

## **Research Trend of Joint Ventures in Construction: A Two-decade Taxonomic Review**

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### **Abstract**

**Purpose** – This paper aims to systematically and critically explore the research trend of construction joint ventures (CJVs) in some selected leading construction journals over the past two decades between 1993 and 2012. It is also expected that some valuable insights into the extended application of JVs to facilities service management and maintenance could be generated from the research findings.

**Design/methodology/approach** – A powerful search engine “Scopus” was selected to identify those journals that have published CJV related articles. Papers related to CJVs, as retrieved from the selected journals, were firstly classified based on their relevance to CJV study and were then analyzed in terms of the annual number of CJV related publications, research focus of CJV studies and the applied research methods and techniques. Future research directions are suggested to enrich and add value to the extant literature about CJVs.

**Findings** – An apparent increasing trend of research on CJVs has been witnessed over the past two decades. A critical analysis of the two-decade research outputs indicated that research topics of CJVs published in the selected journals consist of several key areas: (1) theory and model development; (2) motives, benefits and other strategic demands of application; (3) performance measurement or management; (4) risk assessment or management; (5) influential factors for practice; (6) problematic issues and challenges in practice; and (7) Managerial practices of CJVs in the industry. This study also identified that the research methods employed in CJV studies are predominantly questionnaire survey, case study, literature review/analysis, and interview. Research techniques applied in CJV studies were classified into seven main groups, with rank-order analysis, structural equation modelling and regression analysis being the three mostly adopted analytical tools.

**Research limitations/implications** – The critical review of CJV literature reveals several inherent limitations of the existing research and practices of CJVs, The research findings also help visualize future research directions associated with the identification of barriers to the adoption and successful operation of CJVs, investigation of the appropriateness and effectiveness of CJV contracting strategies, and exploration into possible strategies for improving the industrial applications in future.

**Originality/value** – Joint Ventures have been extensively used in the construction sector, which calls for the need of more rigorous and meaningful research to guide the appropriate and effective use of it. The findings of this taxonomic review could provide useful insights towards researchers into shaping their research foci under the umbrella of CJVs to suit the demands of both the literature base and the real construction market.

**Keywords:** Reviews, Publications, Construction industry, Joint ventures, Research trend

**Paper type:** Literature review

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### **Introduction**

Although joint ventures (JVs) have become a way of life for some industries, such as off-shore oil exploration or jet engines (Harrigan, 2003), they are still a relatively new concept in construction today (Kazaz and Ulubeyli, 2009). Since the 1980s, however, JVs have become the principal vehicle for foreign construction firms to gain entry into the local construction market (Chow, 1985). The use of a joint-venture relationship in the construction industry has become a convenient and necessary means of providing the concentration of economic resources, skills, and knowledge required to negotiate, bond and complete a new large-scale construction project (Garb, 1988). On the other hand, the application of JVs in new construction can be extended to facilities development and management as well at their delivery phase and maintenance phase. Especially for those mega-sized, technically complex infrastructure or industrial facilities delivered under the public-private partnership (PPP) model, selection of JV contracting method for their delivery and maintenance, when compared to some other single-party arrangements, is much favoured by the facilities and/or property management service providers in light of the capability of construction joint ventures (CJVs) in integrating technical and financial strengths of CJV contracting partners into the operation and maintenance services.

The guidance notes of “Joint Venture Tendering for Contracts in the United Kingdom”, published by the National Joint Consultative Committee (NJCC) for Building in 1985, imply the emergence of JVs in the construction industry in the 1980s. Ozorhon, Arditi, Dikmen and Birgonul (2007) stated that although establishing international construction joint ventures (ICJVs) is a widely used strategy in the construction industry, the majority of the current literature on international joint ventures (IJVs) is about the manufacturing industry and the validity of underlying theories have not been extensively and empirically investigated in the construction industry. In terms of ICJVs, Mohamed (2003) summarized that the published work on ICJVs have addressed such key issues as: (1) motivations behind ICJV formation; (2)

associated advantages and disadvantages; (3) critical success factors; and (4) risk analysis and management. Ozorhon *et al.* (2007 and 2010) also came up with the summary that a small group of studies on IJVs are associated with the risks of IJVs in construction, the factors affecting the performance of IJVs and management issues on IJVs. Generalities alike, however, may hinder the recognition of research efforts in the study of CJVs. Thus, a systematic, holistic examination of research contributions to CJVs within the past two decades is essential for raising a convincing and well-received appreciation of the research outputs in the field, which is absent from the pool of the contemporary literature.

As academic journal papers present the most important wealth of literature available (Fellows and Liu, 2008), this paper attempts to comprehensively and critically review the CJV literature and to investigate the research trend of JV related studies in top-tier leading journals in construction engineering and management between 1993 and 2012, as no such critical analysis has been undertaken so far in the field of CJVs.

This study intends to crystallise on the understanding of the coverage of CJV related studies published in construction journals and to explore the change or evolution of the themes / foci / interests of the CJV related publications within the past two decades. More importantly, it is expected that the research findings could engender valuable insights to other researchers into shaping their research foci under the umbrella of CJVs to suit the demands of both the literature base and the real construction market.

Building upon the observations of research outputs on CJVs, the contribution of the peer-reviewed construction journals is evaluated, and future research directions are visualized. Hence, the research aims are threefold: (1) to identify the volume of research outputs on CJVs; (2) to capture the themes / foci / interests of the CJV related publications; and (3) to examine the research techniques employed during the study of issues associated with CJVs.

## **Overview of Joint Ventures in Construction**

### ***Definition and Scope of Joint Ventures in Construction***

The term 'Joint Venture' originated as commercial or maritime enterprises used for trading purposes (Harrigan, 2003). A JV is generally defined as an arrangement where there is commitment of funds, facilities, and services by two or more legally separated interests to an enterprise for their mutual benefits for a long period of time (Tomlinson, 1970). It involves at least two parent organizations that contribute equity and resources to a semiautonomous legally separate entity, of which they participate in the decision-making process (Geringer, 1988).

A desktop literature review of JVs in the building and construction sector unveils that there is no unanimous definition on CJVs. Chow (1985) stated that there is no generally accepted statutory or legal definition of a JV, at least under common legal law systems. Garb (1988) quoted the appropriate definition of joint-venture groupings, in the context of the construction industry, as:

*“a business alliance of limited duration formed by two or more unrelated business or professional entities for the purpose of furnishing engineering, consulting, procurement, construction and construction management services by consolidating the skills and resources of the participants”.*

The National Joint Consultative Committee (NJCC) for Building (1985) of the United Kingdom distinguished JVs from other contractual patterns by defining it as:

*“a partnership between two or more companies covering building, mechanical and electrical engineering, or other specialist services for the purpose of tendering for, and executing a building or civil engineering contract, each of the participating companies having joint and several liability for their contractual obligations to the employer”.*

Munns, Aloquili and Ramsay (2000) attempted to define JVs by employing five criteria: legal agreement, duration, equality, participants and profits. Resorting to these five criteria, the study of Munns *et al.* (2000) is concerned with business JVs between two or more partners of comparable commitment, who create a distinct legal entity that may be of fixed or unlimited duration.

The scope of CJVs, as defined in this study, is limited to the procurement/cooperative approach adopted by the architectural/engineering/construction (AEC) firms. A CJV differs from an alliance in that a JV is typically a short-term or one project agreement (Badger, Mulligan, Carter, Gay, Held and Markham, 1993). A JV launched on a project basis, is sometimes called a consortium, contractual JV, or contractual alliance (Chen and Messner, 2009). CJVs, dominantly as project-based JVs, is formed under a contractual agreement, rather than taking the form of equity JVs. The project-based JVs are temporary in nature and are the creation of separate entities through the alliance of two or more organizations for the purpose of carrying out a specific project (Sillars and Kangari, 2004).

