



PROJECT PERFORMANCE IMPROVEMENT THROUGH APPLICATION OF KNOWLEDGE MANAGEMENT PROCESSES

Nagesh Tummapudi

Senior Engineer – Projects,
Kuwait National Petroleum Company (KNPC), Kuwait
E-mail: nagesh.tummapudi@gmail.com

ABSTRACT

Purpose: According to The Society for Petroleum Engineers (SPE) the Oil and Gas industry is now facing a rapid decline in skilled manpower thus resulting in huge knowledge loss. This trend is likely to continue, and the situation is expected to deteriorate further. Hence, new ways of thinking and paradigms are required to maximise the use of in-house knowledge in the organisations.

Design/methodology/approach: A case study of a merger of a smaller project unit with the large organisation that captures the experiences, challenges, insights and presented.

Findings: Based on the study it emerged that the larger organisation has an inherent and casual presence of Knowledge Management (KM) processes, and it did not evolve as a part of a conscious effort to implement the KM initiatives, but business needs gave rise to its progression. When the smaller project unit was frantically trying to integrate with the giant, the unit through its interactions and scanning of the resources found the required guidance and directions. The so-called resources were more of knowledge assets scattered around the organisation and had evolved based on the different needs at the different point of time. Thus suggesting that organisations even before undertaking a formal implementation of a KM initiative, they may still continue to develop their business processes on the principles of KM systems and continue to benefit immensely.

Value: The processes associated with to create, gather, store, share and apply knowledge, if encouraged, allowed and actively practiced, then some benefits on the business performance may be visible even before a full-fledged KM initiatives implemented in the organisations. Further, this strategy will enable them to build the right behaviour and prepare for implementations of the KM initiatives in future, meanwhile continue to achieve some improvements in business performance.

Keywords: case study; merger; knowledge acquisition; knowledge creation; knowledge sharing; project performance; construction.

Reference to this paper should be made as follows: Nagesh, T. (2015) 'Project Performance Improvement Through Application of Knowledge Management Processes', *Int. J. Innovation and Knowledge Management in the Middle East and North Africa*, Vol. 4, No. 2, pp.108–117.

INTRODUCTION

The Knowledge Management (KM) in oil and gas industry is relatively new. However, experiencing rapid changes in its landscape especially with the ongoing mergers, advances in technology, extensions of offshore drillings, acquisitions and also in addressing the environmental concerns. The KM has played a significant role in making operations more efficient and provided support through technology, technology transfer and enabling optimal utilisation of its assets.

According to the Chevron Texaco's defines KM – processes, tools and behaviours that deliver the right content to the right people at the right time, and in the right context so they can make the best decisions, exploit business opportunities and promote ideas (Leavitt, 2002), is very relevant and apt in the Oil and Gas industry. Moreover, the views expressed by some of the industry experts of the now merged companies that had embraced KM also resonates the same:

- "We got into KM because we had so many projects going on that it was difficult to standardize without limiting creativity. ... Through KM, different leaders not only share experience and knowledge but go forward to create what I call 'contamination centers' where people infect each other with ideas." – Rudulfo Prieto, PDVSA.
- "We must become experts in capturing knowledge, integrating and preserving it, and then making what has been learned quickly and easily available to anyone who will be involved in the next business decision," – D.E. Baird, Schlumberger.
- "We learned that we could use knowledge to drive learning and improvement in our company. We emphasize shopping for knowledge outside our organization rather than

trying to invent everything ourselves. Every day that a better idea goes unused is a lost opportunity. We have to share more, and we have to share faster." – Ken Derr, Chevron.

- "All companies faces a common challenge: using knowledge more effectively than their competitors do." – John Browne, BP Amoco.
- "Knowledge management is the framework for innovation to succeed in the new business while adapting employees to the rapidly changing operating environment." – Brendan O'Neill, Imperial Chemicals Industries (Eavitt, 2002).

However, it is startling to note based on The Society for Petroleum Engineers (SPE)'s projections that the O&G industry is now facing a rapid depletion of skilled manpower resulting into massive knowledge loss and statistics presented below supports the same notion.

- SPE estimated that between 1980 and 1998 the oil and gas industry witnessed a sharp decline in manpower – from about 700,000 to 300,000 persons.
- Today the median age is 47 of the SPE member organisations, suggesting that almost half of the workforce will be fresh or new.
- The attrition rate is expected to be as high as 44% among the petroleum engineers by 2010.
- A loss of 231,000 years of cumulative experience and knowledge in the next decade due to retirements expected in the oil and gas industry.
- Upstream oil and gas companies alone are collectively likely to lose more than 60% of employees along with their experience and knowledge by 2010 (Sapient Corporation, 2001).

The above projections point to a very dim scenario due to the presence of a dominant trend in the organisations as a result of knowledge loss. Therefore an urgent need arises to develop appropriate strategies to arrest such losses, and one of that can be through KM and accomplishing its effectiveness in the organisation.

ROLE OF KM IN CONSTRUCTION PROJECTS IN O&G

It is a paradox that we have made so much progress in the field of managing projects. However, construction projects often associated with project delays, non-conformity to quality standards, cost overruns leading to poor performance, and that leaves most of the stakeholders unsatisfied (Egan, 1998; Latham, 1994). It is an accepted fact that majority of the project undergo unexpected change throughout the design and construction execution phase, and such constant obstructions hamper project completion and successes (CIRIA, 2001; Construction Industry Institute, 1994), and the changes also result in time and cost overruns and quality deviations. The current construction change management literature clearly points to the importance attached to the introduction of various tools and techniques to manage the change process thus leaving aside the crucial role the knowledge and experiences can play in managing successful projects (Senaratne and Sexton, 2009). According to *Constructing Excellence* (2004, p.4) "construction is a collaborative activity – only by pooling the knowledge and experience of many people can buildings meet the needs of today, let alone tomorrow." Thus, structuring and encouraging the team's interactions and sharing of their knowledge becomes an utmost important aspect of project change management.

