# A review of International Construction Joint Ventures research in construction journals

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#### Abstract

Research on international construction joint ventures (ICJVs) has increased for the past two decades, and the aim of this contribution is to conduct a systematic review to identify current research priorities and future research directions for development. It analyzed the trend of ICJV research in terms of annual publication, countries' contributions, contributions by institutions and researchers, and research papers published in 17 selected CM journals from 1990 to 2018. Scopus search engine was used with some related keywords, a systematic desktop search was conducted, followed by the selection of journals and papers. The results indicated that while the largest contribution to ICJV research has come from developed countries like Singapore, the UK, and the US, developing countries like China and Turkey have also made an enormous contribution. Also, the output of this study shows the pioneer authors and the leading institutes. The key research topics covered within the study period include entry modes, formation decision strategies, and operation; risk assessment and management practices; performance evaluation; dispute resolution mechanisms; management issues in ICJVs; influential factors for ICJV practice; and technology transfer. The findings provide an in-depth understanding of ICJV research to practitioners and researchers and stimulate future research based on the identified gaps.

**Keywords:** International construction joint ventures, Construction industry, Construction management, Literature review, Research trends

### 1. Introduction

International construction joint ventures (ICJVs) is now popular in today's business environment worldwide. Global industry players have adopted ICJVs because of the demand for bulk market opportunities, and other related benefits (Gale and Luo, 2004; and Zhang and Zou, 2007). ICJVs are typically launched on large scale infrastructure projects. Thus, there has been substantial growth both in theory and practice for the successful realization of its operations and management. Theoretically, there have been a number of studies on ICJVs with diverse focus from both the perspective of developed and developing countries (Gale and Luo, 2004; and Razzaq et al., 2018). For instance, Mohamed (2003) grouped some key research interest on ICJVs as motivations behind ICJV formation; related benefits and disadvantages; critical success factors (CSFs); and risk analysis and management. Likewise, building on Mohamed's (2003) study, Ozorhon et al. (2008a) also grouped ICJVs studies as risk management; factors affecting the performance of ICJVs; and management related issues.

The increasing number of research publications with different focus has hindered the recognition of research efforts in the area. Hence, a systematic review of the existing literature on ICJV studies is needed to enhance the understanding of the ICJV concept and pave the way for future researchers to undertake more efficient and intensive research. Although Hong and Chan (2014) conducted a literature review on joint ventures in construction, their study still has the following shortcomings. First, it did not analyze joint ventures in construction from an international perspective. Second, it did not analyze the research outputs from various locations, institutions, and authors. Third, it does not cover the literature published over the last half-decade since the analysis was made of publications from 1993 to 2012. In addressing the shortcomings, the present review study aims at answering these research questions: (1) what is the annual publication trend of ICJV-related studies from 1990 to 2018? (2) what are the contributions of authors from different countries and institutions to ICJV research? And (3) what are the key research areas?

Many scholars (Li et al., 2014a; Darko and Chan, 2016) have conducted literature review studies by analyzing contributions made by various countries, institutions, and authors to show the research trend in different construction management disciplines. However, this study is the first to replicate this review methodology in the context of ICJV research. The study is restricted to ICJV research papers published in selected CM journals from 1990 to 2018 (as of the end of August). This study provides invaluable insights for researchers and practitioners to appreciate ICJV research trends and developments and expand the knowledge in the field.

#### 1.1 Global definition of ICJV

JVs have different definitions in the literature (Hong and Chan, 2014). In the Global business market, it is defined as a long-term marriage between at least two independent organizations who combine complementary resources for the benefits of undertaking a project, and a legal rule binding their formation (Tomlinson, 1970; and Geringer, 1988). Therefore, there is a creation of the newly incorporated company where each has an equity position (Killing, 1988). In the view of Garbs (1988), from the construction industry perspective, JVs exist for a limited period with the objectives of undertaking procurement works, engineering, consulting, construction and construction management services by combining complimentary resources. Accordingly, a construction joint venture (CJV) turn up to be one project or typically a short-term agreement (Kreitl et al., 2002)). Hong and Chan (2014) defined CJVs as the marriage between at least two firms who join forces together in pursuit of Architectural, Engineering and Construction projects. It becomes "international" where the headquarters of at least one partner is situated outside the venture operation country (Geringer and Hebert, 1989). In the same vein, Girmscheid and Brockmann (2010) also argued that, a collaboration involving multinationals can be termed as an international joint venture (IJV). In addition, Girmscheid and Brockmann (2010) pointed out that, when a construction contract is signed between the JV system and the client, then we have ICJV. Therefore, to determine the research trend and gaps for future studies, this study falls under the defined scope of ICJVs established by Girmscheid and Brockmann (2010) and Hong and Chan (2014).

