



22 and technology transfer. This study also suggests useful directions for future research. The findings  
23 provide in-depth understanding of ICJV research to practitioners and researchers and stimulate  
24 future research based on the identified gaps.

25 **Keywords:** International construction joint ventures; Construction industry; Construction  
26 management; Literature review; Research trends.

## 27 **Introduction**

28 The collaboration of multinational construction firms as International Construction Joint Ventures  
29 (ICJVs) has become popular in the global business environment today (Ozorhon et al. 2007). Its  
30 attractiveness to global industry players is because of the demand for bulk market opportunities,  
31 and other related benefits (Gale and Luo, 2004; and Zhang and Zou, 2007). ICJVs have extensively  
32 been utilized for more complex and large-scale construction projects including: off-shore oil  
33 exploration and production, design and real estate development, industrial projects, urban public  
34 facility projects and underground rail construction (Harrigan, 2003; and Hwang et al., 2016).  
35 Ultimately, the expansion of its adoption has resulted in a more complex web of construction  
36 organizations, necessitating great attention to successful operations and management. Hence, there  
37 have been a number of studies on ICJVs with diverse focus from both the perspective of developed  
38 and developing countries (Gale and Luo, 2004; and Razzaq et al., 2018). For instance, Mohamed  
39 (2003) encapsulated some key research interest in published works on ICJVs as motivations behind  
40 ICJV formation; related benefits and disadvantages; critical success factors (CSFs); and risk  
41 analysis and management. Likewise, Ozorhon et al. (2008) identified similar clustered focus from  
42 a small group of studies on ICJVs as risk management; factors affecting the performance of ICJVs;  
43 and management related issues.

44 The existing literature is concealed with highly diversified topics that hinder the recognition of  
45 research efforts in the area. Therefore, a systematic and comprehensive examination of the existing  
46 literature on ICJV studies is needed to enhance the understanding of the ICJV concept and pave  
47 the way for future researchers to undertake more efficient and intensive research. According to  
48 Cohen et al. (2002), one of the ways through which scholars can influence industrial practice and  
49 inform policymakers is publication of research papers and reports. While other countries might  
50 benefit from the research outputs from a particular country, the number of research outputs and  
51 publications from a particular country on a certain topic has a key role in advancing industrial  
52 development on that topic in that country (Hong et al., 2011). Darko and Chan (2016) emphasized  
53 that it is important to keep a track record of publications on a specific topic in different locations  
54 in order to devise strategies for advancement where required. While Hong and Chan (2014)  
55 reviewed the literature on joint ventures in construction, their study has a number of limitations.  
56 First, it did not analyze joint ventures in construction from an international perspective. Second, it  
57 did not analyze the research outputs from various locations, institutions, and authors. Third, it does  
58 not cover the literature published over the last half decade since the analysis was made of  
59 publications from 1993 to 2012. To address these limitations, the present review study aims at  
60 answering these research questions: (1) what is the annual publication trend of ICJV-related studies  
61 from 1990 to 2018? (2) what are the contributions of authors from different countries and  
62 institutions to ICJV research? And (3) what are the key research areas?

63 The review of analyzing contributions made by various countries, institutions and authors has  
64 been adopted by many researchers (Yi and Chan, 2014; Li et al., 2014a; Darko and Chan, 2016)  
65 to present research trend in different construction management disciplines. However, the present  
66 study is the first to replicate this review methodology in the context of ICJV research. This review

67 study is restricted to ICJV research papers published in selected CM journals from 1990 to 2018  
68 (as of end of August). In the academic discipline, it is useful for especially firsthand researchers  
69 to investigate and understand research developments on a selected topic for exploration by  
70 focusing on papers published in academic journals (Hong et al., 2011; and Tsai and Lydia Wen,  
71 2005). This study provides invaluable insights for researchers and practitioners to appreciate ICJV  
72 research trends and developments and expand the knowledge in the field.

### 73 **ICJV Definition: A Global Perspective**

74 A number of unrelated definitions of the term “Joint Ventures (JVs)” exist in the literature (Hong  
75 and Chan, 2014). In the international business literature, it is viewed as a long-term relationship  
76 between two or more legally distinct organizations who combine complementary resources for a  
77 long-term benefit, under a common legal law system (Tomlinson, 1970; and Geringer, 1988).  
78 Thus, there is a creation of the newly incorporated company where each has an equity position  
79 (Killing, 1988). In the view of Garbs (1988), from the construction industry perspective, JVs exist  
80 for a limited period with the objectives of undertaking procurement works, engineering,  
81 consulting, construction and construction management services through resource collaboration.  
82 The NJCC for Building (1985) added that, for JVs in construction, partnering companies have joint  
83 and several liabilities for their contractual commitments to the client. This was reinforced in Kreitl  
84 et al.’s (2002) study that, there is a contractual relationship between the client and the joint venture.  
85 Accordingly, a construction joint venture (CJV) turn up to be one project or typically a short-term  
86 agreement (Badger et al. 1993). It can also be formed either with a limited objective or without a  
87 time limit (Kreitl et al. 2002). Hong and Chan, (2014) defined CJVs as the marriage between at  
88 least two firms who join forces together in pursuit of Architectural, Engineering and Construction  
89 projects. It becomes “international” where the headquarters of at least one partner is situated

90 outside the venture operation country (Geringer and Hebert, 1989). In the same vein, Girmscheid  
91 and Brockmann (2010) also argued that, if the partners come from different countries, then we talk  
92 about an international joint venture (IJV). In addition, Girmscheid and Brockmann (2010) pointed  
93 out that, when the employer or client becomes part of the JV system through a construction  
94 contract, then we have ICJV. With a plethora of studies on JVs and IJVs, literature on ICJVs are  
95 scarce (Contractor and Lorange, 2002). Therefore, Girmscheid and Brockmann (2010) proposed a  
96 framework to clearly distinguished IJVs and ICJVs. The noticeable characteristic between the two  
97 per their definition is that IJVs particularly takes the form of equity joint ventures, and ICJVs are  
98 contractual joint ventures (i.e. regulated by both the JV contract and construction contract signed  
99 with the client).

100 The differentiation of the two was based on their contractual regulations and the extent of  
101 duration. As equity joint ventures are regulated by a corporate and a joint venture contract with an  
102 unlimited period to develop and grow, contractual joint ventures are defined by two different  
103 contract arrangement as indicated earlier. Contractual joint ventures also undergo growth cycle,  
104 however, with limited time period as construction contract defines the task, budget and time  
105 precision (Gale and Luo, 2004; Prasitsom and Likhitrungsilp, 2015). This is depicted in figure 1.

106 (Insert Figure 1)

107 Therefore, this study falls under the defined scope of ICJVs established by Girmscheid and  
108 Brockmann (2010) and Hong and Chan (2014) to determine the research trend and gaps for further  
109 studies.

## 110 **Research Methodology**

111 A review methodology adopted by previous researchers Darko and Chan (2016) and Oppong et al.  
112 (2017) was used in searching and selecting suitable research output for this review. The research

113 process is shown in Fig. 2. ICJV-related literature published in selected CM journals from 1990 to  
114 2018 were gathered and systematically examined to provide awareness of the current ICJVs  
115 research trend, as well as identify key areas for future research. ICJVs has gained popularity both  
116 in academia and industry since 1990 (Luo, 2001; and Hwang et al., 2017). Additionally, papers  
117 obtained during this period provide a good picture of the historical and current trends in ICJVs  
118 research. The entire study approach began with the selection of construction management journals  
119 with the help of the Scopus search engine and some related keywords. This was followed by the  
120 selection of relevant papers from targeted CM journals through some set of parameters. Afterward,  
121 a critical analysis of the papers was carried out. An in-depth explanation of the various stages is  
122 given in the following sub-sections.

