France, the Taiwan high-speed railway, the Three Gorges Dam in China, and the Hong Kong-Zhuhai-Macau Bridge (Girmscheid and Brockmann, 2010; Liang et al. 2019).

Despite prior evidence of numerous benefits and successful implementation, several barriers and risks pervade their practice, which invariably contributes to the manifestation of failure. Compared to domestic ventures the failure rate of ICJVs is higher (Ozorhon et al. 2007a). Without a doubt, the highly complex and dynamic environment (i.e., market, political distribution system, etc.), which the ICJV partners must operate and survive is repeatedly professed as the major cause (Ozorhon et al. 2008a). Besides, a multiplicity of sources including management/governance (Lin and Ho, 2013; Han et. al. 2019), operational issues at company and project levels (Gale and Luo, 2004), and occurrences which are beyond firms' capacities (Bing et al. 1999; Bing and Tiong, 1999) are mentioned. Recognizing risks and barriers as inevitable in ICJVs operation, increasing research studies are seeking to understand

the barriers and risk factors connecting these sources within ICJVs. For example, from an integrated perspective, Shen et al. (2001) identified 58 risk factors associated with ICJVs operation in China. In Singapore, Zhao et al. (2013) identified 27 critical factors impeding ICJVs success. Recently, from a global perspective, Lu et al. (2020) identified 17 barrier factors affecting ICJVs. While these and many related studies with discrete factors from different geographical locations exist, until now, no study attempt to review and analyze previous research work on this subject. Note that identifying, aggregating, and prioritizing the discrete factors will no doubt not only enable joint venture managers and policymakers to learn and innovate but also assist them to develop robust action plans for future implementation. Therefore, this study aims to identify and classify the barriers and risk factors affecting ICJVs through the lens of a systematic review methodology. For completeness, the research questions necessitating great attention are: 1) what is meant a barrier and risk in ICJVs? 2) what is the annual publication trend on the barrier and risk factors associated with ICJVs? 3) in which geographical context (country/jurisdiction) were the studies conducted? 4) what are the barriers and risk factors in ICJVs? 5) How can the barriers and risks be managed in ICJVs operation?

Answers to the above research questions will broaden the understanding of the various factors contributing to the underperformance/complete failure of ICJVs to practitioners, policymakers, the sector, and the economy at large. The provision of an all-inclusive list of influential factors serves as a valuable frame of reference for researchers and practitioners to develop more reliable, comprehensive, and proactive management strategies for ICJVs. More importantly, possible or anticipated future discoveries can easily be identified. The structure of this paper is as follows: The next section delineates the structure of ICJVs, followed by an overview of barriers and risks in ICJVs setting. The next section focuses on the overall research methodology process. Afterward, the analysis and discussion of results followed, and lastly, conclusions and implications are drawn.

ICJV structure and complexity

Typically, ICJVs directly serves two sides, the partnering companies, and a client organization. On the partners' side, there is a joint venture contract between legally distinct construction companies from different locations worldwide (Zhang et al. 2010). The contract stipulates the venture goal, duration, management, etc. (Girmscheid and Brockmann, 2010). Certainly, a client becomes part of the venture system through a construction contract. The construction contract defines the scope, the duration, and the budget for the venture operation. Thus, ICJV is often described as a "project-based" or "complete and dissolve" type of strategic alliance. National Joint Consultation Committee for Building (1985) added that in ICJVs parties have joint and several liabilities for their contractual commitments to the client. Figure 1 shows the structure and complex nature of an ICJV. Aside from the difficulties encircling the relationship between the ICJV and a client and its organization, the construction projects, the host country regulations, and the environment, etc., ICJV itself is complex. The complexity stems from the differences related to the involvement of multiple parents, and their employees and requirements, the control structures available for use, their operational styles, individual goals, etc. These differences create ambiguities in ICJVs, which can result in unsatisfactory performance, conflict, mistrust, and finally, dissolution of the venture (Ozorhon et al. 2008a). According to Alashwal and Ann (2019), even when companies come from the same country their organizational practices may differ, and these differences represent the incompatible organizational process and conflicting goals. The study systematically reviewed prior literature to identify and cluster the various barriers and risk factors impeding ICJVs success contingent on this definition.

<Please Insert Figure 1 here>

Overview of ICJV barriers and risks

ICJVs as an organizational form are not free of uncertainties and challenges (Gale and Luo, 2004; Shen and Cheung, 2018). The complex organizational structure coupled with the uncertain conditions within the host country is the prime cause of their shortcomings. Failure factors surrounding ICJVs implementation remains the most widely explored area in ICJV studies (Tetteh and Chan, 2019). The majority of the existing studies focusing on risks have extended broadly from the identification of risk factors (Bing and Tiong, 1999; Zhao et al. 2013; Hwang et al. 2016; Razzaq et al. 2018) to assessment (Zhang and Zou, 2007; and Hwang et al. 2017), through to prioritization (Bing and Tiong, 1999; Zhao et al. 2013; Hwang et al. 2017; Razzaq et al. 2018), management/treatment (Bing et al. 1999; Kwok et al. 2000; Odediran and Windapo, 2017), and risk allocation preference (Hwang et al. 2016; 2017). The performance implications of risks in ICJVs operation have been studies (Ozorhon et al. 2008a; Al-Sabah et al. 2014). More importantly, analytical and computerize models for managing and transferring risks in ICJVs have also been developed (Hsueh et al. 2007). In general, critical risk clusters which include internal, project-related, and external risks have incessantly been cited to jeopardize ICJVs success (Bing et al. 1999; Shen et al. 2001).

Meanwhile, other studies have either partially or entirely expounded on the obstacles, challenges, or difficulties in ICJVs (Alashwal and Ann, 2019; Lu et al. 2020). While generic studies exist, there are also multiple studies with the coexistence of factors denoting a single concept (Prasitsom and Likhitruangsilp, 2015; Samanta and Singla, 2019). For example, whereas Hsueh et al. (2007) and Lin and Ho (2013) mentioned; loss of management control, problems occasioned by organizational cultures, language barrier, etc. as barriers, Shen et al. (2001) and Prasitsom and Likhitruangsilp (2015) classified them as risks. For a more coherent analysis of the extant literature, barriers in this study represent potential factors known to occur and with solely negative influence on ICJVs success (Hong, 2014). Hence, they are known with more certainties and require immediate management response (Sankararajan and

Shrivastava, 2012). Challenges, difficulties, problems, obstacles, and issues are the terms interchangeably used for the factors impeding ICJVs success (hereafter, barriers). Risks in this study denote uncertainties with possibly both the positive and negative impact on ICJVs development goals (Hillson, 2002; Hong and Chan, 2014). Explicitly maintaining consistency and establishing that barriers and risks are two separate concepts will enhance proactive management response strategies in ICJVs application. As ICJVs undergo growth cycle cogently based on the underlying rationale of the project approach (i.e., pre-inception stage, formation and organization stage, implementation and adjustment stage, and completion and evaluation stage) (Tetteh et al. 2019), accumulation of the barriers and risk factors throughout the stagewise progression could result in more complex and destructive occurrences, which are detailed in different areas. Thus, a series of vicious circles of compounded negative effects diffuse management plans, which eventually contribute to the manifestation of unsatisfactory performance/complete failure (See, Figure 2). There is, therefore, a need to devise a clear-cut and systematic management response strategy/framework for the barriers and risks for a smooth and efficient operation of ICJVs.

<Please Insert Figure 2 here>

Research Methodology

A systematic mapping method – "an approach that allows for relatively high procedural and interpretive objectivity and replicability" (Ghobadi, 2015; Chan et al. 2020) was adopted. This ensures that the search strategy is transparent and minimizes the potential bias in identifying relevant publications for the study. The whole research process is described in detail as follows.

Planning the Study

This phase involved two steps which included: (i) development of the review protocol, and (ii) the establishment of the research keywords. To serve the defined objectives of the study, the review procedure was defined, revisited, and revised by two academic experts in the ICJV area.

To establish the research keywords, the phenomenon of interest was defined as *"research that investigates the barriers, problems, issues, obstacles, etc., and risks in ICJVs".* To match this definition with the published papers and address literature diversity in studying the barriers and risks in ICJVs, a preliminary review of influential articles (Bing and Tiong, 1999; Shen et al 2001) was reviewed to identify relevant concepts or terms that might be common throughout the wider literature. After this process, an initial list of search string was developed by consulting three academic experts who have published at least three papers in the current field of study. This was to increase the level of rigorousness and to minimize the potential bias in identifying relevant publications for the study.

Papers retrieval

To ensure a high level of scientific methodological robustness, and to obtain considerable and exhaustive archival publications for the present study, while earlier review studies consider the top six construction management (CM) journals according to Chau's (1997) ranking list, the present study focused on the top 12 CM journals with average scores above 60% (Chan and Owusu, 2017). To build a dataset of articles upon which to conduct the systematic analysis, the Virtual Libraries (VLs) were used to retrieve journal papers. The keywords used was *"barriers" OR "problems" OR "issues" OR "challenges" OR "difficulties" OR "obstacles" OR "risk" AND "joint venture" OR "international joint venture" OR "international construction joint venture",* with no year limitation (searched on July 14, 2020). Search results show that only 8 of the 12 journals on Chau's list had one or more papers related to the subject. This returned 126 publications. Note that publications were identified if our key terms occurred in the record title, abstract, or keywords. Aside from the listed journals by Chau (1997) two decades ago, note that current potential journals that might fully or partly expound on the research interest were not included. Therefore, the second cluster of papers was gathered by using search engines like Google Scholar and databases, particularly Engineering Village and

the Web of Science. Nonetheless, submissions of earlier works acknowledged the relevance for use of the above-listed databases for literature review studies (Hong et al. 2012; Li and Love, 2020). Using the same keywords, four additional publications from *International Journal of Construction and Management (IJCM) (4), Canadian Journal of Civil Engineering* (CJCE) (2), *Journal of Civil Engineering and Management (JCEM) (1), Journal of Construction Research* (JCR) (2), and *Advances in Civil Engineering (ACE) (1)* were included. In selecting the journal, three coherent parameters were chosen: (1) journals that presented two or more papers (Tetteh and Chan, 2019); (2) journals identified earlier in Chau's list were not included; and (3) solely paper focusing on ICJVs were considered valid. This approach was deemed important for maintaining comprehensiveness.