# 2. Research Methodology

This study followed a review process adopted by Darko and Chan (2016), to determine the current trend of ICJV research. ICJV-related literature published in selected CM journals from 1990 to 2018 were gathered for this study. Firstly, Scopus search engine and some related keywords was employed to select CM journals. The entire search code is as follows:

TITLE-ABS-KEY ("International Construction Joint Venture" OR "International Joint Ventures" OR "Construction Joint Ventures" OR "Joint Collaboration Ventures" OR "ICJVs" OR "International Construction" AND "Construction Industry" OR "Building Industry") AND DOCTYPE (ar OR re) AND PUBYEAR > 1990 AND PUBYEAR < 2018 AND (LIMIT-TO (SUBJAREA, "ENGI") OR LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "DECI") OR LIMIT-TO (SUBJAREA, "ECON") AND (LIMIT-TO (LANGUAGE, "English")) (Search results: 374 documents (searched on August 28, 2018). A total of 374 papers were originally identified from over 50 different journals (both construction and non-construction journals showed up) (searched on August 28, 2018).

Journals that did not fall under the category of CM were discarded, and a total of 36 construction journals were retained after the visual screening. After this process, the initial number of papers (i.e. 374) reduced to 261. A preliminary screening was conducted of all the 261 publications to discard book reviews, conference papers, and editorials even though they contained some valuable information. This is because, such publications do not go through a rigorous examination process and are not sufficiently advanced for wide dissemination in the academic community (Drott, 1995). Thus, 246 refereed journals were retained and collating under their respective journals after the process.

To facilitate the relevant paper selection process, two set parameters adopted by Hong et al. (2011) and Darko and Chan (2016) was considered to reduce the number of papers retained. Hence, journals selected in this study met either one of the criteria below:

- 1. The journal must have at least two papers according to the search results to reduce the possibility of ignoring relevant publications (Bao et al. 2018).
- 2. The journal ranks within the top six of Chau's (1997) quality rating of construction management journals. This ranking is widely accepted and adopted by many researchers in the construction management domain.

Finally, a total of five journals: Journal of Construction Engineering and Management (JCEM); Journal of Management in Engineering (JME); International Journal of Project Management (IJPM); Construction Management and Economics (CME); and Engineering, Construction and Architectural Management (ECAM) were selected contingent on the second parameter. Twelve journals: Building Research and Information (BRI); Journal of Professional Issues in Engineering, Education and Practice (JPIEEP); Journal of Facilities Management (JFM); Automation in Construction (AC); Construction Economics and Building (CEB); Advance in Civil Engineering (ACE); Journal of Civil Engineering and Management (JCEM); Canadian Journal of Civil Engineering (CJCE); International Journal of Construction Engineering and Management (IJCEM); International Journal of Construction Management (IJCM); International Journal of Civil Engineering (IJCE); and Construction and Architectural Management (CAM) that met the first criteria. Thus, 17 construction journals were selected for the study.

After this exercise, the 17 construction journals captured 231 articles; nonetheless, there was a possibility that unrelated papers still appeared; because they met some of the keywords. Therefore, a robust and comprehensive examination was conducted by reading the abstract and whole document of each of the 231 papers to filter out

irrelevant papers. Note that, publications that did not fully or partially satisfy the subject matter were excluded. After filtering, a total of 53 papers formed the basis of the review. Table 1 explicitly summarizes the targeted journal papers that were finally selected for the review.

