

1 **Drivers for international construction joint ventures adoption: A systematic literature**
2 **review**

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31 **review**

32 **Abstract**

33 Recognizing that there exist discrete sets of factors driving the adoption of international
34 construction joint ventures (ICJVs) for different countries, organizations, and stakeholders, this
35 study aims to identify the drivers and integrate them into a classification framework for better
36 understanding. The Virtual Libraries (VL) of respective journals were accessed directly to
37 retrieve the related papers for the study. Popular search engines such as Google Scholar, the
38 Web of Science, and Engineering Village were used to complement the search process. From
39 the review, universal drivers that promote the adoption of ICJVs have been identified for
40 policymakers and stakeholders' realization. The UK, Australia, Singapore, Turkey, and China
41 have been the top countries noted for pioneering ICJV drivers' research. While the bulk of
42 studies has come from developed countries, developing countries have also made a significant
43 contribution. A conceptual framework has been developed to guide, determine and assess the
44 success of ICJVs based on 47 identified drivers. The framework consists of five major
45 categories of ICJV drivers: legal and market-driven drivers, strategic vision drivers,
46 organizational and personal goal drivers, relationship building and operational success drivers
47 and capacity building drivers. These drivers act as a blueprint for the parties to the venture and
48 may determine the success and failure dynamics of the ICJVs operation. The developed
49 framework serves as a guide for all industry practitioners and decision-makers interested in
50 adopting ICJVs. Further, it can facilitate the development of appropriate and effective policies
51 by government agencies to promote the adoption of ICJVs. Moreover, the checklist and

52 framework provide a strong foundation for researchers to conduct a further empirical
53 investigation on the topic.

54 **Keywords:** Benefits; construction industry; drivers; international construction joint ventures;
55 literature review

56 **Introduction**

57 Globalization stimulates interconnectedness in various economic activities including those of
58 construction markets due to the increasing global economic interdependences among countries.

59 In the drive to improve the capacity and competency levels of firms, multinational
60 collaborations in the form of joint ventures (JVs) have become popular nowadays (Ozorhon et
61 al., 2008a). As many empirical studies have shown, with the magnitude and exponential growth
62 in exploiting the potentials of this strategic alliance by organizations, it is expected to dominate
63 the ever-increasing business organizations on the global market in some few years to come
64 (Gale and Luo, 2004; Shah and Rivera, 2007). In the construction industry, JVs are usually
65 launched on large and complex infrastructure projects. Construction joint venture (CJV) is the
66 voluntary partnership of independent construction firms specifically created for the purpose of
67 undertaking Architectural, Engineering, and Construction (AEC) projects (Hong and Chan,
68 2014). It becomes “international” where the headquarters of at least one partner is situated
69 outside the venture operation country (Geringer and Hebert, 1989). In the same vein,
70 Girmscheid and Brockmann (2010) also argued that a corporation between multinational firms
71 is an international joint venture (IJV). In addition, once there is a construction contract between
72 the client and the JV system, then we have an international construction joint venture (ICJV).

73 Over the past two decades, ICJVs research has been extensively explored by researchers
74 worldwide due to the numerous benefits such as creating competitive advantages, sharing of
75 risk, acquiring knowledge, etc. Despite reports of the unstable nature of this hybrid

76 collaboration form, a number of studies have also reported on the factors driving nations,
77 organizations and stakeholders to jointly collaborate in the global construction market (Munns
78 et al., 2000; Panibratov, 2016). Many identifiable drivers, motivations, and mutual benefits
79 with varying importance, according to the country-specific, for different organizations and
80 stakeholders exist. For instance, Girmscheid and Brockmann (2010) classified the motives of
81 partners (local and foreign firms) in ICJVs contingent on merits, as a two-sided and one-sided
82 goal. While the local parties want to acquire technology and managerial expertise, foreign
83 parties adopt ICJV as a means to enter the local market. However, both parties collaborate to
84 share risk (Chen and Messner, 2009). Also, whereas the developing countries focus on building
85 their capacity and competency level, developed countries perceive ICJV as an ideal solution to
86 government-mandated barriers (Odediran and Windapo, 2016). These drivers act as a blueprint
87 for the parties to the venture and may determine the success and failure dynamics of the ICJVs
88 function. Further, construction organizations can develop effective management strategies for
89 their emerging markets using the driving factors identified. A study that presents a
90 comprehensive literature review on the drivers for ICJVs application, has yet to be conducted.

91 In this study, drivers denote the “pull” and “push” factors that attract and compel firms to
92 enter into ICJVs, respectively. It is also defined to include influential factors, motivations, and
93 the potential benefits that encourage firms to adopt ICJVs (Hong, 2014). The paucity of efforts
94 to integrate the existing fragmented ICJV drivers complicate the prospect of understanding the
95 overall goal of parties in ICJVs. This also limits corporate firms’ ability to devise an effective
96 implementation strategy to help realize their dreams. Therefore, this study aims to present a
97 comprehensive review of the literature on the drivers for ICJVs application. The main
98 objectives are: To determine the annual publication trends of ICJV research; to identify
99 authors’ origin/country and active contributors in exploring the drivers for ICJVs application;

100 and to identify the drivers, classify and integrate them into a classification framework for better
101 understanding and easy reference. The contributions of this study are two-fold. Firstly, this is
102 the first study to conduct a comprehensive literature review on the drivers for ICJVs
103 application. A novel framework has been developed which could be used as a guide to assess
104 the success of ICJVs. Secondly, from the managerial viewpoint, the findings would help
105 practitioners and policymakers who are interested in adopting ICJVs to consider the benefits
106 that could be achieved. Thus, it could facilitate the development of appropriate and effective
107 policies by the government to promote ICJV adoption.

108 **Research methodology**

109 There are three phases in this study to fully review and conceptualize the driving factors for
110 the ICJV application. Following similar review studies, the methodology of Oppong et al.
111 (2017) was adapted to retrieve the most relevant articles for this study. The whole review
112 process is depicted in Figure 1. In phase one, a literature search was conducted in construction
113 management journals based on Chau's (1997) ranking list. To complement the search process,
114 other popular search engines such as Google Scholar, Web of Science, and Engineering Village
115 were used. In the second phase, an in-depth visual examination was conducted to identify the
116 most relevant articles for this study. Finally, a content analysis was carried out to identify the
117 drivers and afterward crystallized them into constructs. The three phases are comprehensively
118 elaborated next.

119 (Please insert Figure 1 here)

120 ***Papers retrieval***

121 To begin the search process, construction management journals with an average score greater
122 than 60% according to Chau's (1997) ranking list were considered, i.e., the leading 12 journals
123 (e.g. Chan and Owusu, 2017). After the selection of the journal, the Virtual Libraries (VL) of

124 these respective journals were accessed directly to retrieve the related journal's papers for the
125 study. To obtain a considerable number of publications, the search term used was "joint
126 ventures" OR "international joint ventures" AND "construction", with no limitation regarding
127 the year (searched on May 05, 2019). At the end of the initial search, a total of 146 publications
128 were obtained from the respective journals. Apart from the selected journals which were
129 empirically ranked by Chau's (1997) two decades ago, widely recognized search engines such
130 as Google Scholar, Web of Science, and Engineering Village were consulted to complement
131 the search process (*cf.* Oppong et al., 2017). Note that recent potential journals that might
132 partially or fully explicate the subject matter were not captured in Chau's ranking. Therefore,
133 using the generic search term, an additional 13 publications were identified contingent on three
134 coherent parameters: (1) journals that showed at least two papers (Osei-Kyei and Chan, 2015);
135 (2) already identified journals in Chau's (1997) were to be rejected; and (3) papers that
136 explicitly dealt with IJVs in construction were considered valid. This resulted in a total of 159
137 publications. The approach ensured that adequate research output was captured and that no
138 significant sources were missed and resulted in considerable overlap. Figure 2 shows the detail
139 of the publications included.

