

Organizational Learning Mechanisms for Japanese General Contractors' International Operations

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Abstract: The international construction market, characterized by its fierce competition, poses unique challenges to Japanese construction companies. In such a competitive environment, improving project performance is fundamental to sustain growth. A common mechanism for improvement in project-based and knowledge-intense organizations like construction companies is the strategic reuse of past experiences. In this sense, Japanese construction companies operating in international construction markets can enhance their global performance by proactively sharing knowledge management elements such as best practices and lessons learned within project stakeholders and by incorporating them strategically throughout the project life cycle. Up to date there is little evidence of previous research focusing exclusively on knowledge management practices adopted by Japanese general contractors in the international arena. In an attempt to bridge this gap in literature, the objective of this study is to present knowledge management recommendations and implications for Japanese general contractors operating overseas. This will ultimately provide Japanese general contractors the opportunity of capitalizing from past experiences and avoid the reoccurrence of difficulties and thus, help them produce more competitive advantages in their international operations.

Keywords: International construction projects, Japanese general contractors, knowledge management, lessons learned.

1. Introduction

The rapid development of emerging economies around the world is leading to an abrupt increase in housing and infrastructure requirements. These countries, however, often lack the required technical and managerial expertise to undertake such highly complex projects successfully. In turn, in order to meet these demanding requirements, foreign construction and engineering consulting firms are

increasingly being asked by local governments and international organizations to undertake them. In light of this, statistics reveal that there has been a significant increase in the number of international construction companies engaging in projects outside their domestic markets. Nowadays, many of the world's largest general contractors derive a large percentage of their total revenue from international construction projects (ENR 2016). Some remarkable

examples of this include the German-based and French-based general contractors Hochtief AG and Technip which, received in 2015 more than 95% of their total revenue from international construction projects (ENR 2016).

There are several reasons why construction companies might decide to expand their business operations overseas. The most common include stagnant domestic markets and spreading risks through business diversification (Gunhan and Arditi 2005). The international construction industry is characterized by the high levels of uncertainty and risks involved, fierce competition and its sensitivity to world events (Gunhan and Arditi 2005; Chen and Messner 2009). International construction projects are challenging and plagued with problems (Haussner et al. 2016). When operating overseas, companies are exposed to numerous significant differences between the new geographical location and their domestic markets (Gunhan and Arditi, 2005), and often requires a wider view of the project's context (Chen and Messner 2009). Failure to do so can lead to negative impacts on the company's profits (Han et al. 2007).

This complex nature, among other influencing factors, represents unique challenges to Japanese general contractors wishing to expand into fertile construction markets overseas. Although the international construction market has experienced a steady growth in the last years, the presence of Japanese general contractors in the international construction industry has maintained rather stagnant and has been notoriously outperformed mainly by European and Chinese construction companies.

Knowledge-intensive, project-based organizations like construction firms can enhance their competitive advantage through the strategic reuse of past experiences and lessons learned. Managing organization's knowledge can result challenging due to numerous barriers for successful implementation

of knowledge management (Chinowsky and Carrillo 2007). Nevertheless, when managing knowledge efficiently and leveraging it systematically, it offers construction firms a way to improve their competitiveness against competitors (Carrillo 2004) and allows organizations to capitalize from past experiences by avoiding the reoccurrence of mistakes (Landaeta 2008).

2. Objective

Although the research body on knowledge management in the construction industry has increased over the past years, up to date there is little evidence of previous research examining exclusively knowledge management practices adopted by Japanese general contractors operating in international construction projects. In an attempt to bridge this gap in literature, the main objective of this study is to present knowledge management recommendations and implications for Japanese general contractors operating in international construction projects. This, along with parallel business strategies, is expected that will ultimately provide Japanese general contractors the opportunity of capitalizing from past experiences and avoid the reoccurrence of mistakes and thus, help them produce more competitive advantages in international markets.

3. Methodology

The recommendations and insights presented in this study are based on an extensive literature review and to a lesser extent, professional experience by the author. The literature review mainly focused on knowledge management practices in the construction industry, recent trends of the international construction market and current efforts of knowledge management practices in Japanese construction firms. In this sense, this paper applies theories and techniques previously developed and supported by

scholars in the past; as well as it analyze data from numerous renowned academic journals and databases.