### 123 ***Selection of Construction Journals***

124 CM journals that have published ICJVs-related papers from 1990 to 2018 were consulted for this  
125 study with the help of Scopus. Scopus has been widely used in similar studies on a variety of topics  
126 in the literature (Hong and Chan, 2014; Bao et al., 2018; Khoshbakht et al., 2018). The Scopus  
127 database is comprehensive and covers publications in the broader fields of management,  
128 accounting, engineering, business, and construction (Hong and Chan, 2014). Likewise, Scopus  
129 performs well in terms of accuracy and coverage than the other search engines such as PubMed,  
130 Web of Science and Google Scholar (Falagas et al., 2008). Using Scopus, a systematic desktop  
131 search was conducted to identify and select relevant construction journals for the study.

132 The search keywords used included “International Construction Joint Venture”, “International  
133 Joint Ventures”, “Construction Joint Ventures”, “Joint Collaboration Ventures”, “ICJVs”,  
134 “International Construction” and was limited to the “Construction Industry”, or the “Building  
135 Industry”. Note that international joint ventures are broadly utilized in the business management

136 field and in other management discipline. With the focus of the study, it was merely limited to the  
137 construction industry in order to retrieve ICJVs-related papers to overcome the challenge of  
138 obtaining a workable number of relevant papers for the research (Darko and Chan, 2016). The  
139 search was performed under the “article title/abstract/keywords” field of Scopus, and with  
140 document type of “article or review”. A total of 374 papers were originally identified from over  
141 50 different journals (both construction and non-construction journals showed up) (searched on  
142 August 28, 2018). The entire search code is as follows:

143 TITLE-ABS-KEY (“International Construction Joint Venture” OR “International Joint  
144 Ventures” OR “Construction Joint Ventures” OR “Joint Collaboration Ventures” OR “ICJVs” OR  
145 “International Construction” AND “Construction Industry” OR “Building Industry”) AND  
146 DOCTYPE (ar OR re) AND PUBYEAR > 1990 AND PUBYEAR < 2018 AND (LIMIT-TO  
147 (SUBJAREA , “ENGI”) OR LIMIT-TO (SUBJAREA, “SOCI”) OR LIMIT-TO (SUBJAREA,  
148 “DECI”) OR LIMIT-TO (SUBJAREA, “ECON”) AND (LIMIT-TO (LANGUAGE, “English”))  
149 (Search results: 374 documents (searched on August 28, 2018).

150 Regardless of the restrictions, many journals focusing on unrelated domain appeared (e.g.  
151 Nursing, Medicine and Energy). Thus, journals that do not concentrate on construction  
152 management were discarded. Afterward, a total of 36 construction journals were retained for  
153 further examination. After this process, the initial number of papers (i.e. 374) reduced to 233. Due  
154 to the limited number of publications specifically in this area, and to ensure that an adequate  
155 number of research outputs are captured, and relevant papers are not missed, a direct search was  
156 conducted using the same keywords in the retained journals. The titles and previews of the outcome  
157 of each journal were briefly reviewed before deciding on their inclusion (Oppong et al. 2017).  
158 Also, note that duplicated publications were eliminated. After filtering, an additional 28 papers

159 were found relevant for further analysis. That is, in total, 261 papers were retained for further  
160 analysis.

### 161 ***Selection of Relevant Publications***

162 After the first phase was achieved, a preliminary screening was conducted of all the 261  
163 publications to discard book reviews, conference papers, and editorials even though they contained  
164 some valuable information. This is because, such publications do not go through rigorous  
165 examination or review process, and are not sufficiently advanced for wide dissemination in the  
166 academic community (Drott, 1995). As asserted by Tsai and Lydia Wen (2005), refereed journal  
167 papers are widely acknowledged in the academic discipline as compared to conference papers,  
168 book reviews, etc. Similar review process has been adopted by Owusu et al. (2017) and Oppong  
169 et al. (2017), and this justifies the inclusion of only refereed journal papers for the study. Thus,  
170 246 publications were retained before collating them under their respective journals. To facilitate  
171 the relevant paper selection process, two set parameters adopted by Hong and Chan (2014); Osei-  
172 Kyei and Chan (2015); Darko and Chan (2016) and Owusu et al. (2017) were considered to reduce  
173 the number of papers retained. Hence, journals selected in this study met either one of the criteria  
174 below:

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

180 Finally, a total of five journals: Journal of Construction Engineering and Management (JCEM);  
181 Journal of Management in Engineering (JME); International Journal of Project Management



182 (IJPM); Construction Management and Economics (CME); and Engineering, Construction and  
183 Architectural Management (ECAM) were selected contingent on the second parameter. Twelve  
184 journals: Building Research and Information (BRI); Journal of Professional Issues in Engineering,  
185 Education and Practice (JPIEEP); Journal of Facilities Management (JFM); Automation in  
186 Construction (AC); Construction Economics and Building (CEB); Advance in Civil Engineering  
187 (ACE); Journal of Civil Engineering and Management (JCEM); Canadian Journal of Civil  
188 Engineering (CJCE); International Journal of Construction Engineering and Management  
189 (IJCEM); International Journal of Construction Management (IJCM); International Journal of  
190 Civil Engineering (IJCE); and Construction and Architectural Management (CAM) that met the  
191 first criteria. Thus, 17 construction journals were selected for the study.

192 After this exercise, the 17 construction journals captured 231 articles; nonetheless, there was a  
193 possibility that unrelated papers still appeared; because they met some of the keywords. Therefore,  
194 a robust and comprehensive examination was conducted by reading the abstract and whole  
195 document of each of the 231 papers to filter out irrelevant papers. Note that, publications that did  
196 not fully or partially satisfy the subject matter were excluded. After filtering, a total of 53 papers  
197 formed the basis of the review. Table 1 explicitly summarizes the targeted journal papers that were  
198 finally selected for the review.

199 In all, the 53 identified papers highly stand in a better position to provide an in-depth  
200 understanding of the current status and present knowledge gap for further studies as it relates  
201 positively with past similar collaboration reviews presented in CM literature. Osei-Kyei and Chan  
202 (2015) for instance presented a literature review with 27 papers on critical success factors (CSFs)  
203 for implementing construction public-private partnerships (PPP). With 26 papers, Yu et al. (2018)  
204 presented a review on social responsibility factors for sustainable development in public-private

205 partnerships. Owusu et al. (2017) also used 37 papers to present a review of the causal factors of  
206 corruption in construction project management. Also, with 17 papers, Dwaikat and Ali (2016)  
207 presented a review of empirical evidence on the cost premium of GBs. More importantly, the small  
208 sample size could be attributed to the fact that, ICJVs-related publications are limited. Better still,  
209 the 53 papers could provide knowledgeable information on ICJVs.

210 (Insert Figure 2)

211 (Insert Table 1)

### 212 ***Determining Contributions Examination***

213 Notwithstanding the limited studies conducted in ICJVs, there exist an appreciable contribution to  
214 both industry development and research progress through research publications (Cohen et al.  
215 2002). It is of the belief that the number publications in a specific research area and conducted in  
216 a particular country prove the extent of industrial practice and its application in the country (Hong  
217 et al., 2011). Accordingly, it is imperative to analyze the contributions of each researcher, country,  
218 and institutions to better understand a particular research domain, in order to record the  
219 achievements of past researchers and advance on their contributions.