Selected journals	No. of publications	No. of relevant papers	
Journal of construction Engineering and Management	58	for this study	
(JCEM)	50	0	
Journal of Management in Engineering (JME)	37	7	
International Journal of Project Management (IJPM)	18	4	
Construction Management and Economics (CME)	37	12	
Building Research and Information (BRI)	9	4	
Journal of Professional Issues in Engineering, Education and	5	3	
Practice (JPIEEP)			
Journal of Facilities Management (JFM)	5	1	
Automation in Construction (AIC)	6	2	
Construction Economics and Building (CEB)	4	1	
Advance in Civil Engineering (ACE)	3	1	
Engineering, Construction and Architectural Management	21	1	
(ECAM)			
Journal of Civil Engineering and Management (JCEM)	7	1	
Canadian Journal of Civil Engineering (CJCE)	6	2	
International Journal of Construction Engineering and	2	1	
Management (IJCEM)			
International Journal of Construction Management (IJCM)	5	2	
International Journal of Civil Engineering (IJCE)	3	1	
Construction and Architecture Management (CAM)	5	2	
Total	231	53	

*Table 1. Overview of search results and distribution of selected publications (from 1990 – 2018)* 

## 3. Analysis and discussion of results

#### 3.1 Overview of ICJV Publication Trend

ICJVs started to gain recognition in 1990 in the academic domain (Hwang et al., 2017). Between 1999 to 2010, mark a tremendous growth of ICJVs studies. 35 number of articles were published between the period communicating the growth ICJV studies in the academic domain. Similar results were reported by Hong and Chan (2014). However, nine papers were published in 2008, a peak within the studied period. Comparatively to the industrial practice of ICJVs, this is the period where most construction companies in the developed countries extended their services to the developing countries due to the increase in infrastructure project, and the "open policy strategy" by many governments across the globe. After the increased publication period (i.e. 2010), there have been a steady growth of ICJV studies. However, there is a great potential for an increase at the end of the year due to the increase in practice of this hybrid-collaboration form.



Figure 2: Annual International Construction Joint Ventures (ICJVs) trend from 1992 to 2018 (as of the end of August).

# 3.2 Contribution of Countries of Origin, Institutions, and Researchers to ICJV Research

With reference to Howard et al.'s (1987) widely adopted formula, contributions of multi-authored publications from different countries were calculated. From equation (1) below, in a multi-authored paper, credits were proportionally divided among authors with the higher score given to the first author, followed by the second author and the third in that order. Table 2 below presents the detailed matrix indicating the scores for multi-authored papers.

Score = 
$$\frac{1.5^{n-i}}{\sum_{i=1}^{n} 1.5^{n-i}}$$
 .....(1)

Number of authors	Order of specific author				
	1	2	3	4	5
1	1.00				
2	0.60	0.40			
3	0.47	0.32	0.21		
4	0.42	0.28	0.18	0.12	
5	0.38	0.26	0.17	0.11	0.08

Table 2. Matrix showing the scores for multi-authored papers

Country	Institutions/Universities	Researchers	Papers	Score
Singapore	19	25	14	11.35
China	19	22	11	8.36
Turkey	11	23	10	7.15
USA	12	18	10	6.70
UK	8	9	6	6.00
Hong Kong	5	6	6	4.32

Table 3. Locations of selected ICJVs research papers

				Hong Kong SA 17 – 21 Ju	R, China ine 2019
Australia	7	9	8	3.32	
Taiwan	3	8	3	2.84	
Japan	2	2	3	1.23	
Malaysia	2	2	2	1.21	
South Africa	4	4	3	1.02	
Thailand	1	2	1	1.00	
Austria	1	3	1	1.00	
Finland	1	1	1	1.00	
Pakistan	2	4	1	1.00	
Moscow	1	1	1	1.00	
Canada	1	2	1	1.00	
Nigeria	1	1	1	1.00	
India	1	1	1	0.60	
Switzerland	1	1	1	0.60	
Germany	1	1	1	0.40	
Sri Lanka	1	1	1	0.40	
Korea	1	1	1	0.21	

CIB World Building Congress 2019

From Table 3, Following in the descending order, countries that have contributed significantly to ICJV research are: China, Turkey, USA, UK, Hong Kong, Australia, and Taiwan obtained a contribution score of 8.36, 7.15, 6.70, 6.00, 4.32, 3.32 and 2.84 respectively. Predictably, both the developed and developing countries have contributed much to ICJV research. Similarly, countries like Malaysia, South Africa, Thailand, Austria, Finland, Pakistan, Nigeria, etc. have also made a great attempt in increasing ICJV research, with a contribution score of 1.00 each. Generally, in terms of research, the developing countries have received the limited attention of ICJV-related studies which indicates a slow rate of innovation and industrial practices. The results show a devoted efforts by researchers across the globe to contribute significantly to ICJV research.