4. Research Background

4.1 The international construction industry

The international construction sector plays a fundamental role in the global economy. Mawhinney (2001) defined the international construction as construction projects where a company, resident in one country, undertakes construction works in another country. In this particular study, on the other hand, the international construction industry is referred to the construction market composed of all those companies listed in the Engineering News Record's (ENR) "Top International General Contractors". This list ranks general contractors around the world based on their total revenue derived from its international operations. As shown in Figure 1, the international construction industry has experienced a relatively constant growth in the past eleven years. More specifically, from 2005 to 2015, the total value of this industry grew 62% from 189.4 million USD to 500.1 million USD (ENR 2003-2015).

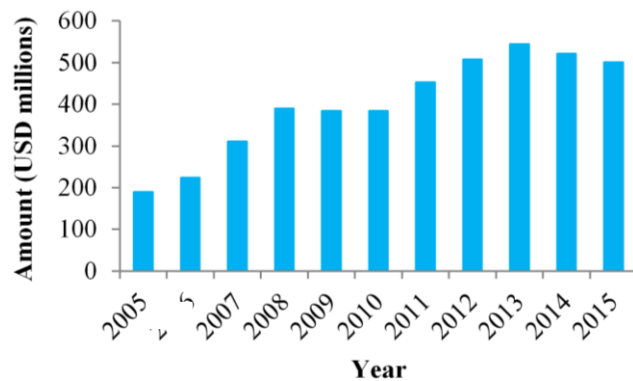


Figure 1. Historical trend of the international construction industry (ENR 2003-2015)

In contrast, Figure 2 shows a 12-year trend of the total amount invested in four selected industry sectors. These four sectors, according to the Engineering News Record, were the most profitable

ones within the international construction industry in 2015. Furthermore, ENR data reveals that during this period, the transportation sector remained as the most valuable sector. Similarly, statistics also point out that the power sector was the only sector that was not affected by the 2006 World economic crisis. The petroleum sector, on the other hand, overtook general building as the second most dominant sector in the international construction industry. Other industry sectors with an influential share on the international construction industry's total revenue include water, telecom, industrial, manufacture, sewer/waste, and hazardous waste (ENR 2003-2015). These were not included in the aforementioned description nor Figure 2 due to space limitations.

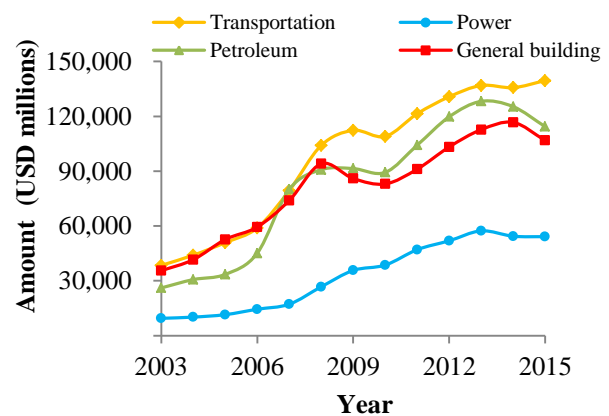


Figure 2. Historical trend by sector (ENR 2003-2015)

Table 1 shows a share breakdown of the international construction market for 2015. In 2015, China dominated the international construction market in terms of total number of construction companies working overseas; followed by USA and Turkey. Contrastingly, in terms of total revenue generated overseas, China also ranked as number one and accounted 19.3% of the international construction industry's total revenue, followed by Spanish and American general contractors. However, in terms of revenue average revenue per company, Spanish companies lead the ranking with an average of 5,439.09 USD millions each.

Table 1. Share breakdown of the international construction industry (2015) (ENR 2016)

Country of origin	No. of firms	International revenue	
		Total revenue ¹	% of total
USA	39	47,319.2	9.7
China	65	93,674.9	19.3
Spain	11	59,797.0	12.3
Japan	14	25,167.7	5.2
Korea	12	40,580.4	8.3
Turkey	39	22,591.7	4.6

¹in USD millions

In terms of geographical locations, 24.8% of the international construction industry’s total revenue was produced in Asia, followed by Europe (19.2%) and the Middle East (15.7%).