140 (Please insert Figure 2 here)

141 ***Relevant paper selection***

142 To identify the most relevant papers, the papers selected for the study were all refereed journals
143 to ensure the high-quality of the data obtained (Wallace and Wray, 2016). After this process, a
144 total of 123 papers remained. Thereafter, an exhaustive examination of the abstracts and
145 conclusions of the potential articles was conducted and, if no relevant information is gotten, a
146 full-text analysis was carried out. Articles that referred to either JVs or IJVs without focusing
147 on construction projects or the construction industry were excluded from the study. Also,

148 journal papers that did not study IJV from a broader perspective but just mentioned it to
149 explicate or differentiate it from other strategic alliance models such as partnerships, relational
150 contract, alliancing, etc. were also excluded. Finally, a total of 73 papers formed the basis of
151 the analysis. The distribution of the final papers in terms of the selected journals is presented
152 in Table 1.

153 (Please insert Table 1 here)

154 ***Identification of the ICJV drivers***

155 To identify the drivers from the 73 publications, while some papers listed some of the factors
156 in tables and charts, others were identified through content analysis. Following Zhang and Lim
157 (2018) study, to conduct the content analysis, a four-step approach was utilized: 1) *De-*
158 *contextualization* – employing codes to represent themes (e.g., words, sentences, phrases) that
159 captures a pre-defined criteria; 2) *Re-contextualization* – condensing the meaning of themes
160 based on their homogeneity through the open coding process; 3) *Categorization and*
161 *compilation* – abstracting and naming each theme in accordance with content-characteristic
162 words, and 4) *Assessment of consistency* – comparing of different judgments to reduce intrinsic
163 subjectivity and any potential variance. Table 2 lists all the identified drivers after
164 systematically reviewing the papers. A total of 47 drivers were identified following the
165 literature review. This study provides details of all the identified drivers for ICJVs application.

166 (Please insert Table 2 here)

167 ***Classification of the ICJV drivers***

168 For easy reference, clarity, simplicity, and understanding of these influential factors, it is
169 important to consolidate either similar or dissimilar variables into broader higher-order
170 constructs. Different from other review studies that define their categories based on just the
171 similarity of concepts or constructs, this study categorized the factors following four robust

172 codified logic used by Ghobadi (2015) and Tetteh et al. (2019). Ghobadi (2015) followed this
173 approach to develop a classification framework for knowledge sharing drivers in software
174 teams using organizational change perspective. Similarly, Tetteh et al. (2019) developed a
175 classification framework for international construction joint ventures performance assessment
176 following the same process. The process includes: (1) each author (writers of this paper) was
177 presented with the list of the identified factors to define their interrelationships, (2) results were
178 compared to ensure that there is uniformity in the categorization of the factors, (3) compared
179 results to previous studies that classified some of the factors (see, for instance, Hong, 2014),
180 and (4) finalization of the categorization through a focus group discussion. This was achieved
181 by involving 3 academicians who have published at least two papers on the phenomenon of
182 interest. Following these classification process, the 47 drivers were classified into five main
183 constructs contingent on their definitions and impact (Darko et al., 2017; Darko and Chan,
184 2017; Owusu et al., 2019). For example, acquiring high-tech expertise and managerial skills
185 directly improves the capacity of construction firms (Ofori, 2008), which may also have a long-
186 term implication on the country. The categories comprise legal and market driven-drivers,
187 strategic vision drivers, organizational and personal goal drivers, relationship building and
188 operational success drivers, and capacity building drivers. In Hong's (2014) study, 15 drivers
189 were categorized into four key constructs, however, with the introduction of additional drivers
190 this study classified the drivers into five constructs that share similar ideology with Hong's
191 classification. Figure 3 shows the conceptual framework for ICJV driver's classification. This
192 process enhanced the conciseness of the classification framework by ensuring that the 47
193 drivers were placed in the most appropriate category. Due to space and word limitations,
194 primary constructs have been discussed fully with little emphasis on their underlying variables.

195 (Please insert Figure 3 here)

196 By employing mean ranking analysis, the intensity of the drivers (i.e. constructs mean score)
197 was determined as depicted in Table 3 and graphically in Figure 4 below. This was achieved
198 by summing up the frequencies of individual drivers encapsulated under a particular construct
199 and dividing it by the number of factors under the construct 'n'. The construct with the highest
200 mean value was ranked first and follows in that order. For example, legal and market-driven
201 drivers (LMD) was calculated using the mean formula below:

$$202 \frac{\sum (\text{lmd1}+\text{lmd2}+\text{lmd3}+\text{lmd4}+\text{lmd5}\dots+\text{lmd16})}{n} \quad (2)$$

$$203 \frac{\sum (11+4+4+5+1+2+1+3+2+2+6+2+3+4+4+2)}{16} = 3.50$$

204 Where 'Σ' represents the sum of individual frequencies and 'n' is the number of indicators
205 underlying a particular construct. Therefore, among the various drivers, LMD appeared third
206 however with the highest number of indicators per the citations recorded in the review.

207 (Please insert Table 3 here)

208 (Please insert Figure 4 here)

209 **Results and discussions**

210 The results shown in this paper explicitly cover publications obtained from the sampling
211 method as discussed above. These warrants caution when interpreting the findings in terms of
212 the annual publication trend, authors' origin/country, active contributors, and countries of
213 research focus. The annual number of publications from the selected journals from 1988 to
214 2019 is presented in Figure 5. The contributions of authors, country and institutions were
215 quantitatively analyzed and ranked by employing Howard et al.'s (1987) widely adopted
216 formula (*cf* Osei-Kyei and Chan, 2015 and Darko and Chan, 2016). From equation (1), in a
217 multi-authored paper, credits were proportionally divided among authors with the higher score
218 given to the first author, followed by the second author and the third in that order.

219
$$\text{Score} = \frac{1.5^{n-i}}{\sum_{i=1}^n 1.5^{n-i}} \quad (1)$$

220 Where n represents the number of authors for a particular paper and i represents the order
221 of specific authors. Table 4 indicates a detailed score distribution for authors. From the table,
222 automatically each publication was given one point regardless of the number of authors. Hence,
223 the one point is shared among authors using the formula.

224 (Please insert Figure 5 here)

225 (Please insert Table 4 here)

226 ***Contributions of countries of origin, institutions, and researchers to ICJV research***

227 As explained earlier, the calculations of active contributors, origin, and institutions were
228 obtained based on the score matrix. For example if author X published two different papers
229 involving two authors (i.e., author X and Y) from different countries, and in the papers author
230 X appeared first and second, respectively, in computing the score for author X from the score
231 matrix author X is scored one point (0.6+0.4) each for the country and institution. Table 5
232 summarizes the score for each country in addition to the number of institutions, researchers
233 and papers produced. The results show that most of the developed countries including the UK,
234 Australia, Singapore, and the USA have the highest number of researchers contributing to the
235 exploration of the ICJV drivers. Similarly, developing countries like Turkey and China have
236 also contributed significantly to the ICJV drivers' research, with a contribution score of 5.28,
237 1.73 and 2.87 respectively.

238 (Please insert Table 5 here)

239 Table 6 presents the top 10 institutions publishing papers on ICJV drivers. The origin of the
240 research centers, the number of authors and papers are well presented. Illinois Institute of
241 Technology (US), The Hong Kong Polytechnic University (Hong Kong), National Taiwan
242 University (Taiwan), Nanyang Technology University (Singapore), National University of

243 Singapore (Singapore), and RMIT University (Australia) have significantly contributed to
244 ICJV drivers research, with a contribution score of 3.84, 3.00, 3.00, 3.00, 2.65, and 2.00
245 respectively. Predominantly, more of the publications come from Asian institutions. This fact
246 explains the widespread of ICJV knowledge among researchers in these countries as a result
247 of their well-implemented and developed ICJV policy.

248 (Please insert Table 6 here)

249 Table 7 considers active authors with at least a score point of one. The analysis shows that
250 15 researchers scored at least one point. Among them, Beliz Ozorhon and David Arditi from
251 the Illinois Institute of Technology in the USA have published five authored papers each. Other
252 active contributors include Jun Luo, S. Ping Ho, Yi-Hsin Lin, Irem Dikmen, etc. The effort of
253 these researchers is mirrored in their respective research centers. Note that some key
254 researchers with many publications in the discipline may not be present due to the search
255 criteria used.

