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Stakeholder management studies in mega construction projects: A review and future directions

Ka Yan Mok [a,*], Geoffrey Qiping Shen [a,1], Jing Yang [b,2]

[a] Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong
[b] School of Property, Construction and Project Management, RMIT University, GPO Box 2476, Melbourne, VIC 3001, Australia

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Abstract

The complex and uncertain nature of mega construction projects (MCP) require an effective stakeholder management (SM) approach to accommodate conflicting stakeholder interests. Previous reviews regarding SM in construction sector are generic as their attentions have been placed on relatively small scale projects. A systematic review on SM studies in relation to MCP seems to be lacking. This paper analyzes the latest research development of this domain by reviewing selected articles published from 1997 to 2014. Four major research topics are identified: "stakeholder interests and influences", "stakeholder management process", "stakeholder analysis methods" and "stakeholder engagement". This study reveals that SM approaches in MCP are subject to national context of the project, indicating a need to identify the impact of national culture on this discipline. Moreover, traditional stakeholder analysis techniques are widely adopted in MCP notwithstanding their weaknesses; therefore a social network approach for managing stakeholder interrelationships in these projects is needed.

Keywords: Stakeholder management; Mega construction projects; Research review

1. Introduction

According to the Development Bureau (DB) in Hong Kong, mega construction projects (MCP) refer to projects with contract sums over HK$1 billion, involving a huge number of participants, having significant social and economic impacts, extensive works, large geographical coverage and close connection to other major developments (DB, 2002). Based on this definition, MCP often involve various stakeholders of diverse occupational and professional backgrounds who have different levels and types of interests in the project. The complex and volatile nature of these projects require systematic approaches and appropriate skills of project managers to accommodate stakeholder interests and to achieve the best value of project outcome. Stakeholder management (SM) is regarded as an effective approach for doing this by bringing stakeholder concerns to the surface and developing robust stakeholder relationships in complex project environments (Bourne and Walker, 2005). Previous research has made considerable contributions regarding the theories and practical approaches in engaging and managing stakeholders in ordinary size construction projects. For example, Yang et al. (2010) identified social responsibilities, prompt communication, and information input as three important critical success factors for SM in the perspective of project managers. Jepsen and Eskerod (2009) stated that ambiguous instructions in stakeholder prioritization and insufficient inquiring skills are two major problems encountered by project managers in applying stakeholder analysis guidelines in a hospital building project. Olander and Landin (2005) discussed the influence of open

* Corresponding author. Tel.: +852 3400 8138; fax: +852 2764 5131.
E-mail addresses: margaret_mok@yahoo.com.hk (K.Y. Mok), bsqpshen@polyu.edu.hk (G.Q. Shen), rebecca.yang@rmit.edu.au (J. Yang).
[1] Tel.: +852 2766 5817; fax: +852 2764 2572.
[2] Tel.: +61 3 9925 3289.

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communication with the media on SM in a housing project. Despite the valuable contribution of previous research, a considerable portion of their attention were placed on relatively small scale projects, yet managing stakeholders in MCP is a much more complicated task.

In MCP, project managers often face challenges in the processes of identifying stakeholder and their needs, assessing stakeholder impacts and their relationships, and formulating appropriate engagement strategies (Yang et al., 2011b). A recent example is the large sea-crossing bridge project designed to connect Zhuhai in mainland China to Hong Kong and Macao. Due to underestimation in the influence of affected vicinity and their concerns on environmental issues, the project commencement was delayed for one year by a legal dispute regarding ecological impact of the bridge (MDT, 2011). This legal challenge and associated delay aroused vigorous controversies from politicians, pressure groups, media and the community. The government has ended up spending extra effort and resources in catching up project progress and handling negative responses from the public. These challenges in managing stakeholders can be attributed to the great uncertainty and complexity in the project environment (Burton and Obel, 2003). Notwithstanding their professional knowledge and experience, the accuracy of assessment and judgment of project managers often decrease as the project grows in size and complexity. The foundation for stakeholder identification and prioritization is also not strong due to limited cognition of project managers and incomplete stakeholder boundary. Ward and Chapman (2008) pointed out that stakeholders are a main source of uncertainty in large construction projects where stakeholder entities, their claims and interrelationships at every project phases are the major stakeholder-associated uncertainties. MCP are higher in complexity and comprise many more stakeholders than relatively small scale projects, leading to a larger number of stakeholder-related uncertainties and risks (Cicmil and Marshall, 2005). Project managers have encountered greater obstacles for balancing stakeholder claims and maintaining robust relationships in mega than in ordinary size projects, necessitating an industry need for more SM studies in MCP.

Literature review is regarded as a useful methodology to gain in-depth understanding on a research topic. A systematic examination of existing publications can help researchers in identifying the current body of knowledge and stimulating inspirations for future research. Notwithstanding the importance of a critical review, no such work has been conducted regarding SM research in MCP. This can be explained by the higher attention of previous studies on addressing SM problems in ordinary size projects than in MCP. Yang et al. (2009) conducted an overview on SM publications in general and identified their practical implications for the construction sector. Littau et al. (2010) carried out a meta-analysis of publications on stakeholder theory in selected project management journals, and found that literatures focusing on project evaluation and strategy are the major contributors to stakeholder theory development within their research scope. Theses previous reviews seem to be generic and their research focus is not specific on MCP.

SM problems in real life MCP have exposed research and industry needs to systematically review existing literature of this field. Therefore, this paper undertakes a critical analysis of SM articles in relation to MCP published from 1997 to 2014. This study begins with the background of SM and MCP, followed by an account of the research methodology. In the findings section, the authors reviewed the selected publications under four themes: (1) stakeholder interests and influences; (2) stakeholder management process; (3) stakeholder analysis methods; and (4) stakeholder engagement. Finally, directions for further studies of this topic are suggested. For consistency, this study adopted the definition by DB on MCP as the predominant definition.