Selection of relevant publications

Only peer-reviewed journals were selected for analysis, while book reviews, editorials, conference papers, discussions, and closures, etc. were discarded because they do not go through a rigorous peer-review process for wide dissemination in the academic community (Drott, 1995). According to Ramos-Rodríguez and Ruíz-Navarro, (2004), journal papers are known to be a more reputable source and classified as "certified knowledge" in the academic discipline. Previous studies have conducted similar review studies in the construction management domain. (Darko and Chan, 2016; Tetteh et al. 2019). Based on this criterion, 113 of the 126 papers were retained for further analysis.

After this phase, unrelated papers still appeared, because they met some of the search terms. Thus, the whole sample was divided among the authors for critical appraisement and evaluation to filter out unrelated papers. Journal papers that made mention of the term IJV and focused on other sectors different from construction or infrastructure were discarded. Journal papers that did not comprehensively study IJV but used it as a context to study some other phenomena were also excluded. These criteria were considered to improve the reliability of the synthesized

findings by limiting the review to empirically supported results. In total, 40 papers were selected after the rigorous examination. The next step involved the snowballing sampling technique (checking the reference lists of the retained papers against the selection criteria to further examine how prior studies distinguished the barriers and risks in ICJVs studies). Note that already identified publications were not included in this round. This resulted in including additional 3 papers. Thus, in sum, 43 articles were considered for the study. Table 1 shows the final search results for the relevant publication.

<Please Insert Table 1 here

Analysis and discussion of results

The 43 selected publications objectively project the understanding of the discrete sets of factors affecting ICJVs success and limitations for future avenues, as it is comparable to other literature review studies in the construction management field (Osei-Kyei and Chan, 2015; Dwaikat and Ali, 2016; Yu et al. 2018). Figure 3 shows the geographical distribution of the selected papers. 16 different countries/jurisdictions around the world have published papers related to factors affecting ICJVs. The bulk of the studies were conducted in Asia, particularly China (12 papers). Literature confirms that these countries/jurisdictions engage in large-scale infrastructure projects such as underground rail construction, bridges, roads, etc., which involve higher risks and challenges (Hwang et al. 2017). In Europe, the UK has also made an enormous contribution to this interest. Unsurprisingly, the increasing implementation of this hybrid collaboration form in these countries/jurisdictions puts much emphasis on the need to research more into the influential factors for its successful implementation.

<Please Insert Figure 3 here>

Annual Publication Trend

Figure 4 shows the yearly number of selected papers, with a trend of varying growth since 1990. However, over the past three decades (1990 – 2020), an average of 1.45 and 2.25 papers

was published yearly in the first decade (1990 – 2004) and second half-decade (2005 – 2020) of the observation period, respectively. Within the period (1997 – 2012) indicates the maximum number of publications of 25, with a double peak in 2009 and 2019 (four papers each). A review conducted by Hong and Chan (2014) reflects the increasing need for the exploration of the barriers and risks in ICJVs by many researchers to make best practices for ICJVs within the period. Tetteh and Chan (2019) added that effective implementation strategies of this hybrid collaboration form necessitate a critical assessment of the failure factors as industrial practices progress. Given the vast practices of ICJVs in the global construction market, there is considerable room for an increase in the barriers and risks impeding its success due to the dynamic global circumstances and a more complex web of construction organizations adopting ICJVs.

<Please Insert Figure 4 here>

Reporting the review

Identification and classification of the barriers and risks factors

The barriers and risk factors were identified by two different means: 1) some factors were identified directly from papers that listed them in tables, charts, and bulleted lists; and 2) content analysis via the open coding method, where the factors are not shown in tables and charts (cf., Oppong et al., 2017; Darko et al. 2017). Note that not all the 43 relevant papers contained both the barriers and risks. Thus, while some papers contained both the barriers and risk factors, others specifically focused on either the barriers or risks. This affected the numbering order of the references in the tables. Tables 2 and 3 summarizes the identified barriers and risk factors, respectively. Although researchers have used different phrases to represent some of these factors in the literature, notwithstanding, the identified factors were thoroughly examined to bring together interrelated factors, which generated an integrated list of 37 barriers and 53 risk factors. For instance, the following barriers (differing management

techniques, lack of management control, and poor management control) were recorded as "loss of management control".

This study coherently clustered the factors following four rigorous processes for easy understanding: (1) each author was provided with the identified list of factors to outline their interdependence; (2) results were compared to check for consistency; (3) results were further compared to prior studies that categorized some of the factors, and (4) focus group discussion to finalize the groupings. This whole process enhanced the categorization clarity by confirming that all the factors were placed in the most fitting group. It also minimized or eliminated differences in views or subjectivism of the categorization. Further, the causal links between the factors were mapped at the classification level and incorporated into a classification framework (see, Figures 5 and 6). For example, for the barrier factors, poor relationship management may create friction within both the internal and external ICJV teams, and in turn, reduce the mutual commitment level of partners (Panibratov, 2016).

Barriers to ICJVs success

The 37 barrier factors are classified into six categories, namely: inter-organizational differences, lack of expertise and confidence by ICJV contracting parties, lack of effective planning and suitable strategies, lack of experiential knowledge of ICJV's fundamentals, conflicts among ICJV entities, and ICJV management difficulties. This shares a similar ideological concept with Hong (2014). Figure 6 shows the conceptual framework of the barrier factors, and the number of times cited based on the overall sample used for the study.

Inter-organizational differences

To a large extent, inter-organizational differences have received a great deal of attention in the ICJVs' studies and are regarded as a major barrier to the cause of failure in ICJVs (Munns et al. 2000; Ozorhon et al. 2008a; 2008b). The main barrier factors noted under this construct include complicated problems occasioned by organizational cultures and different policies and

procedures among entities. In Turkey, for example, Ozorhon et al. (2008a) found a strong relationship between organizational cultures and ICJVs success. Likewise, Sridharan (1995) identified that cultural impact on JV organization is inherent and manifests its existence by way of conflicts in a clash of cultures. The prime complexity added is the differences in the ideological concepts hold by parties involved, management style, their employees and requirement, etc., and if not addressed well, could lead to the ICJV failure (Hong, 2014). Thus, the wider the cultural gap, the more difficult it will be to create the necessary cohesion (Gale and Luo, 2004). Hung et al. (2002) confirmed that inter-organizational differences among parties to an ICJV are a key barrier impeding ICJVs success. Similarly, in the UK, Dalle and Potts (1999) reported that the differences in policies frequently result in a weak working relationship which causes major problems in ICJVs. Possible differences and contradictions in the organizational culture pose a serious obstacle to the effectiveness of the cooperation.

<Please Insert Table 2 here>

<Please Insert Figure 5 here>

Lack of expertise and confidence by ICJV contracting parties

Building competitiveness and maintaining an ICJV relationship is dependent on the capabilities of the parties involved. As such, studies have been devoted to the selection criteria for ICJV partners (Williams and Lilley, 1993; Liang et al. 2019). This barrier construct has seven underlying barrier factors. Among the underlying barriers, the incompetence of the project management team obtained the maximum citation score of 12. An empirical study by Zhao et al. (2013) explicitly demonstrates that forming an ICJV with a company lacking managerial expertise and confidence greatly impact ICJVs success. Gale and Luo (2004) argued that information relating to the management expertise of potential partners should be given the needed attention during the selection of an ICJV partner. The other critical barriers include fear of legal action, the poor spirit of cooperation, lack of confidence about experience and

knowledge which is most evident in local or host partners, fear of exposure strength and weakness, low productivity of workers, and the use of outdated skills and technology.

Lack of effective planning and suitable strategies

As effective strategies contribute or drive the ICJV towards achieving the set goals and objectives, improper planning would lead to failure (Do and Lee, 2015). This barrier construct is critical in almost every organization. The project-based nature of ICJVs means time limitation. Thus, ICJV parties require adequate planning and deliberations even at the pre-conception stage of the venture-formation (Hung et al. 2002). The underlying barriers of this construct have been reported in many studies (Swierczek, 1994; Walker and Johannes, 2003) to impede ICJVs success. For example, lack of project planning and budgeting was recorded by Shen et al. (2001) as one of the difficulties facing Sino-foreign CJVs in China. Similarly, Do and Lee (2015) emphasized that the failure to carefully analyze the IJV project using systematic and scientific methods has caused completed and current ICJVs project failure.

Lack of experiential knowledge of ICJV's fundamentals

ICJVs are always successful when the fundamentals of their administrative structures are right (Norwood and Mansfield, 1999; Ozorhon et al. 2008b). However, the lack of understanding and without knowing the ICJVs' administrative structures in various related areas such as communication, contract terms, coordination, etc. often hinders the recognition of the ICJVs success (Prasitsom and Likhitruangsilp, 2015a). Occasionally, merely out of the intention of engaging in an infrastructure project, due to time limitation leads to the ICJV parties not fully evaluating and understanding how well an ICJV should be operated in a desirable manner which results in their failure (Hong, 2014). Some JVs may have been established on an ad-hoc or possibly incomplete basis, or even entirely orally which certainly encounter problems that lead to their failure (Abdul Rashid, 2015). For instance, in Tanzania, the IJV contract between Mwananchi Engineering and Contracting Company (MECCO) and a Dutch Overseas

Construction Company (OCC) was unsuccessful and abandoned after two years due to the lack of knowledge by MECCO on ICJVs fundamental issues (Mansfield and Sasillo, 1990). In Singapore, Sridharan (1995) observed that the performance of most European-Singapore JVs was unsatisfactory due to the lack of understanding of objectives. These findings suggest that a lack of fundamental understanding of the vital terms of and key functions for the operation of ICJVs limits the effectiveness of the parties to fulfil the overall goal of the ICJV.