4.2 Japanese general contractors overseas

With the exception of a few companies, international operations account for a modest share of the total revenue of most Japanese general contractors. This low international penetration has been attributed to a business strategy that focuses mainly on the domestic construction market due the belief that construction companies can sustain growth without expanding overseas (Mutoh et al 2014). Nonetheless, as public investment continues to decrease and the local market continues to shrink, Japanese general contractors are increasingly being under pressure to reconsider their position towards venturing into international markets.

Statistics reveal that, despite the fact that the international construction industry has experienced a relative constant growth over the past fifteen years, the participation of Japanese general contractors in the international arena has remained rather stagnant and have lost a competitive advantage against Chinese, Spanish and other European counterparts at a worrying rate. This fact is reflected in Figure 3 which illustrates a historical trend of the international operations of Japanese, Chinese and

Spanish general contractors listed in the ENR’s “*Top International General Contractors*”. In this figure, it can be observed that in 2003, the total revenue derived from international operations of Japanese general contractors was above the one of Spanish and Chinese construction companies. However, in a relatively short period, Japanese general contractors were outperformed by Spanish and Chinese general contractors.

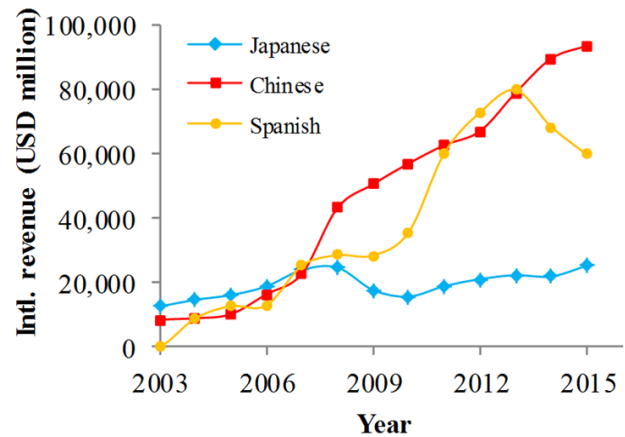


Figure 3. Trend of international operations of selected countries (ENR 2003-2015)

Moreover, the internationalization degree (share of international operations in relation to their total revenue) of the top five largest Japanese general contractors (Obayashi, Kajima, Taisei, Shimizu and Takenaka) in the year 2015 was below 25% (Haussner and Miyawaki 2017). In contrast, international competitors of comparable size and technological and financial capabilities enjoy significant higher internationalization degrees.

In terms of the geographical distribution of their operations, in 2015 more than 50% of their operations were concentrated in Asia. The United States of America and Europe were followed with a 23% and 11% share. Moreover, 5.1% of the total revenue was derived from projects in the Middle East. On the other hand, their presence in Latin America and the Caribbean (LAC) and Africa remained low (1.6% and 1.2%) (Haussner and Miyawaki 2017).

4.3 Organizational learning in the construction industry

The construction industry is project based. As a result, much of its knowledge is created through the execution of unique tailored-made facilities in accordance with customer's requirements (Carrillo 2012). In project based organizations, after project culmination, the project team is normally dissolved and stakeholders are relocated to different projects. This ultimately leads to knowledge drainage that in turn becomes only accessible through informal networks (Schindler and Epler 2003). The knowledge created in a construction project (and also in projects of project-based organizations) can be classified as *tacit knowledge* and *explicit knowledge* (Nonaka and Takeuchi 1995). Tacit knowledge is knowledge that is stored in "peoples' heads" and is acquired through experience and is difficult to record or articulate (Nonaka and Takeuchi 1995). Explicit knowledge, in contrast, is knowledge that can be physically stored and is generally available in company documents such as reports and manuals (Lin et al. 2006).