To distinguish the general term of “JVs” and the specific term of “CJVs”, this study makes reference to the comparative discussion of Girmscheid and Brockmann (2010), in which the marked difference between IJVs and ICJVs was stressed and pointed out by indicating that IJVs mostly take the form of equity JVs whereas ICJVs are contractual JVs. Specifically, CJV is regulated by both JV contract and construction contract signed with the client, as elaborated in Figure 1.

**(Please insert Figure 1 here)**

## ***Classification of Joint Ventures in Construction***

### ***1. Integrated and non-integrated construction joint ventures***

JVs in the construction industry fall broadly into two categories: integrated and non-integrated (Norwood and Mansfield, 1999; Garb, 1988). The integrated JVs may alternatively refer to jointly managed JVs (JMJ) (Ho, Lin, Chu and Wu.,2009a). Under an integrated JV agreement, the parties essentially agree to perform their work as if it were performed by a single corporation having several stakeholders (Garb, 1988). Thus, the integrated JVs are adopted when the parties to the proposed JV intend to perform their work on an integrated basis (Garb, 1988). The non-integrated form of JVs, being synonymous with separately managed JVs (SMJ) (Ho *et al.*, 2009a), is often termed as item JVs (Badger *et al.*, 1993), wherein the parties, for the most part, undertake their respective portions of the work separately (Garb, 1988). The non-integrated JVs are normally used when parties to a joint venture each have discrete scopes of work and the JV is being formed merely to satisfy a particular requirement necessitating a joint bid (Garb, 1988).

### ***2. International and domestic construction joint ventures***

International construction joint venture (ICJV) is a type of CJV involving multinational partners. ICJV is seen by developing countries as one of the best instruments for meeting the competing interests of national development and the prevention of the domination of the economy by foreign investors (Sornarajah, 1992; Mohamed, 2003).

Domestic construction joint venture (DCJV) is defined in this study as the type of CJVs with partners from a single country. Apart from the use by entrepreneurial firms to expand into new businesses and tap new markets, JVs are also being used voluntarily as a strategy option within mature economics (Harrigan, 2003). Industrial studies have found some support that JVs are a form of strategy behavior to increase market power (Kogut, 1988). From the strategic perspective, DCJV, as formed by partners from the same country, enables the share of resources of the national A/E/C firms, expedites technology transfer and adapts to the global competition.

## **Research Methodology**

Following the assertion that a systematic analysis of papers published in academic journals would help researchers to explore the current status and future trend of a chosen topic (Tsai and Wen, 2005), this study centres on the analysis of published literature extracted from top-tier journals in the field of construction engineering and management. A powerful search engine “Scopus” was selected to identify those journals that have published CJV related articles. The rationale for choosing “Scopus” search engine lies in that it covers the publication database in a variety of research fields (e.g. engineering, management, business, etc.) and was also adopted in other construction-related literature review papers, such as the review by Ke, Wang, Chan, and Cheung (2009) on the research trend of public-private-partnership (PPP) and the critical analysis by Hong, Chan, Chan and Yeung

(2012) on partnering research trend.

To facilitate a clear and in-depth illustration of CJV related research, a three-stage search process (i.e. “Scopus” general search, “Scopus” specific search and journal-specific search) was adopted to launch content analysis of CJV related papers published between 1993 and 2012, both years inclusive, which is presented in Figure 2. At the first stage, with the aid of the powerful search engine “Scopus”, keywords relating to CJVs were used for search purposes. The advanced search function of “Scopus” enables the authors to strictly limit the search results to JV study in the A/E/C industry.

A comprehensive desktop search was conducted under the “title / abstract / keyword” field of the powerful search engine “Scopus”. Search keywords included “Joint Venture”, “Joint Ventures”, and “Joint Venturing”, which are limited to the field of A/E/C industry by using the keyword “Construction”. Papers with these specific terms included in the title, abstract or keyword were considered to have met the requirements of this research study. The search was further confined to the subject area such as “engineering”, “environment”, “business”, “management”, “decision sciences”, “economics, econometrics and finance”, and “social sciences” with the document type of “article or review”. The full search code is as follows:

***TITLE-ABS-KEY ("Joint Venture" OR "Joint Ventures" OR "Joint Venturing"  
AND "Construction") AND DOCTYPE (ar OR re) AND SUBJAREA (ener OR  
engi OR busi OR envi OR deci OR econ OR soci OR manag) AND PUBYEAR AFT  
1992 AND PUBYEAR BEF 2013 AND LANGUAGE (english) AND SRCTYPE (j)***

Search results: 197 (searched on 3 April 2013)

Drawing upon the search result with respect to the number of papers in CJVs published by each journal and the corresponding journal titles, seven top-tier construction journals with publications on CJVs were extracted for further analysis. Those journals are *Journal of Construction Engineering and Management* (JCEM), ASCE; *Construction Management and Economics* (CME); *International Journal of Project Management* (IJPM); *Journal of Management in Engineering* (JME), ASCE; *Journal of Professional Issues in Engineering Education and Practice* (JPEEP), ASCE; *Engineering, Construction and Architectural Management* (ECAM); *Automation in Construction* (AIC).

At the second search stage, the study further refers to the list of Chau (1997)’s ranking of construction journals and the list of journals adopted in other construction-related literature review papers (e.g. Holt, 2010; Tang, Shen and Cheng., 2010; Xue, Shen, and Ren., 2010; Yang, Yeung, Chan, Chiang and Chan, 2010) in order to shortlist well-recognized peer-review journals in the field of construction engineering and management. Further examination of the search results from “Scopus” reveals that some other top-tier construction journals as included in Chau (1997)’s list are not covered by “Scopus”. Specific search into those journals unveils that publications on CJVs have also been recorded in the journals of *Building Research and Information* (BRI); *Journal of Construction Procurement* (JCP); *Construction Law Journal* (CLJ).

The search results in “Scopus”, in combination with other journals in Chau (1997)’s ranking list of construction journals, engenders the ten target journals for literature analysis as including: *Journal of Construction Engineering and Management* (JCEM), ASCE; *Construction Law Journal* (CLJ); *Construction Management and Economics* (CME); *International Journal of Project Management* (IJPM); *Building Research and Information* (BRI); *Journal of Management in Engineering* (JME), ASCE; *Journal of Professional Issues in Engineering Education and Practice* (JPEEP), ASCE; *Engineering, Construction and Architectural Management* (ECAM); *Automation in Construction* (AIC); *Journal of Construction Procurement* (JCP).

Followed by the determination of target journals for analysis of the literature in CJVs is the specific search (the third stage of the search process) of papers on CJVs from the selected journals. All papers retrieved from the search within “Scopus” database are supposed to be relevant to the study of CJVs, albeit the inclusion of which for analysis is pending further examination. Accordingly to Holt (2010)’s statement that the categorization of papers (regarding, for example, subject focus and methodological standpoint), was a result of subjective evaluation. The relevance of papers, as retrieved from the desktop search, to this study was evaluated by sole recourse to the authors’ experiential judgments.

To further define and crystallize the scope of sources for analysis, it is specified that articles published under the broad categories of editorial, book review, forum discussion/closure, letter to editor, article in press, index, foreword, introduction, conference/seminar report, research information, briefing sheet, comment, erratum and announcement were all excluded from the analysis. The respective number of publications on CJVs from each target journal are then counted and presented in Table 1.