220 Adopting scoring methods employed by earlier researchers to conduct similar reviews studies  
221 in different CM journals (Yi and Chan, 2014; and Darko and Chan, 2016), the contributions of  
222 authors, country and institutions was quantitatively analyzed and ranked in this paper. With  
223 reference to Howard et al.'s (1987) widely adopted formula, contributions of multi-authored  
224 publications from different countries were calculated. The reliability and suitability of the formula  
225 is guaranteed as posit by Darko and Chan (2016), due to its widely used. From equation (1) below,  
226 in a multi-authored paper, credits were proportionally divided among authors with the higher score  
227 given to the first author, followed by the second author and the third in that order. For example, if  
228 a paper is published by a single author, the author will receive a score of 1.00; if a paper is

229 published by four authors, in a descending order, they will receive a score of 0.42, 0.28, 0.18 and  
230 0.12 respectively (*see* Table 2).

231 
$$\text{Score} = \frac{1.5^{n-i}}{\sum_{i=1}^n 1.5^{n-i}} \dots\dots\dots(1)$$

232 Where *n* denotes the number of authors for a particular paper and *i* denotes the order of specific  
233 authors. With each paper representing a score of one point, a detailed score matrix for authors is  
234 presented in Table 2. The accumulated score for each country, institution, together with the authors  
235 was computed, ranked and analyzed based on the score matrix.

236 (Insert Table 2)

237 **Analysis and discussion of results**

238 The results presented in this paper cover exclusively publications obtained from the sampling  
239 approach discussed in the third section. This clearly puts a great emphasis on the findings when  
240 interpreting the results. For instance, the condition that the identified contributors to ICJV research  
241 as the most important contributors can vary is largely permitted (*cf* Darko and Chan, 2016). The  
242 following sub-sections captures the annual publication trend, various countries contributions,  
243 institutions and authors contributions as well as the research topics covered over the years.

244 ***Overview of ICJV Publication Trend***

245 Fig 3 depicts the annual distribution of ICJV-related articles that were published between the year  
246 of 1992 to 2018. From the figure below, as indicated in previous studies, ICJVs started to gain  
247 popularity in the academic discipline from 1992 (Hwang et al., 2017). Likewise, between 1999 to  
248 2010, demonstrates an ever-increasing publication trend of ICJV studies. Of the 53 identified  
249 ICJV-related publications 35 number of articles were published between that period indicating the  
250 increasing devoted attention that the ICJV discipline received from researchers. Similar results  
251 were reported by Hong and Chan (2014). However, nine papers were published in 2008, a peak

252 within the studied period. Comparatively to the industrial practice of ICJVs, this might be the  
253 period (within the first 10 years of the 21<sup>st</sup> century) where the industrial practices of ICJVs and  
254 innovations progressed as emphasized by Hong et al. (2011). A study by Do and Lee (2012) on  
255 the key factors of successful joint ventures in Korea – two different case scenarios – supports the  
256 assertion of the relatively mature practice of IJVs in the construction industry within the specified  
257 period. It is within this period that a greater number of publications focused on risk assessment  
258 and management strategies in the discipline, as a result of the risky nature of this hybrid  
259 collaboration arrangement.

260 Table 1 indicates that CME, JCEM, JME, IJPM, BRI and JPIEEP journals published the highest  
261 number of ICJV-related articles during the study period. CME JCEM and JME have the highest  
262 number of publications than any other journal. That is 12, 8 and 7 respectively. This clearly shows  
263 that these three journals have the most significant contribution to the ICJV discipline. After the  
264 increased publication period (i.e. 2010), there have been an unstable and reduction in the number  
265 of ICJV research publications from 2010 to 2018 (as of end of August). However, there is a great  
266 potential for increase due to the increase in practice of this hybrid-collaboration form (Hong and  
267 Chan, 2014).

268 (Insert Figure 3)

### 269 ***Contributions of Countries of Origin, Institutions, and Researchers to ICJV Research***

270 As mentioned earlier, in determining the country of origin and contribution of institutions, the  
271 individual scores of all authors coming from the same country were computed to obtain an overall  
272 score. For instance, if author ‘X’ published two different papers involving two authors (i.e. author  
273 ‘X’ and ‘Y’) from different countries, and in the papers, author ‘X’ appeared first and second  
274 respectively, in computing the score for author ‘X’, from the score matrix, author ‘X’ is scored

275 one point (0.6+0.4) each for the country and institution. Table 3 summarizes together the overall  
276 score for each country of origin in addition to the number of researchers, institutions, and papers  
277 produced.

278 The results indicate that Singaporean researchers dominated and have contributed much to the  
279 ICJV studies. In overall, researchers in Singapore were involved in 14 papers and accumulated an  
280 overall score of 11.5. Following in the descending order, countries that have contributed  
281 significantly to ICJV research are: China, Turkey, USA, UK, Hong Kong, Australia, and Taiwan  
282 obtained a contribution score of 8.36, 7.15, 6.70, 6.00, 4.32, 3.32 and 2.84 respectively.  
283 Unsurprisingly, both the developed and developing countries have contributed much to ICJV  
284 research and bulk of the studies were from the Asian countries. Literature explicitly confirms that  
285 many of the countries for instance Singapore, Taiwan, China, and Hong Kong engage in large and  
286 complex infrastructure projects (such as, Sea bridges, underground rails construction, skyscrapers  
287 etc.), which requires high-level of civil engineering technologies and a large amount of capital  
288 (Zhao et al. 2013; Hwang et al. 2014; Liang et al. 2018). Typical examples include the channel  
289 tunnel between the United Kingdom and France, the Taiwan high-speed railway, the expressway  
290 system in Bangkok or the Three Gorges Dam in China (Girmscheid and Brockmann, 2009). A  
291 more recent example is the Hong Kong-Zhuhai-Macau Bridge (a large-scale island and tunnel  
292 engineering project) jointly developed by three regional governments of Guangdong Province,  
293 Hong Kong Special Administration Region and Macau Special Administration Region (Liang et  
294 al. 2018). Also, legal regulations (local content policy) and government insistence promote this  
295 joint collaboration (Gale and Luo, 2004; Zhao et al. 2013). For instance, in Singapore, the  
296 government encouraged foreign firms to form ICJVs with local contractors through the  
297 introduction of the Preferential Margin Scheme (PMS) (Zhao et al. 2013; Hwang et al. 2014).

298 (Insert Table 3)

299 Widely adoption of this collaborative arrangement in those countries puts a great emphasis on  
300 the advancement of ICJV studies in this location. Similarly, countries like Malaysia, South Africa,  
301 Thailand, Austria, Finland, Pakistan, Nigeria, etc. have also made a great attempt in increasing  
302 ICJV research, with a contribution score of 1.00 each. Generally, in terms of research, the  
303 developing countries have received the limited attention of ICJV-related studies which implies that  
304 the extent to which industrial innovation and practices are progressing in the research area is slow.  
305 This creates the impression that multiple factors hinder research contribution in the developing  
306 countries. It could be because of immature publication culture or the high failure rate of such  
307 hybrid collaboration as literature pronounced due to management control challenges, unreliable  
308 local partners, the unpredictability of local environment etc. which deters it adoption to drive  
309 academic research. However, the overall results show a dedicated effort by researchers from  
310 different parts of the world and institution to contribute significantly to ICJV research for the  
311 studied period.