2. Background of stakeholder management and mega construction projects

2.1. Stakeholder concept and stakeholder management literature

The stakeholder concept was firstly brought into the management domain by the Stanford Research Institute in 1963, where stakeholders were described as any groups or individuals who are crucial for organizational survival (Freeman, 1984). Following its origin, the stakeholder notion diverged into four key directions concerning organizational studies: *corporate planning*, *systems theory*, *corporate social responsibility* and *organizational theory*. A renowned book of Freeman (1984), *Strategic Management: a Stakeholder Approach*, has been widely acknowledged as a milestone in the evolution of SM research, where Freeman (1984) defined stakeholders as the ones "who can affect or is affected by the achievement of the firm's objectives". After this notable publication, different perspectives of SM research emerged; for example, the three aspects (*descriptive*, *instrumental* and *normative*) of categorizing stakeholder theory (Jones, 1995), the concepts of stakeholder dynamics (Freeman, 1984), the stakeholder salience and the typology (Mitchell et al., 1997). Elias et al. (2002) summarized the overall development of SM research through a stakeholder literature map. Inspired from stakeholder research of strategic management field, construction management scholars have devoted extensive research efforts on managing construction project stakeholders in recent years; while SM in MCP has become a particular theme of growing research interest, in view of the challenges encountered in managing stakeholders of complex project environment as explained in the sections below.

2.2. Mega projects in general

Research of mega projects has become an increasingly widespread interest in the engineering and project management domains. The fast pace of mega project development can be attributed to the advanced construction technology and rapid globalization. Mega project is defined as a substantial capital project, of several billion dollars, which requires concerted efforts from major participants in terms of resources, skills and expertise (Flyvbjerg, 2007; Sykes, 1990). There are numerous types of mega projects, including transport infrastructures, oil

and gas extraction, defense and aerospace, water and dams, power supply and urban development (Flyvbjerg, 2007; Gellert and Lynch, 2003). The huge size and high complexity of mega projects bring about three major challenges in their project management: (1) the involvement of numerous stakeholders leading to complex stakeholder interrelationships and conflicting interests; (2) the dynamics and growing capacity leading to high project uncertainty (Yeo, 1995); and (3) their governance by a stringent multi-role administrative structure leading to high public attention and controversies (Yeo, 1995).

2.3. Mega construction projects

MCP are massive investments of infrastructure, often initiated by the government, which have long schedule, huge lifespan, extreme complexity and significant social impacts (Sun and Zhang, 2011). Salet et al. (2013) divided MCP into two major groups according to their project function. The first group considers one new single project or an aggregate of projects which are initiated to serve a primary infrastructural function. They comprise project components of the same sector. For example, the Hong Kong–Zhuhai–Macao Bridge involves project components (bridge, highway, and tunnel) of a single sector, transportation. The second group considers a combination of new projects, each serving different functions, but integrated under the single umbrella of a strategic development plan. Kai Tak Development in Hong Kong is an example where it comprises project components from the residential, educational, and leisure sectors. MCP play three major roles in the strategic development of a society: (1) satisfying human, economic and societal needs; (2) elevating a country's social image; and (3) delivering leading international events (Jia et al., 2011). Notwithstanding the significance of mega project developments, many difficulties are encountered in their stakeholder management process. Rose and Manley (2010) indicated that late involvement of major stakeholders and discrepancy in their relationship intentions were two major negative drivers in aligning the work motivation of contractors and consultants. Emuze and Smallwood (2011) revealed that in developing countries, the skills of public sector departments in collaborating stakeholders were inadequate which consequently compromised project performance. Iyer and Jha (2006) stated that the schedule performance of MCP could be significantly hindered due to conflict, indecisiveness and inadequate coordination of project stakeholders.

Problems have arisen from the SM in MCP, giving rise to the need of a systematic review of existing literature in this domain. This study can assist researchers in gaining an in-depth understanding of previous research efforts on this topic, and in exploring directions for future research.

3. Research methodology

3.1. Paper retrieval

This literature review was undertaken by an intensive comparison of peer-reviewed journals of the SM domain in MCP. Three search criteria were established for paper retrieval. Firstly, only academic journals were selected for review, in consideration of their impact positions in the research community in terms of SCImago Journal Rank and H-index. Book reviews, editorials and papers in conference proceedings were eliminated. This is to ensure that all retrieved papers could be investigated using an identical analytical construct in terms of research aims and methodologies. Three academic databases: ISI web of knowledge, Scopus and ABI/INFORM complete, were searched for relevant publications. Secondly, some keywords were used in the literature search; they include *stakeholder*, *project participant*, *mega construction projects*, *major infrastructure projects*, *mega infrastructure projects*, *large construction projects*, *complex construction projects* and *civil engineering projects*. The search rule used was ("stakeholder" OR "project participant") AND ("mega construction projects" OR "major infrastructure projects" OR "mega infrastructure projects" OR "large construction projects" OR "complex construction projects" OR "civil engineering projects"). The authors used these keywords because they contain meanings alike but appear in different research disciplines and countries (Feliu, 2012; Manwong and Ogunlana, 2006; Toor and Ogunlana, 2010). Thirdly, the scope of publication search was scaled down to a time span of 1997/1/1–2014/2/28. The authors selected this timeframe because the relevant publication appeared since 1997 (Genus, 1997), while earlier studies were not analyzed specifically from the perspective of SM in MCP. The authors suggested that, the state-of-the-art of SM research in MCP could be clearly depicted by reviewing academic journals of this time span. A total of 354 articles were retrieved. Despite the rigorous search rule, some retrieved publications appear to be less relevant. Therefore, the authors applied the filtering process previously adopted by Olander (2006) and Yang et al. (2011b) in their literature reviews. This process comprised two stages. In the first stage, publications which do not contain the abovementioned keywords in their titles and abstracts were screened out. In the second stage, the authors excluded the less relevant and irrelevant papers after a brief review of the paper contents, leaving a total of 85 publications for further analysis. The selected publications covered various perspectives of managing stakeholders in MCP, for instance stakeholder interests and influences, stakeholder participation, the theories and practical approaches of handling stakeholder claims in MCP. Fig. 1 shows the research framework of this study.