256 (Please insert Table 7 here)

257 ***ICJV drivers***

258 ***Legal and market-driven drivers***

259 Legal and market-driven drivers are drivers that attract or compel companies/organizations to
260 adopt ICJVs for special infrastructure projects. They are “open door” policy strategy mainly
261 set by the government or external organizations to welcome companies that wish to undertake
262 construction projects. Within this category, 16 drivers were identified which include
263 government insistence/legal enforcement, satisfaction of client requirement, satisfy local
264 development needs, external regulation support policies, prevention of wholly-owned foreign
265 companies, competing interest of national development, domestic recession, serves core
266 customers, social support, high in demand for project implementation, mode of foreign

267 investment, growth in construction globalization, increased market share, enter new
268 construction market, overcome cultural and political barriers and means of internationalization.
269 The entry strategy decision for a firm is extremely reliant on the market structure and the
270 intensity of competition. The determinants of this decision are explained in detail in the entry
271 mode choice theory (Cheng, 2006). Chen and Messner (2009) defined entry mode as an
272 institutional arrangement for establishing and conducting international business transactions.
273 Investment restrictions, cultural and political factors in domestic market force foreign
274 companies to adopt ICJVs in order to minimize the inefficiencies in the domestic market (Li et
275 al., 2009). Per the frequency of the individual citations recorded in the review, the top three
276 variables which were revealed to have a high score as compared to the other variables are
277 government insistence/legal enforcement, mode of foreign investment, and external regulation
278 support policies. Although this construct was rated third out of five with a mean value of 3.50
279 as computed by the average of underlying factors citation frequencies, majority of the
280 underlying factors constitute more than 10% of the entire publications reviewed. For instance,
281 government insistence/legal enforcement was identified by 11 out of 73 different publications
282 constituting more than 15% of the whole reviewed articles. The establishment of free trade
283 blocs by governments has increased the construction trade and realigned the construction
284 industry by supporting ICJVs. A number of studies have provided evidence to support this
285 driving agenda (Han and Diekmann, 2001; Al-Sabah et al., 2014; Panibratov, 2016). The need
286 to meet the nation's aspirations by satisfying the host nation's managerial skills and
287 technological gaps, boosting exports and promoting industrial integrations, preventing the
288 dominance of wholly foreign construction firms, knowledge of local contracting procedures
289 and policies, language requirements, etc. have placed much pressure on the government to
290 incentivize and mandate the adoption of ICJVs. In China, for example, as part of their policy

291 requirement, foreign companies are required to partner with the domestic firms through ICJVs
292 for the realization of infrastructure projects. Likewise, in Hong Kong, there is no legal
293 restriction on foreign construction firms. However, their engagement in the industry often starts
294 with forming JVs with local firms so that they can tap into the local knowledge and network
295 (Chang et al., 2018). In Singapore, the government encouraged foreign firms to form ICJVs
296 with local contractors through the introduction of the Preferential Margin Scheme (PMS) (Zhao
297 et al. 2013; Hwang et al. 2014). Also, in many developing countries, such as Ghana, the
298 introduction of the Local Content and Local Participation, Regulation 2013 L.I 2204, requires
299 foreign firms to form a JV with domestic firms, with foreigners holding 10% shares. Similarly,
300 in Libya, foreign firms are allowed to hold a maximum of 49% equity stake.

301 With external regulation support policies, the role of international organizations in
302 regulating international laws is also one of the great importance to integrate countries into the
303 world trade economy (Xu et al., 2005a). An example is the World Trade Organization (WTO)
304 which ensures that foreign companies are permitted to establish JVs without any quantitative
305 restrictions. Also, the growing market/client requirements often play a key role in driving ICJV
306 adoption. ICJVs are formed to ensure that bidding criteria for specific projects are met. For
307 example, owners may demand a certain type of expertise to be present in firms that intend to
308 bid for their projects. Further, governments may require that corporations meet their minority
309 or small-business requirements. Forming ICJV with the right firm might satisfy bidding criteria
310 that would have been difficult for a firm to go alone (Badger and Mulligan, 1995).

311 *Strategic vision drivers*

312 Strategic vision drivers focus on the long-term impact on the local markets and companies to
313 the ICJV considering all other beneficial factors (Norwood and Mansfield, 1999). Gale and
314 Luo (2004) emphasized that sustaining the local economy is heavily reliant on building a

315 changing environment that promotes growth, supporting export-oriented contracting and
316 promoting industrial integration into the world economy. Per the definition and its theoretical
317 background, 9 factors were classified under this construct which include promotion of
318 economic growth in the long-term, ensure stability, attract capital investment, secure financing,
319 overcome the environmental deficiencies, simulate export-oriented contracting, desired for
320 modern conveniences, improved the existing imperfect mechanism of the construction
321 industry, and expansion of local construction companies. The lure of the SV construct is its
322 long-term implication (Zhang and Zou, 2007; Hwang et al., 2017; Park et al., 2010). Even
323 though SV construct is the least ranked construct in terms of the frequency of citation with a
324 mean value of 2.11, the underlying factors within this construct are key in the developing
325 countries and may even be the leading drivers in some developing countries. By the promotion
326 of economic growth in the long-run, unprecedented increase in the rate at which innovative
327 know-hows are introduced as well as the increasing complexity of both the public client and
328 individual requirement, require firms to remain competitive and respond to the advanced
329 technological and managerial tools to thrive in this changing environment (Sillars and Kangari,
330 1997). ICJV is seen as a novel approach for constantly providing a way to develop a control
331 and resolution strategy for overcoming future competition (Munns et al., 2000). Thus, through
332 the acquisition of advanced knowledge, individual firms can utilize it in future infrastructure
333 projects (Walker and Johannes, 2003). Eventually, productivity in construction projects can be
334 improved. Thus, construction projects would be completed in less time than would be required
335 under normal situations (Badger and Mulligan, 1995). This means that there would be more
336 adherence to schedule and time savings, which often translates into appreciable financial
337 savings. Ensure stability means that ICJV creates the opportunity for firms who establish good
338 and long-term relationship with clients/owners, demanding considerable and consistent

339 construction projects, to have a good base workload (Dulaimi, 2007). In fact, this is most
340 desirable in an uncertain economy where the involvement in international construction market
341 provides an alternative to compensate for slumps in the domestic market (Badger and Mulligan,
342 1995). In today's global construction business environment, clients often expect contractors
343 to provide attractive financial packages for the successful implementation of their projects.
344 ICJV, therefore, enables firms to combine forces together to provide far-reaching and ingenious
345 financing to the client (Gunhan and Arditi, 2005). According to Norwood and Mansfield
346 (1999), ICJVs adoption can totally alter the structure of the industry by bringing together
347 advanced knowledge, finance, and technical tools to radically change the way companies
348 operate in the construction industry.

349 ***Organizational and personal goal drivers***

350 Different from external or legal regulations, these are intrinsically self-motivated factors that
351 drive or attract companies to adopt ICJVs. The environment within which companies are
352 situated often determines these basic drivers. They consist of increased efficiency, increased
353 credibility, building reputation, improved track records, improved company's image,
354 diversification, demand for value for money (VM), competition as a driving force, opportunity
355 to work on large and complex projects, acquire new construction projects, and overcome the
356 lack of local knowledge of international firms. The characteristics of the local market in respect
357 of market intensification accompanied with the low level of technology and expertise creates
358 tension which breed competition to motivate firms to diversify or brand themselves to be
359 competitive in the local and foreign market. According to Gunhan and Arditi (2005), no market
360 is forever safe from foreign competition. Undoubtedly, domestic firms eventually have to face
361 foreign competition, even when they stay at home. This OPG construct obtained a mean value
362 of 2.55 and appeared fourth among the constructs. The main variables noted under this

363 construct include competition as a driving force, improved company's image, demand for VM,
364 diversification, and opportunity to work on large and complex projects (Gunhan and Arditi,
365 2005b; Zhao et al., 2013; Shen and Cheung, 2018).