Conflicts among ICJV entities

There is no conflict-free ICJV relationship as Gale and Luo (2004) highlighted. The complex inter-organizational relationships – for example, the IJV partners' opportunistic behaviour, management style, organizational culture, and policy, often lead to conflicts during the operation of ICJVs which in turn results in an unsuccessful relationship (Hong, 2014; Han et al. 2019). Among the underlying barrier factors, conflicting interest/objectives is the most frequently voiced objections to ICJVs success, with a citation score of 15. According to Han et al. (2019), the goal incongruences among ICJV parties may originate from the difference in the primary benefits anticipated by each company. An example can be seen from the integration between the British and the French contractors, Transmanche-Link (TML), who was awarded a contract to design, construct, and commission a transport system by Eurotunnel – client/employer. During the operation, the inconsistent goals coupled with task interdependencies complicated and slowed the work (Young, 1992; Maemura et al. 2018). As international joint venture agreement stipulates the overall goal of the partners, yet, in operation, partners deviate from the original agreement due to their opportunistic behaviours which lead to conflicts and consequently the venture failure. A more recent study by Liang et al. (2019) explicitly confirms that the presence of competition between ICJV parties outside of the agreement significantly impairs chances for the survival of the ICJV. It is also important to note that, unfair distribution (e.g. pain and gain) and execution of authority contribute

significantly to the failure of ICJVs. Without fair distribution of power, partners' effectiveness may be reduced due to friction in resource arrangement and allocation, and contributions.

ICJV management difficulties

Management issues in ICJV applications have been widely discussed in the literature, and many ICJVs have failed due to this complexity (Mjoen and Tallman, 1997; Luo, 2001; Girmscheid and Brockmann, 2009). The management complexities stem from the complex structures involving at least two partner organizations typically of diverse cultures, either as competitors or as collaborators (Ozorhon et al. 2008b). Many times, there is immense pressure for rapid decision-making given the project-specific of such ventures. Such a limitation in time usually leads to specific managerial difficulties (Hung et al. 2002). In Russia, for example, Panibratov (2016) reported that several IJVs failed to achieve their goals due to management issues. Munns et al. (2000) put forward that, the complexities related to management structures, normally lead to the failure of ICJVs. Also, inflexible organizational structures that fail to accommodate varying adjustments during the venture operation due to the environment often leads to the dissatisfaction of IJV parties (Hung et al. 2002; Drouin et al. 2009).

Risks impeding ICJVs success

Table 3 shows the 53 risk factors influencing ICJVs success. To give a broader explanation to the risk factors, and to show academic rigor, a classification framework proposed by past researchers (Shen et al. 2001; McIntosh and McCabe, 2003; and Hwang et al. 2017), was adopted. Therefore, six risk categories have been proposed which include policy and political risks, legal risks, financial risks, management risks, project, and technical risks, and market risks (Figure 6). A detailed discussion of the constructs is as follows.

<Please Insert Table 3 here>

<Please Insert Figure 6 here>

Policy and political risks

These risks originate from the host/foreign government interference with the normal conduct of the business regulations (Ling and Hoi, 2006; Deng et al. 2018). The flexibility and variations of either the central or the local government policies and regulations have a significant impact (either positive or negative) on ICJVs success (Shen et al. 2001). For example, an unexpected change of the central government resettlement policy led to a reduction of 50% profit of an ICJV project in an old city in the Guangdong province, China. From a different perspective, excessive regulations or rigid conformity to policies endanger ICJV progress. For instance, ICJVs, at times, accommodates midterm adjustments during operations due to the dynamic environmental circumstances to address any emergent yet unexpected needs or problems to contribute and enhance work efficiency. In such a case, it jeopardizes ICJVs operation which eventually fails. Further, Bing et al. (1999) highlighted that the ruling political systems such as democratic, authoritative, socialist, etc. as seen in many developing countries could imperil ICJVs stability and continuity.

Legal risks

Contractual clauses, regulations, and codes, as well as legal actions in different countries, present risks to the ICJVs. In many cases, the uncertainties that surround the contractual terms of ICJVs deters its progress. For instance, a partner to the venture may decide to terminate or discontinue the ICJV relationship and such a situation could result in venture failure. Kwok et al. (2000) emphasized that such a contractual relationship, negotiations, and development of strategic terms of a contract should be undertaken carefully. In addressing the legal risks in ICJVs, Bing et al. (1999) added that the disagreements arising from flawed contract documentation, inappropriate types of contract, improper tendering procedure, or improper contractual clauses endanger the smooth operation of the venture.

Financial risks

These risks relate to macroeconomic conditions such as inflation, exchange rate fluctuations, currency convertibility difficulties (Bing et al. 1999), etc. Macroeconomic factors could have a significant effect on the profit or loss of each participant in an ICJV. Thus, the slowdown of the economy would cause the construction market to shrink thereby impacting the industry operations (Hwang et al. 2014). Bing et al. (1999) added that foreign exchange risks that exist in the ICJV contract are like the normal contractor-client agreement. The contractor is exposed to currency fluctuations between the bid and award dates. Hence, ICJV contractors do not have the flexibility as compared to other industries to shift prices and production to cope with foreign risks. Baker (1997) reported that the financial crisis in Asia caused Australian-Asian JVs to collapse.

Management risks

Management risks relate to internal policy adherence and human resource management in the ICJV (Ling and Hoi, 2006). The completion of a project may be delayed due to various reasons which include but are not limited to over-interference by the parent company of either party, industrial disputes, frequent policy changes in the parent company towards ICJV, etc. This could result in ICJV failure (McIntosh and McCabe, 2003). Parent companies broadly influence ICJV's performance by limiting their self-rule, contributing unqualified staff, and delaying the required funds. According to Bing et al. (1999) when parent company policy changes, ICJV support reduces and eventually results in management difficulties.

Project and technical risks

These are unpredicted events from project characteristics and technical factors, which may affect ICJV performance (Hwang et al. 2017). Risk factors such as changes or errors in design, equipment failure, injuries and accidents, cash flow problems, and so on, will make project construction operation break off. For example, Zhao et al. (2013) mentioned that client's

462 excessive demand and variations will result in changes in task allocation among entities, work
463 disruption and claims, and finally breed disputes and conflicts which threaten the ICJV
464 performance and project objectives. Shen et al. (2001) added that the differences in partners
465 working procedures and practices could also lead to technical risk. A typical example was the
466 increase in the cost of a commercial building project developed by a JV in Beijing due to the
467 difference in working procedures for wall construction (Shen et al. 2001).

468 ***Market risks***

469 Market risks refer to those arising from the availability of resources, market demand, and
470 competition (Shi et al. 2014). Also, in many cases, the inability to accurately forecast the
471 market demands present major risks to the ICJVs success (Bing et al. 1999; McIntosh and
472 McCabe, 2003; Odediran and Windapo, 2016). In China, "nationalism and local protectionism"
473 affected many ICJVs operations. Further, in India, the fluctuation of labour, materials, and
474 equipment increased the budgeted cost for ICJVs projects (Ling and Hoi, 2006). Similarly, in
475 Singapore, Vietnam, and Indonesia, these risks threatened many ICJVs projects (Hwang et al.
476 2017).

477 ***Methodologies adopted for studies on ICJV barriers and risks***

478 By exploring the methodological processes employed to study the barriers and risks in ICJV
479 studies, three data collection methods were identified which include questionnaire surveys,
480 case studies/interviews, and mixed-methods. Table 4 presents the respective number of papers
481 for various categories. Questionnaire surveys and case studies have been the most preferred
482 approach to exploring the barrier and risk factors in ICJVs accounting for 52% and 36% of the
483 total number, respectively. This is understandable because of the practical nature of ICJV,
484 which necessitates the understanding of researchers, based on a thorough examination and to
485 allow more experts to participate. From the review, statistical tools like Structural equation
486 Modeling, risk criticality index, regression analysis, factor analysis, analytical hierarchy

process, etc. have been used in the survey studies, and content analysis for the case studies. The least preferred method is a mixed method accounting for 12%. These two methods necessitate great attention as it combines the positive of different methods to reflect more robust and an all-inclusive study to increase the objectivity of findings. Also, due to the multifaceted and uncertain disposition of ICJVs, analytical tools like system dynamics, artificial intelligence, etc. should be employed to understand and manage the various complexities in ICJVs operation.

<Please Insert Table 4 here>

An Example of the Barrier-Risk Cycle

A thorough analysis of the literature and information gathered through expert interviews provided an understanding of the barrier-risk cycle in ICJVs. Figure 7 and Table 5 shows an example framework of the barrier-risk cycle and key, respectively. The framework shows multiple paths of barriers and risks loops throughout the stagewise progression of an ICJV. A construction company's preparedness for an IJV must be based on a good knowledge of the host country's cultural environment. Challenges encountered in ICJVs often find their genesis in the differences between parties involved location customs and legal requirements (Gunhan and Arditi, 2005a). Particularly, the lack of understanding of the host country's statutory requirement and language frailty (i.e. B2, B1) adds ample risk to the intended contract performance. This weakens the contractual regulations and creates a significant security risk for the contract objective from the inception (e.g., R2, R3).

At the formation and organization stage, the combined complexities originated from the pre-inception phase aggravate the difficulties, and consequently negatively influences the ICJV. Poorly formulated ICJV agreement (B5) due to the lack of understanding of the ICJV contractual structures (B2, B3) right from the onset implies that parties have digressed from the focus right from birth (Bing and Tiong, 1999). The resultant threat is a wrongly formulated

governance structure, which could then translate to the disagreement on some conditions of contract risk (R5). Thoughtlessly, it can lead to a breach of contract by a partner (R3), and the termination of the ICJV contract (R4) (Hwang et al. 2017).