3.2. Overview of selected publications

Fig. 2 shows the annual number of publications, indicating a sharply increasing research interest since 2005, which could be explained by the globally rising trend of MCP and the real life problems encountered in managing diverse stakeholder claims (Li et al., 2012).

Table 1 presents the distribution of selected publications in different journals. Regarding their geographical jurisdiction, 67% of the articles examined a single domestic market. This could be attributed to the variances of social, cultural and

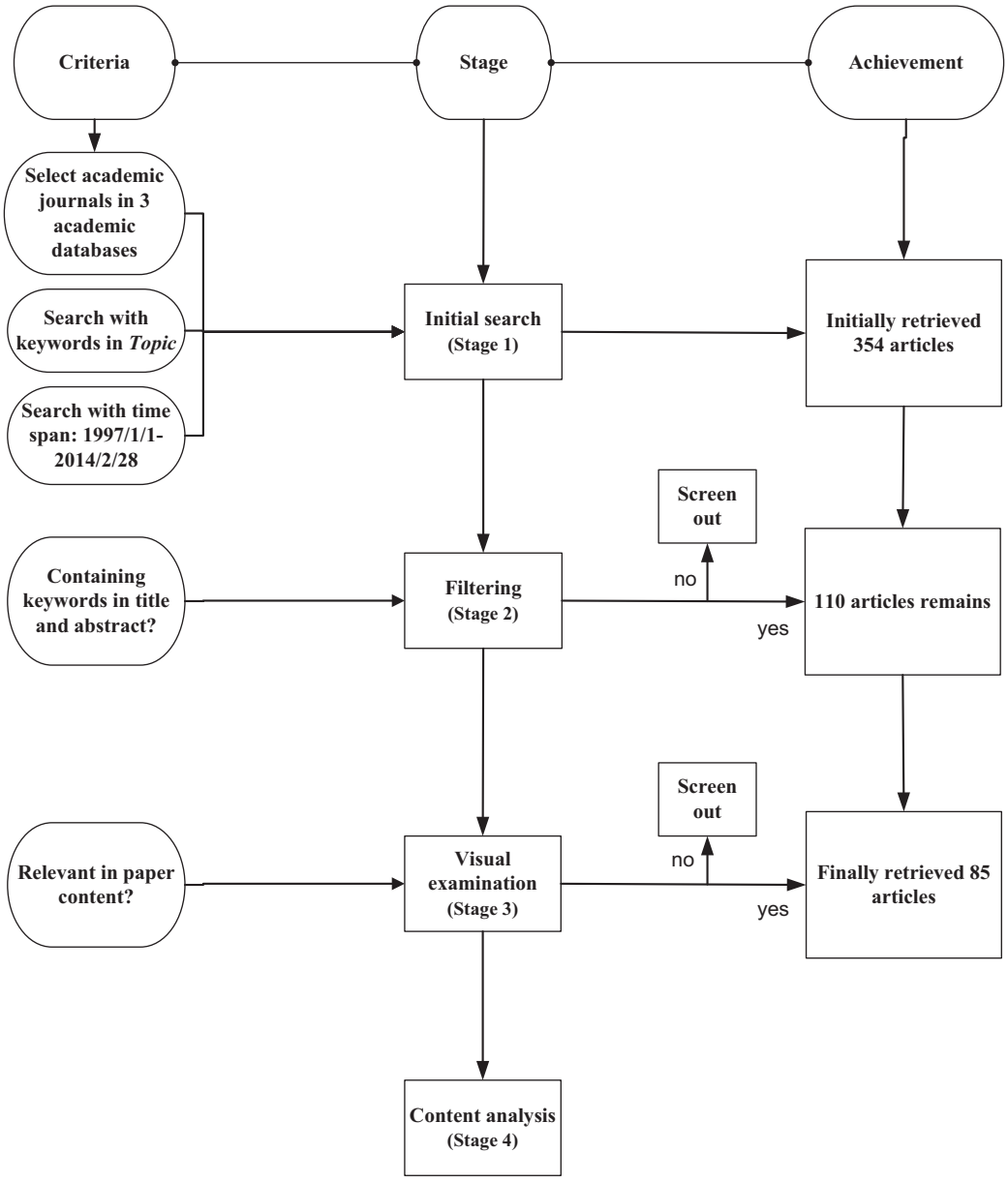

Fig. 1. Research framework of this study.

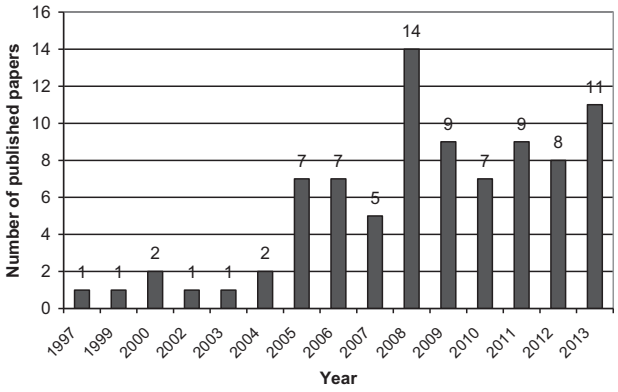

Fig. 2. Number of relevant papers published yearly from 1997 to 2014.

economic systems of different countries (Hofstede, 1991). Therefore, SM practice is subject to the national or regional context of the project, and generalizing findings across national borders could produce only limited practical implications. Among these studies, the majority investigated the markets of Asia (24%), Europe (21%) and America (11%). In addition, 15% of the articles were considered multi-country as multinational organizations were their subject of study, and 18% were unspecified in terms of country. Table 2 presents the number of publications by geographical jurisdiction.