366 In the construction industry, to stay competitive, firms must have strength in financing,
367 procurement, engineering, and construction. An apparent benefit for ICJVs adoption is the
368 acquisition of the foreign firms' extant knowledge which is sufficient for gaining competitive
369 advantage in the local market (London and Siva, 2011; Panibratov, 2016). Thus, the developed
370 strength enables companies to compete with their contenders during prequalification and also
371 obtain a higher allocated market volume. ICJVs are known to satisfactorily deliver
372 infrastructure projects (Kumaraswamy and Shrestha, 2002; Hwang et al., 2017). Consequently,
373 parties gain an intangible benefit which is related to the recognition and reputation (improved
374 company's image) within the construction industry for the project being undertaken. ICJV
375 partners are highly promoted and given much recognition by the public upon successful
376 completion of a public project that either epitomizes a local revolutionary or one that puts
377 forward technical difficulties to contractors (Hong, 2014). The public overall impression of an
378 organization is the image or reputation (London and Siva, 2011). Also, to obtain high-quality
379 engineering services at a lower price (demand for VM), corporations with limited capabilities
380 and operational facilities in delivering construction projects form an ICJV with potential
381 partners to fully enjoy the benefit. For example, bidding expenses and the heavy costs
382 connected with construction are normally reduced. The reduction of these operational costs can
383 translate into increased profits for the partnering firms (Walker and Johannes, 2000).
384 Diversification means that firms can work on large-scale projects or projects beyond their
385 specialty. Corporations with diverse qualities and expertise form ICJV to successfully deliver
386 construction projects than each firm can deliver its own. For example, while one firm brings

387 on board managerial expertise (task with business content like financial management,
388 accounting, procurement of works and services, etc.), the other may provide advanced
389 technology (task with technological content like project planning, selection of construction
390 method, estimating and control; all of these tasks require a solid engineering background).
391 ICJVs provide additional business opportunities to individual firms as they can obtain more
392 projects when they have an experienced partner to learn from (Badger and Mulligan, 1995). It
393 reaffirms that the increased industrial acknowledgment and status, not only denote narcissistic
394 image of the company, however, but also provide the opportunity to work on large and more
395 complex projects as well as sustains the long-term development of the industry. Further,
396 authors claim that the variables under this construct can enhance relationships with other
397 stakeholders and a higher chance to win bids, which can eventually increase revenue and profits
398 (Young, 1992; Walker and Johannes, 2003; Zhao et al., 2013).

399 ***Relationship building and operational success drivers***

400 Another strategic benefit of teaming up with multinationals in the form of ICJVs is to promote
401 long-term business relationship (Munns et al., 2000), and efficiently deliver infrastructure
402 projects as scheduled, and within the preferred amount (Kumaraswamy and Shrestha, 2002).
403 RBOS construct is ranked second highest among the constructs with a mean value of 12.14,
404 and with seven underlying variables. Unsurprisingly, this construct has been employed as one
405 of the key determinants of the success of ICJVs, as reported by Tetteh et al. (2019). Ozorhon
406 et al. (2010a) statistically confirmed that the variables under this construct explain the
407 multidimensionality partnering firms' goal in ICJVs. The principal variables are reducing
408 project risk/risk sharing, sharing of resources, gaining economies of scale and allowing greater
409 ease of work (Hsenh et al., 2007; Ozorhon et al., 2007b; Ochieng and Price, 2010). Penetrating
410 new construction market presently is much difficult as compared to previous years. ICJV

411 allows firms to work in oversea markets while sharing risks with other firms. This is achieved
412 when the host partner is able to work through the local bureaucracy, customs clearance
413 assistance, certifying work, accessing the local labor market, etc. (Badger and Mulligan, 1995).
414 The host partners may be in the best position to negotiate for lower labor costs and benefits
415 because they understand the local market. A large percentage of infrastructure mostly requires
416 ICJVs due to the immense capital, high risk involved and the depth of national expertise.
417 Joining hands with multinationals strengthens the capital base of the ICJV which provides
418 sound assurance and preference to the client of their capability to successfully satisfy the
419 project requirements. Especially in the developing and emerging economies, infrastructure
420 projects require large upfront of investment firms to enable them to meet the combined effect
421 of explosive demands and the legacy of insufficient supply through adequate and timely
422 construction (Sillars and Kangari, 1997; McIntosh and McCabe, 2003). A number of empirical
423 studies have attested that the predominant factor that drives ICJV adoption is to spread financial
424 and technical risk (Hsenh et al., 2007; Kazaz and Ulubeyli, 2009; Han et al., 2019) In the oil
425 and gas sector (for upstream projects), for example, due to the significant high risk of failure
426 to produce, alongside with the high cost of production has resulted to the establishment of
427 ICJVs purposely to share risk (Almohsen and Ruwanpura, 2016). Other notable variables
428 include promote partnering, promote industrial integration, and achieve greater value in
429 construction procurement. ICJVs brings possible business benefits such as closer cooperation
430 and collaboration, networking opportunities as well as trust (Munns et al., 2000). Ozorhon et
431 al. (2010b) found that a harmonious relationship is a key driver for establishing ICJVs in large
432 Turkish construction firms. Satisfactory performance of previous collaboration incentivizes
433 partners to team up again when the need arises. Long-term established relationships through
434 ICJVs facilitate combined strengths in the form of technology, managerial expertise, and

435 capital which breeds opportunities for undertaking more construction projects. It is important
436 to understand that a stable strategic relationship also provides a multi-link of integration
437 especially in the production chain (Panibratov, 2016). The continual mutual commitment of
438 partners is expected to stimulate the trust and collaboration between them which brings in
439 advance knowledge to benefit the host economy and the local firms as well as enhances the
440 relations between the ICJVs (Jung et al., 2011; West, 2014).

441 *Capacity building drivers*

442 Capacity building drivers set the platform for an interminable development and strengthening
443 of skills, instincts, abilities, processes, and resources that corporations require to survive, adapt
444 and thrive in this fast-changing world. This construct is explained by five different drivers,
445 which include advanced construction technology acquisition, improved management expertise,
446 better execution of project, increased quality levels of projects and increased productivity at all
447 levels. This construct appeared first with a mean value of 15.0, and with the lowest underlying
448 variables of five out of the 47 drivers. Conceptually, ICJV serves as a conduit/vehicle for local
449 companies to acquire knowledge. Local firms lacking the qualifications and capability of
450 completing infrastructure works on their own can be supported by foreign firms which are
451 specialized in those areas. This enables local firms to develop technology and management
452 expertise themselves (Do and Lee, 2012). In the construction industry, the strength of firms
453 depends crucially on physical assets, knowledge and human capabilities that enable a more
454 efficient infrastructure delivery and services, innovative construction techniques,
455 organizational know-how and managerial innovation (Ganesan and Kelsey, 2006). Hence, the
456 imported knowledge when integrated with the existing local expertise stimulates the overall
457 national capacity of local firms. A growing number of construction companies in the
458 developing countries often consider the variables under this construct as part of their core

459 corporate mission statement or policy (Lewis, 2007). Forming ICJVs does not only benefit the
460 growth of parties involved but also contribute to boosting the construction capacity, and the
461 internal transfer of expertise to junior domestic firms to build up the resource capacity of the
462 host country (Devapriya and Ganesan, 2002). Nonetheless, the visible impact in upgrading
463 construction outputs in terms of cost, time, quality, safety, environment, etc. or a combination
464 of all significantly act as a means of knowledge acquisition.

465 **Conclusion, future research and implication**

466 Understanding factors that drive the adoption of ICJVs is critical for allowing both
467 policymakers and stakeholders to devise strategies, monitor and, to take steps toward attaining
468 their goals. This article presents a comprehensive review and synthesizes predominant
469 literature regarding the drivers for ICJV application. To achieve this aim, 73 ICJV papers
470 published in refereed journals were aggregated and systematically reviewed. The results show
471 that most of the developed countries including the UK, Australia, Singapore, and the USA have
472 the highest number of researchers contributing to the exploration of ICJV drivers for the past
473 two decades. Similarly, developing countries like Turkey and China have also contributed
474 significantly to ICJV drivers' research. Also, 47 drivers are identified, distilled, classified, and
475 integrated into a classification framework. The developed framework comprises five main
476 drivers, namely: legal and market driven-drivers, strategic vision drivers, organizational and
477 personal goal drivers, relationship building and operational success drivers, and capacity
478 building drivers.