312 Table 4 presents the top 10 institutions publishing ICJV papers in the construction field. Also, the  
313 origin of the research centers, number of authors and papers are well presented. Research  
314 institutions that have contributed most to ICJV research include Nanyang Technology University  
315 (Singapore), Illinois Institute of Technology (US), Southeast University, Nanjing (China), Middle  
316 East Technical University (Turkey), National University of Singapore (Singapore), and Hong  
317 Kong Polytechnic University (Hong Kong), with a contribution score of 4.66, 3.60, 3.57, 3.43,  
318 3.41, and 2.00 respectively. Predominantly, Asian institutions still dominate in the study area as  
319 mentioned earlier.

320 Further, the contributions of several authors were identified based on their number of papers  
321 and the weighting score. However, authors with at least a score point of one were considered. Note  
322 that some key researchers with many publications in the ICJV discipline may not be present due  
323 to the formula employed for calculating the contribution scores. As presented in Table 5, the  
324 analysis depicts that nine (9) researchers scored at least one point in contributing to ICJV research.  
325 Among them, Xianbo Zhao from National University of Singapore (Singapore) and Beliz Ozorhon  
326 from Illinois Institute of Technology (US) obtained the highest contribution score of 2.49 and 2.15  
327 respectively. The effort of these two researchers also reflects in the highest score for their  
328 respective researcher centers. The study provides a relevant source of information for scholars and  
329 practitioners who are interested in ICJV research and development, and to further explore the  
330 subject area through research collaborations (Hong et al. 2011).

331 (Insert Table 4)

332 (Insert Table 5)

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

334 With the growing interest in ICJV-related studies and a diversified array of published papers within  
335 the studied period, it deemed necessary to capture, organized and classify them into constructs and  
336 their underlying sub-groups in order to distinguish them. However, a significant effort was made  
337 by previous researchers, e.g., Mohamed (2003) and Ozorhon et al. (2008), who classified ICJV-  
338 related studies into similar scopes with limited number of studies as; motivations behind ICJV  
339 formation; related benefits and disadvantages; critical success factors (CSFs); risk analysis and  
340 management, factors affecting the performance of ICJVs; and management related issues. In a  
341 more recent study by Hong and Chan (2014), they categorized CJV studies into seven major  
342 themes based on some selected journals papers within their study period as; theory and model

343 development; identification of motives, benefits and other strategic demands of application;  
344 performance measurement or management; risk assessment or management; influential factors for  
345 practice; problematic issues and challenges in practice; and managerial practices of CJVs in the  
346 industry. Due to the generic nature of the concept by Hong and Chan (2014) in their study as  
347 mentioned earlier, the present study identified and classified ICJV-related papers into seven (7)  
348 best-fit constructs with underlying sub-groups (see Table 6 below).

349 Remarkably, it merits the attention that, some identified research interest/topic share the same  
350 ideological concept as Hong and Chan (2014) classification because their study shared some  
351 highlights on the ICJV concept. They include risk assessment and management practices;  
352 performance evaluation elements; and influential factors for ICJV practice. According to  
353 Themistocleous and Wearne (2000) and Holt (2010), the subjectivity involved in the categorization  
354 of a particular research interest/topic results in an undefined and unprofessional manner. Thus, the  
355 issue of subjectivity was reduced or otherwise possibly eliminated (Hong and Chan, 2014), through  
356 the collaborative nature of the study comparatively than sole authorship. More importantly,  
357 another condition was that each paper is to one of the identified research areas, and where a  
358 particular paper captures more than one area, it was encapsulated to the best-fit category as  
359 suggested by Hong et al. (2011) and Darko and Chan (2016). Also, a similar classification by other  
360 researchers was adopted which makes it more objective in nature than being subjective.

361 A detailed analysis of the selected ICJV papers within the studied period mainly covered the  
362 following; (1) entry modes, formation decision strategies and operation (e.g. Ling et al. 2005;  
363 Chen, 2008; Ling et al. 2008; Chen and Messner, 2009; and Isa et al. 2014); (2) risk assessment  
364 and management practices (e.g. Bing and Tiong, 1999; Bing et al. 1999; Kapila and Hendrickson,  
365 2001; Hsueh et al. 2007; Zhang and Zou, 2007; Zhao et al. 2013; Al-Sabah et al. 2014; Hwang et



366 al. 2017; Razzaq et al. 2018; Chang et al. 2018). (3) performance evaluation elements (e.g.  
367 Mohamed, 2003; Pheng et al. 2004; Ozorhon et al. 2007a; 2007b and Ozorhon et al. 2010a; 2010b);  
368 (4) dispute resolution mechanisms (e.g. Chan and Suen, 2005a; and Maemura et al. 2018); (5)  
369 management issues in ICJVs (e.g. Luo, 2001; Neves and Bugalho, 2008; Ho et al. 2009; and  
370 Girmscheid and Brockmann, 2009); (6) influential factors for ICJV practice (e.g. Kreitl et al. 2002;  
371 Gale and Luo, 2004; and Ozorhon et al. 2008b); and (7) technology transfer (e.g. Carrillo, 1996;  
372 Ganesan and Kelsey, 2006; and Zhang et al. 2010). A summary of all the seven broad research  
373 topics and their sub-topics together with the CM journals publishing those articles as well as the  
374 percentage of papers falling under each research topic is provided in Table 6 below.

375 (Insert Table 6)

376 As depicted in the table, much attention has been given to risk assessment and management with  
377 42% of articles falling under this domain, followed by entry modes, formation decision strategies  
378 and operation (16%), management issues in ICJVs (11%), influential factors for ICJV practice  
379 (9%), performance evaluation elements (11%), technology transfer (7%). and dispute resolution  
380 mechanisms (4%).

381 A detailed discussion of the various constructs (research topic) is provided in the following  
382 section to better project what has been done from what needs to be done (Darko and Chan, 2016),  
383 so that the research gap can be identified to stimulate future research.

384 1) ***Entry modes, formation decision strategies, and operation.*** The adoption of joint ventures  
385 by AEC firms for strategic purposes in the global construction market is widely  
386 acknowledged in literature (Fisher and Ranasinghe, 2001 and Ling et al. 2008). The easiest  
387 way for foreign contractors to have access to a domestic market is through joint ventures  
388 with local construction firms (Fisher and Ranasinghe, 2001 and Xu et al. 2005). A number

389 of ICJV-related studies have reported on the entry mode and formation decision strategies  
390 (Chen, 2008), factors that affects entry mode decision (Chen, 2008 and Jia et al. 2016), and  
391 model for entry location and timing (Isa et al. 2014).

392 2) ***Risk assessment and management practices***. Risk assessment and management control  
393 remains the most highly explored area within the study period as indicated earlier. Majority  
394 of the high failure rate inherent with ICJV formation and its operation is due to internal,  
395 project-related and external risk manifested in several empirical studies (Bing and Tiong,  
396 1999; and Ho et al. 2009). Studies relating to risk in ICJV have expanded extensively from  
397 risk identification (Bing and Tiong, 1999; Zhao et al. 2013; Hwang et al. 2016 and Razzaq  
398 et al. 2018) to risk assessment (Zhang and Zou, 2007; and Hwang et al. 2017), to  
399 prioritization of risk (Bing and Tiong, 1999; Zhao et al. 2013; Hwang et al. 2017; and  
400 Razzaq et al. 2018), to risk management/treatment (Bing and Tiong, 1999; Bing et al. 1999;  
401 Kapila and Hendrickson, 2001; Odediran and Windapo, 2016; and Chang et al. 2018),  
402 through to risk allocation preference (Hwang et al. 2016; 2017). To some extent, risk  
403 implications on the performance of ICJVs have also been studied (Ozorhon et al. 2008b  
404 and Al-Sabah et al. 2014). Consequently, models have been developed to manage and  
405 transfer risk in ICJV operations (Bing and Tiong, 1999 and Hwang et al. 2016; 2017).  
406 Generally, issues related to risk have empirically been given much attention from previous  
407 studies. However, there still exist limited studies in risk-related areas which have been  
408 addressed in the subsequent section for further studies.