3.3. Content analysis

This study adopts content analysis, a structured and systematic technique "for compressing many words of text into

Table 1
Distribution of selected journal papers.

Journal title	Number of selected papers
Construction Management and Economics	15
International Journal of Project Management	15
Journal of Construction Engineering and Management ASCE	5
Project Management Journal	5
Building Research and Information	3
Automation in Construction	2
Engineering, Construction and Architectural Management	2
Facilities	2
Habitat International	2
Management Decision	2
Research Policy	2
AACE International Transactions	1
Architectural Science Review	1
Baltic Journal of Management	1
Cities	1
Civil Engineering and Environmental Systems	1
Desalination	1
Disaster Prevention and Management	1
Ecological Economics	1
Engineering Management Journal	1
Environmental Impact Assessment Review	1
European Journal of Industrial Engineering	1
Journal of Architectural Engineering	1
Journal of Civil Engineering and Management	1
Journal of Environmental Management	1
Journal of Facilities Management	1
Journal of Infrastructure Systems	1
Journal of Management in Engineering ASCE	1
Journal of Transport Geography	1
Journal of Urban Planning and Development ASCE	1
Journal of Water Resources Planning and Management ASCE	1
KSCE Journal of Civil Engineering	1
Land Use Policy	1
Proceedings of the Institution of Civil Engineers Municipal Engineer	1
Scandinavian Journal of Management	1
Structural Survey	1
Supply Chain Management — An International Journal	1
Sustainability	1
Sustainable Development	1
Systems Research and Behavioral Science	1
The TQM Magazine	1
Total	85

fewer content categories based on explicit rules of coding" (Stemler, 2001), to identify key research themes for literature review. Content analysis facilitates scholars to examine huge amount of textual data in an organized manner, to identify the focus of subject matter, and to observe emerging patterns in literatures (Elo and Kyngäs, 2008; Krippendorff, 2004; Weber, 1990). This methodology was applied by Laplume et al. (2008) in their review of stakeholder theory-related publications where they discovered major research themes by coding and analysis using an inductively developed but standardized codebook. Laplume et al.'s (2008) codebook was adapted to accommodate the purpose of this review. Table 3 illustrates the structure of the codebook used for content analysis of this study.

Table 2
Distribution of selected publications by geographical jurisdiction.

Geographical jurisdiction	Percentage of selected papers (%)
Asia	24
Europe	21
America	11
Australia	8
Africa	2
The Middle East	1
Multi-country	15
Unspecified	18
Total	100

4. Critical review of previous studies

By content analysis, this study reveals that SM research in relation to MCP is categorized under four major themes, namely (1) stakeholder interests and influences, (2) stakeholder management process, (3) stakeholder analysis methods, and (4) stakeholder engagement. Some articles discussed more than one identified theme but they are classified according to the main research interest examined in the papers. Table 4 presents the distribution of publications by period and identified research themes. It indicates that scholars have made the greatest researcher efforts on "stakeholder management process", but given the least attention to "stakeholder interests and influences". It is notable that the research interest on "stakeholder engagement" has been rising rapidly since 2006. One limitation is that, under limited search scope, the selected publications may not be able to cover all relevant studies of this domain, but it can reflect the overall development of its research trend.

4.1. Stakeholder interests and influences

Conflicts often arise in the development of MCP due to the diverse interests, perceptions and expectations of the numerous

Table 3
Codebook for content analysis of this study.
Adapted from Laplume et al. (2008).

Code	Definition of code
Quantitative variables coded	
Year	Year of publication
Author	List of authors
Article title	Title of the article
Journal	Publication in which the article was published
Institution	Institution of the first author
Category	Descriptive, instrumental, normative, mixed
Concern	Primary stakeholders, secondary stakeholders, both
Project	Type of mega construction project
Perspective	Project perspective, organizational perspective
Geographical jurisdiction	Country from which the data was collected
Methodology	Qualitative, quantitative, mixed methods
Data source	Survey, interview, secondary data, others
Dependent variables	Dependent variable(s) used in this study
Independent variables	Independent variable(s) used in this study
Qualitative variables coded	
Research questions	Research question explicitly stated in the article
Contributions	Contributions explicitly stated in the article
Major findings	Major findings explicitly stated in the article

Table 4
Distribution of publications by period and identified research themes.

Research theme	Period (year)				Total	Percentage (%)
	1997–2000	2001–2005	2006–2010	2011–2014		
Stakeholder interests and influences	2	0	7	6	15	18
Stakeholder management process	3	4	13	8	28	33
Stakeholder analysis methods	2	5	8	3	18	21
Stakeholder engagement	0	1	13	10	24	28
Total	7	10	41	27	85	100

stakeholders involved. Li et al. (2012) consolidated a list of seventeen stakeholder interests in public infrastructure and construction projects; their concerns are multidimensional such as improving international reputation, maintaining construction sustainability and enhancing infrastructural facilities in the society. In many cases, stakeholders seek to prevent their vested interest from being jeopardized; consequently, an issue that is very important to one stakeholder group may be in the lowest priority of other groups. The different priorities that major stakeholder groups placed on their interests have been investigated in an infrastructure project in Hong Kong, the findings revealed that the government emphasizes the potential economic benefits generated by the project, while the community focuses on sustainable land use, pressure groups are concerned with maintaining ecological and environmental sustainability, and project-affected groups mainly consider tangible compensation (Li et al., 2012).