479 The conceptual framework provides a rich picture of ICJV drivers and serves as a guide for
480 industrial practitioners and decision-makers interested in adopting ICJV. It could also facilitate
481 continued inquiry into assessing the success and failure dynamics of ICJVs. For instance, the
482 analysis of the results suggests valuable opportunities for conducting empirical investigations

483 to determine how corporate firms are able to achieve their dream and any possible strategies
484 that could be made to enhance the goal of adopting ICJVs. This would help provide direction
485 for making decisions regarding the promotion of ICJVs adoption. More empirical studies are
486 needed through case studies as most of the drivers identified are opinion-based of researchers.
487 Almost all the empirical studies were conducted in the developed countries, this can be
488 considered as a call for researchers to undertake more research to examine the drivers for ICJVs
489 adoption from the developing countries' perspective.

490 The authors acknowledge the limitation of the sampling approach used. Thus, the results of
491 this study are subject to the sampling approach, however, this is justified by the inapplicability
492 of considering all possible ICJV publications in a single review study. The identified drivers
493 have not been empirically tested. Therefore, it is recommended that future studies conduct
494 thorough empirical surveys from different geographical perspectives to determine the highly
495 ranked drivers that necessitate critical attention.

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Table 1. Search results for relevant publications

N/S	Name of journal	Initial number of publications	Final number of publications	References
1	<i>International Journal of Project Management (IJPM)</i>	27	18	Aleshin. (2001); Boeva (1990); Drouin et al. (2009); Fan (1988); Gale and Luo (2004); London and Siva, (2011); Mansfield and Sasillo (1990); Melese et al. (2017); Munns et al. (2000); Norwood and Mansfield (1999); Ochieng and Price (2010); Ozorhon et al. (2007a); Simkoko (1992); Swierczek (1994); Walker and Johannes (2003); Xu et al. (2005a); Yeung et al. (2012); Zhao et al. (2013)
2	<i>Journal of Construction Engineering and Management (JCEM)</i>	27	18	Bing and Tiong (1999); Bing et al. (1999); Girmscheid and Brockmann (2009); Gunhan and Arditi (2005a); Gunhan and Arditi (2005b); Ho et al. (2009); Jung et al. (2010); Lin and Ho (2012); Ling and Gui (2009); Ling et al. (2006); Mohamed (2003); Ozorhon et al. (2008a); Ozorhon et al. (2010a); Park et al. (2010); Shen et al. (2001); Sillars and Kangari (1997); West (2014); Zhang and Zou (2007)
3	<i>Journal of Management in Engineering (JME)</i>	27	13	Almohsen and Ruwanpura (2016); Carrier (1992); Chen and Messner (2009); Hansen and Tatum, (1989); Jung et al. (2011); Kazaz and Ulubeyli (2009); Han et al. (2019); Martek and Chen (2014); Odediran and Windapo (2016); Ozorhon et al. (2007b); Ozorhon et al. (2008b); Ozorhon et al. (2010b); Xu et al. (2005b)
4	<i>Construction Management and Engineering (CME)</i>	40	10	Al-Sabah et al. (2014); Carrillo (1996); Fisher and Ranasinghe (2001); Ganesan and Kelsey (2006); Kreitl et al. (2002); Ling et al. (2005); Luo (2001); Neves and Bugalho (2008); Oswald et al. (2018); Ping Ho et al. (2009)
5	<i>Building Research and Information (BRI)</i>	9	4	Devapriya and Ganesan (2002); Kumaraswamy and Shrestha (2002); Luo et al. (2001); Young (1992)
6	<i>Engineering, Construction and Architectural Management (ECAM)</i>	15	2	Dulaimi (2007); Hwang et al. (2017)
7	<i>Automation in Construction (AIC)</i>	1	1	Hsueh et al. (2007)
8	<i>Canadian Journal of Civil Engineering (CJCE)</i>	2	2	Abdul-Aziz and Cha (2008); McIntosh and McCabe (2003)
9	<i>International Journal of Construction Management (IJCM)</i>	3	2	Shen and Cheung (2018); Zhang et al. (2010)
10	<i>Journal of Construction Research (JCR)</i>	2	1	Kwok et al. (2000)
11	<i>International Journal of Organizational Innovation (IJOI)</i>	2	1	Tsai and Chen (2013).

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11	<i>Journal of East-West Business (JEWB)</i>	4	1	Panibratov (2016).
Total		159	73	

Table 2. Drivers for the ICJV’s application identified from the literature

Code	Drivers for ICJVs application	References	Sum
dr1	Reduce project risk/risk sharing	[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36]	36
dr2	Sharing of resources	[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36]	36
dr2	Advance construction technology acquisition	[2,3,6,8,10,11,12,13,15,16,21,23,25,29,31,37,38,39,40,41,42,43,44,45,46,47,48,49,50]	29
dr3	Improved managerial expertise	[2,3,6,8,10,11,12,13,15,16,21,23,15,19,31,37,38,39,40,41,42,43,44,45,46,47,48,49,50]	29
dr4	Government insistence/legal regulation enforcement	[2,13,22,31,41,48,56,57,59,60,71]	11
dr5	Increased quality levels of projects	[5,8,11,12,16,28,41,53,72,66]	10
dr6	Competition as driving force	[14,36,37,40,41,43,47,53,68]	9
dr7	Mode of foreign investment	[2,21,29,45,46,60]	6
dr8	Gain economics of scale	[6,10,12,15,16,19]	6
dr9	Promotion of economic growth in the long-run	[29,43,45,47,53]	5
dr10	External regulation support policies	[9,57,59,69,73]	5
dr11	Demand for value for money (VM)	[33,51,53,54]	4
dr12	Better execution of project	[20,29,37,43]	4
dr13	Overcome cultural and political barriers	[17,42,62,63]	4
dr14	Enter new construction market	[31,68,69,70]	4
dr15	Satisfaction of client requirement/achievement of pre-qualification conditions	[8,47,50,53]	4
dr16	Satisfy local development requirement	[2,41,45,53]	4
dr17	Increased market share	[12,13,68]	3
dr18	Increased productivity at all levels	[37,43,47]	3
dr19	Diversification	[17,36,61]	3
dr20	Opportunity to work on large and complex projects	[20,42,45]	3
dr21	Ensured stability	[12,54,66]	3
dr22	Improved company’s image	[33,42,67]	3
dr23	Serve core customers	[8,31,47]	3
dr24	Attract capital investment	[2,31,41]	3
dr25	Allows greater ease of work	[5,12,36]	3
dr26	Expansion of local construction companies	[12,13]	2
dr27	Promote partnering	[49,53]	2
dr28	As a front (means to internationalized)	[31,64]	2
dr29	Social support	[25,31]	2
dr30	Growth in construction globalization	[41,65]	2
dr31	Secure financing	[31,41]	2
dr32	High in demand for project implementation	[25,72]	2
dr33	Competing interest of national development	[41,68]	2
dr34	Achieve greater value in construction procurement	[53]	1
dr35	Increased efficiency	[53]	1
dr36	Improved track records	[42]	1

dr37	Overcome the lack of local knowledge of international firms	[54]	1
dr38	Building reputation	[33]	1
dr39	Increased credibility	[33]	1
dr40	Promote industrial integration	[49]	1
dr41	Prevention of wholly-own foreign companies	[68]	1
dr42	Acquire new construction project	[41]	1
dr43	Desired for modern conveniences	[72]	1
dr44	Overcome environmental deficiencies	[38]	1
dr45	Domestic recession	[67]	1
dr46	Improved existing imperfect mechanism of the construction industry	[2]	1
dr47	Stimulate export-oriented contracting	[2]	1