409 3) ***Performance evaluation elements***. Measuring the performance of ICJVs have always been  
410 a challenging task for both practitioners and researchers because practitioners are  
411 challenged with the perspective from which performance should be measured from (i.e.

412 either from the partner perspective, project-based perspective, ICJV itself, or the overall  
413 satisfaction), and researchers also find it difficult to determine variables relating to ICJV  
414 performance due to the partially unevenness and incompatibility of performance  
415 determinants in ICJV literature (Ozorhon et al. 2010b). Performance evaluation of  
416 international joint ventures (IJVs) from the international business domain even still remains  
417 uncertain (Geringer and Herbert, 1991), and the case is worsened in the construction market  
418 because of duration precision coupled with complex structures and dynamic environmental  
419 conditions. Drawing from the international business literature, objective and subjective  
420 measures have mainly been used for assessing the performance of IJVs. With the objective  
421 measures focusing on financial determinants (e.g. profitability measures, growth, and cost  
422 position, longevity, and survival), subjective measures relate to the overall satisfaction as  
423 perceived by the JV partners (Geringer and Herbert, 1991). Ozorhon et al. (2007b) modeled  
424 the determinants of ICJV success in their study and came out with three distinct  
425 performance criteria: inter-partner relationship, structure of the ICJV, and inter-partner fit.  
426 With the increasing complexity of ICJV structure, Ozorhon et al. (2007a) extended the  
427 performance measurement concept by modeling a two-dimensional construct (i.e. “overall  
428 satisfaction” and “project performance”) to reflect multiple dimensions of ICJV  
429 performance. To broadly capture and extend the performance measurement model,  
430 Ozorhon et al. (2008b) proposed a three-dimensional construct as project performance,  
431 partner performance and the performance of the ICJV itself. Nonetheless, overall  
432 satisfaction as a final dimension was raised by Ozorhon et al. (2010a; 2010b). These  
433 performance assessment criteria reflect both the objective and subjective indicators as  
434 Ozorhon et al. (2007a) postulated. From the process-based perspectives, Mohamed, (2003)

435 modeled key processes in the stagewise progression of ICJV growth and performance,  
436 where the performance of ICJV was measured by value, profit, and satisfaction. Also, in  
437 assessing management control and performance of Sino-foreign CJVs, Luo (2001)  
438 employed profit and management control measures to measure performance. In overall, an  
439 adequate combination of the performance measures may reflect ICJV success.

440 4) ***Dispute resolution mechanisms***. With the earnest of attention given to dispute resolution  
441 in the construction management discipline, it was surprising to find that research attention  
442 on dispute resolution is by far the lowest in the ICJVs studies. In ICJVs, the increase in the  
443 number of partners with different cultural and organizational background in the  
444 construction value chain means more business interactions and arguments, irrespective of  
445 the contractual or social relationship, hence leading to increasing in construction disputes  
446 (Kumaraswamy and Yogeswaran, 1998). Chan and Suen (2005a) studied the main sources  
447 of disputes and how they can be resolved in Sino-foreign joint ventures in China and in  
448 their study, they classified the sources of disputes into three categories: contractual, cultural  
449 and legal matters and the common dispute resolution methods used are mediation and  
450 arbitration. Maemura et al. (2018) also reported on the root causes of contractual conflicts  
451 in international construction projects by multinationals and identified nineteen (19) causal  
452 factors of contractual conflicts encapsulating under six (6) categories. Accordingly,  
453 contractual disputes are unavoidable and detrimental if not properly managed, and timely  
454 controlled. A number of studies have addressed empirically the contractual disputes  
455 resolution mechanisms in the international business field (Chan and Suen, 2005b; Gad et  
456 al. 2011; Gad et al. 2016). Some of these mechanisms include litigation, arbitration,  
457 mediation, adjudication, early neutral evaluation, mini-trial, Dispute Resolution View

458 Board (DRB)/Dispute Adjudication Board, and summary jury trial. They vary in terms of  
459 cost, time, decision enforceability, etc. (Chan and Suen, 2005a). However, the major issue  
460 becomes what process(es) best satisfies the parties' interest and whether it's cost and time  
461 efficient. The extant empirical studies on dispute resolution methods indicate the lengthy  
462 resolution of contractual disputes in ICJVs (Chan and Suen, 2005a). However, there are  
463 rare literature yet to improve and ensure timely and effective resolution of contractual  
464 disputes in ICJVs. Thus, more comprehensive studies on how to successfully resolve  
465 disputes in a timely manner in ICJVs are promising research interest.

466 5) **Management issues in ICJVs.** Management control, coordination, and governance in  
467 ICJVs are found to be crucial for efficiently utilizing resources and effectively  
468 implementing strategies (Girmscheid and Brockmann, 2009). Therefore, the  
469 ineffectiveness of management control results to unsatisfactory performance (Lin and Ho,  
470 2012). Managerial practices identified from literature can be viewed from two different  
471 perspectives. That is management control (Luo, 2001; Neves and Bugalho, 2008; and  
472 Girmscheid and Brockmann, 2009) and governance structure choices (Ping Ho et al. 2009  
473 and Lin and Ho, 2012). In examining management control in the construction industry,  
474 though with the limited number of studies in this area, different conceptualizations and  
475 measures have been used empirically. Thus, resulting in inconclusive findings. For  
476 instance, Luo (2001) investigated the relationship between management control and  
477 performance in Sino-foreign CJVs in China by using dominant and shared control as a  
478 management control mechanism. Neves and Bugalho (2008) analyzed the control and  
479 coordination process in multinational firms using bureaucratic, cultural and social control.  
480 Likewise, Girmscheid and Brockmann (2009) conceptualized management control

481 structures by using formal and informal control. Comparatively, with the aim of providing  
482 an effective organizational governance structure mechanism, Ho et al. (2009) proposed a  
483 model for choosing the best governance structure for CJVs. They proposed two different  
484 taxonomy of governance structure which is: jointly managed JVs (JMJs) and separately  
485 managed JVs (SMJs). Accordingly, in JMJs there is a close coordination and frequent  
486 communications are extended to the entire JV organizational level. In respect of the SMJs,  
487 every partner is responsible for a portion/subtask of the overall project. Building upon Ho  
488 et al.'s (2009) study, Lin and Ho (2012) investigated the performance impacts of the two-  
489 governance structure taxonomy by holding the same level of governance structure fit and  
490 found a significant positive relationship between the two. With the limited studies in this  
491 area as well as the inconclusive findings from empirical studies require great attention for  
492 successful ICJV operations.