**(Please insert Table 1 here)**

The papers extracted from specific search into all target journals, though perhaps not exhaustive or inclusive of all publications in the selected field, are deemed as comprehensive and appropriate for literature analysis in-so-far as the scope and depth of this study is concerned. The retrieved papers are analyzed in terms of the annual research publications, research coverage / foci / themes in CJVs, and methodological applications. Future research trends on the development of CJVs are also visualized based on the existing research outputs. Figure 3 presents the schematic flow of the comprehensive review of published literature about CJVs in construction-related journals.

**(Please insert Figure 3 here)**

## **Discussion of Search Results**

### ***1. Research Productivity of Identified Construction Journals on CJV Papers***

According to the search results on the basis of the search engine “Scopus”, the total number of CJV related papers identified was 71. Figure 4 portrays the respective number of publications on CJVs per year in each target journal within the two-decade period between 1993 and 2012. As the search results indicate, the year 1993 is a tipping point for the commencement of CJV studies in the selected journals. Obviously, the statistics manifested in Figure 4 show that research on CJV topics have increasingly emerged within the first 10 years of the 21st Century. The number of papers published on CJVs in the target journals between 2000 and 2012 is 58, far more than 13 in the 1990s. Special attention should be given to the fact that those journals published 7 CJV papers in 2009, a peak within the studied period. These statistics reinforced that research interests in CJV topics have been growing consistently throughout the 20 years since its genesis. As indicated in Table 1, within the studied period, the journal JCEM has published the highest number of CJV related papers of 14, followed by CLJ and IJPM of 11 papers each. The number of CJV papers published in JCEM is much higher than any of the other selected journals, resulting in the greatest contribution by this specific journal to construction from CJV studies.

**(Please insert Figure 4 here)**

Studies into CJVs reached a relative balance after 2005, with the annual number of publications fluctuating between 4 and 7, which may to some extent reflect the relatively mature and steady practices of CJVs in the construction industry. Considering the annual number of publications (approximately 4.5 per year) since 2000, the volume of study on CJVs still has great potential for increase given the vast practices of JVs in the construction industry.

### ***2. Research Coverage, Focus and Trend on CJVs***

Based on the authors’ experiential judgment, each paper was grouped under one major area of research interest. Categorization of the research interests of papers is acknowledged to be concurrent with two caveats: the evaluative process is subjective by nature and the papers may span more than one research focus (Holt, 2010). Since the analysis of literature was undertaken by a group of researchers rather than a single author, any variations in views could thus be minimized or even eliminated. Furthermore, if one paper may cover more than one research interest, the “best-fit” one was ascribed to that paper. Based on this criterion of categorization, the major research interests used to classify the papers related to CJV studies from the selected journals within the studied period, are identified as: (1) theory and model development; (2) identification of motives, benefits and other strategic demands of application; (3) performance measurement or management; (4) risk assessment or management; (5) influential factors for practice; (6) problematic issues and challenges in practice; and (7) managerial practices of CJVs in the industry. Details of the distribution of papers under each identified research interest are shown in Table 2.

**(Please insert Table 2 here)**

### ***Theory and model development of CJVs***

A retrospect of the observed publications on CJVs indicates a conspicuous lack of theoretical contributions to CJV study, ranging from building up theory to developing CJV practice model and framework. Defining the scope of CJVs has always been an imperative task for researchers to position the domain of studies relating to CJVs. The distinction of contractual JVs and equity JVs in the context of multinational partners, within the study of Girmscheid and Brockmann (2010), is among the rare cases concerning the differentiation of JVs and CJVs in terms of the scope of study. Similar scarce instance for providing any implications for the procedural formation of CJVs could be resorted to the cyclic model of negation developed by Munns *et al.* (2000) for the formation of JVs in construction, which involves five sequential elements of aspiration, information exchange, social exchange, knowledge and uncertainty. Another instance of contribution to the model development relating to CJVs is the study of Ho *et al.* (2009a), where a model for organizational governance choices in CJVs was proposed to decide on the use of joint managed JVs or separately managed JVs. Except for these examples of studies, the existing literature about CJVs provides few theoretical underpinnings for the formation and operation of CJVs in real practice.

### ***Motives, benefits and other strategic demands of application***

Research into CJVs is also concerned with the key issues in terms of the motivations for the use of CJVs and the success criteria of CJV practices. Motives and benefits underneath the application of CJVs, as identified by the previous studies, involve technology transfer (Norwood and Mansfield, 1999; Kumaraswamy and Shrestha, 2002; Girmscheid and Brockmann, 2010), risk sharing/transfer (Norwood and Mansfield, 1999; Kazaz and Ulubeyli, 2009; Girmscheid and Brockmann, 2010), financial strengths (Kumaraswamy and Shrestha, 2002; Kazaz and Ulubeyli, 2009; Girmscheid and Brockmann, 2010), together with combination/pooling of general resources and specialist skills (Norwood and Mansfield, 1999; Munns *et al.*, 2000; Kazaz and Ulubeyli, 2009). Other potential benefits such as bringing in outside expertise (Norwood and Mansfield, 1999), and opportunities for long-term profitable business development (Bellhouse, 1999) have also been referred to in the literature. Especially for the developing construction markets such as Mainland China, ICJVs could be adopted to improve local construction technology, raise project management skills and promote the development of the local construction market (Editorial, 2001).

The extensive research attention to JVs has been largely attributable to their importance as a strategic alternative in global competition (Ozorhon, 2007). Use of JVs by architectural / engineering / construction (A/E/C) firms for strategic purposes in the construction sector has been widely examined in the literature. Raftery, Pasadilla, Chiang, Hui and Tang (1998) highlighted that the easiest way for foreign contractors to operate in domestic markets is through JV with local construction firms in the Asian construction sector. Ling and Gui (2009a) reported from interview findings that forming JVs is perceived as one response

adopted by Vietnamese A/E/C firms to the threat of foreign competition, through which the Vietnamese A/E/C firms can have fast access to up-to-date technology through their JV partners. Forming international JVs with foreign A/E/C firms has also been identified as the key strategy to overcome some of the weaknesses of the Chinese consulting firms and to reduce the competition from foreign A/E/C firms (Ling, Pham and Hoang, 2009b). Ling *et al.* (2008a and 2008b) found that one of the most effective market entry modes for the A/E/C firms in Singapore and the broader area of Southeast Asia is to form project JVs with local firms.

Oyegoke (2006) advocated the organizational learning through JVs or project alliances as an essential part of operational management, which is an alternative to build a competence for managing claims in the construction industry. The use of JVs has also been proposed as the risk sharing strategy in construction contracts (O'Reilly, 1995). Case study by Lo *et al.* (1998) on building Taipei's mass rapid transit system implied the imperative call for strategic use of JVs in complex and most technically challenging projects as these JVs may have accumulated a high level of expertise.

### ***Performance measurement or management of CJVs***

Measuring JV performance has been a difficult task as efforts to identify variables associated with JV performance have been constrained by disagreements on the comparability and reliability of alternative performance measures and methods (Geringer and Hebert, 1991). A sound selection and identification of the measures of CJV project performance is critical to the validity and reliability of measurement. With respect to the performance measurement of CJV projects, the types of CJV projects in the pool of the identified publications fall exclusively into the category of ICJV, with no record of study on DCJV.