The construction and adjustment phase of an ICJV involves several tasks and activities increasingly covered with multiple uncertainties and challenges (Zhao et al. 2013). At this stage, to some extent, it becomes very difficult to eliminate certain complexities. Although others may be controllable, and their associated sources could be managed (Bu-Qammaz et al. 2009). It is a well-established fact that if the consequences are not managed and effective response strategies are not implemented, it may lead to a complete collapse of the ICJV. For example, where management control is lacking (B7), the partners ability to manage the activities, resources, and successfully implement their strategy reduces (Ghauri et al. 2013). Consequently, this will result in an improper project and strategic planning for the ICJV operation (e.g., B8, B10, B12, etc.), which seriously endangers the ICJV's operational success. Thus, more complex, and destructive problems where the cause is not clear, or the effects may be detailed in different areas are bound to occur (e.g., R9, R10, etc.).

At the final stage, completion and evaluation phase, the compounded complications do not only negatively impact the performance of ICJV at the project level, but also, the ICJV itself and partnering firms as well. From the perspective of partnering firms, for example, parties may blame each other (B13) as they fail to achieve targeted goals. This could lead to an unfair distribution of salary package among the parties involved (B14), which eventually causes industrial disputes (R7) (Chan and Suen, 2005). Also, parties find it very difficult in measuring performance at this stage (B15); the difficulties mask the perspective from which performance should be measured. Hence, the result is an unsuccessful performance or complete failure.

<Please Insert Figure 7 here>

<Please Insert Table 5 here>

Conceptual framework for managing the barriers and risks in ICJVs

As pointed out earlier, ICJVs undergo a growth cycle (i.e., pre-inception stage, formation and organization stage, implementation and adjustment stage, and completion and evaluation stage), which indicate that different barriers and risk factors suffuse their practice (Bing and Tiong, 1999; Gale and Luo, 2004; Prasitsom and Likhitruangsilp, 2015a). This requires systematic management throughout the stages. From Figure 8, between the execution, monitoring and control are the potential factors known to occur and needing immediate response strategies (barriers). Within this phase necessitates a more formal process similar to managing risks where the identified barriers are recorded, prioritize, having action, and owners to manage them independently from the risks. Whereas the accumulation of barriers results in more risks and more complex and destructive problems where the cause may not be identified, or the effects may be detailed in different areas; this vicious cycle of compounding negative effects can only be break-off by performing effective risk management because risk management prevents additional future difficulties (Hillson, 2002; Piney, 2012). Accordingly, it is of good practice to break-off the problem-risk cycle in an uncertain area as it has not happened yet. As the hypothetical model structures a systematic approach for managing the barriers and risks in ICJVs operation, it leaves the validation of the proposed model to future researchers using real-life ICJV projects.

<Please Insert Figure 8 here>

Knowledge Gap and Future Research Directions

While identifying and aggregating the discrete sets of factors affecting ICJVs implementation, there is also a need to identify knowledge areas of strength and deficiencies. First, before the validation of the hypothetical framework, future studies should empirically test and analyze the underlying interdependencies among the various constructs and indicators of both the barriers and risks to understand and increase the objectivity of the proposed framework. This could be

achieved through multiple case studies while incorporating a greater volume of secondary data from literature to drive a better triangulation of the results. This would provide a firmer basis on which to build a formal and well-thought-out assessment and management process for ICJVs.

Second, the identified barriers and risks are generic factors in ICJVs studies, which the extant literature has failed to capture the barriers and risk factors in a stagewise progression of the ICJV lifecycle (i.e., pre-inception stage, formation and organization stage, implementation and adjustment stage, and completion and evaluation stage). In realizing the need, Prasitsom and Likhitruangsilp (2015b) tried to specifically consider the risk factors at the formation stage of the ICJV lifecycle in Thailand. Therefore, future studies should consider categorizing both the barrier and risk factors into stages of the ICJV lifecycle using real life ICJV projects. This would assist practitioners to plan even before they enter into ICJVs. Also, through an empirical validation of these factors, the development of a more dynamic management process that integrates the stagewise progression of ICJV lifecycle for the barriers and risks; using more robust computer-aided simulation techniques such as system dynamics and agent-based modeling would help in determining the cause and effect (impact) relationships of these thwarting factors in ICJVs. Integrating a dynamic perspective into ICJVs management may aid successful implementation. Similarly, artificial intelligence techniques such as neural networks, random forest, k-nearest neighbour, decision tree, etc. could be employed to predict the performance implications of these factors. This would help in devising a clear-cut and effective management response action plan for ICJVs.

Lastly, research publications on risk in ICJVs are centred on the negative side of risks (threats). Thus, studies have neglected the positive (managing opportunities) view of this goal. Therefore, future studies should consider a holistic view of both threats and opportunities in ICJVs risk analysis in other to modify the process. Further, while the majority of empirical

studies devoted to the barriers and risks were conducted in developed countries; it is, therefore, a call for researchers to undertake more research in different geographical scopes specifically from the developing countries' perspective. This will bring to light the significant factors in terms of their impacts in different settings for the development of appropriate measures.

Conclusions and Implications

This paper presents a comprehensive literature review of the barriers and risks impeding ICJVs success. The main aim was to identify and classify the barriers and risk factors of ICJVs reported in the literature. Based on a sample with 43 peer-reviewed papers retrieved from construction management journals, the descriptive analysis of the reviewed papers showed an increasing publication trend for the past three decades (1990-2020). It was further identified that the bulk of the studies were conducted in Asia, particularly China (12), Hong Kong (4), Taiwan (3), Singapore (4), etc. In Europe, UK (5) has also made an enormous contribution to this interest. Other countries/jurisdictions like the USA, Australia, Canada, Switzerland, South Africa, etc. have also contributed. 37 barriers and 53 risk factors were identified from reviewing the 43 papers. Top cited barriers include but are not limited to loss of management control, complicated problems occasioned by organizational cultures, conflicting interest/competing objectives, language barrier, and incompetence of project management team. Likewise, top-cited risk factors include but are not limited to inconsistency in government policies, laws and regulations, inflation, force majeure, economy fluctuation, and exchange rate fluctuation. A classification framework for the barriers and risk factors in ICJVs has been developed for better understanding. The framework for the barriers comprises six main categories, namely, inter-organizational differences, lack of expertise and confidence, lack of effective planning and strategies, lack of knowledge of ICJV’s fundamentals, conflicts, and management difficulties. Next, the risk factors were grouped into six, namely, policy and political risks, legal risks, financial risks, management risks, project and technical risks, and market risks. Lastly, a

conceptual framework has been proposed for managing the barriers and risks in ICJVs operation.

The study not only contributes to the ICJVs body of knowledge but also has practical implications. First, the provision of an exhaustive list of failure factors will create a valuable reference and information base for practitioners and policymakers to develop more reliable, comprehensive, and proactive management strategies for ICJVs operation. This would also promote sustainable management practices for ICJVs worldwide. Second, this study is positioned to alleviate the negligence of previous studies that combined the barrier and risk factors as a single list. Besides, it would help practitioners reduce operational conflicts, advance collective management effectiveness, bring to success efficient distribution of resources, and introduce contemporary managerial outlook into ICJVs discipline.

In sum, our approach is not without limitations. Whereas the selection criteria may be deemed unreliable, the cross-systematic mapping approach provided a wider scope of related publications for the study. The method also contributed to the validity of extensive coverage of high-impact peer-reviewed journals. Additionally, the use of a complex combination of keywords to obtain papers incorporating the barriers and risks may be another limitation. Nonetheless, the approach is regarded appropriate since, from the open systems perspective, simpler search terms yield an inferior selection of research papers.

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This paper has been accepted for publication in the *International Journal of Construction Management*. Submitted on 23 July 2020; Accepted on 10 November 2020.

Table 1. Search results for relevant publication

N/S	Name of journal	Initial number of publications	Final number of publications	References
1	*Journal of Construction Engineering and Management (JCEM)*	27	12	Ozorhon et al. (2008a), Girmscheid and Brockmann (2009), Ho et al. (2009a), Ozorhon et al. (2010a), Ling et al. (2018), Zhang and Zou (2007), Shen et al. (2001), Bing et al. (1999), Bing and Tiong (1999), Lin and Ho (2012), Sillars and Kangari (1997), Liang et al. (2019).
2	*International Journal of Project Management (IJPM)*	27	10	Walker and Johannes (2003), Swierczek (1994), Mansfield and Sasillo (1990), Norwood and Mansfield (1999), Munns et al. (2000), Drouin et al. (2009), Gale and Luo (2004), Ozorhon et al. (2007a), Zhao et al. (2013), Williams and Lilley (1993).
3	*Journal of Management in Engineering (JME)*	38	5	Ozorhon et al. (2008b), Chen and Messner (2009), Ozorhon et al. (2010b), Odediran and Windapo (2016), Han et al. (2019).
4	*Construction Management and Engineering (CME)*	12	4	Carrillo (1996), Luo (2001), Ho et al. (2009b), Almohsen and Ruwanpura (2016).
5	*Building Research and Information (BRI)*	9	1	Young (1992)
6	*Engineering, Construction and Architectural Management (ECAM)*	8	4	Hwang et al. (2017), Cui et al. (2019), Liu et al. (2020), Maqsoom et al. (2020).
7	*Automation in Construction (AIC)*	1	1	Hsueh et al. (2007)
8	*Canadian Journal of Civil Engineering (CJCE)*	2	1	McIntosh and McCabe (2003)
9	*Journal of Civil Engineering Education (JCEE)*	3	1	Chan and Suen (2005)
10	*International Journal of Construction and Management (IJCM)*	4	1	Alashwal and Ann (2019)
11	*Advances in Civil Engineering (ACE)*	1	1	Lu et al. (2020)
12	*Journal of Construction Research (JCR)*	2	1	Kwok et al. (2000)
13	*Journal of Civil Engineering and Management (JCEM)*	1	1	Hwang et al. (2016).
	Total	134	43	

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Table 2. Barrier factors of ICJVs identified from the literature