493 6) ***Influential factors for ICJV practice.*** Focusing on the relational and practical aspects in  
494 implementing ICJV operations, this construct captured the perceptual fact of key  
495 interrelated factors that lead to the operational success of ICJV as indicated by previous  
496 researchers (Luo et al. 2001 and Gale and Luo, 2004). They include but not limited to  
497 commitment, co-operation, partner selection, cultural fit, inter-partner relations, strategic  
498 and organizational fit, etc. (Morledge and Adnan, 2006). Further, models have been  
499 developed to test the relationships between some of these influential factors on the  
500 operational success of ICJVs. Example, the effect of partner fit, host country (*cf* Ozorhon  
501 et al. 2007a; 2008a) etc.

502 7) ***Technology transfer.*** Joint ventures as a tool/vehicle/mechanism for technology and  
503 knowledge transfer over the past decades has been extensively acknowledged in the

504 construction industry (Carrillo, 1996 and Ofori et al. 2001). ICJVs presents an immense  
505 potential means for local partners to achieve core technological advantage from their  
506 foreign partners. However, given the popularity and relevance of this research interest, it  
507 is surprising to notice that research attention given to it is low in the ICJV discipline. This  
508 can largely be attributed to the lack of set practical processes, mechanisms or systematic  
509 guidelines, the extent of realization of the need etc. as postulated by Zhang et al. (2010).  
510 Thus, it worth it conducting studies in this area. Nonetheless, regardless of the numerous  
511 advantages obtained as a result of technology transfer to local partners, ICJVs also presents  
512 some constraints as an effective transfer and learning mechanisms, as highlighted by  
513 previous researchers (Ofori et al. 2001 and Ganesan and Kelsey, 2006). Drawing from  
514 literature under the sub-themes; knowledge transfer mechanisms and learning  
515 effectiveness, Zhang et al. (2010) emphasized that the technology transfer process that is  
516 knowledge-based driven requires adequate absorptive capacity from the recipient industry.  
517 Thus, acquiring this human capital facilitates the transfer, absorption, and adaptation of  
518 new technologies (Ganesan and Kelsey, 2006). Dulaimi (2007) also added that lack of  
519 commitment and the readiness to create an enabling environment for knowledge transfer  
520 has clouded the recognition ICJVs as a vehicle for achieving knowledge transfer.

#### 521 ***Data Collection and Analysis Methods in ICJVs Studies***

522 The summary of data collection and analysis method for each identified research topic is presented  
523 in Table 7. The basic idea was to explore essentially in details the methodological process used in  
524 each research interest and appreciate the concluding findings. Thus, this could further stimulate  
525 more comprehensive research methodologies and statistical robustness of the analysis to achieve  
526 an all-inclusive as well as increase the objectivity of the research findings. Because the ICJVs

527 concept is a construction management practices for strategic gains, therefore, it's impractical to  
528 provide effective measures and propositions without knowledge of the industry practice. Thus, as  
529 depicted in Table 7, it is clear that questionnaire survey, case study/interview, and mixed methods  
530 are the main methods used for collecting data in previous studies. Generally, surveys and case  
531 studies/interviews are the main data collection techniques in ICJV studies (accounting for 91% of  
532 the articles). This is attributed to the practicality of the ICJV concept as it requires researchers to  
533 deeply understand situations base on an in-depth investigation.

534 All the survey studies adopted analytical tools such as frequency ranked analysis, standard  
535 deviation (SD), percentages, relative importance index (RII), mean score, factor analysis, *t*-test,  
536 regression analysis, criticality index, correlations, structural equation modeling (SEM), analytical  
537 hierarchy process (AHP), fuzzy analytical hierarchy process (AHP), and analytical network  
538 process (ANP). For instance, ranking analysis to determine or examine most influential factors for  
539 practice (Bing et al. 1999; Al-Sabah et al. 2014 and Hwang et al. 2017), factor analysis for  
540 grouping of multiple variables into constructs (Deng and Low, 2013 and Chang et al. 2018),  
541 structural equation modeling (SEM) for studying the interrelationships between multiple  
542 independent and dependent variables (Mohamed, 2003 and Ozorhon et al. 2007a), multicriteria  
543 decision-making tool (AHP) used for imprecision and complex decision problems for example,  
544 risk assessment at the formation stage by Zhang and Zou (2007) etc. The case studies mostly used  
545 interviews with content case analysis for drawing conclusions. A critical observation from the table  
546 indicates that the analytical tools employed for research topic like the entry modes, formation  
547 decision strategies and operation, dispute resolution mechanisms, management issues in ICJVs  
548 and technology transfer requires more robust analysis to reflect the actual industry practice due to



549 the complex and varying conditions of situations as it naturally happens. Further, more  
550 complicated methods, like simulation techniques, system

551 (Insert Table 7)

552 dynamics, artificial intelligent tools like the ANN etc. should also be utilized in ICJV studies to  
553 better reflect the reality. Therefore, there is an increasing future research study for ICJVs by  
554 applying different modeling techniques.

### 555 ***Knowledge Gaps and Future Studies***

556 In the light of pointing out the research gaps in the existing body of knowledge for future studies,  
557 a systematic review of what has been done and what remains to be explored has been captured in  
558 a conceptual framework below (see Fig. 4). The framework projects both the current status and  
559 future research directions of ICJV studies in CM journals within the study period. Within the larger  
560 frame of the framework denotes the contract signed between the partnering firms (ICJV contract),  
561 and the various issues addressed in literature (i.e., the seven identified broad topics from literature).  
562 With the intention of each research interest influencing the operational success of ICJV  
563 (performance), there is a direct link of each research interest to increase the overall performance.  
564 Further, the interlinked of the research interests indicate that achieving a right balance of studies  
565 in each area drives industrial innovation which leads to higher performance. Also, the overall  
566 performance located at the center highlights five key performance criteria (project level,  
567 company/partner level, ICJV itself, overall satisfaction, and corporate sustainability) and with a  
568 stagewise progression of the ICJV life cycle (Pre-inception stage, formation and organizing stage,  
569 operation and adjustment stage, and completion and evaluation stage). On the other hand, the  
570 construction contract that binds ICJV partners and the client/employer is indicated

571 To conserve space, this study chose to emphasize five key gaps from the research topics  
572 identified from the literature. This includes performance evaluation; dispute resolution  
573 mechanisms; management issues in ICJVs; influential factors for ICJV practice; and technology  
574 transfer. The relevance of this research interest is in two folds; 1) key to the ICJV success, and 2)  
575 limited studies in these areas. The subsequent section focuses mainly on the analysis of future  
576 research directions worth to be noted and emphasized.

577 (Insert Figure 4)

578 **Performance Evaluation Criteria.** The performance measurement of ICJVs has received  
579 significant attention for the past few decades. Corporate bodies awareness to benchmark  
580 the operational success or prove that a planned effort has achieved a desired result in ICJV  
581 operations has increased due to the increase of its adoption. However, the difficulties that  
582 mask the perspective from which performance should be measured and the  
583 determinants/variables related to the performance still remains challenging both at the  
584 industry level and in academic studies. Considerable efforts have been made by previous  
585 researchers (Mohamed, 2003; Ozorhon et al. 2007a; Ozorhon et al. 2008b; and Ozorhon et  
586 al. 2010a), however, there still remains key indicators and variables to be added up as a  
587 result of the dynamic global circumstances. Previous studies have focused on the  
588 performance of ICJVs at the project level, company level, ICJV management, and overall  
589 satisfaction, and have neglected the overall sustainability performance of the ICJV  
590 operational initiatives. The increasing pressure on construction companies to increase their  
591 responsibility beyond economic performance, to an all-inclusive capturing social justice  
592 and environmental performance as well as economic efficiency is an important agenda and  
593 must form part of the company's strategic decision making (Pagell and Gobeli, 2009; and

594 Sev, 2009). Thus, existing literature should further be extended to establish a more holistic  
595 performance indicator with key underlying variables, which covers all perspectives of  
596 ICJV performance together with economic, social, and environmental perspectives of  
597 corporate sustainability in evaluating the effectiveness of ICJVs operations.