A variety of measures for assessing CJV performance have been witnessed with no consensus achieved so far in the literature. Ozorhon *et al.* (2007) applied three different constructs: JV structure, interpartner fit and interpartner relations, as the measures of ICJV performance. Building upon and extending the performance assessment model developed in 2007, Ozorhon *et al.* (2010) raised four aspects for assessing the overall IJV performance: project performance, perceived satisfaction with IJV, performance of the IJV management, and partner performance, each of which is assessed with separate measures. Mohamed (2003), from the process-based perspective, developed a research model to explore the relationships between three key processes, i.e., partner selection, ICJV formation and ICJV operation, in the life of an ICJV and their effects on the success of the ICJV, where the ICJV's performance is measured by three items: value, profit and satisfaction. While in the context of equity JVs in construction, installation and decoration, Luo (2001) used the number of projects undertaken by the JVs, the average annual profit rate of the JVs and a subjective managerial measure to assess the performance of Sino-foreign JVs. Differing from these aforementioned studies, Sillars and Kangari (2004), with reference to the study of Warszawski (1996) on strategic planning, adopted the construct of organization return (profitability), which is further measured by JV return, and company growth (market position change) to measure organization success under the circumstance of project-based JV practice.

### ***Risk assessment or management of CJVs***

Previous research has demonstrated that despite several applications and perceived benefits, JVs frequently go awry and create problems, with dangers and risks to the success of JVs arising from anti-trust, sovereignty conflicts, lack of autonomy and control, as well as a loss of competitive advantages through strategic inflexibility (Harrigan, 2003). Risks inherent with CJV formation and operation render it essential to develop an effective mechanism for risk management, assessment and control.

A frequently adopted classification of risks in CJVs is to incorporate three main groups of risks – internal, project-specific, and external risks – into the analysis of CJV risks, which was developed by Li *et al.* (1999a) in the context of ICJV in East Asia and was further adopted by Hsueh, Perng, Yan and Lee (2007) to develop an on-line multi-criteria risk assessment model for JVs and was also used by Zhang and Zou (2007) to evaluate risks in CJV projects in Mainland China. The study of Li *et al.* (1999a) indicated the most critical risk factors inherent with ICJVs are associated with financial strengths, government policies, project relationships, economic conditions and subcontractors' competence. Differentiated criticality of these risks in three different phases of ICJVs, i.e., start-up, operation, and dismantle, is further disclosed in their study. Li and Tiong (1999b) proposed a risk management model for ICJVs, where eight key measures – partner selection, agreement, subcontract, engineering contract, employment, good relationships, control and renegotiation – were used to assess the risks of ICJVs. Shen *et al.* (2001) classified the risks associated with Sino-foreign CJVs into six groups: financial, legal, management, market, policy and political, and technical risks. Their study empirically revealed that among the top 10 risks in Sino-foreign CJVs, there are 5 risks related to management, 2 related to market, 2 related to policy and 1 related to technical issue.

Overall, the general observation unveils that the system of risks in CJV has been developed systematically and identified empirically in the past studies. However, there is still a dearth of literature devoted to the development of strategies and models to avoid, mitigate or transfer risks in CJV practices. It has been observed from the study of Shen *et al.* (2001) that practical risk management strategies in ICJVs may be appealed to the co-operation with government offices, proper risk allocation within the contract, and full control of the technical risks.

### ***Influential factors for CJV practices***

The desktop review of the literature indicates there appears to be more similarities than differences in perceptions concerning the critical success factors for CJVs, of which commitment, co-operation, management control, agreement of JV contract, and partner selection, are widely identified from the previous studies (Gale and Luo, 2004; Morledge and Adnan, 2006). Gale and Luo (2004), focusing on the formation stage of JVs, investigated the key factors conducive to the success of JVs. Morledge and Adnan (2006), based on a literature review and semi-structured interviews, examined the critical success factors for CJV projects in Malaysia and identified the top three ones as agreement of contract, commitment and co-operation, followed by management control, inter-partner trust and

financial stability. Apart from communication, partner selection and co-operation, Munns *et al.* (2000) also advocated cultural homogeneity as a critical factor to the success of CJVs.

Apart from the major critical success factors identified from the existing studies, some underlying factors influencing and contributing to the performance/success of CJVs have also been examined and explored in the literature. For instance, in the context of ICJVs, cultural differences between the CJV partners (Ozorhon *et al.*, 2008a), interpartner fit (Ozorhon, Arditi, Dikmen and Birgonul, 2008b), together with the host country conditions and project characteristics (Ozorhon *et al.*, 2007), were explored to disclose their impacts on the ICJV performance. Walker and Johannes (2003) examined pertinent issues in JV design, of which JV vulnerability and risk factors, trust and commitment factors were investigated in terms of their respective influences on JV design. Ho *et al.* (2009b) studied the determining effects of four influential factors – corporate cultural difference, mutual trust, need for procurement autonomy and motivation for learning – on the selection of organizational governance structure in CJVs.

The factor of trust has also been specifically examined in the context of ICJVs by Girmscheid and Brochmann (2010), where a model of trust in ICJVs was derived and developed from three components of trust, namely trust process, objects of trust and the consequences of trust. Under the culture dimension, Fisher and Ranasinghe (2001) examined uncertainty avoidance as the most determinant cultural characteristic than cultural distance for foreign investor's choice of the entry mode of JVs.

Selection of CJV partners has also been identified as one of the critical success factors for CJVs (Gale and Luo, 2004; Morledge and Adnan, 2006). Nine criteria specifically for the selection of JV partners were raised by Williams and Lilley (1993), where strategic compatibility, complementary skills and resources, relative company size, financial capability, compatibility between operating policies, trust and commitment, compatible management teams, and mutual dependency and communications barriers should be considered for selecting the best-fit JV partners.

### ***Problematic issues and challenges in CJV practices***

Culture is among the frequently explored constructs in the study of CJVs. Culture is perceived as the major cause of failure in a CJV (Swierczek, 1994; Munns *et al.*, 2000). The potential for conflicts in any JVs exists because of the differences in the partners involved, which may be further increased as a result of the different cultural backgrounds that the partners possess (Munns *et al.*, 2000).

Studies into the dispute resolution in CJVs are also worthy of attention for reducing construction disputes in CJV projects. In connection with the Sino-foreign JV international projects, arbitration is identified through interviews as the preferred dispute resolution method (Chan and Suen, 2005a). The study of Chan and Suen (2005b) unfolded that the sources of construction disputes in Sino-foreign JV construction projects in Mainland China can be classified into three categories: contractual, cultural, and legal matters, which are

resolved through mediation and arbitration. Allen (2011) reported that nearly one third of the JV construction projects result in disputes, where the conduct of the project managers or engineers was found to be at the heart of disputes on more than half (53%) of occasions. A lack of sound understanding of contractual procedures and a partiality to the employer's interests were further referred in the study of Allen (2011) as the two most significant mistakes that project managers or engineers have made.

Technology transfer through the use of JVs in the construction industry has been extensively identified as one major benefit of CJVs, which corresponds to the assertion that JV appears to be the most widely preferred vehicle of construction technology transfer (Kumaraswamy and Shrestha, 2002). However, it has been advocated that although the benefits have accrued in terms of technology transfer to local contractors in Singapore through JVs, the process was observed to be fraught with problems (Ofori, Pin and Leong, 2001). Ofori (2000) asserted that JVs are not always effective as transfer vehicles as reflected by some previous studies. Ofori (2000) also concluded that research work on CJVs has not yet considered in detail the effective operation of such business entities effecting as the channels for transferring technology to local contractors, which results in an imperative to identify the factors contributing to the success of this process. What is more, Kumaraswamy and Shrestha (2002) identified the major barriers to technology transfer, together with the needs, expectations and effectiveness of technology transfer, in the CJV projects of Hong Kong.