In order to satisfy individual vested interests, stakeholders often apply strategies to affect project decision-making in a way that matches their specific objectives. Understanding these strategies is helpful for project managers in forecasting stakeholders' likely behaviors and managing the stakeholder environment more systematically (Frooman, 1999). Aaltonen et al. (2008) classify eight influencing strategies that stakeholders adopt during the project execution stage: "resource building", "credibility building", "direction action", "coalition building", "communication", "conflict escalation", "direct withholding" and "indirect withholding". By using an appropriate strategy, stakeholders can increase the attention of project managers in satisfying their claims and thereby influencing project outcomes. They further suggested that stakeholder influencing strategies are dynamic over the entire project lifecycle as stakeholders take different roles and actions to cope with the changing project environments (Aaltonen and Kujala, 2010). Instead of taking the stakeholder perspective, influencing strategies have been investigated from the viewpoint of a focal organization who takes the leading role in project implementation (Oliver, 1991). Five strategies are identified regarding project organizations' responses to stakeholder claims: "adaption", "compromise", "avoidance", "dismissal" and "influence" (Aaltonen and Sivonen, 2009). One limitation of the above strategies is that their basis is built on the dyadic interaction between project managers and individual stakeholders, notwithstanding the significance of the network of stakeholder interrelationships in shaping these influencing strategies (Aaltonen and Sivonen, 2009).

4.2. Stakeholder management process

The procedures involved in SM process of MCP have been widely discussed in existing literature. In his pioneering work, Cleland (1986) identifies four simple steps, namely stakeholder identification, classification, analysis and strategy development. The main purpose of SM in MCP is to gain stakeholder support in project implementation and to make project activities "issue driven rather than stakeholder driven" (Jergeas et al., 2000). To achieve this purpose, education, communication, mitigation and compensation are four essential activities that the project team should continuously undertake during the entire SM process of MCP (Jergeas et al., 2000). The six-step SM process model established by Karlsen (2002) is another model frequently cited in construction and project management literature (Aaltonen, 2011; Jepsen and Eskerod, 2009; Yang et al., 2009). These steps include defining objectives, resources and operational details; identifying stakeholders; evaluating their interests and impacts; reporting evaluation results; formulating stakeholder management strategies; and monitoring effectiveness. Summarizing these procedures, stakeholder identification, stakeholder analysis, strategy development and performance control appear to be four essential stages in the SM process of MCP. However, as evidenced by the absence of stakeholder classification in Karlsen's (2002) model and the lack of performance control in Cleland's (1986) suggested procedures, existing SM process models of MCP are not entirely consistent. SM performance in MCP is criticized as unsatisfactory (Pryke and Smyth, 2006), its process is "characterized by spontaneity and casual actions" (Karlsen, 2002). Fragmented and informal SM process is insufficient to manage the complicated interfaces involved in MCP. Consequently, there is an acknowledged need for a complete, systematic and formal SM process model for application in MCP (Yang et al., 2011b).

Some scholars focus on the spatial dynamics of the SM process in MCP. Spatial distance has been considered as a significant factor of stakeholder interaction and influence in some stakeholder literature of the business and ecological research domain (Driscoll and Starik, 2004; Gladwin et al., 1995; Hein et al., 2006). This concept has been applied in the context of infrastructure planning, where the link between spatial dynamics and stakeholder impact in seaport planning and development was examined (Dooms et al., 2013). Stakeholder structure and interests vary with their spatial distance from the project, with stakeholders gaining higher

salience as they become geographically closer to the project (Dooms et al., 2013). This concept of spatial dynamics is particularly useful in the SM process of MCP with transnational involvement. The interests and actions of stakeholders at different spatial scales are influenced by locational factors such as local culture, media, political systems and regulations (Dooms et al., 2013). Disregarding the spatial dimension in SM of MCP leads to incomplete stakeholder boundaries and unexpected negative effects on project execution.

Some existing literature pays particular attention to the SM process at early project phases. For example, at the project planning stage, the scrutiny of alternative project solutions and communication of project values are significant parts of the SM process (Olander and Landin, 2008). The processes of integrating and managing council stakeholders during the project planning, inception and design phases have also been investigated (Heywood and Smith, 2006). However, MCP are characterized by long lifecycles and complicated division of works (Chou and Yang, 2012), placing focus solely on the SM process of early project phases is insufficient to manage stakeholder claims in complex project environments. Fully illustrating the SM process at every project stage along the entire lifecycle of MCP will be needed.

4.3. Stakeholder analysis methods

Stakeholder analysis in MCP is an interpretation process by project managers in analyzing the project stakeholder environment, where stakeholder environment is defined as a project setting including "all organizations, and relationships between them, that can affect or be affected by the project" (Aaltonen, 2011). Various stakeholder analysis methods are presented in previous research concerning stakeholder identification, classification and assessment. A stakeholder salience model has been developed to characterize and classify stakeholders by considering three stakeholder attributes of power, legitimacy and urgency (Mitchell et al., 1997). Based on stakeholders' possessing of one, two or all attributes, stakeholders can be categorized into a seven-class typology; this classification system can gauge the amount of attention that project managers should give in addressing stakeholder needs (Mitchell et al., 1997). Another classification model considers stakeholder attitude towards a project by distinguishing whether a stakeholder is an advocate or adversary of the project in five levels of "active opposition", "passive opposition", "not committed", "passive support" and "active support" (McElroy and Mills, 2000). These approaches are useful in determining the direction of stakeholder influence on project decision making in MCP (Olander, 2007). However, classifying stakeholders is only an initial step in stakeholder identification, it is useful for distinguishing stakeholders in the general case, yet of little help in allocating stakeholders into appropriate categories (Achterkamp and Vos, 2008).