598 Further, performance measurement in ICJVs has been too static and therefore failed to  
599 consider the evolutionary stages of the ICJV life cycle development. As previously  
600 indicated, ICJVs undergo growth cycle, however, with limited time period as construction  
601 contract defines the task, budget and time precision (Bing and Tiong, 1999; Gale and Luo,  
602 2004; Prasitsom and Likhitrungsilp, 2015). Previous studies have placed more emphases  
603 on the whole ICJVs life cycle when measuring ICJV performance rather than categorizing  
604 various performance measures in stages (life cycle as indicated in Figure 3). Hence, future  
605 studies should address these two key research questions:

606 *1) What success criteria should be adopted by a newly formed ICJVs from inception*  
607 *to completion?*

608 *2) Do newly formed ICJVs share the same objectives as existing ICJV organizations?*

609 Thus, the development of an integrated performance measurement model that considers  
610 the stagewise progression of ICJV growth is probably a promising research direction.  
611 Future studies can utilize artificial intelligence tools like the neural networks (ANN) to  
612 predict the performance of ICJVs base on certain relevant factors.

613 • **Dispute Resolution Mechanisms.** Dispute and disputes resolution in ICJVs are key issues  
614 that demand critical attention, yet limited studies in the area. ICJVs are characterized by  
615 geographically dispersed multinational teams with different conflicting routines, strategies,  
616 diverse cultures, and language (Soibelman et al. 2010), and even worse when a third party

617 (client) becomes part of the team through construction contract. Thus, there will be an  
618 increase in construction disputes by nature. At the same time, the identified papers have  
619 mainly been devoted to the developed countries like China and Hong Kong (Chan and Suen  
620 2005a; and Maemura et al. 2018), with limited studies in the developing countries. Thus,  
621 future researchers can explore the factors that lead to disputes as well as the mechanisms  
622 or strategies or methodologies for controlling them. Additionally, future studies can  
623 develop a holistic framework for curbing disputes and conflicts by considering the  
624 stagewise progression of ICJV lifecycle from both the developed and developing country's  
625 perspective. Also, more comprehensive studies on how to successfully resolve disputes in  
626 a timely manner in ICJVs using modeling techniques like simulation-based techniques,  
627 system dynamics etc., have yet to be conducted.

628 • **Management Issues in ICJVs.** Management control structures used in ICJVs operations  
629 have greater implications on performance as acknowledged in the literature. However,  
630 given the limited number of studies in this area, yet there exist different conceptualizations  
631 and practices to reflect management control and governance in ICJVs as indicated earlier.  
632 It appears that identified publications within the study period focused more on the  
633 developed countries such as USA, Portugal, and Switzerland, and very few from the  
634 developing countries. Given the acceleration of large infrastructure projects, globalization,  
635 and intensification of domestic market competition, the use of ICJVs has gained much  
636 recognition in the developing countries. However, the collaboration of this hybrid form is  
637 normally prone to high failure rate due to management control and coordination difficulties  
638 (Yan and Gray, 2001). Also, with the central issue on the direct relationship between  
639 ownership and management control in the international business literature (Wong et al.

640 2005; and Li et al. 2009), an empirical investigation as reported by Luo (2001) between  
641 Chinese-French construction JV revealed that management control over ICJV is not  
642 certainly by majority of ownership. Also, the relationships between ownership,  
643 management control, and ICJV performance have received very little attention in ICJV-  
644 related studies. Thus, there are several inadequacies and inconsistencies associated with  
645 the existing studies on factors measuring ownership, and management control in ICJVs,  
646 which leads to difficulties in the benchmark for its measurement. Further studies should  
647 critically and systematically review literature on ownership and management control in  
648 IJVs to enable the benchmark of ownership and control in construction projects. Future  
649 studies can explore other measurable factors by which management control mechanism can  
650 be represented in the construction industry. Management control develops distinctively in  
651 various context and locations, and the processes and its establishments differ as well (Luo,  
652 2001). Therefore, as control is likely to vary across multiple perspective situations. Future  
653 studies should assess the relationships between management control mechanisms and ICJV  
654 performance from the developing country's view. Likewise, future studies can also identify  
655 partners contributions and model its influence on mechanisms of control. Identifying key  
656 drivers that affects the choice of control mechanism in ICJVs is a pressing need.  
657 Researchers can also develop an integrated model for the effective management control  
658 mechanisms for ICJVs by considering the stagewise progression of ICJV life cycle. Future  
659 studies can also employ the ANN tool to predict the performance of ICJVs by using the  
660 mechanisms of control constructs, in order to appreciate the significant impact of  
661 management control in ICJV operations.

- 662       • **Technology Transfer.** As afore-discussed, lack of set practical processes, mechanisms or  
663       systematic guidelines, the extent of realization of the need, and the readiness of the  
664       recipient industry (absorptive capacity), represents the main challenges for transferring  
665       knowledge and technology in ICJVs. Thus, future studies should be carried out to develop  
666       ways to match the ideals for transferring knowledge by both ICJV partners to ensure  
667       efficient and effective transfer. Further studies can examine the correlations between  
668       transfer, absorption and specific influential factors through the ICJV life cycle. Hence,  
669       future studies can simulate the transfer processes during ICJV development stages using  
670       simulation-based approaches. Also, further studies should be carried out to explore the  
671       challenges of transferring technology mostly in the developing countries as more research  
672       work has been directed to the developed countries. Researchers should develop innovative  
673       mechanisms or approaches that have the capability for sustained application for  
674       transferring technology in ICJVs.
- 675       • **Influential Factors for ICJV Practice.** The very few studies on this research topic present  
676       a promising gap which future researchers should be more concerned with. Future studies  
677       can explore practical industrial applications factors for improving ICJV operations.

678       Generally, with reference to the research gap framework (see Figure 4) as presented above,  
679       there is a wide research gap in literature which demands critical attention to ensure successful  
680       ICJVs operations.

## 681 **Conclusions**

682       The adoption of international construction joint ventures (ICJVs), of late, for more complex and  
683       large-scale construction projects across the globe, has resulted in a more complex web of  
684       construction organizations, necessitating great attention for successful operations and

685 management. Consequently, there have been proliferation of research on ICJVs studies over the  
686 past two decades. Thus, the research objective was to systematically analyze ICJV research trends  
687 and development in globally renowned construction management (CM) journals. 17 selected CM  
688 journals, namely JCEM, JME, IJPM, CME, ECAM, BRI, JPIEEP, JFM, AC, CEB, ACE, JCEM,  
689 CJCE, IJCEM, IJCM, IJCE, and CAM from 1990 to 2018 was analyzed.