Organizational learning can be regarded as a fundamental performance driver in construction firms as prior projects offer valuable experiences that can be applied in similar future project settings (Bartsch et al. 2013). Therefore, the ability to successfully manage knowledge created throughout the project cycle is crucial. As highlighted by Schindler and Epler (2003), the systematic retention of experiences and knowledge enables an organization to document its most effective problem mechanisms as well as reduce project risks through the systematic documentation of mistakes or potential difficulties.

Knowledge management is related to creating, securing, capturing, coordinating, combining, retrieving and distributing knowledge (Tserng and Lin 2005). Although knowledge management and

organizational learning mechanisms have been successfully implemented in other project-based industries, the construction industry in contrast has failed to do so (Lin et al. 2006). According to Carrillo et al. (2004), the major difficulties to implement knowledge management practices in construction organizations are the lack of standard processes, insufficient time, organizational culture, insufficient funding and inadequate information technology infrastructure.

The research body of knowledge management in the construction industry is relatively in its early stages, and the importance of this issue is increasingly being recognized. Previous studies on knowledge management in the construction industry include the development of a knowledge management framework, knowledge transfer between organizations, the impact on construction innovation and on business processes and performance, and case studies within specific construction companies (Carrillo 2004).

4.3.1 Lessons learned systems in construction organizations

Lessons-learned mechanisms have been adopted as an instrument to identify improvements and innovations in the construction industry (Carrillo et al. 2013). Previous studies claim that these are able to capture positive and negative experiences which can in turn be implemented to avoid the reoccurrence of past mistakes (Carrillo 2005). The Construction Industry Institute (2007) defines lessons learned as "*knowledge gained from experience, successful or otherwise, for the purpose of improving future performance*"

According to Carrillo (2005), lessons learned systems involve elements of both, organizational learning and knowledge management. In this manner, Huber (1991) stated that the process of organizational learning includes the following three

elements: (a) acquiring information, (b) interpreting and categorizing the information, and (c) storing the information. On the other hand, Arditi et al. (2010) reported that the process of knowledge management includes accessing, retrieving and disseminating the information obtained. For dissemination of lessons learned, Fong and Yip (2006) identified channels which can be used, including: document distribution, database systems, company website, e-mail distribution and lessons learned meetings.

Lessons learned systems have been a focus of research in project management literature, but evidence suggests that few efforts have concentrated specifically in construction organizations. Previous efforts to bridge this gap in literature include studies by Paranagamage et al. (2012), Chen and Mohamed (2010) and Carrillo (2004 and 2005). In this sense, according to Carrillo et al. (2013) the large majority of literature on lessons learned has focused on capture mechanisms rather than the dissemination and implementation of these.

4.4 Knowledge management in the Japanese construction industry

4.4.1 Overall status

Although knowledge management in the Japanese construction industry has been a focus of research in the past, a literature review on the topic revealed that up to date, there is still a modest research body in comparison with other industries. Moreover, English literature specifically focusing on knowledge management practices in the Japanese construction industry is practically inexistent. Among the few comprehensive studies on the topic is the one undertaken by the Research Institute of Construction and Economy, published in the “Construction Economy Report No. 48” (Research Institute of Construction and Economy –RICE 2007).

In January 2007, as an attempt to learn about knowledge management efforts by Japanese

construction companies, the Research Institute of Construction and Economy, a non-profit independent think tank which conducts research on several aspects of the Japanese construction industry, administered a questionnaire survey to 54 affiliated construction companies, obtaining a response rate of 67 percent. The main findings of this study are summarized below.

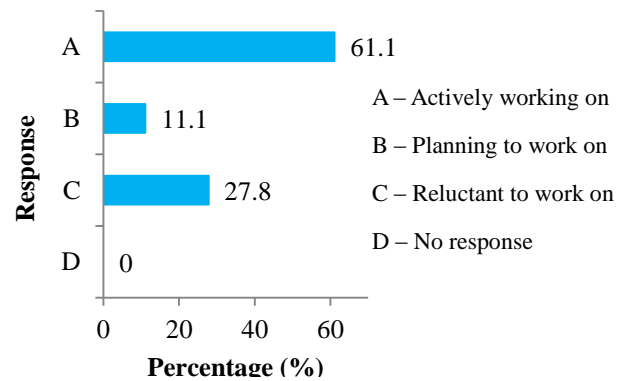


Figure 4. Knowledge management efforts in Japanese construction companies (RICE 2007)