Code	Barriers in ICJV	References	Sum
B1	Loss of management control	[2,3,4,6,7,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,27,35,36,39,41]	25
B2	Complicated problems occasioned by organizational cultures	[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,39,41]	18
B3	Language barrier	[2,3,4,6,7,11,14,18,19,20,25,26,36,39,42]	15
B4	Conflicting interest/competing objectives	[1,2,3,4,6,7,11,14,18,19,20,25,26]	13
B5	Unfair gain/pain share among parties	[2,3,8,9,20,24,25,26,30,31,36,39]	12
B6	Differing policies and procedures among entities	[2,3,4,7,11,16,25,36,37,39,40,42]	12
B7	Unfair distribution and execution of authority	[2,3,7,8,9,12,23,25,30,36,42]	11
B8	Incompetence of project management team	[1,2,3,6,7,8,9,14,16,23,25]	11
B9	Difficulty in measuring ICJVs success	[2,3,4,5,10,13,30,33,34]	9
B10	Incomplete contract terms with partner	[1,2,3,6,7,14,19,26,31]	9
B11	Poorly formulated governance structure	[2,3,8,9,10,14,15,17,42]	9
B12	Problems associated with relationship management	[1,6,7,8,9,14,39,40]	8
B13	Lack of mutual commitment of partners	[2,3,11,19,25,36,39,40]	8
B14	Lack of understanding and knowledge at the onset	[11,12,17,18,19,36]	6
B15	Inconsistent project objectives among entities	[1,6,14,16,32,39]	6
B16	Poorly formulated decisions in assigning limited resources	[6,8,9,23,25,32]	6
B17	Unstable agreement for a limited time period	[11,12,14,20]	4
B18	Inappropriate partner selection	[7,12,19,40]	4
B19	Improper project feasibility studies	[1,6,7,14]	4
B20	Fear of legal actions	[7,16,28]	3
B21	Poor spirit of cooperation	[11,14,40]	3
B22	Improper project planning and budgeting	[1,7,14]	3
B23	Fear of exposure of strength and weakness	[8,16,29]	3
B24	Lack of strategic planning for ICJVs operations	[1,6,7]	3
B25	Lack of confidence about experience and knowledge from the local partner	[6,14]	2
B26	Poor problem-solving culture	[11,39]	2
B27	Human resource management problems	[13,39]	2
B28	Blaming habits	[11,12]	2
B29	Extensive external workload of entities to the ICJV	[2,3]	2
B30	Unstructured problems and issues management framework	[12,39]	1
B31	Lack of continuous improvement	[12]	1
B32	Social sense of superiority	[11]	1

B33	Lack of preparedness to accept company philosophy	[11]	1
B34	Reluctance in training local staff/No standardized training	[31]	1
B35	Low productivity of workers	[16]	1
B36	Friction created within ICJV's internal management and client organization and local people	[24]	1
B37	Outdated skills and technology	[16]	1

References are as follows: **1** = Hsenh et al. (2007); **2** = Ozorhon et al. (2008a); **3** = Ozorhon et al. (2010a); **4** = Ozorhon et al. (2007a); **5** = Ozorhon et al. (2008b); **6** = Zhang and Zou, (2007); **7** = Shen et al. (2001); **8** = Bing et al. (1999); **9** = Bing and Tiong (1999); **10** = Lin and Ho (2012); **11** = Swierczek (1994); **12** = Williams and Lilley (1993); **13** = Drouin et al. (2009); **14** = McIntosh and McCabe, (2003); **15** = Ho et al. (2009a); **16** = Hwang et al. (2017); **17** = Munns et al. (2000); **18** = Young (1992); **19** = Gale and Luo (2004); **20** = Carrillo (1996); **21** = Luo (2001); **22** = Neves and Bugalho (2008); **23** = Walker and Johannes (2003); **24** = Norwood and Mansfield (1999); **25** = Zhao et al. (2013); **26** = Sillars and Kangari (2004); **27** = Girmscheid and Brockmann (2009); **28** = Odediran and Windapo (2016); **29** = Ling and Gui (2009); **30** = Mohamed, (2003); **31** = Mansfield and Sasillo (1990); **32** = Chen and Messner (2009); **33** = Almohsen and Ruwanpura, (2016); **34** = Ozorhon et al. (2010b); **35** = Han et al. (2018); **36** = Kwok et al. (2000); **37** = Ho et al. (2009b); **39** = Lu et al. 2020; **40** = Alashwal and Ann (2019); **41** = Maqsoom et al. (2020); **42** = Hwang et al. (2016)

Table 3. Risk factors identified from the literature

Code	Risks in ICJV	References	Sum
R1	Complicated problems associated with national culture of host country	[2,4,5,6,7,8,9,10,17,21,22,23,24,25,26,27,28,30,32]	19
R2	Inconsistency in government policies, laws, and regulations	[1,2,3,4,5,6,7,8,9,11,12,13,14,15,17,18,23,32,33]	17
R3	Inflation	[1,2,3,4,5,6,7,8,9,10,11,16,23,31]	14
R4	Force majeure	[1,2,3,5,6,7,8,10,11,12,23,25,30]	13
R5	Economy fluctuation	[1,2,3,4,14,6,7,8,9,12,15]	11
R6	Exchange rate fluctuation	[1,2,4,5,6,7,8,9,10,11,23]	11
R7	Lack of trust among ICJV contracting parties	[2,5,7,9,11,12,14,16,21,]	10
R8	Client's cash flow problems	[1,4,5,6,7,8,9,10,13,23]	10
R9	Technology transfer dispute	[1,5,7,8,10,20,21,23,35]	9
R10	Import and export restrictions	[1,7,8,10,11,12,13,19]	8
R11	Lack of mutually agreed conflict resolution mechanism	[2,6,10,17,24,25,26,27]	8
R12	Client's excessive demands and variations	[1,5,6,7,8,9,10,23]	8
R13	Corruption and Bribery	[3,4,5,6,10,16,23]	7
R14	Restrictions/difficulty on fund repatriation	[1,5,6,7,10,16,21]	7
R15	Frequent policy changes in parent's company towards ICJV	[1,5,6,7,10,20]	6

R16	Distrust between partner employees	[1,6,7,10,20,23]	6
R17	Pollution	[1,4,5,6,7]	5
R18	Nationalism and local protectionism	[5,10,11,15,21]	5
R19	Partner's parent company in financial problems	[1,7,8,10,20]	5
R20	Security problems	[4,7,8,10,14,17]	5
R21	Errors in design drawings	[10,11,15,23]	4
R22	Unknown site conditions	[10,11,14,17]	4
R23	Industrial disputes	[10,11,17,19]	4
R24	Safety issues during construction	[4,10,23,25]	4
R25	Shortage of resources	[5,10,11,24]	4
R26	Bureaucracy for late approvals	[4,5,10,23]	4
R27	Change of organization within local partner	[4,5,10,20]	4
R28	Over-interference by the parent company of either partner	[1,4,7,8]	4
R29	Project delay	[4,5,10]	3
R30	Lack of enforcement of contractual regulations	[5,10,17]	3
R31	Increase in price of facilities, labour, and materials	[5,10,23]	3
R32	Increase of resettlement costs	[5,10,11]	3
R33	Shortage of skilled labor	[5,10,23]	3
R34	Payment risk	[11,16,21]	3
R35	Delay of permits and licenses	[4,11,3]	3
R36	Equipment failure	[10,37]	2
R37	Unpredicted technical problems in construction	[4,21]	2
R38	Threat of terrorism	[11,16]	2
R39	High crime rate	[11,16]	2
R40	Disagreement on some conditions of contract	[4]	1
R41	Capital return difficulty	[4]	1
R42	Expropriation	[4]	1
R43	Breach of contract by a partner	[5]	1
R44	Uncertainty and unfairness of court justice	[5]	1
R45	Competition from other similar projects	[5]	1
R46	Unfairness in tendering	[9]	1
R47	Increase in project management overheads	[9]	1
R48	Increase in site overheads	[9]	1
R49	Low credibility of shareholders and lenders	[9]	1
R50	Hazards of environmental regulations	[9]	1
R51	Red tape/legislative bottleneck	[11]	1
R52	Termination of the ICJV contract	[18]	1

R53	Holidays and religious observations	[11]	1

References are as follows: **1** = Zhao et al. (2013); **2** = Ozorhon et al. (2010a); **3** = Mohamed (2003); **4** = Zhang and Zou (2007); **5** = Shen et al. (2001); **6** = Bing et al. (1999); **7** = Bing and Tiong (1999); **8** = Ling and Hoi (2006); **9** = McIntosh and McCabe (2003); **10** = Munns et al. (2000); **11** = Odediran and Windapo (2016); **12** = Hsenh et al. (2007); **13** = Ozorhon et al. (2007b); **14** = Mansfield and Sasillo (1990); **15** = Walker and Johannes (2003); **16** = Deng et al. (2018); **17** = Norwood and Mansfield (1999); **18** = Hwang et al. (2017); **19** = Ozorhon et al. (2008a); **20** = Ozorhon et al. (2007a); **21** = Swierczek (1994); **22** = Girmscheid and Brockmann (2009); **23** = Williams and Lilley (1993); **24** = Drouin et al. (2009); **25** = Gale and Luo (2004); **26** = Ho et al. (2009a); **27** = Ozorhon et al. (2008b); **28** = Lin and Ho (2012); **30** = Ho et al. (2009b); **31** = Alashwal and Ann (2019); **32** = Maqsoom et al. (2020); **33** = Hwang et al. (2016)

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Table 4. Data collection methods and analytical tools used

S/N	Paper selection category	Statistical tools employed	Number of papers	Percentage (%)
1	Questionnaire survey	Structural equation modelling (SEM), Significant index, Regression analysis, qualitative analysis, Ranking analysis, Hierarchical regression analysis, Ordinary least squares (OLS) regression analysis, Risk criticality index, Analytical hierarchy process (AHP), Means score, Kendall's concordance test, Spearman's correlations, Factor analysis, one-way ANOVA test	23	53%
2	Case study/interview	Qualitative analysis, fuzzy technique for order preference by similarity to ideal solution (Fuzzy-TOPSIS), Fuzzy analytical hierarchy process (AHP)	15	35%
3	Mixed method	Descriptive statistics, qualitative analysis, Content and thematic analysis, Spearman's correlations and multiple linear regression, Principal component analysis, SEM,	5	12%