690 In overall, 53 ICJV- related papers were systematically analyzed in this study. The study  
691 analyzed the trend of ICJV research in terms of annual publication, countries' contributions,  
692 contributions by institutions and researchers, data collection and analysis methods adopted, and  
693 research interests. The results highlighted an increasing attention to ICJV research within the  
694 studied period. Both developed and developing countries like China, Turkey, USA, UK, Hong  
695 Kong, Australia, and Taiwan have contributed significantly to ICJV research. Similarly, countries  
696 like Malaysia, South Africa, Pakistan, and Nigeria have also made a good attempt at increasing  
697 ICJV research. There is a greater expectation from the developing countries to advancing ICJV  
698 research studies, given the acceleration of large infrastructure projects, globalization, and  
699 intensification of domestic market competition. Researchers from the various institutions like the  
700 Nanyang Technology University (Singapore), Illinois Institute of Technology (US), Southeast  
701 University, Nanjing (China), etc. have published most of the ICJV research papers. Key research  
702 topics covered within the study period included: 1) entry modes, formation decision strategies, and  
703 operation; 2) risk assessment and management practices; 3) performance evaluation; 4) dispute  
704 resolution mechanisms; 5) management issues in ICJVs; 6) influential factors for ICJV practice,  
705 and 7) technology transfer. Surveys and case studies/interviews are the main data collection  
706 techniques in ICJV studies. Statistical tool such as frequency ranked analysis, standard deviation  
707 (SD), percentages, relative importance index (RII), mean score, factor analysis, *t*-test, regression

708 analysis, criticality index, correlations, structural equation modeling (SEM), analytical hierarchy  
709 process (AHP), and fuzzy analytical hierarchy process (FAHP) are mostly utilized for analysis.

710 Further research directions are proposed based on the analysis of the current status of ICJV  
711 research topics. The limitations of this research study are the small sample size (53 paper) used for  
712 the analysis. This is justified by the inapplicability of considering all possible ICJV research  
713 keywords in a single review study. Though the findings reflect the overall ICJV research trend,  
714 not all related studies have been reviewed. Furthermore, there is a limitation on the generalizability  
715 of the research findings to other industries since it was restricted to only the construction industry.  
716 Further studies can increase the sample size and focus on other industry to provide a reference for  
717 future proofing of what has been done in this study. The findings provide an in-depth  
718 understanding of ICJV research to practitioners and researchers, and stimulate future research  
719 based on the identified gaps.

#### 720 **Data Availability Statement**

721 Data generated or analyzed during the study are available from the corresponding author by  
722 request.

#### 723 **Acknowledgments**

724 This paper forms part of a large-scope PhD. study on Determinants of success for ICJVs in Ghana.  
725 The authors acknowledge that this paper shares a similar background and methodology with other  
726 related papers, but with different scopes and objectives. The authors acknowledge the Department  
727 of Building and Real Estate of The Hong Kong Polytechnic University for funding this research.  
728 Finally, we are exceedingly grateful to the editors and anonymous reviewers whose invaluable  
729 comments and suggestions substantially helped in improving the quality of this paper.



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

Selected journals	No. of publications	No. of relevant papers for this study
Journal of construction Engineering and Management (JCEM)	58	8
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 Practice (JPIEEP)	5	3
Journal of Facilities Management (JFM)	5	1
Automation in Construction (AC)	6	2
Construction Economics and Building (CEB)	4	1
Advance in Civil Engineering (ACE)	3	1
Engineering, Construction and Architectural Management (ECAM)	21	1
Journal of Civil Engineering and Management (JCEM)	7	1
Canadian Journal of Civil Engineering (CJCE)	6	2
International Journal of Construction Engineering and Management (IJCEM)	2	1
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

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

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

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959 **Table 3.** Locations of selected ICJVs research 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
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
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961 **Table 4.** Top 10 research institutions publishing ICJV papers (using the score matrix)

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
9	University of Hong Kong	Hong Kong	2	3	1.00
10	University of Toronto	Canada	2	2	1.00

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

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

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975 **Table 6.** Research areas and sub-focus in ICJV publications from 1990 to 2018 (as of end of August)

Research area	Sub-focus	CM journals	Number of papers (%)
Entry modes, formation decision strategies, and operation	Culture characteristics to entry decision; Entry strategies; Collaboration and competition; Entry mode classification; Influential factors for entry mode choices; Model for entry location and entry timing; and Host country related factors on entry mode selection	CME (3), IJPM (1), JME (2); CEB (1), JPIEEP (1), CJCE (1)	16
Risk assessment and management practices	Model for managing risk; Risk identification and its impact on the project; Political risk management; Risk mitigation by resource level and capabilities; Exchange rate risk management; culture and performance; Host country risk and performance; Critical external risk; and Risk assessment and allocation preference;	JCEM (7), CME (1), JME (2), ACE (1), AC (2), IJPM (2), IJCEM (1), IJCE (1), ECAM (1), JPIEEP (2), CAM (2)	42
Performance evaluation elements	Modeling perspective of performance; Multidimensional performance measures; comparative performance study	JCEM (1), CME (2), JME (3)	11
Dispute resolution mechanisms	Sources of disputes and resolution strategies	JCEM (2)	4
Management issues in ICJVs	Coordination and control; Trust; Management and operating performance; Governance structure strategies; Model for organizational governance choices; and Safety management challenges	CME (4), JCEM (2),	11
Influential factors for ICJV practice	Key factors influencing the success of ICJVs at the formations stage; Market concentration and ICJV formation; Partner fit and performance; Corporate growth strategies; and Practical aspect of ICJV implementation	IJPM (1), IJCM (1), JME (1), CME (1), BRI (1)	9
Technology transfer	Knowledge transfer mechanisms; and learning effectiveness	CME (2), IJCM (1)	7

Note: CME- Construction Management and Economics; IJPM- International Journal of Project Management; JME- Journal of Management in Engineering; CEB- Construction Economics and Building; JPIEEP- Journal of Professional Issues in Engineering, Education and Practice; CJCE- Canadian Journal of Civil Engineering; JCEM- Journal of Construction Engineering and Management; ACE- Advance in Civil Engineering; AC- Automation in Construction; IJCEM- International Journal of Construction Engineering and Management; IJCE- International Journal of Civil Engineering; ECAM- Engineering, Construction and Architectural Management; CAM- Construction and Architectural Management; BRI- Building Research and Information

977 **Table 7. Research areas and data collection and analysis method in ICJVs studies**

S/N	Research areas	Data collection method	Analytical tools employed	Number of papers	Percent (%)
1	Entry modes, formation decision strategies and operation	Survey	Regression analysis, factor analysis, and <i>t</i> -test	7	13
2	Risk assessment and management practices	Case study/interview	Content analysis	2	4
		Survey	Relative importance index (RII), mean score, factor, <i>t</i> -test, analysis, criticality index, correlations, structural equation modeling (SEM), and fuzzy analytical hierarchy process (AHP)	16	30
3	Performance evaluation	Case study/interview	Content case analysis	2	4
		Mixed method	Percentages, and Delphi technique	5	9
		Survey	Structural equation modeling (SEM), analytical hierarchy process (AHP), and analytical network process (ANP)	5	9
4	Dispute resolution mechanisms	Survey	Frequency ranked analysis	1	2
5	Management issues in ICJVs	Case study/interview	Content case analysis	1	2
		Survey	Correlation analysis, regression analysis, mean, and standard deviation	3	6
6	Technology transfer	Case study/interview	Content case analysis	3	6
		Survey	Percentages, regression analysis, and factor analysis	2	4
7	Influential factors for ICJV practice	Case study/interview	Content case analysis	1	2
		Survey	Structural equation modeling (SEM), mean score, standard deviation (SD) and percentages	4	8
	Total	Case study	Content case analysis	1	2
				53	100

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