Figure 4 above presents knowledge management efforts by Japanese construction companies as for January 2007. Results of this questionnaire survey revealed that at the time of the survey, the majority of the construction companies (61.1%) were actively working on a type of knowledge management system, whereas 11.1% of the firms were planning to work on the topic. In contrast, 27.8% of the firms were reluctant about implementing knowledge management practices within their organizations in the future due to shortage of human resources and their doubts about its potential benefits. On the other hand, companies working on knowledge management mechanisms reported that their motivation behind this initiative was to improve their performance in construction sites and sales increase, as well as a countermeasure against the rapid aging population issue in Japan.

Figure 5 presents the major countermeasures against knowledge drainage adopted by Japanese

construction companies surveyed as for January 2007. This figure is to be read in conjunction with Table 2.

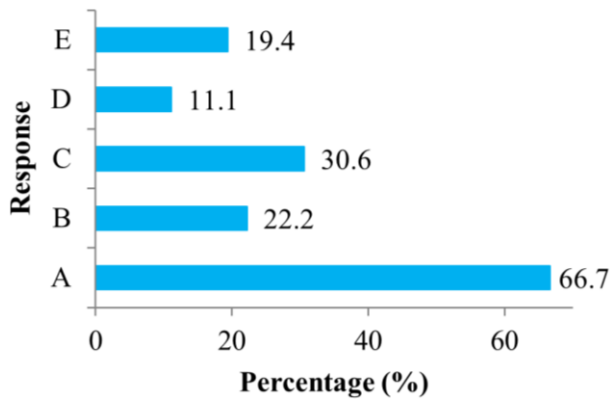


Figure 5. Countermeasures against knowledge loss (RICE 2007)

Table 2 below presents the details of the categories plotted in the y-axis of Figure 5.

Table 2. Countermeasures against knowledge loss (RICE 2007)

Response	Meaning
A	Assign a junior employee to a veteran for knowledge transfer (also commonly referred to “on the job training – OJT”).
B	Hold hearings with veteran employees and/or access information on paper and video produced by them.
C	Currently working on a platform that allows enquiring veteran employees from remote locations.
D	No particular measures taken.
E	Others

According to RICE (2007), the most common countermeasure (66.7%) against knowledge loss adopted by the surveyed firms is “On the Job Training” (OJT), which consists of assigning a young employee to a veteran employee for a specific time for intense and personal mentoring. In addition, 30.6% of the firms surveyed reported that at the time

of the survey, the company was developing a platform through which employees could remotely consult experienced veteran staff. To a lesser extend (22.2%), respondents reported holding meetings with veteran employees and/or access written and digital information created by veterans. In contrast, 11.1% reported not having any particular system for knowledge retention.

Due to a lack of recent data on the topic, it was not possible to proof whether the trends presented in this section reflects the current situation. In this sense, there is a possibility that current efforts differ from the ones presented in this study.

4.4.2 Case study: Current state of a large Japanese general contractor

As an additional effort to find out about current knowledge management efforts in a Japanese general contractor, the author conducted a semi-structured interview with an experienced industry practitioner. The interviewee holds an upper-level management position in the international division of a large Japanese general contractor and possesses vast years of professional experience in planning, designing, executing and supervising different kinds of infrastructure projects across Asia and Africa. The company, on the other hand, has a long track record of having undertaken medium to large-size infrastructure development and building projects in more than 45 countries across five continents.

During the interview, the respondent was first asked about his professional background, followed by numerous open ended questions. Improvised follow-up questions to dig deeper into specific topics were also made.