Knowledge management and knowledge sharing in CJV projects were also found to be investigated within the CJV literature. Dulaimi (2007), using the case study methodology, uncovered a lack of clear commitment and intent to create an environment conducive to knowledge sharing and the incompatibility between the foreign and local cultures as the major barriers to effective knowledge sharing in ICJVs.

### ***Managerial practices of CJVs in the industry***

Other papers, with little connection with the above identified research interests, fall exclusively into the broad category of the managerial practice of CJVs in the A/E/C industry, including CJV case reports, reporting and recording of the CJV practices.

## **3. Methodological Approaches and Techniques for Research Analysis**

### ***Scope of Analysis***

An investigation into the research methodologies employed in CJV related research has identified four major categories of research approaches as literature review/analysis, questionnaire survey, interviewing, and case study, which are prevalent and dominant in the discipline of construction engineering and management.

Any studies adopting the aforementioned research methods yet not examining CJV pertinent issues are excluded for analysis. For instance, although the study of Maio, Schexnayder, Knutson and Weber (2000) used the case of Atkinson-Washington-Zachry JV on the Eastside

Reservoir Project in California, the analysis based on the JV project is not to address issues concerning CJV but to validate the influence of the class interval decision on the selection of a distribution function. Thus, the case study approach employed is not counted for analysis of research methods in CJV research in this paper. Similarly, CJV practices reported in some papers are not counted as case study since the cases, e.g., Phase II of the Channel Tunnel Rail Link (or CTRL) in the study of Anderson and Davis (2008), were not explored essentially and in detail. Following the specifications of the scope of literature/documentary synthesis by Holt (2010), literature review/analysis, as a key research methodology in this study, includes examination of all kinds of existing knowledge or data for the purpose of conceptualizing, developing theory, or presenting propositions (Davies, 2007; Holt, 2010). Thus, a briefing introduction of the past studies without the aim of deriving any models, theories or propositions, is not perceived as using literature review as a key research method.

### ***Major Research Findings***

With reference to the above identified scope of analysis, the result of summary on the research methods used is depicted in Figure 5.

**(Please insert Figure 5 here)**

It was observed that questionnaire survey is the most favoured research method within the sample papers, taking account of 30.3% of the total number, which echoes the assertion that questionnaires are favoured within the broader field of construction management research (Holt, 2010). Questionnaire surveys on CJV research are used in studies on multi-facets, e.g. ranking of risk factors in CJV (Shen *et al.*, 2001), identification of key success factors for CJVs (Gale and Luo, 2004), assessment of the performance of ICJVs (Ozorhon, Arditi, Dikmen and Birgonul, 2010), etc. On top of questionnaire surveys are the research approaches of case study and interview, with the percentage of 24.7% and 23.6% respectively. Case study methodology is also much favored in CJV research and records the amount of use approximate to that of questionnaire surveys. The research purposes of case study approach extend from pure analysis of CJV practices (e.g. Case Report, 2010) to testing/validating the proposed models concerning the formation and operation of CJVs. Examples include using case studies to test the proposed model of behaviors in the negotiation of JV formation by Munns *et al.* (2000), to materialize and substantiate the proposed criteria for partner selection in CJVs by Williams and Lilley (1993) and to demonstrate the application of the proposed fuzzy Analytic Hierarchy Process (AHP) model for assessing risks in CJV projects by Zhang and Zou (2007), etc.

Literature review/analysis, as the thirdly favored research techniques in CJV research, is seen as the underpinnings to come up with propositions, conceptualize theories, and develop models in connection with the formation and operation of CJVs. Typical instances are the review of cost-based and resource-based perspectives of governance structure determinants in CJVs by Ho *et al.* (2009a) for developing the model of governance structure choices in CJVs, the review of different approaches to explain the phenomenon of trust for developing a theory of trust and a trust model in ICJVs by Girmscheid and Brockmann (2010), and the review of

the performance of IJVs by Ozorhon (2010) for developing the determinants of IJV Performance.

Other research methods have also been observed in the literature, including expert group discussion adopted by Ozorhon *et al.* (2007) for determining the relative importance of the ICJV performance criteria and the strength of interrelations between them, and use of secondary data, such as the use of meta-analysis of studies on 12 Asian economies in the construction sector (Raftery *et al.*, 1998) to report and comment on significant new developments in the Asian region and the use of *Kompass* and *Worldscope* directories of foreign-owned businesses to construct the database of the population of building and construction industry foreign investment in Singapore (Fisher and Ranasinghe, 2001).

Another look of this study is at the variance and types of employed research techniques in CJV related publications. Only 31 papers within the total of 71 papers relevant to CJV study have used research tools to analyze the research data. The research techniques applied in the sample papers can be classified in a broad context into three major categories, covering importance ranking methods (e.g., rank-order analysis), decision-making tools (e.g., utility theory, AHP, ANP, SWOT analysis, etc) and between-variable and within-variable relational examination approaches (e.g., Structural Equation Modelling (SEM), regression analysis, etc). Details of the distribution of research tools employed in CJV research are shown in Table 3.

**(Please insert Table 3 here)**

Rank-order analysis, as the major data analysis tool to determine the importance ranking of identified variables, is most frequently (15 out of 35 observations) used in CJV research, such as to determine the relative importance of the critical success factors for CJVs (Morledge and Adnan, 2006; Gale and Luo, 2004), to assess the relative significance among risks in Sino-foreign CJVs (Shen *et al.*, 2001) and to rank most commonly used dispute resolution mechanisms and sources of disputes in Sino-foreign CJVs (Chan and Suen, 2005b).

Of the relational examination approaches, SEM is most favored (6 out of 35 observations), of which the purpose could appeal to determining the coefficients of different measures to overall IJV performance (Ozorhon *et al.*, 2010) and determining the factor loadings and path coefficients when examining the impact of cultural differences and the fit between IJV partners on IJV performance in construction (Ozorhon *et al.*, 2008a and 2008b). Another frequently adopted relational examination tool subsequent to SEM is regression analysis, which had been used to predict the contribution of organizational attributes to the success of project-based JVs (Sillars and Kangari, 2004), to test the proposed governance structure model and propositions in CJVs (Ho *et al.*, 2009b), to explore the relative correspondence between the two cultural characteristics of uncertainty avoidance and cultural distance to the formation of JVs for foreign investors (Fisher and Ranasinghe, 2001).

Decision-making tools employed in CJV research record a wide range of variety, such as use of AHP and utility theory to develop a multi-criteria risk assessment model for construction pre-JVs stage (Hsueh *et al.*, 2007), use of analytic network approach to examine the links between the determinants of performance and to observe the influences of these factors on ICJV performance (Ozorhon *et al.*, 2007), and use of SWOT analysis to identify and respond to opportunities and threats (Ling and Gui, 2009a; Ling *et al.*, 2009b), etc.

### **Implications from Literature Review**

With regard to the emergence of industrial practices of CJVs, the solid theoretical contributions to CJVs are essential for providing useful guidance to practitioners in avoiding barriers and achieving success throughout the formation and operation of CJVs. Assessment of risks inherent with CJVs also equips the practitioners with the knowledge about the existence of potential risks and the intention of seeking possible and effective strategies to avoid, mitigate or transfer these risks. Establishing consolidated measurement criteria and operational systems for CJV projects offers a benchmarking tool for the practitioners to monitor and meliorate the performance of CJVs. The influences on the performance and success of CJVs and the problematic issues concerning CJV practices may derive from various aspects, the identification of which is indispensable for comprehensively guaranteeing the effective operation of CJVs.