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Table 5. Barrier-risk cycle key

Code	Barriers in stages (-)	Code	Risks in stages (-/+)
Pre-inception stage		*Pre-inception stage*	
B1	Language barrier	R1	Lack of enforcement of contractual regulations
B2	Lack of understanding of local statutory requirements/building regulations	R2	Security problems
		R3	Breach of contract by a partner
		R4	Termination of the ICJV contract
Formation and Organization stage		*Formation and Organization stage*	
B3	Lack of understanding and knowledge at the onset	R3	Breach of contract by a partner
B4	Inappropriate partner selection	R4	Termination of the ICJV contract
B5	Poorly formulated governance structure	R5	Disagreement on some conditions of contract
B6	Incomplete contract terms with partner		
Implementation and Adjustment stage		*Implementation and Adjustment stage*	
B7	Loss of management control	R6	Safety issues during construction
B8	Improper project planning and budgeting	R7	Industrial disputes
B9	Use of outdated skills and technologies	R8	Lack of trust among ICJV contracting parties
B10	Human resource management problems	R9	Shortage of resources
B11	Friction created in ICJV's internal management and client organization and local people	R10	Unpredicted technical problems in construction
B12	Lack of strategic planning for the ICJV operation	R11	Payment risk
		R3	Breach of contract by a partner
Completion and Evaluation stage		*Completion and Evaluation stage*	
B13	Blaming habits		
B14	Difference in salary package between foreign and local employees		Unsuccessful performance/complete failure
B15	Difficulty in measuring ICJVs success		

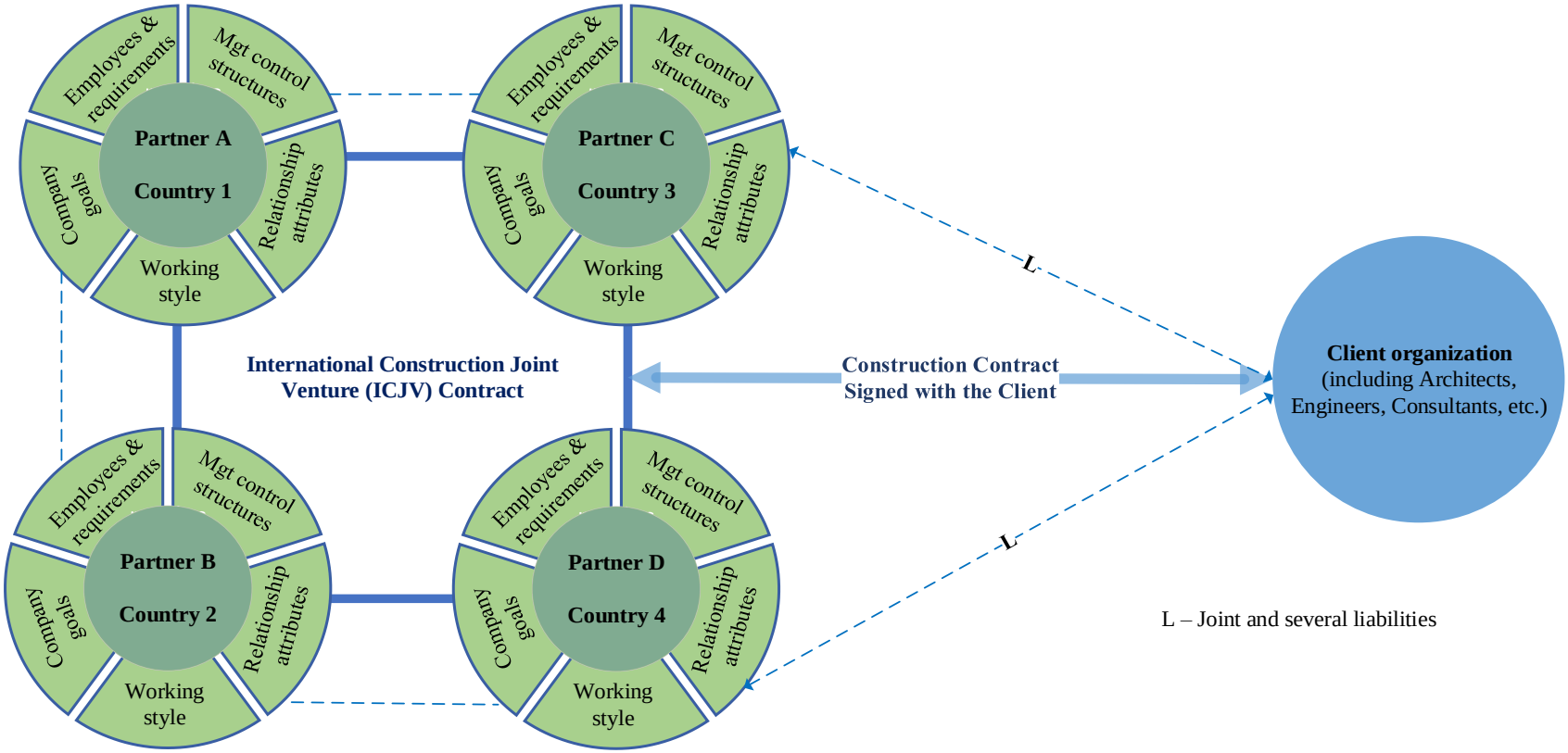

Figure 1. Structure of an ICJV

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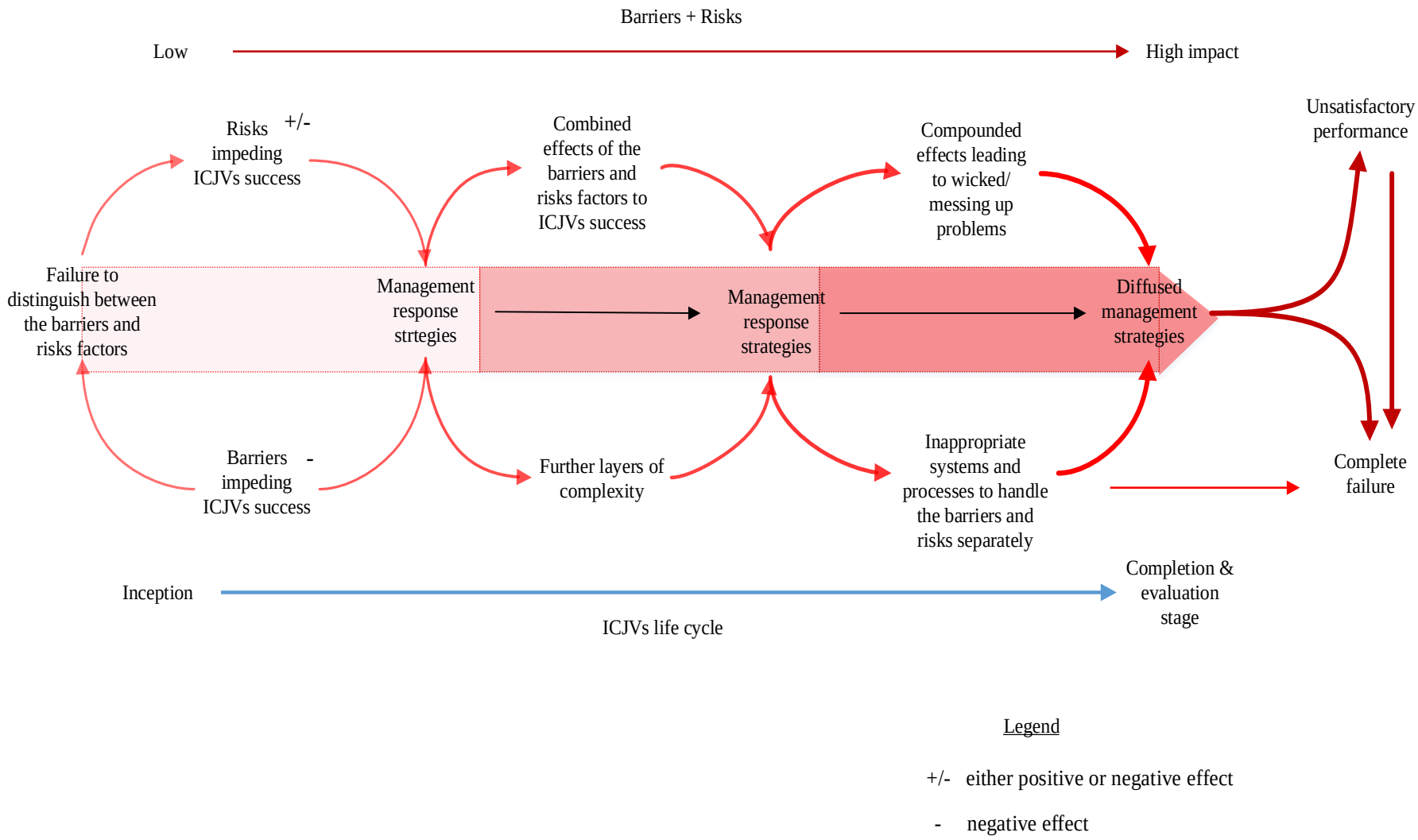