Table 4 presents the top 10 institutions publishing ICJV papers in the construction field. Also, the origin of the research centers, number of authors and papers are well presented. Research institutions that have contributed most to ICJV research include Nanyang Technology University (Singapore), Illinois Institute of Technology (US), Southeast University, Nanjing (China), Middle East Technical University (Turkey), National University of Singapore (Singapore), and Hong Kong Polytechnic University (Hong Kong), with a contribution score of 4.66, 3.60, 3.57, 3.43, 3.41, and 2.00 respectively.

As presented in Table 5, the analysis depicts that nine (9) researchers scored at least one point in contributing to ICJV research. Among them, Xianbo Zhao from National University of Singapore (Singapore) and Beliz Ozorhon from Illinois Institute of Technology (US) obtained the highest contribution score of 2.49 and 2.15 respectively. The effort of these two researchers also reflects in the highest score for their respective researcher centers.

Rank	Institution/University	Country	Researchers	Papers	Score
1	Nanyang Technology University	Singapore	4	5	4.66
2	Illinois Institute of Technology	US	4	4	3.60
5	Southeast University, Nanjing	China	5	4	3.57
3	Middle East Technical University	Turkey	2	4	3.43
4	National University of Singapore	Singapore	5	5	3.41
6	Hong Kong Polytechnic University	Hong Kong	4	3	2.00
7	National Taiwan University	Taiwan	2	4	1.84
8	Griffith University	Australia	1	1	1.00

Table 4. Top 10 research institutions publishing ICJV papers (using the score matrix)

				CIB \	Norld Building Con	gress 2019
					Hong Kong S	SAR, China
					17 - 21	June 2019
9	University of Hong Kong	Hong Kong	2	3	1.00	

Researcher	Papers	Affiliation	Country	Score
Xianbo Zhao	5	National University of Singapore	Singapore	2.49
Beliz Ozorhon	5	Illinois Institute of Technology	US	2.15
Irem Dikmen	4	Middle East Technical University	Turkey	1.87
Jun Luo	3	Ove Arup and Partners Ltd	UK	1.48
David Arditi	4	Illinois Institute of Technology	US	1.40
Bon-Gang Hwang	4	National University of Singapore	Singapore	1.39
S. Ping Ho	3	National Taiwan University	Taiwan	1.24
Yi-Hsin Lin	3	Southeast University, Nanjing	China	1.16
Low Sui Pheng	2	National University of Singapore	Singapore	1.07

Table 5. Authors contributions to ICJVs related papers in construction (scoring at least one point)

#### 3.3 Key Research Areas and Sub-focus Captured in ICJV Study

Following Hong and Chan's (2014) study which classified CJV studies into seven major themes based on some selected journals papers within their study period, the present study also shared similar classification of ICJV-related papers to Hong and Chan's classification. To conserve space, a brief discussion of the various research topics is provided in the following section to better project what has been done from what needs to be done so that the research gap can be identified to stimulate future research.