The above identified research interests enable generalizing that research on CJVs overwhelmingly targets for guiding industrial practitioners on recognition of CJV issues and achievement of project success through the use of CJV approach, however, the practical value of those studies are questionable, with certain doubts from a variety of aspects, such as a lack of managerial practices of the performance measurement model or mechanism and risk assessment model or system in real-life CJV projects.

Concurrent with the extensive application of CJVs is the question of how to improve the success rate of JVs in construction projects. Prior research has articulated that the worldwide trend of using JVs has increased since the 1990s, but with very unsatisfactory results (Munns *et al.*, 2000). Nearly one-third (31%) of these JVs in place to deliver a construction project resulted in disputes (Allen, 2011). Hence, there is an imperative need to look at and explore thoroughly the reasons for the failure of CJVs.

To sum up, while a critical review of the publications on CJVs observes the increased popularity and complexity in CJV research, it also reveals the inherent limitations of the research and practices of CJVs, which may be resorted, but are not limited, to the following:

- Research on the benefits, motives and success factors of CJVs barely builds upon empirical demonstrations. Without proper validation from the construction industry, the perceived factors are only descriptive in nature, the value of which in providing implications to real practices of CJVs is questionable. Furthermore, the strategic adoption of JV approach in construction projects should build upon the tangible benefits reaped through real-life implementation. These concerns render it necessary to solicit the practitioners' perceptions and learn lessons from practical CJV cases.

- There is a conspicuous lack of systematic theoretical framework underpinning the formation and operation of CJVs. Building up and validating the theoretical framework involved in the process of CJV practices provides effective guidelines for industrial practitioners to implement CJVs successfully. Strategic planning of CJV application requires substantial knowledge support in terms of the theories and principles behind the success of CJVs, the literature of which needs to be imperatively enriched.
- There is a dearth of literature on identifying the appropriateness of selecting the JV approach in construction projects. The appropriateness and superiority of CJVs over other contracting approaches in construction projects have not yet been identified. JVs may not be a panacea for business, especially in the building and construction sector with increased complexity. When improperly conceived and executed, JVs can be as contentious, damaging, and wasteful of corporate assets as any prolonged takeover fight (Wille, 1998). Questions concerning in what context JV strategy can be the superior choice deserve substantial attention from the academic field.
- There is also an absence of research into the investigation of the barriers to CJV formation and operation and the reasons for the failure of CJVs. The increased project complexity and associated risks (especially in mega-sized projects) in the construction sector calls for the increased adoption of JVs as the desirable project delivery method. Essentially, the barriers to CJV adoption and success should be properly identified before entry into JV contracting approach. The identified barriers could be transformed into some potential strategies for avoiding or mitigating these barriers and facilitating the appropriate use of CJV approach.
- Research on the investigation into domestic CJVs issues should be enriched. The existing literature about CJVs is overwhelmingly on international CJVs. CJVs, however, as a strategic alternative, also affect among partners from the identical country to display its advantages and reap practical benefits. Furthermore, the possible negative impact of cultural differences among JV partners on JV performance does not exist in domestic CJVs as the JV partners share the same cultural background.

The identified research gaps are conducive to some significant perspectives towards which future research efforts can enrich and add value to the existing literature base on CJVs. Further, to strengthen the research-practice link and to make the best use of research outputs, the assessment and improvement of industrial in-take of the research efforts and products in CJVs should be consistently of significant value for future studies. This research agenda involves the identification of what products are actually filtered through to practice and which aspects of research outputs can actually demonstrate real end-user impacts (Holt, 2010).

## **Conclusions**

Based on the observations of all CJV related studies, seven major categories of research focus on CJVs have been classified: (1) theory and model development; (2) identification of motives, benefits and other strategic demands of application; (3) performance measurement or management; (4) risk assessment or management; (5) influential factors for practice; (6) problematic issues and challenges in practice; and (7) managerial practices of CJVs in the

industry. Major research methodologies adopted in CJV related research are observed as including questionnaire survey, case study, literature review/analysis, interview, expert group discussion and use of secondary research data. The literature review also indicated the applied research techniques could be generally categorized into three groups: (1) the importance ranking methods (e.g., rank-order analysis); (2) decision-making tools (e.g., utility theory, AHP, ANP, SWOT analysis, etc); and (3) between-variable and within-variable relational examination approaches (e.g., SEM, regression analysis, etc).

The research findings towards the dearth of literature in several research aspects of CJVs enable the scholars to gain direct insights into the future research opportunities and values in CJVs. Future research directions for CJVs that could add significant value to the existing knowledge base are visualized as covering the following aspects: (i) establishing a theoretical framework concerning the formation and operation of CJVs; (ii) investigating the appropriateness and effectiveness of CJV contracting strategy; (iii) empirically validating the benefits and success criteria of CJVs; (iv) identifying potential barriers to the adoption and successful operation of CJVs; and (v) exploring possible strategies for improving the industrial applications in future.

In general, since the benefits and success criteria of CJVs have been well-documented in the literature, future research could be more valuable and practical when concerned about how to reduce the number of disputes in and even failures of CJVs, which in-turn renders it significantly important for researchers to develop relevant state-of-the-art criteria/framework to aid the assessment of appropriateness of selecting CJV contracting method in project procurement.

Last but not least, JVs can also be extended to facilities service management and maintenance, as a result of the capability of integrating technical and financial strengths by JV contracting parties into the operation and maintenance services, particularly for those mega-sized, technically complex infrastructure or industrial facilities procured under the public-private partnership (PPP) model.