Figure 2. Effect of the barrier and risk factors in ICJVs operation

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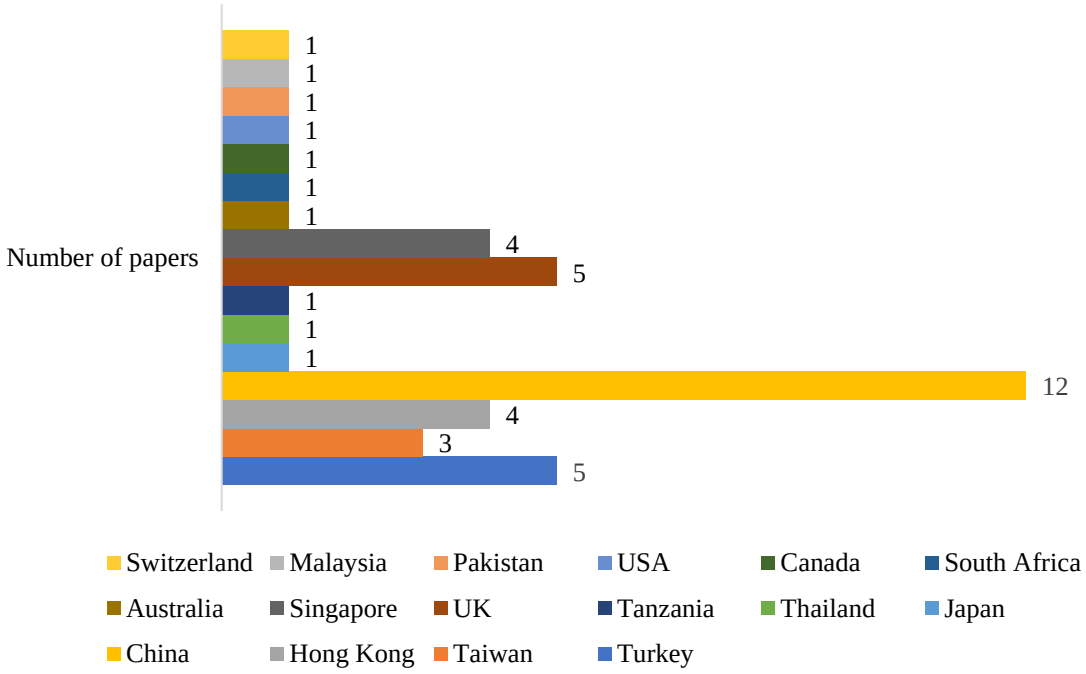

Figure 3. Geographical distribution of selected articles

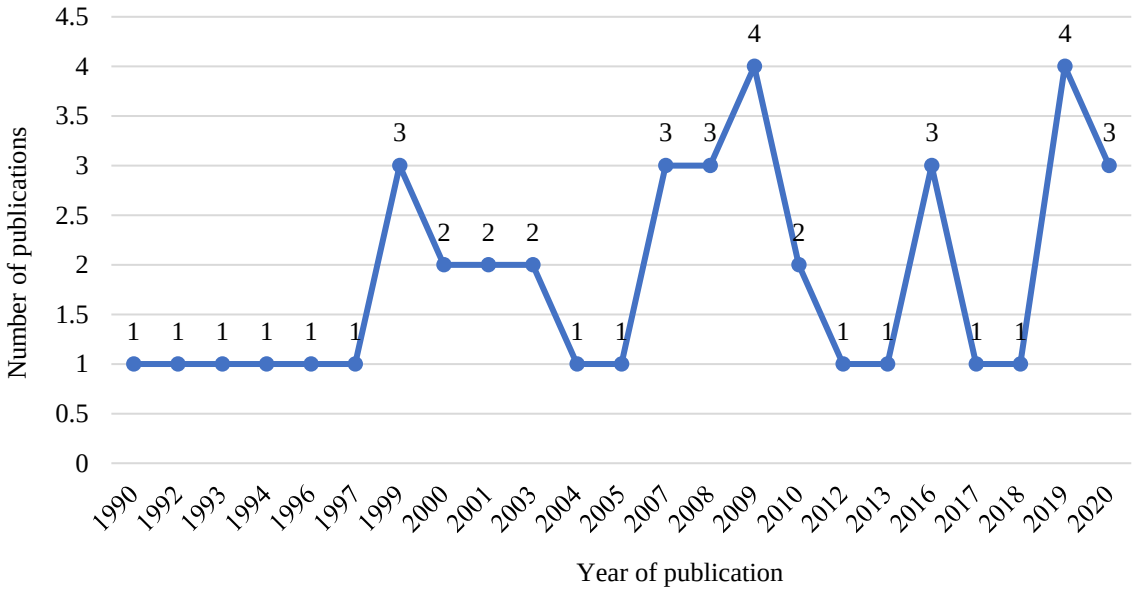

Figure 4. Number of relevant papers published yearly from 1990 – 2020 (searched on July 14, 2020)

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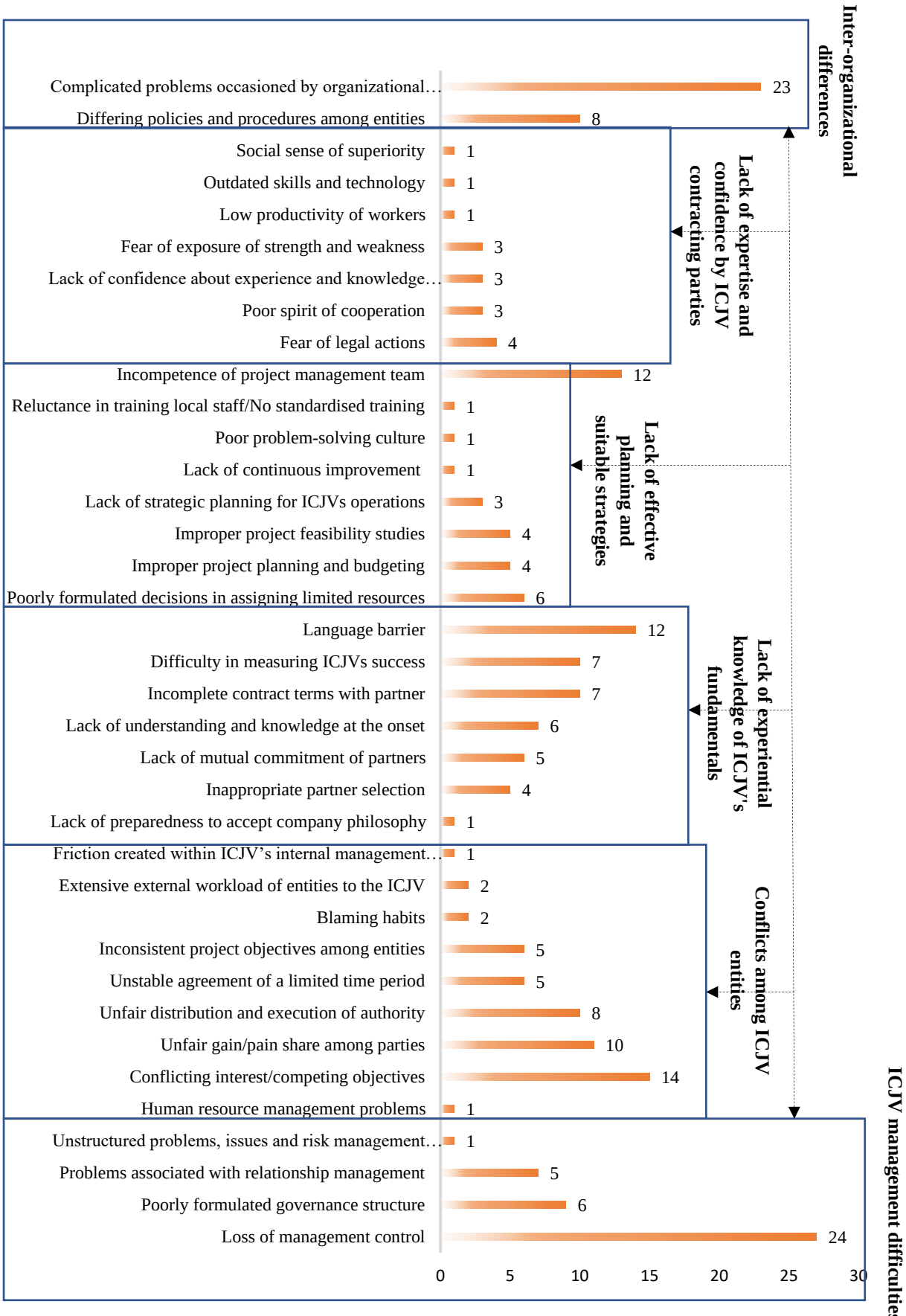