References are as follows: 1 = Hsenh et al. (2007); 2 = Luo et al. (2001); 3 = Ozorhon et al. (2010b); 4 = Han et al. (2019); 5 = Jung et al. (2011); 6 = Ozorhon et al. (2007b); 7 = Kazaz and Ulubeyli (2009); 8 = Carrier (1992); 9 = Ling et al. (2006); 10 = Ozorhon et al. (2008b); 11 = Lin and Ho (2012); 12 = West (2014); 13 = Zhang and Zou (2007); 14 = Gunhan and Arditi (2005a); 15 = Ozorhon et al. (2010a); 16 = Girmscheid and Brockmann (2009); 17 = Young (1992); 18 = Jung et al. (2010); 19 = Ozorhon et al. (2008a); 20 = Zhao et al. (2013); 21 = Xu et al. (2005a); 22 = Al-Sabah et al. (2014); 23 = Ochieng and Price (2010); 24 = Melese et al. (2017); 25 = Aleshin, (2001); 26 = Drouin et al. (2009); 27 = Ling et al. (2005); 28 = Ping Ho et al. (2009); 29 = Hwang et al. (2017); 30 = Abdul-Aziz and Cha (2008); 31 = McIntosh and McCabe (2003); 32 = Odediran and Windapo (2016); 33 = Shen and Cheung (2018); 34 = Boeva (1990); 35 = Mansfield and Sasillo (1990); 36 = Norwood and Mansfield (1999); 37 = Devapriya and Ganesan (2002); 38 = Panibratov (2016); 39 = Hansen and Tatum, (1989); 40 = Gunhan and Arditi (2005b); 41 = Sillars and Kangari (1997); 42 = Carrillo (1996); 43 = Ozorhon et al. (2007a); 44 = Ganesan and Kelsey (2006); 45 = Luo (2001); 46 = Gale and Luo (2004); 47 = Walker and Johannes (2003); 48 = Fan (1988); 49 = Munns et al. (2000); 50 = Simkoko (1992); 51 = Walker and Johannes (2003); 52 = Zhao et al. (2013); 53 = Kumaraswamy and Shrestha (2002); 54 = Dulaimi (2007); 55 = Walker and Johannes (2003); 56 = Bing and Tiong (1999); 57 = Xu et al. (2005b); 58 = Kreitl et al. (2002); 59 = Ling and Gui (2009); 60 = Bing et al. (1999); 61 = Neves and Bugalho (2008); 62 = Fisher and Ranasinghe (2001); 63 = Swierczek (1994); 64 = Fisher and Ranasinghe (2001); 65 = Oswald et al. (2018); 66 = Park et al. (2010); 67 = London and Siva, (2011); 68 = Mohamed (2003); 69 = Chen and Messner (2009); 70 = Martek and Chen (2014); 71 = Jung et al. (2011); 72 = Almohsen and Ruwanpura (2016); 73 = Shen et al. (2001)

Table 3. Drivers for ICVs application constructs Rank

Number	Construct	Drivers	Code	Frequency	Mean	Rank
1.0	Capacity building drivers	-	CA	-	15	1st
1.1		Advance construction technology acquisition	ca1	29	-	1
1.2		Improved managerial expertise	ca2	29	-	1
1.3		Increased quality levels of projects	Ca3	10	-	2
1.4		Better execution of project	Ca4	4	-	3
1.5		Increased productivity at all levels	ca5	3	-	4
2.0	Relationship building and operational success drivers	-	RBOS	-	12.14	2nd
2.1		Reduce project risk/risk sharing	rbos1	36	-	1
2.2		Sharing of resources	rbos2	36	-	1
2.3		Gain economies of scale	rbos3	6	-	2
2.4		Allows greater ease of work	rbos4	3	-	3
2.5		Promote partnering	rbos5	2	-	4
2.6		Promote industrial integration	rbos6	1	-	5
2.7		Achieve greater value in construction procurement	rbos7	1	-	5
3.0	Legal and market-driven drivers	-	LMD	-	3.50	3rd
3.1		Government insistence/legal regulation enforcement	lmd1	11	-	1
3.2		Mode of foreign investment	lmd2	6	-	2
3.3		External regulation support policies	lmd3	5	-	3
3.4		Satisfaction of client requirement	lmd4	4	-	4
3.5		Satisfy local development requirement	lmd5	4	-	4
3.6		Enter new construction market	lmd6	4	-	4
3.7		Overcome cultural and political barriers	lmd7	4	-	4
3.8		Serve core customers	lmd8	3	-	5
3.9		Increased market share	lmd9	3	-	5
3.10		Competing interest of national development	lmd10	2	-	6
3.11		Social support	lmd11	2	-	6
3.12		High in demand for project implementation	lmd12	2	-	6
3.13		Growth in construction globalization	lmd13	2	-	6
3.14		As a front (means to internationalized)	lmd14	2	-	6
3.15		Prevention of wholly-owned foreign companies	lmd15	1	-	7
3.16	Domestic recession	lmd16	1	-	7	
4.0	Organizational and personal goal drivers	-	OPG	-	2.55	4th

4.1		Competition as a driving force	opg1	9	-	1
4.2		Demand for value for money (VM)	opg2	4	-	2
4.3		Improved company's image	opg3	3	-	3
4.4		Diversification	opg4	3	-	3
4.5		Opportunity to work on large and complex projects	opg5	3	-	3
4.6		Increased efficiency	opg6	1	-	4
4.7		Increased credibility	opg7	1	-	4
4.8		Building reputation	opg8	1	-	4
4.9		Improved track records	opg9	1	-	4
4.10		Acquire new construction projects	opg10	1	-	4
4.11		Overcome the lack of local knowledge of international firms	opg11	1	-	4
5.0	Strategic vision drivers	-	SV	-	2.11	5th
5.1		Promotion of economic growth in the long-run	sv1	5	-	1
5.2		Ensure stability	sv2	3	-	2
5.3		Attract capital investment	sv3	3	-	2
5.4		Secure financing	sv4	2	-	3
5.5		Expansion of local construction companies	sv5	2	-	3
5.6		Overcome the environmental deficiencies	sv6	1	-	4
5.7		Stimulate export-oriented contracting	sv7	1	-	4
5.8		Desired for modern conveniences	sv8	1	-	4
5.9		Improves the existing imperfect mechanism of the construction industry	sv9	1	-	4

1 **Table 4.** 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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3 **Table 5.** Locations of relevant selected ICJVs research papers

Country/Jurisdiction	Institutions/Universities	Researchers	Papers	Score
UK	11	15	11	9.13
Australia	9	13	10	8.18
Singapore	7	11	9	6.39
Hong Kong SAR, China	4	9	9	5.60
Taiwan	5	6	8	5.28
USA	3	5	7	5.03
Canada	3	6	6	3.00
China	3	5	5	2.87
Turkey	2	3	3	1.73
Germany	2	3	3	1.40
Malaysia	1	1	2	1.00
Portugal	1	1	1	1.00
South Africa	1	1	1	1.00
Russia	1	1	1	1.00
Sweden	1	1	1	1.00
Thailand	1	1	1	1.00

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5 **Table 6.** Top 10 research institutions publishing ICJV papers (using the score matrix)

Rank	Institution/University	Country/Jurisdiction	Researchers	Papers	Score
1	Illinois Institute of Technology	USA	2	5	3.84
2	The Hong Kong Polytechnic University	Hong Kong SAR, China	4	4	3.00
3	National Taiwan University	Taiwan	4	10	3.00
4	Nanyang Technology. University	Singapore	5	9	3.00
5	National University of Singapore	Singapore	4	4	2.65
6	RMIT University	Australia	2	2	2.00
7	Ove Arup and Partners	China	1	2	1.87
8	Middle East Technical University	Turkey	2	5	1.73
9	University of Strathclyde	UK	3	3	1.60
10	University of Hong Kong	Hong Kong SAR, China	4	4	1.60

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7 **Table 7.** Authors contributions to the drivers for ICJVs (scoring at least one point)

Researcher	Papers	Affiliation	Country	Score
Beliz Ozorhon	5	Illinois Institute of Technology	USA	2.20
David Arditi	5	Illinois Institute of Technology	USA	1.64
Jun Luo	3	Ove Arup and Partners Ltd	China	1.40
S. Ping Ho	3	National University Taiwan	Taiwan	1.24
Yi-Hsin Lin	6	National University Taiwan	Taiwan	1.16
Irem Dikmen	5	Middle East Technical University	Turkey	1.04
Andrei Panibratov	1	Saint Petersburg State University	Russia	1.00
B. A. Young	1	University College London	UK	1.00
Jason West	1	Central Queensland University	Australia	1.00
Artem Aleshin	1	University of Bremen	Germany	1.00
J. Daniel Carrie	1	Parsons Brinckerhoff Quade & Douglas	USA	1.00
Linda Fan	1	The Hong Kong Polytechnic University	Hong Kong SAR, China	1.00
Sherif Mohamed	1	Griffith University	Australia	1.00
Fredric William Swierczek	1	Asian Institute of Technology	Thailand	1.00