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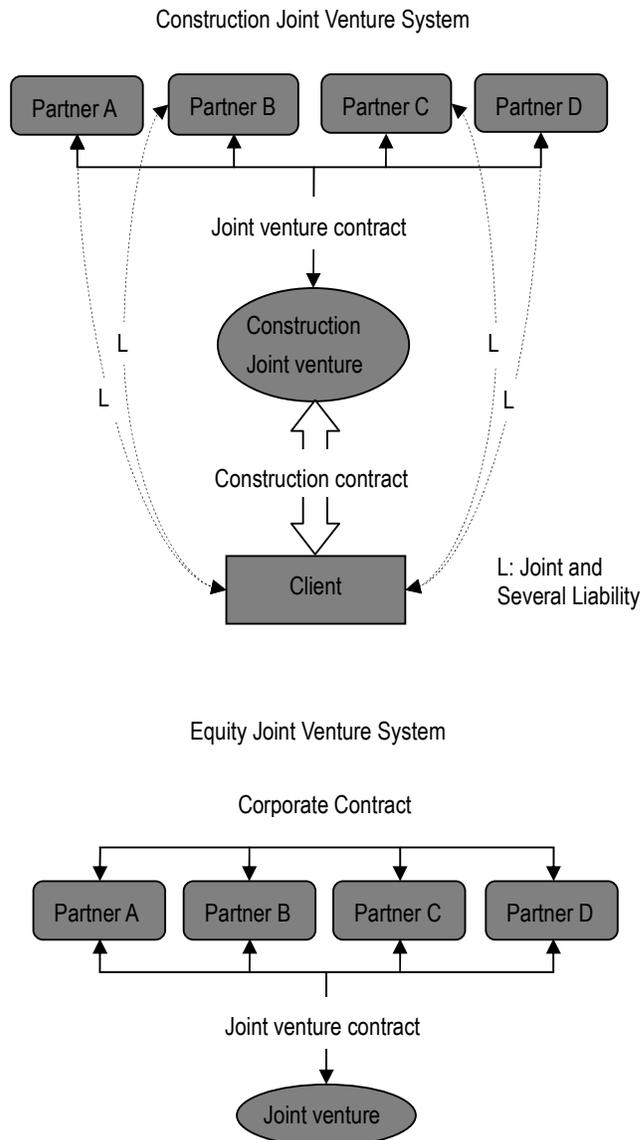
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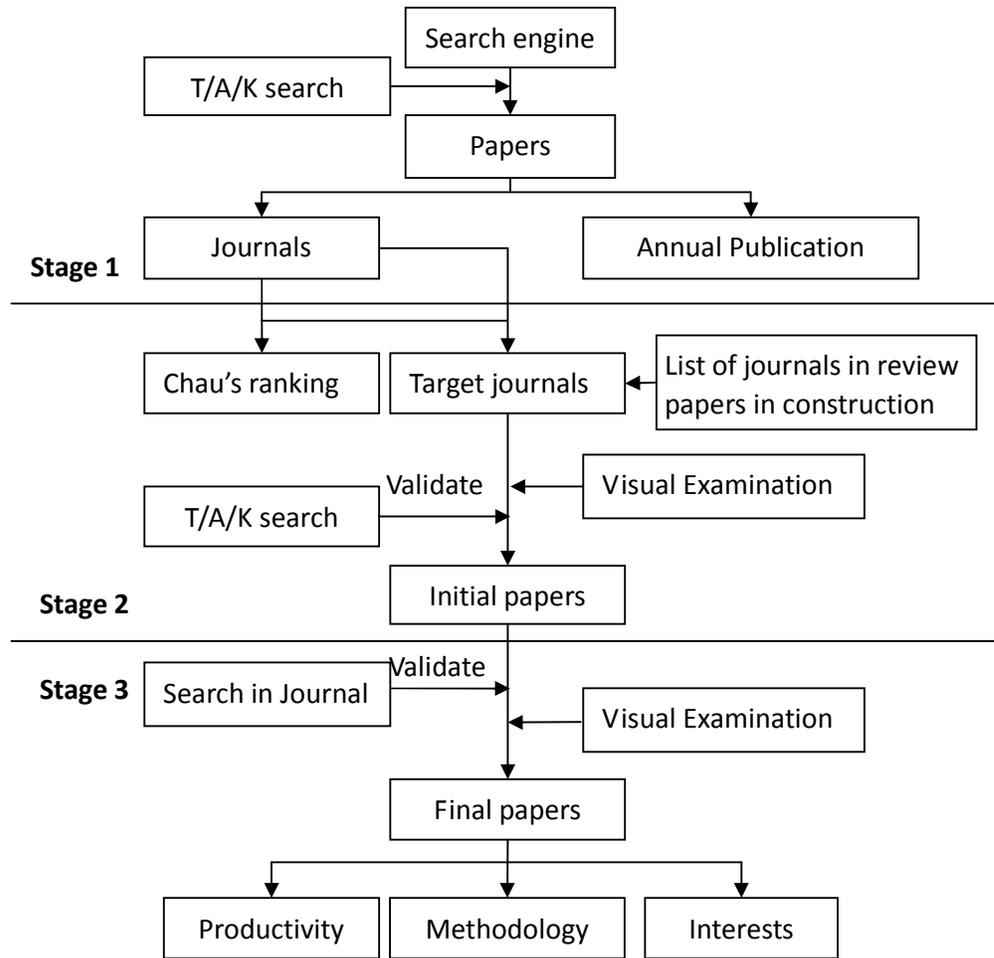
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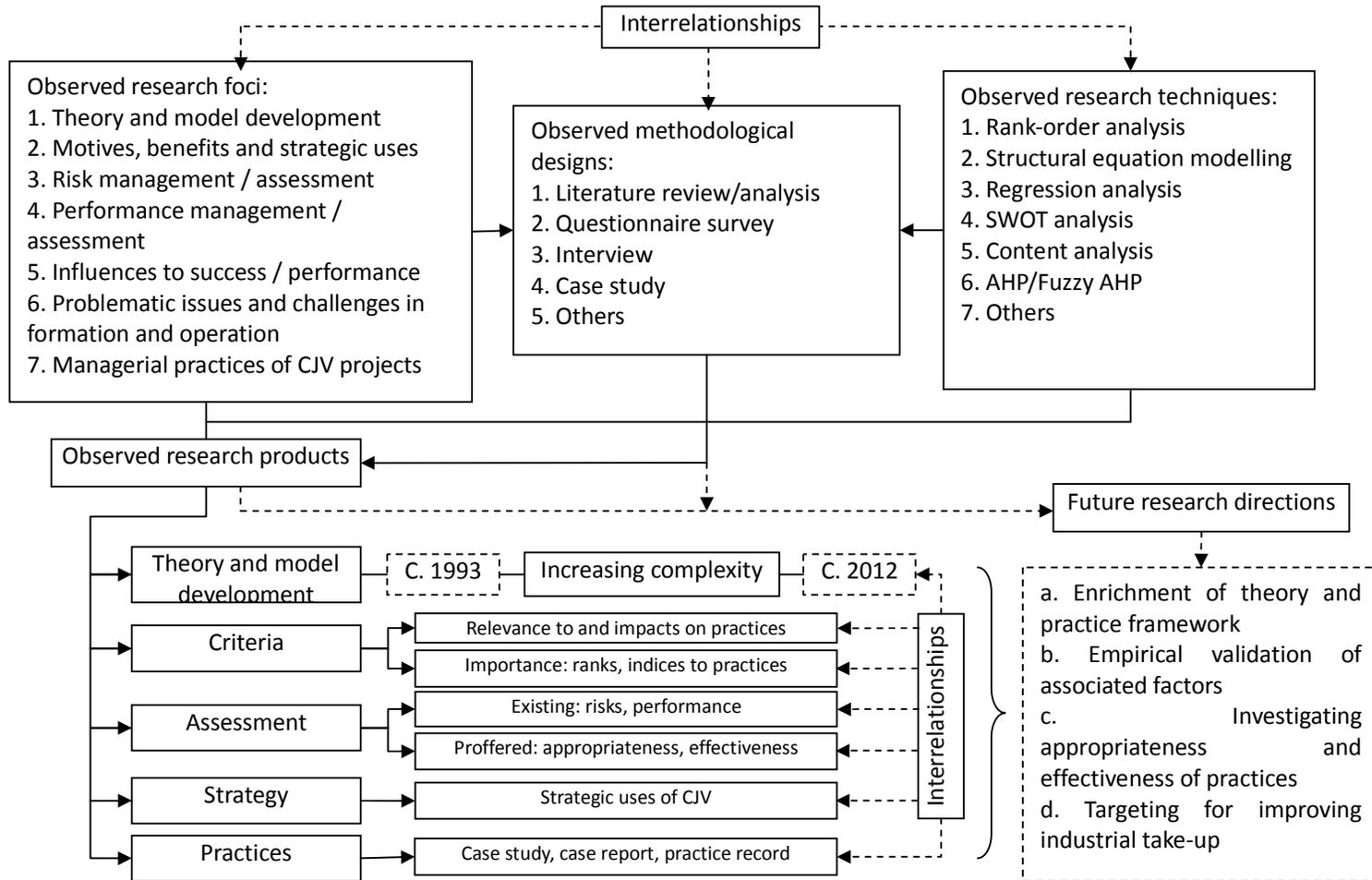