- 1) Entry modes, formation decision strategies, and operation. ICJVs have long been adopted by AEC firms for strategic purposes in the global construction market (Ling et al. 2008). Over the past two decades, the "open door" policy strategy made by many governments around the world have increased the engagement of multinational firms in the global construction market. The easiest way for foreign contractors to have access to a domestic market is through joint ventures with local construction firms (Xu et al. 2005). A number of ICJV-related studies have reported on the entry mode and formation decision strategies (Chen, 2008), factors that affect entry mode decision (Chen, 2008 and Jia et al. 2016), and model for entry location and timing (Isa et al. 2014).
- 2) Risk assessment and management practices. This is the most largely explored area within the study period as indicated earlier. Majority of the high failure rate inherent with ICJV formation and its operation is due to internal, project-related and external risk manifested in several empirical studies (Bing and Tiong, 1999; and Ho et al. 2009). Studies relating to risk in ICJV have expanded extensively from risk identification (Hwang et al. 2016 and Razzaq et al. 2018) to risk assessment (Zhang and Zou, 2007; and Hwang et al. 2017), to prioritization of risk (Zhao et al. 2013; Hwang et al. 2017; and Razzaq et al. 2018), to risk management/treatment (Bing et al. 1999; Kapila and Hendrickson, 2001; Odediran and Windapo, 2016; and Chang et al. 2018), through to risk allocation preference (Hwang et al. 2016; 2017). To some extent, risk implications on the performance of ICJVs have also been studied (Al-Sabah et al. 2014). Consequently, models have been developed to manage and transfer risk in ICJV operations (Bing and Tiong, 1999 and Hwang et al. 2016; 2017). Generally, issues related to risk have empirically been given much attention from previous studies.
- 3) Performance evaluation elements. Performance measurement in ICJVs have received significant attention in the literature yet challenging task for both practitioners and researchers. While practitioners are challenged with the perspective from which performance should be measured from (i.e. either from the partner perspective, project-based perspective, ICJV itself, or the overall satisfaction), and researchers also find it difficult to determine variables relating to ICJV performance due to the partially unevenness and incompatibility of performance determinants in ICJV literature (Ozorhon et al. 2010b). From the international business perspective, objective and subjective measures have been used for measuring the performance of IJVs. With the objective measures focusing on financial determinants (e.g. profitability

measures, growth, and cost position, longevity, and survival), subjective measures relate to the overall satisfaction as perceived by the JV partners (Geringer and Herbert, 1991). Ozorhon et al. (2007b) proposed three distinct performance criteria as: inter-partner relationship, the structure of the ICJV, and inter-partner fit. Ozorhon et al. (2008b) further proposed a three-dimensional construct as project performance, partner performance and the performance of the ICJV itself. Nonetheless, overall satisfaction as a final dimension was added by Ozorhon et al. (2010a; 2010b). These performance assessment criteria reflect both the objective and subjective indicators as Ozorhon et al. (2007a) postulated. Further, in Mohamed's (2003) study the performance of ICJV was measured by value, profit, and satisfaction.

- 4) Dispute resolution mechanisms. In ICJVs, the increase in the number of partners with a different cultural and organizational background in the construction value chain means more business interactions and arguments, irrespective of the contractual or social relationship, hence leading to increasing in construction disputes (Kumaraswamy and Yogeswaran, 1998). By studying the sources of disputes and disputes resolution strategies in Sino-foreign joint ventures in China, Chan and Suen (2005a) classified the sources of disputes into three categories: contractual, cultural and legal matters and the common dispute resolution methods used are mediation and arbitration. Maemura et al. (2018) also reported on the root causes of contractual conflicts in international construction projects by multinationals and identified nineteen (19) causal factors of contractual conflicts encapsulating under six (6) categories. A critical review of ICJV literature has shown that dispute resolution methods have always focused on the contractual relations between partnering firms whilst neglecting the contract signed with the client. However, there is still limited work in this subject area.
- 5) Management issues in ICJVs. Management control remains key for efficiently utilizing resources and effectively implementing strategies (Girmscheid and Brockmann, 2009). Different concepts and measures have been used empirically when examining management control therefore resulting in inconclusive findings. For instance, Luo (2001) investigated the relationship between management control and performance in Sino-foreign CJVs in China by using dominant and shared control as a management control mechanism. Neves and Bugalho (2008) analyzed the control and coordination process in multinational firms using bureaucratic, cultural and social control. Likewise, Girmscheid and Brockmann (2009) conceptualized management control structures by using formal and informal control. Comparatively, with the aim of providing an effective organizational governance structure mechanism, Ho et al. (2009) proposed a model for choosing the best governance structure for CJVs. They proposed two different taxonomy of governance structure which is: jointly managed JVs (JMJs) and separately managed JVs (SMJs). Building upon Ho et al.'s (2009) study, Lin and Ho (2012) investigated the performance impact s of the two-governance structure taxonomy by holding the same level of governance structure fit and found a significant positive relationship between the two.
- 6) Influential factors for ICJV practice. This theme mainly focused on the relational and practical aspects in implementing ICJVs operations, and the perceptual factors that results to the ICJVs success as indicated by previous researchers (Luo et al. 2001 and Gale and Luo, 2004). They include but not limited to commitment, co-operation, partner selection, cultural fit, inter-partner relations, strategic and organizational fit, etc. (Morledge and Adnan, 2006). Further, models have been developed to test the relationships between some of these influential factors on the operational success of ICJVs. Example, the effect of partner fit, host country (*cf* Ozorhon et al. 2007a; 2008a) etc.
- 7) Technology transfer. Joint ventures serve as a tool for transferring knowledge in the construction industry (Carrillo, 1996 and Ofori et al. 2001). However, it is surprising to notice that research attention given to it is low. Zhang et al. (2010) noted that it is due to the lack of set practical processes, mechanisms or systematic guidelines, and the extent of realization of the need etc. as postulated by. Thus, it worth it conducting studies in this area. Nonetheless, regardless of the numerous advantages obtained as a result of technology transfer to local partners, ICJVs also presents some constraints as an effective transfer and learning mechanisms, as highlighted by previous researchers (Ofori et al. 2001 and Ganesan and Kelsey, 2006). Drawing from literature under the sub-themes; knowledge transfer mechanisms and learning effectiveness, Zhang et al. (2010) emphasized that the technology transfer process that is knowledge-based