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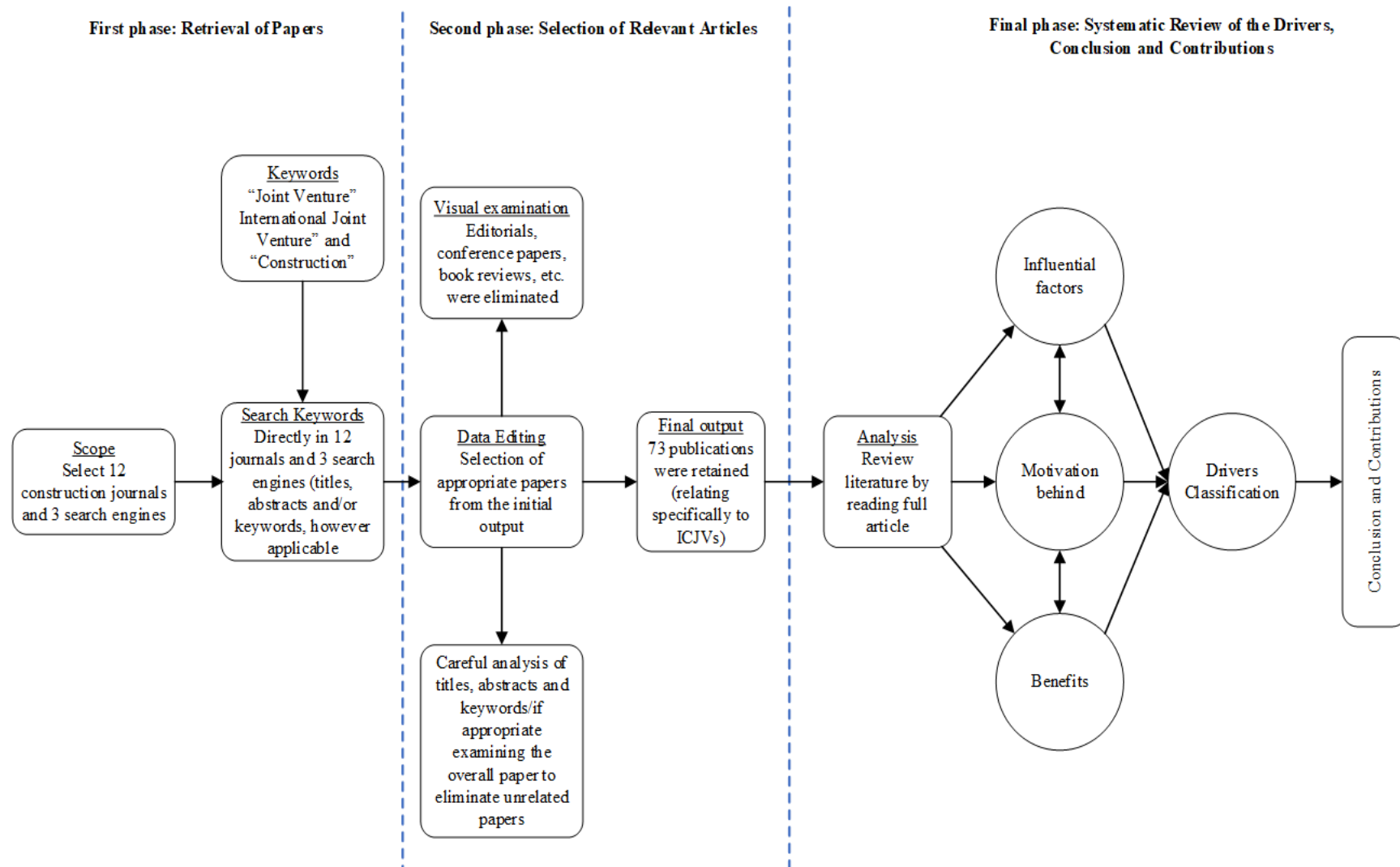


Figure 1. An overview of the literature review search and research process adapted from Oppong et al. (2017).

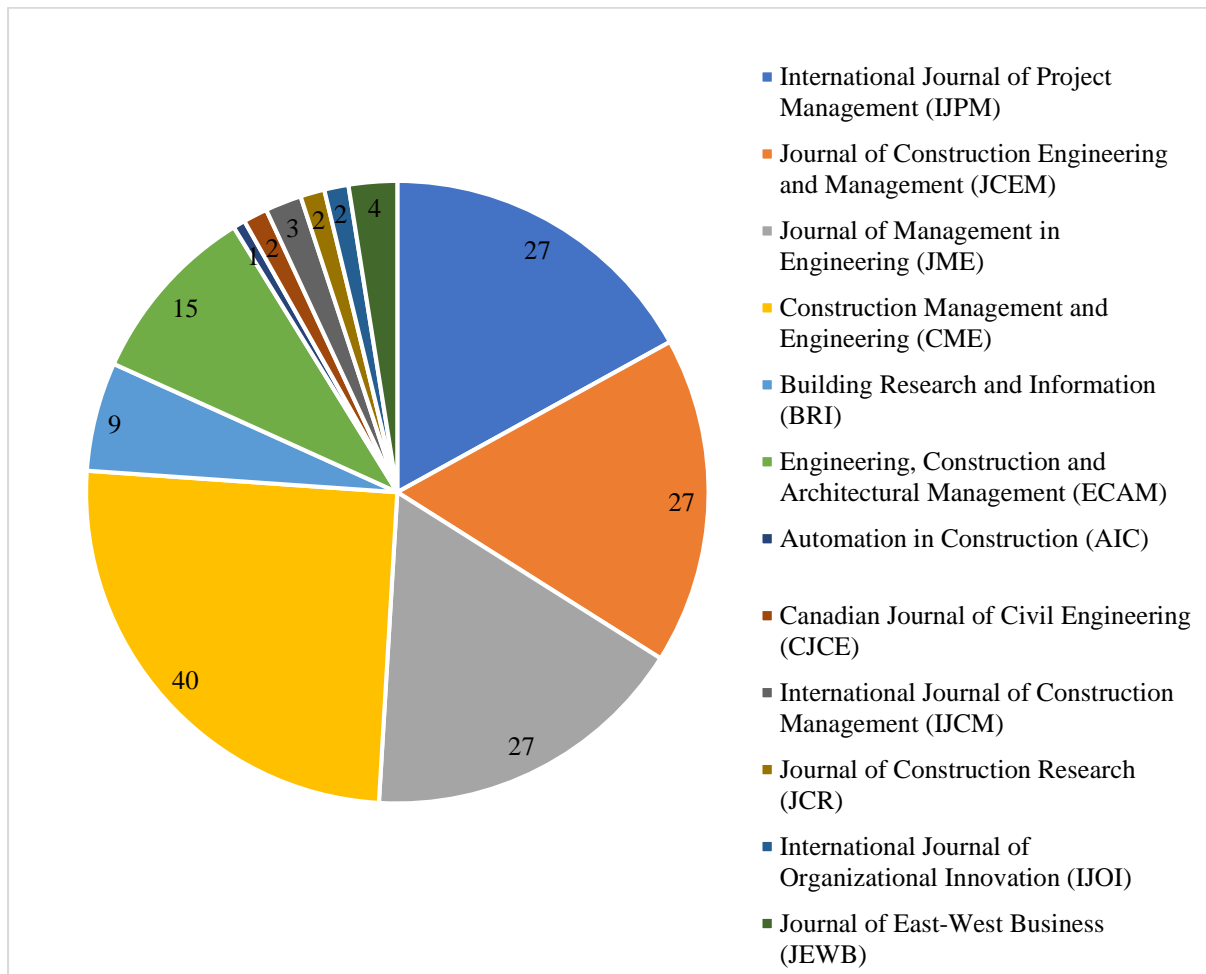


Figure 2. Publication details in terms of the selected journals.