**Figure 1.** Construction joint venture and equity joint venture  
(adapted from Girmscheid and Brockmann, 2010)

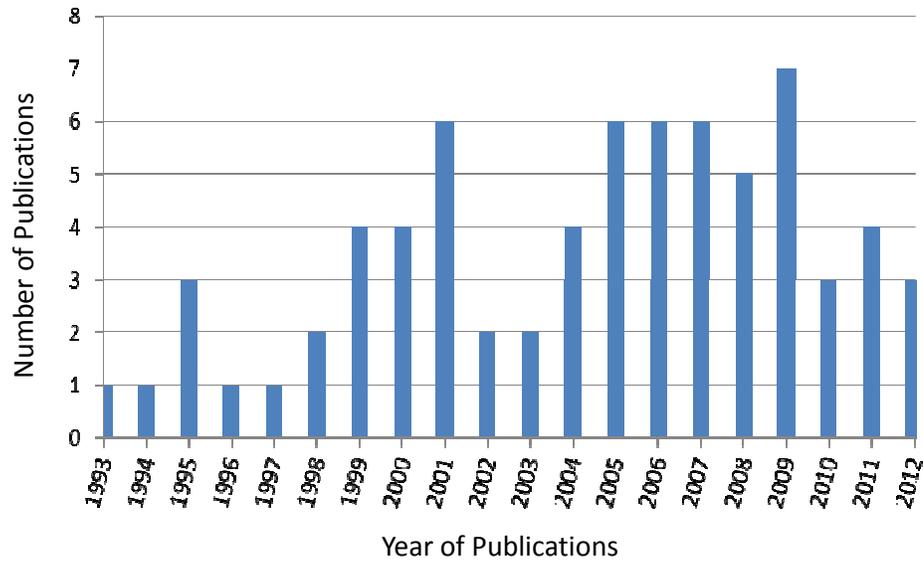


Note: T/A/K-Title/Abstract/Keywords

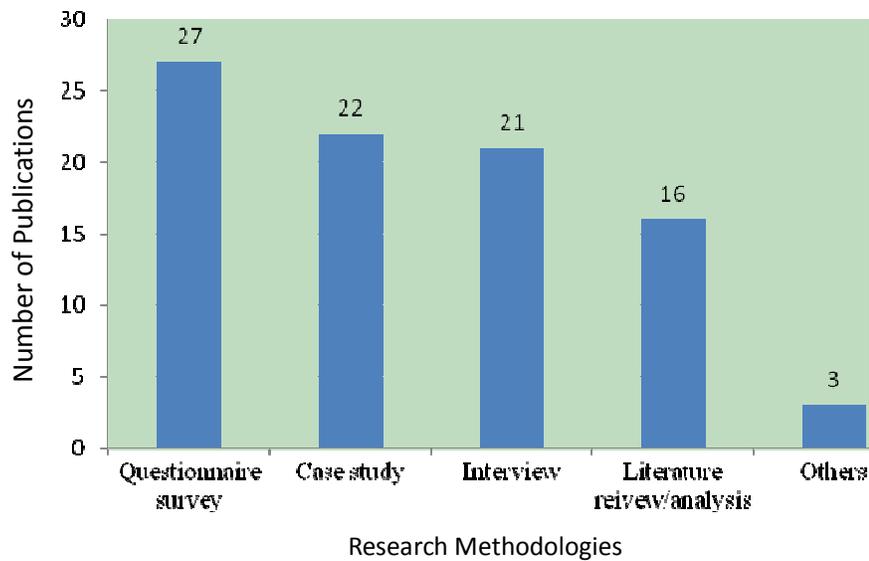
**Figure 2.** Research framework for this study (Adapted from Hong *et al.*, 2012)



**Figure 3.** Schematic flow for literature review of CJV research (adapted from Holt, 2010)



**Figure 4.** Annual number of publications on CJVs in ten target construction journals between 1993 and 2012



**Figure 5.** Distribution of different research methodologies employed in CJV research papers

Note: Other research methodologies refer to expert group discussion (1 observation) and using secondary data (2 observations).

**Table 1.** Search Results of Research Papers on CJVs in Selected Construction Journals

Journal name	Number of papers retrieved from search engine	Number of papers relevant to current study
<i>Journal of Construction Engineering and Management, ASCE</i>	15	14
<i>Construction Law Journal</i>	13	11
<i>International Journal of Project Management</i>	11	11
<i>Construction Management and Economics</i>	10	9
<i>Journal of Management in Engineering, ASCE</i>	8	8
<i>Building Research and Information</i>	6	6
<i>Journal of Professional Issues in Engineering Education and Practice, ASCE</i>	4	4
<i>Engineering, Construction and Architectural Management</i>	4	4
<i>Automation in Construction</i>	2	2
<i>Journal of Construction Procurement</i>	2	2
Total	75	71

**Table 2.** Major Research Interests of Relevant Studies on Construction Joint Ventures (CJVs)

Research focus	Description	Example papers	Number of papers	Percentage of papers (%)
Theory and model development	Defining the scope of joint ventures in the construction field and developing models related to the formation and operation of CJVs.	Girmscheid and Brockmann (2010); Munns et al. (2000)	3	4.2
Motives, benefits and other strategic demands of application	Identification/investigation of motives and potential benefits of CJV application and examination of the use of CJVs for other strategic purposes, e.g. entry to overseas market, organizational learning, etc.	Norwood and Mansfield (1999); Kumaraswamy and Shrestha (2002); Girmscheid and Brockmann (2010); O'Reilly (1995); Oyegoke (2006); Ling, Ibbs and Chew (2008a); Ling and Chan (2008b)	22	31.0
Performance measurement or management	Development of performance measurement model and criteria and measuring CJV performance.	Luo 2001; Mohamed (2003); Ozorhon et al. (2007 and 2010)	6	8.5
Risk assessment or management	Development of risk assessment model/criteria and assessing risks inherent with CJVs.	Li and Tiong (1999); Li et al. (1999); Shen et al. (2001); Zhang and Zou (2007); Hsueh et al. (2007)	6	8.5
Exploration into influential factors/issues for practice	Identifying underlying factors/issues critical to or impacting on the performance/success of CJVs.	Gale and Luo (2004); Adnan and Morledge (2006); Ozorhon et al. (2007, 2008a and 2008b); Ho et al. (2009b); Girmscheid and Brochmann (2010)	9	12.6
Problematic issues and challenges in practice	Investigation of problematic or practical issues on CJV formation and operation.	Ozorhon et al. (2008a and 2008b); Ho et al. (2009b); Kumaraswamy and Shrestha (2002); Ofori (2000)	12	16.9
Managerial practices of CJVs in the industry	Reporting the operation and management of CJV practices of A/E/C firms in the construction industry.	Lin, Tserng and Lin (2006); Lawson (2006); Elgrari and Ingirige (2011)	13	18.3
Total			71	100

**Table 3.** Research Tools Employed in Relevant Studies on Construction Joint Ventures (CJVs)

Research tool	Number of observations	Percentage of observations	Example papers
Rank-order analysis	15	41.7%	Li et al. (1999a); Shen et al. (2001)
Structural equation modelling	6	16.7%	Mohamed (2003); Ozorhon et al. (2007, 2008a and 2008b)
Regression analysis	3	8.4%	Sillars and Kangari (2004); Ho et al. (2009)
SWOT analysis	2	5.5%	Ling and Gui (2009a); Ling et al. (2009b)
Content analysis	2	5.5%	Chen and Messner (2009); Elgrari and Ingirige (2011)
AHP/Fuzzy AHP	2	5.5%	Hsueh et al. (2007); Zhang and Zou (2007)
Others	6	16.7%	Luo (2001); Ozorhon et al. (2007)
Total	36	100%	

Note: Others are once observed research tools, covering analytical network process, utility theory, correlation analysis, factor analysis, social network analysis, and grounded theory.