driven requires adequate absorptive capacity from the recipient industry. Thus, acquiring this human capital facilitates the transfer, absorption, and adaptation of new technologies (Ganesan and Kelsey, 2006).

#### 4. Conclusions

Research on international construction joint ventures (ICJVs) has increased for the past two decades due to the proliferation of large and complex infrastructure projects across the globe. The present study systematically analyzed ICJV research trends and development in globally renowned construction management (CM) journals. 17 selected CM journals, namely JCEM, JME, IJPM, CME, ECAM, BRI, JPIEEP, JFM, AC, CEB, ACE, JCEM, CJCE, IJCEM, IJCM, IJCE, and CAM from 1990 to 2018 was analyzed. In overall, 53 ICJV- related papers were systematically analyzed in this study. The results highlighted an increasing attention to ICJV research within the studied period. Both developed and developing countries like China, Turkey, USA, UK, Hong Kong, Australia, and Taiwan have contributed significantly to ICJV research. Similarly, countries like Malaysia, South Africa, Pakistan, and Nigeria have also made a good attempt at increasing ICJV research. Researchers from the various institutions like the Nanyang Technology University (Singapore), Illinois Institute of Technology (US), Southeast University, Nanjing (China), etc. have published most of the ICJV research papers. Key research topics covered include entry modes, formation decision strategies, and operation; risk assessment and management practices; performance evaluation; dispute resolution mechanisms; management issues in ICJVs; influential factors for ICJV practice; and technology transfer.

Due to space and word limitation, it is proposed that future studies establish a more holistic performance indicators with key underlying variables, which covers all perspectives of ICJV performance together with corporate sustainability measures in evaluating the effectiveness of ICJVs operations. Performance in ICJV has been too static and therefore failed to consider the evolutional stages of the ICJV life cycle development. The development of an integrated performance measurement model that considers the stage wise progression of ICJV growth is probably a promising research direction. Also, future studies should examine the nature of interrelationships between the ICJV contract system and the client team. Further, there are also limited studies of management control in the developing country context. Future studies can explore practical industrial applications factors for improving ICJV operations. These are wide research gaps which demand critical attention to ensure successful ICJV operation.

The limitations of this research study are the small sample size (53 paper) used for the analysis. This is justified by the inapplicability of considering all possible ICJV research keywords in a single review study. Furthermore, there is a limitation on the generalizability of the research findings to other industries since it was restricted to only the construction industry. Future studies can increase the sample size by adopting a different research process. The findings provide an in-depth understanding of ICJV research to practitioners and resessarchers and stimulate future research based on the identified gaps.

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