Another method, Stakeholder Circle™, provides an effective means of visualizing the project stakeholder community and offering a systematic way to picture their pattern of influences (Bourne, 2005). Nonetheless, a weakness of this approach is the lack of indication of stakeholder attitude — it clearly shows the direction of stakeholder forces towards the project team but does not reflect whether they perceive the project positively or negatively (Nguyen et al., 2009). Olander (2007) has developed a quantitative method to assess stakeholder impact by integrating: (1) Mitchell et al.'s (1997) stakeholder attributes; (2) Bourne and Walker's (2005) stakeholder vested interest-impact index; and (3) McElroy and Mills's (2000) stakeholder position towards the project. He states that this methodology is comprehensive because it assesses stakeholder impact in terms of its nature, probability, intensity and also stakeholder attitudes. Based on Olander's (2007) stakeholder impact index, Nguyen et al. (2009) propose a similar quantitative approach to evaluate stakeholder influence but incorporating one more variable, stakeholder knowledge. They emphasize the significance of stakeholder knowledge in large projects by stating that stakeholders with inadequate project knowledge can only exert limited influence even if they have the power and, in addition, stakeholders are more influential if they gain concrete project information instead of relying on rumors and anecdotes.

As discussed above, traditional stakeholder analysis methods categorize stakeholders and analyze their impact based on individual attributes, attitudes, roles and predictability. However, for application in MCP, these methods are constrained by cognitive limitation of project managers and incomplete stakeholder boundary as the project grows in size and complexity (Yang et al., 2009). A social network approach can comprehend the stakeholder environment by considering structural characteristics of the stakeholder network and the interactions among multiple stakeholders (Rowley, 1997). Social network analysis (SNA) was built upon the assumptions that network members are interdependent and their behaviors are confined by relationship patterns within the network structure (Wasserman and Galaskiewicz, 1994), it is therefore a useful method to examine the "simultaneous influence of multiple stakeholders" and to forecast the corresponding responses and organizational strategies (Rowley, 1997). There are two benefits in analyzing stakeholders using SNA: firstly, the quantitative evaluation of relational ties and overall network structure provides more rigor analysis of stakeholder impact; and secondly, it enables the visualization of complex and abstract stakeholder relationships using socio-grams at different project stages (Chinowsky et al., 2008). Stakeholder research in the construction management discipline is increasingly applying SNA, as every construction project is eventually a network of social interaction and collaboration, where resources and knowledge flow among network members are constrained by the network structure (Chinowsky et al., 2008). For example, Yang et al. (2011a) applied SNA in the stakeholder analysis for a small school building project; while Lienert et al. (2013) examined how stakeholder relationships in terms of collaboration and decision making can impact their priorities of interests in a water infrastructure project using SNA.

Stakeholder analysis in MCP is complicated and the various methods available can lead project managers to confusion in practice. Some project managers do not possess sufficient skills

or knowledge to undertake the required activities of the stakeholder analysis process (Jepsen and Eskerod, 2009), and this is a possible reason why the current knowledge of stakeholders' nature and their impacts on MCP is still limited (Nguyen et al., 2009). There is a need to thoroughly understand the strength and weaknesses of existing stakeholder analysis methods, and to produce a suitable approach for specific use in MCP.

4.4. Stakeholder engagement

Stakeholder engagement in MCP aims at involving all project stakeholders in the planning, decision making and implementation of the project, so as to reduce conflicts and establish clear project priorities (Deegan and Parkin, 2011; Webler and Tuler, 2000). It can be viewed as a management tool to promote collaboration, a social learning platform to establish shared goals, and an ethical need to maintain fairness and equity (Mathur et al., 2008). Deegan and Parkin (2011) identified two levels of stakeholder engagement: (1) *involvement* as a means of "information giving and consultation" to increase stakeholders' knowledge of a project; and (2) *participation* as a higher level of engagement by reducing stakeholder resistance to a project.

Public engagement in MCP, which serves as a means to safeguard public interest, has been given particular emphasis in existing literature (Batheram et al., 2005; Rowe and Frewer, 2000; Sewell and Phillips, 1979). Despite being an external stakeholder who lacks a formal project authority (Aaltonen, 2011; Walker et al., 2008), conflicts or resistance from the public can adversely affect or even kill the project. Ng et al. (2012) investigate three elements of public engagement in MCP: (1) *who* that refers to the entities recognized by stakeholder identification; (2) *what* that refers to stakeholder concerns and project constraints in the engagement process; and (3) *how* that refers to the engagement strategies. Public engagement serves different purposes in different stages of MCP. El-Gohary et al. (2006) state that, in the planning and design stage, public engagement promotes interactive communication between the project team and the community; however, it often becomes unidirectional in the construction stage as the project design is mostly completed.

Many researchers have undertaken empirical studies concerning stakeholder engagement and relationships in MCP (Genus, 1997; Lizarralde, 2011; Patel et al., 2007; Pinto et al., 2009). Bakens et al. (2005) emphasize the importance of effective communication in stakeholder engagement; where *effective* refers to three key points: (1) delivering the correct messages to appropriate stakeholders, (2) using a suitable means of communication, and (3) clarifying the project value and benefits clearly. Bosher et al. (2009) suggest that a bottom-up approach would be a better method than top-down for stakeholder engagement, because the latter hinders engagement by the "traditional demarcation in roles and responsibilities" among project stakeholders. Dalahmeh et al. (2009) discuss the significance of trust building between government and the public. Feige et al. (2011) investigate the obstacles brought by the dynamics of stakeholder community in stakeholder engagement of MCP. Their lessons learnt can help project managers to formulate practical stakeholder engagement approaches in mega projects.