When asked about past or current knowledge management practices in his organization, the interviewee revealed that approximately one decade ago, the mother company introduced an interactive knowledge management system accessible to

everyone in the organization. The system emulates a search engine that requires entering an inquiry that will be looked into a database. If no results are found, or the answer doesn't fully address the inquiry, the inquiry is forwarded electronically to someone else in the organization with the required know-how. Therefore, the system feeds itself in the sense that whenever a new inquiry is addressed, it will automatically save and strategically store for future reference. Moreover, this platform is designed in a way that it allows users attach supporting documents such as pictures, drawings, design policies and industry standards, among others. The respondent reported having personally used this platform several times in the past and confirmed its efficiency. Nevertheless, its access limitation to those outside Japan and the fact that the system is only available in Japanese was reported as a significant constraint for knowledge sharing.

Furthermore, the respondent mentioned that during project closure, it is compulsory to record lessons learned, best practices and challenges experienced throughout the project lifecycle. This practice is done following a pre-established template. After the project is officially closed, a meeting to share the most important highlights of the project is held. However, the respondent admitted that based from his experienced, he believes that these documents are rarely referred; mainly because people do not know about its existence.

The interviewee reported "retirement", "relocation of project team after project closure" and the "lack of a friendly system in place to share/upload lessons learned" as the main influencing factors affecting knowledge retention in the international operations of his organizations. On the other hand, "performance and productivity improvement" and the "avoidance of same errors and failures" were reported as the main motivators to develop a sustainable knowledge management system.

Ultimately, when asked about his opinion about knowledge management initiatives as a strategic complementary means to improve their international operations, the interviewee openly expressed his support to lessons learned systems and agreed on the importance of organizational learning initiatives. The lack of a comprehensive system to share lessons learned was reported as the most challenging factor for its implementation in international construction projects.

5. Implications and recommendations for Japanese general contractors

The previous section focused primarily on presenting general facts about organizational learning in the construction industry, including a brief overview of past efforts on knowledge management in Japanese construction companies. This section, on the other hand, aims to elicit specific reasons (from the point of view of the author) why Japanese construction companies should reassess their efforts on knowledge management practices as a complementary strategic element to improve their competitiveness in the international arena. The second subsection, on the other hand, introduces objective recommendations on how these recommendations may be achieved.

5.1. Why do Japanese general contractors need to implement knowledge management practices?

a. Reoccurrence of past challenges and mistakes

As mentioned in the literature review section, knowledge loss is unfortunately a common phenomenon in project based organizations like construction companies. A previous study on critical incidents in international construction projects by Haussner et al. (2016), revealed that a large majority of critical encounters faced by practitioners in these

kinds of project settings can be mainly attributed to their lack of awareness of the local conditions. (Haussner et al. 2016). Astonishingly, Haussner et al. (2016) revealed that many respondents belonging to the same organization reported the same critical incidents in numerous occasions. These striking findings suggest that although the majority of these critical encounters could be avoided relatively easy, it is evident that organizational knowledge assets like past lessons learned are not being properly reused, allowing the reoccurrence of events detrimental to the project. In this manner, the author therefore emphasizes that adopting lessons learned mechanisms or other organizational learning tools would allow Japanese construction companies avoid negative encounters in international construction projects.

b. Aging workforce

The Japanese construction industry is currently facing a serious contraction of its workforce, which is mainly fueled by the rapid population shrinkage and the tight immigration policies in place.

Organizational assets such as knowledge give Japanese construction companies a competitive edge in international construction markets. Among the greatest competitive advantages of Japanese construction companies is their advanced technical capacity and know-how, as well as their impeccable track record gathered through the completion of innumerable challenging projects in their domestic market, and to a lesser extent, overseas. However, this unique competitive advantage against international competitors is being seriously threatened by the rapid aging of the workforce. Therefore, if knowledge management efforts are underestimated and if systematic knowledge management mechanisms are not put in place (or enhanced), know-how gathered from previous projects will be wasted, thus damaging their

international competitiveness. Therefore, the resulting lower capacity to compete in the international arena would be to a certain extent due to their lower capacity to innovate and find sound economical solutions to the continuously increasing strict demands of international clients.

c. Globalization of the construction industry

While operating in international construction projects, it is likely that the local project team may not possess the necessary know-how to meet the demanding requirements of the clients and/or to solve unexpected technical problems that may arise during project planning or execution. As Japanese construction companies increase their operations overseas, there is a possibility that this scenario becomes more acute.