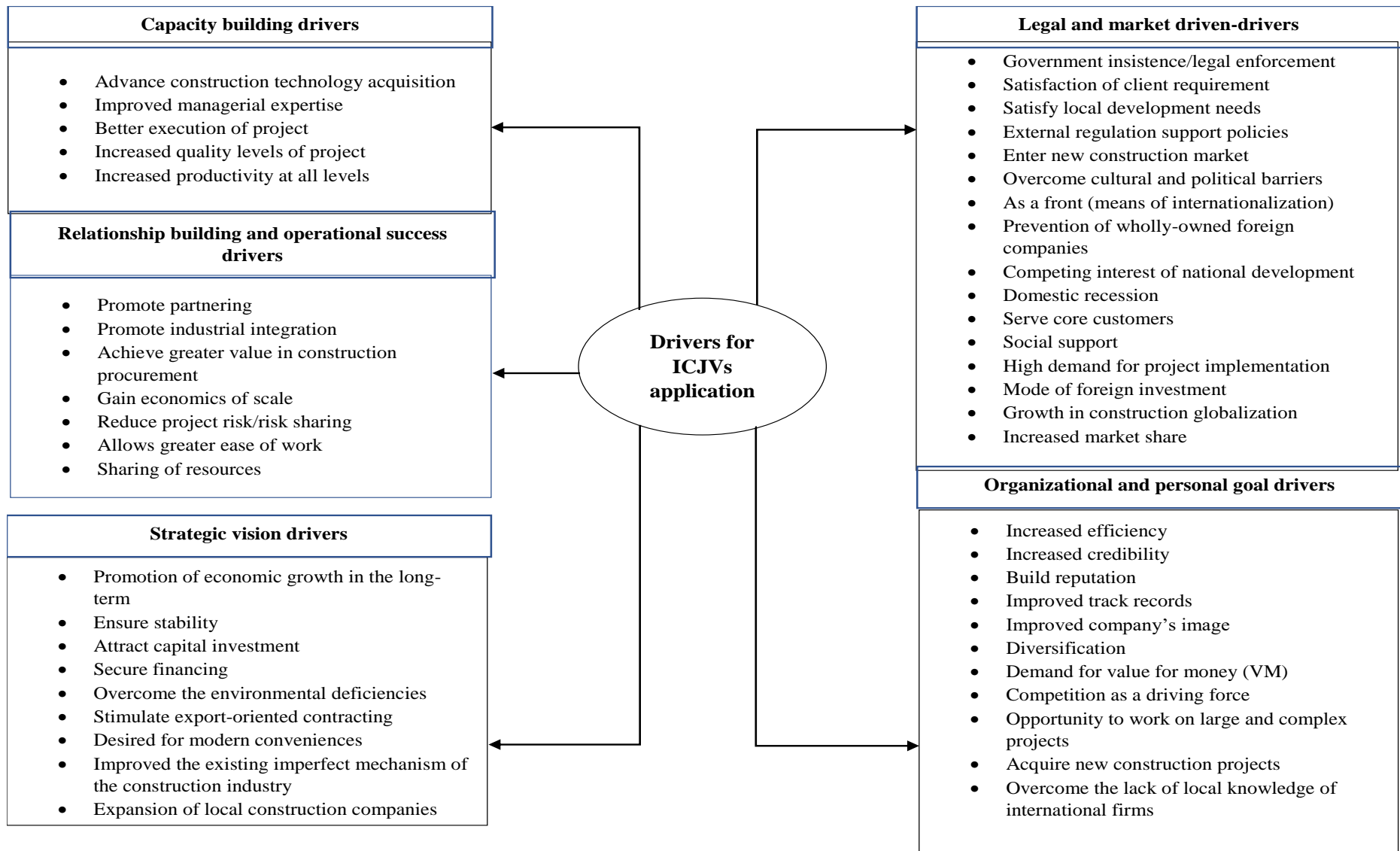


Figure 3. Conceptual framework for ICJV driver's classification

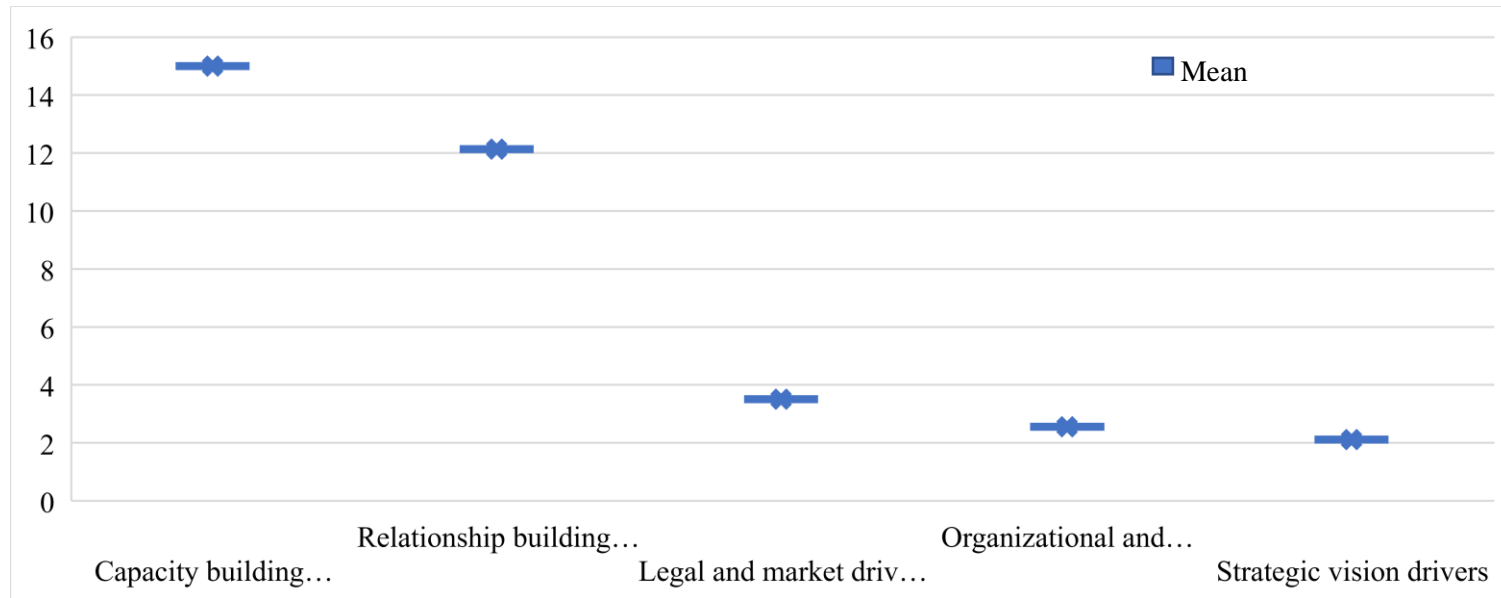
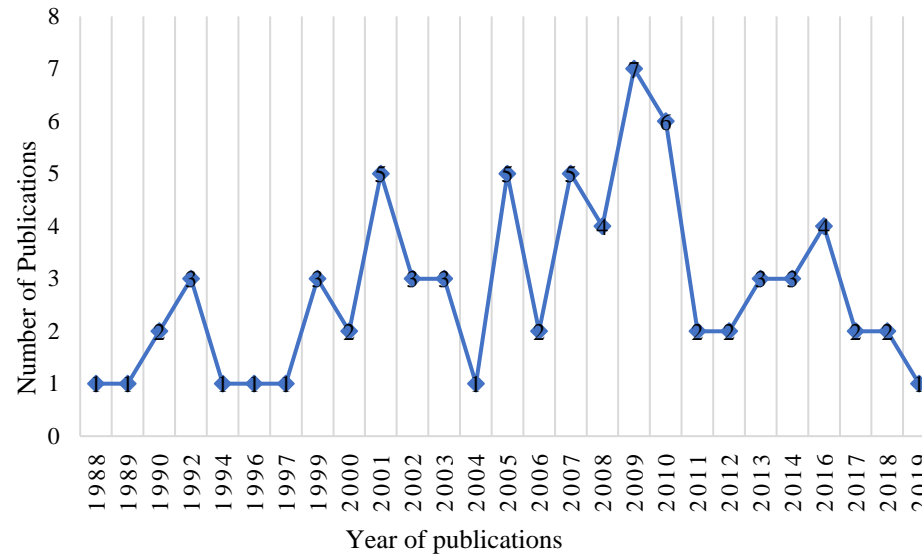


Figure 4. Graphical representation of the construct mean score



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2 **Figure 5.** Number of relevant papers published yearly (searched on May 05, 2018 with no limitation)
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