5. Future research directions

The previous section presents a systematic review of existing SM research relating to MCP. In doing the review, several areas have emerged as in need of further research, which are illustrated in Fig. 3 and explained in the following discussion.

5.1. Identifying the impact of national culture on SM in MCP

Existing studies show that stakeholder perceptions and behaviors are important considerations of SM in MCP, and they are affected by the values and assumptions deeply embedded in the cognitive minds of stakeholders (Hofstede, 1980). As defined by Hofstede (1994), national culture is "the collective programming of the mind in a country"; that is, the common understandings accumulated and shaped from the norms of an entire society or national environment (Jones et al., 2007). National culture exerts substantial implications on SM in MCP because these deeply rooted beliefs and values shape the way that stakeholders (of a nation) comprehend the project environment, pursue their claims, interact with other stakeholders, and consequently project managers' decision making. Despite the strong connection between national culture and SM in MCP, this issue and its impacts were largely unexplored in existing literature. A portion of existing studies have neglected national cultural variances and attempted to propose SM approaches of MCP which are universal across national borders. Therefore, future research in this area would provide insightful and beneficial results.

In future research, empirical studies can be undertaken to investigate the practical implications of national culture on SM in MCP from different perspectives. Owing to the western origin of stakeholder theory, a comparison between SM in eastern and western cases can have particular significance. There is also a need to explore the influences of both transnational and trans-regional involvement of stakeholders in MCP where cultural variances may exist at intra-national level as "many countries have large subcultures" (Minkov and Hofstede, 2012). By evaluating the impacts of national cultural diversity of project stakeholders at different levels, effective SM approaches in MCP could be developed to enhance stakeholder collaboration across national or regional borders.

5.2. Developing a SM model for the entire lifecycle of MCP

Some publications have discussed SM process along the whole project lifecycle in which they provided innovative theories and approaches for implementation in various kinds of large and intricate projects (Eskerod and Jepsen, 2013; Huemann and Zuchi, 2014; Trentim, 2013). Notwithstanding their acknowledge contributions, empirical studies illustrating SM processes at every project stage of MCP appears to be inadequate, and the recent SM research in MCP has placed

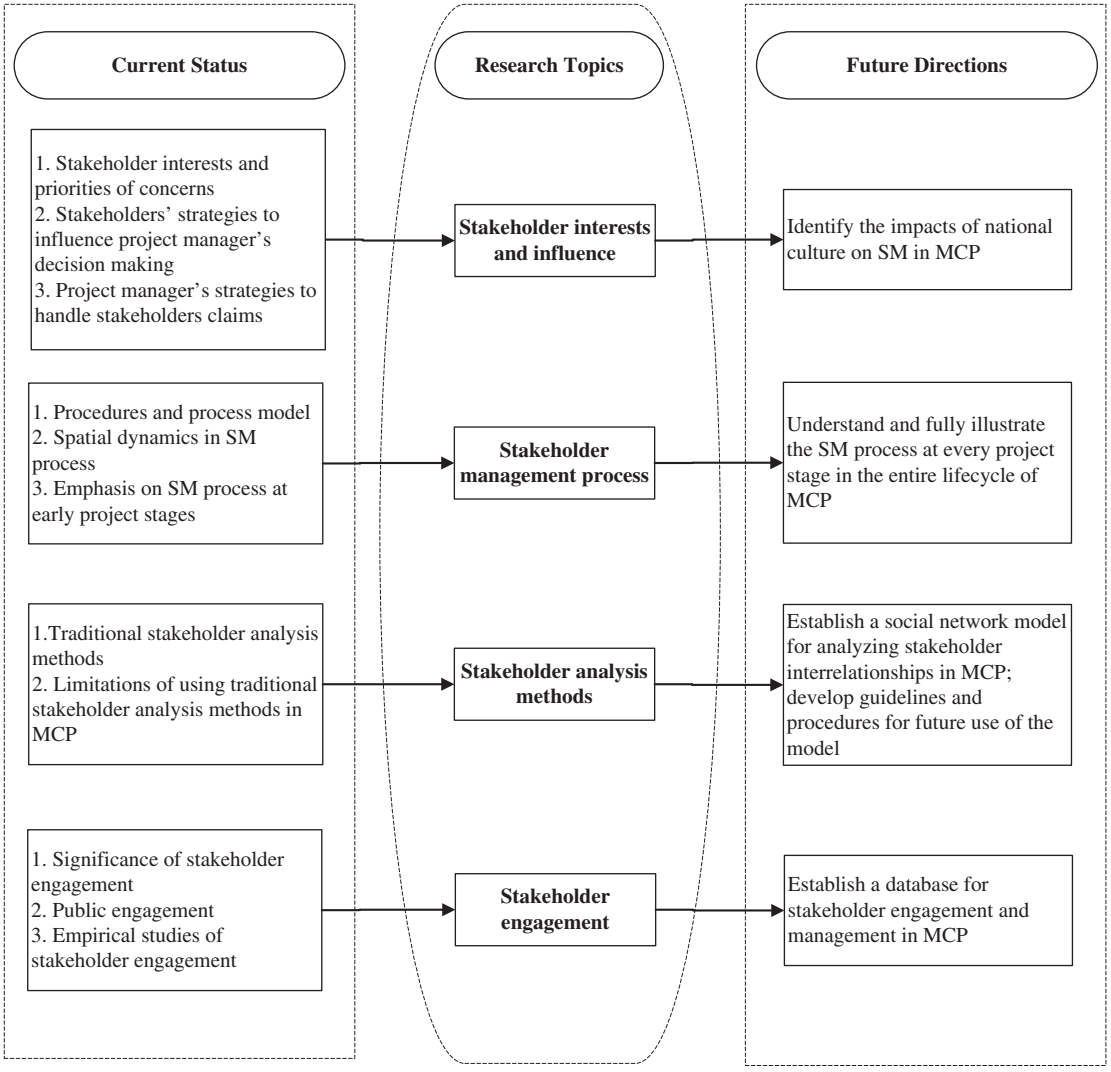

Fig. 3. Current status and future directions of stakeholder management research in mega construction projects. Adapted from Li et al. (2014).

much attention on the SM process in early project phases. This may be attributed to the relatively higher changeability and flexibility state in early phases of MCP, where they allow greater potential for incorporating stakeholder concerns into project requirements; consequently, many empirical studies have focused on discussing stakeholder analysis toolkits or management approaches for application in the briefing, planning or design stages of MCP (Doloi, 2011; Lienert et al., 2013; Valdes-Vasquez and Klotz, 2013).