Nonetheless, companies do not necessarily have to reinvent the wheel when the required know-how can be found within the organizational network. In this sense, this problematic could be addressed through the development of a comprehensive remote knowledge management data base. This global knowledge network, consisting of past lessons learned, best practices, recommendations and any other project documents deemed potentially useful, would help local teams to come up with timely and cost effective solutions. Furthermore, this system would help them increase their chances of winning international competitive biddings by proposing economically sound and feasible solutions based on their knowledge gathered from past projects in the country.

5.2 Recommendations for Japanese construction organizations

- Recognize the great importance of managing and harnessing organizational knowledge assets.
- Obtain official upper level management support. This will allow the department or person

proposing a knowledge management initiative to allocate necessary resources, time and efforts on its development. In addition, it would help foster its proactive and sustainable implementation.

- Consider the most suitable approach to the firm in line with their philosophy and select the right tools, techniques, and practices when developing a knowledge management strategy.
- Make learning a prominent feature of their activities and embed it deeply in their routines in order to assure continuous improvement and cope with their evolving business environment.
- Any knowledge management practice needs to be fully integrated into the company's project management system as a standard and compulsory practice.
- The knowledge management platform should be accessible by anyone within their organization regardless of their position and geographical location.
- To increase its effectiveness, all levels in the organization should be committed to any knowledge management program. Depending on initial implementation rates, consider offering incentives that encourage knowledge sharing.
- Consider introducing an external and neutral full-time specialized knowledge management team to focus entirely on its development, implementation and maintenance. Their job would include, but not limited to ensure that lessons learned and best practices are rightly uploaded to the system; distribute key lessons learned in regular intra-firm bulletins; hold seminars to promote its effectiveness and importance for future growth, etc.

6. Discussion and conclusion

It has been suggested that beyond the 2020 Tokyo Summer Olympics, the Japanese construction industry will increase at a slower rate. As a result, in

order to sustain growth, Japanese construction companies need to significantly increase their operations in international construction markets. Although the international construction market offers Japanese general contractors a viable option to sustain growth, operating overseas is highly complex and represents many risks and challenges normally not present in domestic projects.

In light of being continuously outperformed by Chinese and European construction organizations, Japanese general contractors are recommended to implement innovative approaches to improve their performance overseas.

Japanese general contractors can compete better in the international marketplace if they avoid the reoccurrence of past mistakes and capitalize from previous lessons learned and best practices. Knowledge management mechanisms like lessons learned systems, if properly developed and implemented, can achieve this. However, some prerequisites for its successful implementation include support from upper management levels, discipline, motivation and expert assessment to maximize its effectiveness. Additionally, in order to assure its successful implementation, these have to be fully integrated into the company's project management system as a standard and compulsory practice. However, it is worth highlighting the fact that while it is believed that capitalizing from past experiences can help Japanese construction organizations improve their competitiveness internationally, knowledge management programs should be implemented in parallel with additional business strategies.

The contribution of this paper is twofold. Firstly, this study contributes to the limited research body in English of knowledge management practices in the Japanese construction industry and by leaving several open questions for future research areas. On the other hand, this study will help the private sector

by presenting initial practical recommendations on how to enhance their efforts (if even existent) towards an organization that embraces past lessons learned and best practices as a strategic means to regain their competitive advantage against global construction firms. Moreover, it is hoped that this paper will encourage those construction organizations still reluctant to employ lessons learned systems and other knowledge management initiatives to reassess their position towards it.

Conclusions and recommendations presented in this study are based on previously developed theories and findings by other scholars, and to a lesser extent, on events experienced by the author as an industry practitioner. For future research activities, the author recommends to distribute questionnaire surveys and conduct structured interviews with various Japanese general contractors engaged in international construction projects in order to obtain a holistic view of current knowledge management efforts within their organizations and assess the efficiency of systems currently in place (if any). This in turn will allow scholars and researchers to suggest additional countermeasures, develop sustainable knowledge management platforms, establish new theories and validate previous findings.

Ultimately, it is necessary to highlight the importance of enforcing knowledge management initiatives in parallel with other business strategies to address aspects that also require further attention.

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