Figure 5. Conceptual framework of barriers in ICJVs

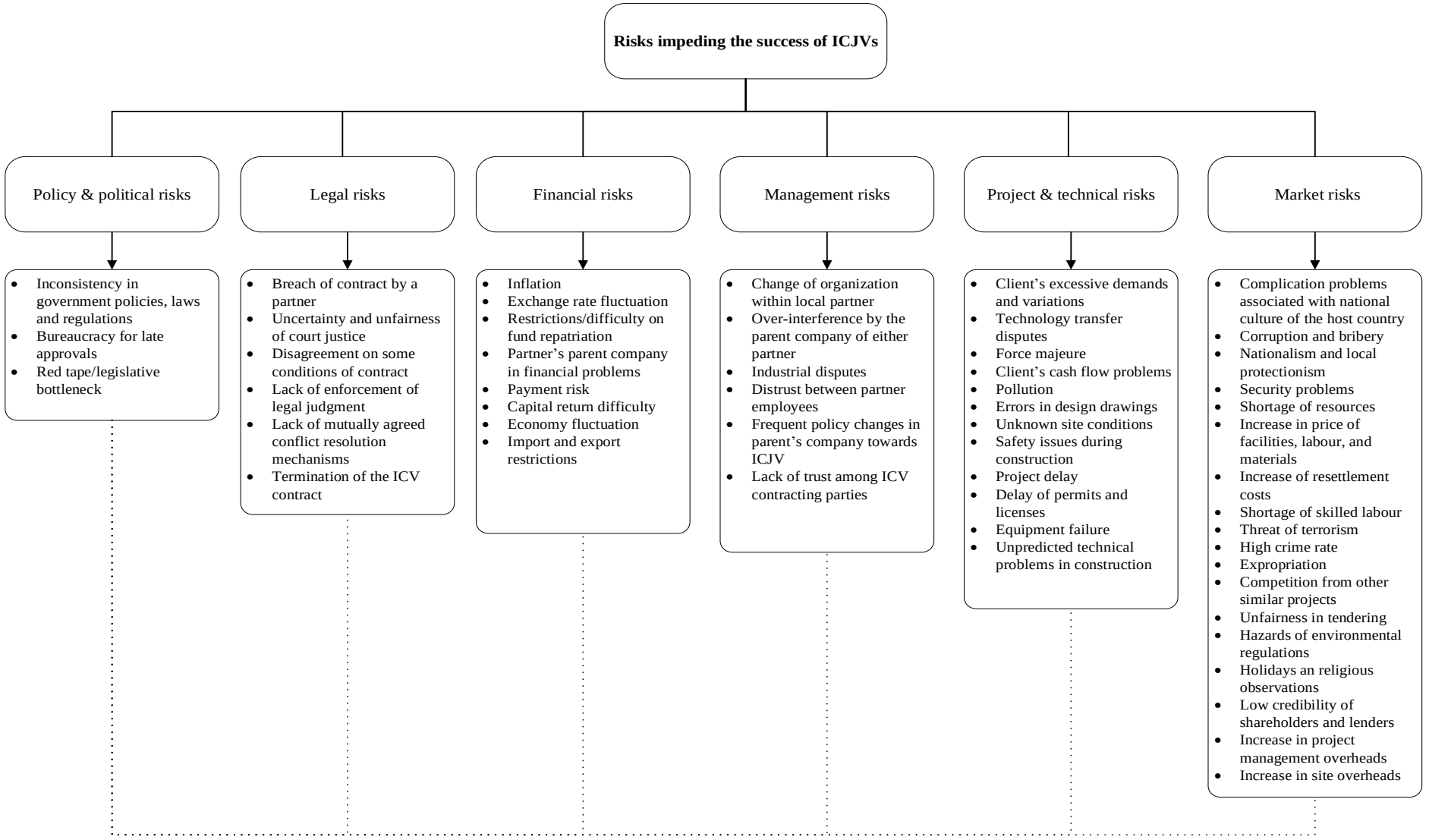

Figure 6. Classification of the risk factors in ICJV adapted from Shen et al. (2001) and Hwang et al. (2017)

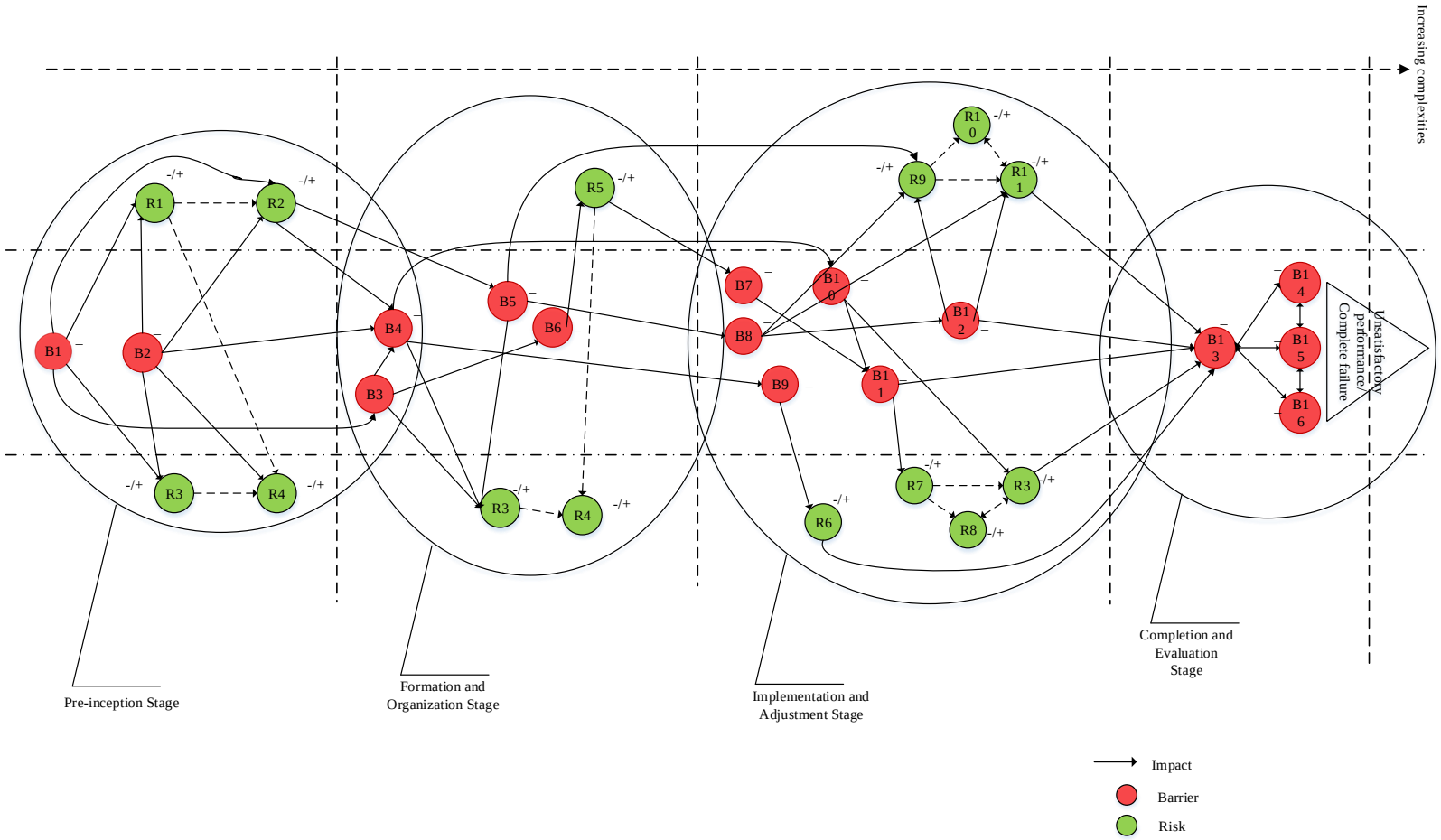

Figure 7. An example framework of the barrier-risk cycle.

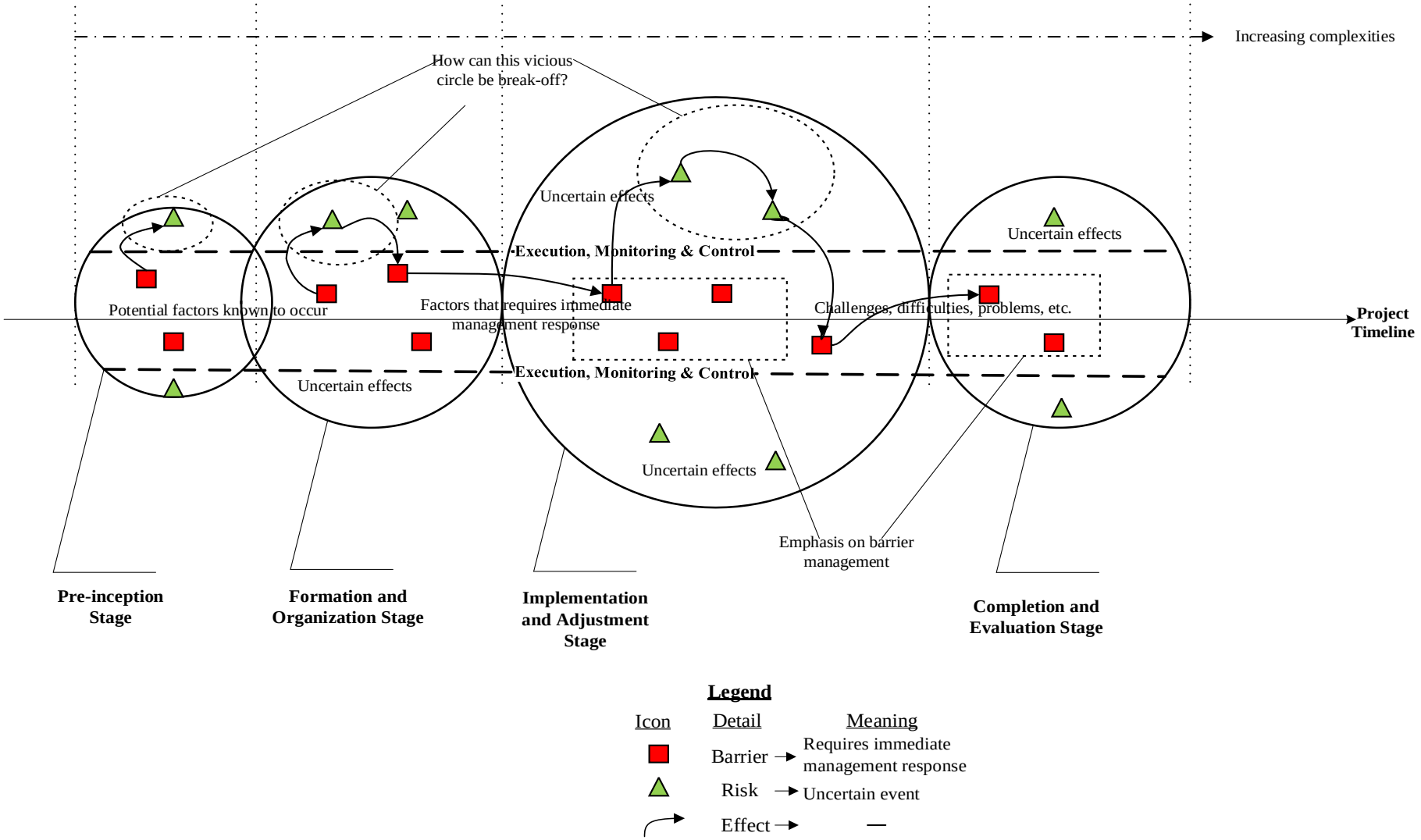

Figure 8. A conceptual framework for managing the barriers and risks in ICJV