Typical MCP include many phases: feasibility study, safety and environmental impact assessment, project appraisal, project alternative identification, application for government approvals, design, tendering, construction, handover, operation and maintenance (van Marrewijk, 2007). Every project stage comprises different activities and specific objectives, where stakeholder composition, stakeholder relationship patterns and stakeholder claims are unique and dynamic along different stages of MCP (Windsor, 2010). To provide insightful thoughts for construction practitioners in MCP, future empirical research should be conducted in the specific contexts of MCP that can fully illustrate the SM process at every stage of MCP.

5.3. Managing stakeholder relationships in MCP by using SNA

There are numerous challenges in the initiation and execution of MCP; and a project is perceived as successful if it has brought about value creation in social, economic, technological or environmental aspects. Taking a similar view to Jergeas et al. (2000), it would seem that, in evaluating stakeholder impacts on MCP, the analysis of stakeholder relationships is a more appropriate method than the assessment of stakeholder attributes and salience. As evaluating individual stakeholders is insufficient to add value to a project, an examination of "how value is created in stakeholder relationships" is needed (Myllykangas et al., 2010).

Notwithstanding the significance of analyzing stakeholder relationships, existing SM research in relation to MCP has placed inadequate consideration on the entire stakeholder

relationship network and its dynamics. Prior studies have paid a disproportionate amount of attention to the two-way relational ties between the focal firm and particular stakeholders, at the expense of the intricate relationship networks emanated from every project stakeholder (Neville and Menguc, 2006). A few previous studies have been undertaken to apply SNA in the stakeholder analysis process (Rowley, 1997; Yang et al., 2009). However, the size of project and their stakeholder relationship networks were quite small, and their investigations were confined to early project stages. In future research, empirical studies can be undertaken to apply SNA in analyzing stakeholder relationships of MCP. A social network model could be established to visualize the ties between project stakeholders, to identify the underlying causes and effects of stakeholder behaviors, and to monitor the dynamics of stakeholder network. To facilitate the overall effectiveness of SM in MCP, guidelines and procedures can be developed to support future use of the social network model by project managers.

5.4. Establishing a database for managing and engaging stakeholders in MCP

Despite the contribution of prior studies in proposing practical SM methods, putting the abstract stakeholder philosophy into project management practice remains a major challenge in contemporary stakeholder research. There have been criticisms that the stakeholder theory is not fully integrated into project management practice, and the practical approaches so developed for handling project stakeholders cannot be easily comprehended by construction practitioners (Agle et al., 2008; Wei-Skillern, 2004). A comprehensible system for SM in MCP is still lacking.

Empirical stakeholder research is needed over a wide range of MCP. The findings will help in the creation of a SM database for MCP to systematically organize the collected data into a benchmark for project managers. This database can include information such as stakeholder composition, attributes, interests, influencing strategies, project manager's response, stakeholder analysis techniques, engagement levels and approaches; and it would serve as a useful tool for project managers in their formulation of SM and engagement strategies at different project stages of MCP.

6. Conclusion

SM in MCP is attracting considerable attention from both construction industry and academia due to its potential in maintaining appropriate balance among stakeholder interests and gaining their support in complex project environment. As a consequence of the immense challenges encountered by industry practitioners in managing stakeholders of MCP, researchers are making concerted efforts in improving stakeholder theory and management practice of this domain. However, previous reviews have placed their focus on SM studies in the context of relatively small scale projects or the whole construction sector which are not mega-project-specific. This paper undertakes a systematic overview of SM articles in relation to MCP, published by academic journals from 1997 to 2014, aiming to depict the latest research development of this field.

In this review, 85 relevant peer-reviewed articles were examined. The annual number of relevant publications indicates a rapidly growing research interest of this area. Regarding geographical jurisdiction, 67% of the papers analyzed a single domestic market instead of taking a multi-country perspective, pointing out that SM approaches are context-specific to the national or regional environment of the project, and an exploration into the impact of national culture on SM is essential. By a content analysis of the articles, four topics have been identified as the key research themes of SM studies in relation to MCP, namely (1) stakeholder interests and influences, (2) stakeholder management process, (3) stakeholder analysis methods, and (4) stakeholder engagement. Based on the review, traditional stakeholder analysis methods, which emphasize individual stakeholder attributes and salience, have been widely used in MCP regardless of their weaknesses. The accuracy of stakeholder evaluation by project managers is constrained due to cognitive limitation and incomplete boundary, necessitating a need to adopt SNA for stakeholder analysis in MCP. By using a social network approach, the network position and interrelationships of stakeholders and associated issues can be clearly identified, which facilitates the assessment of stakeholder influences and improves project decision making in MCP. This study also reveals that existing SM approaches are mainly designed for early planning or construction phase. It is suggested that a comprehensive SM model covering the entire project lifecycle can facilitate effective stakeholder communication and engagement in subsequent project stages. This critical review of SM studies in relation to MCP is of significant value to scholars in providing them an overall picture of previous research efforts and in illustrating a future research roadmap for this field.

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