CIRIA (2001, p.10) defines construction project change as "an alteration or a modification to the pre-existing conditions, assumptions or requirements". These changes in project calls for a revision in project scope leading to the additions, deletions or revisions that are resulting from making an adjustment to contract price and time and sometimes to quality as well (Construction Industry Institute, 1994). Thus suggesting that managing the changes in construction projects

is central to any project management process. However, effective change management is a dynamic process, and the optimal solutions can be obtained only by controlling the viable alternatives and evaluating its impacts before implementing any strategy. Moreover, the problem-solving in a construction environment cannot take place in isolation as it calls for effective team involvement and positive results are expected only when all team member's inputs considered, and more importantly the project manager should play a role of facilitator (Senaratne and Sexton, 2009). It also emerged from the literature that teamwork in a construction project has a direct impact on project performance (Cornick and Mather, 1999).

The literature on construction projects indicates that construction problem-solving is an extremely knowledge-intensive activity (Senaratne and Sexton, 2009). The construction projects all the time provide unique opportunities to its cross-functional team, as they bring in new knowledge and with the constant interactions the team members get immensely benefited (Renzel, 2008; Senge, 1990). Further according to Winch, knowledge and learning processes are the outcome of the problem-solving, as it involves constant discussions and interactions with the team during the entire construction project cycle (Winch, 2002). The project problem situations and finding solutions itself can aid knowledge creation in construction (Egbu et al., 2003), also by effectively integrating experiences gained during the project with the organisational business processes may further facilitate learning and innovation (Barlow and Jashapara, 1998; Gann and Salter, 2000).

The KM practices require an environment that encourage workers to create, capture, share and leverage knowledge to improve performance (Ribeiro, 2009). Law and Ngai (2008) have demonstrated that often the knowledge sharing and learning behaviour results in better business processes, and also in construction activities performances improvements. Therefore by adopting an appropriate KM strategy in construction projects may facilitate in identifying, creating and disseminating knowledge of employees and stakeholders, and ultimately lead to performance improvement (Zin and Egbu, 2010).

According to Webb “KM is the identification, optimization and active management of intellectual assets to create value, increase productivity and gain and sustain competitive advantage” (Webb, 1998). Over the years, KM discipline has evolved and now KM practices are associated with organisations to create, store, use and share their knowledge (Lindner and Wald, 2011; Nonaka, 1999; Saleim and Khalil, 2011). Moreover, specific to construction industry KM processes are associated with creation, processing, sharing, capture and codification (Carrillo et al., 2002). From the literature managing of knowledge in organisations is often associated with the processes encompassing knowledge acquisition, knowledge creation and knowledge sharing (Rusly et al., 2012).

METHODOLOGY

Based on the insight gained so far and the various threads extracted from the literature review, a case study is presented on the merger of a project unit with a large organisation to understand the extent of impact the KM processes created on the project performance.

A case study research is descriptive in nature, and can be either exploratory or explanatory (Dube and Pare, 2003). Yin (2003) also had suggested that case study based research often deployed in the rare or unique events that require better understanding, and to gain deeper insights. The author considering the uniqueness of the event has presented a single case using the explanatory method based on the real experience. The case study may also provide some insight and perspectives on how other organisations can manage knowledge and benefit from it.

A BRIEF BACKGROUND OF THE MERGER

The organisation that is in the focus of the study is a universally recognised, and part of one of top ten oil energy conglomerates of today. Also considered a leader in providing safe, clean energy to the global markets in the business of bringing hydrocarbon energy from domestic reservoirs, and also having upstream interests abroad, that caters to the requirements of its consumer through series of specialised subsidiary

operating companies (KPC, 2015). Early in the year 2013, it took a decision as a part of organisation restructuring plan to dismantle one of its business units (subsidiary); that decision ultimately led to the merger of many of its functional units with other large organisations (subsidiaries).

The project division was one of such functional unit that got merged with a giant subsidiary in the business of handling oil refining, gas liquefaction and distribution of petroleum goods for the local market and established in the 1960s. Since then the giant subsidiary carried out multiple projects to argument its business growth aspirations and by the end of the fiscal year 2013, a total of 26 projects were approved, most of the projects were either executed or in progress, and the total project outlay runs in the tune of multi-billion US\$.

CHALLENGES AND OPPORTUNITIES

After the merger of the project division with the large organisation, and the latter having a well-established and matured project management systems and processes opened up many opportunities and challenges for the new entrant. The project division was already in the process of executing a multimillion dollar construction project, and earlier even completed the critical study and design phase after incorporating the stakeholders needs. However on a merger with the large organisation it faced many challenges that needed effective handling to ensure a smoother integration and that also meets the requirements of the large organisation. The task was not easy and cut out since the project division was embedded and aligned to its processes and systems. However, this situation also created opportunities for the project division as it got exposure to various well-established systems, other ongoing initiatives, and opened up many more avenues for learning that itself was a real motivation for its people.

CHANGE MANAGEMENT THROUGH KM

From the earlier sections and literature review, it had emerged that the essential elements of KM processes are knowledge acquisition, knowledge creation and knowledge sharing. Moreover, when the current process and systems in the

large organisation viewed from this perspective, it further opened up many more avenues for exploitation of the existing knowledge assets, raised questions about how knowledge is acquired and made available to the team, and applied to the new entrant. However, it emerged that the catalyst to this process was managing change as both the entities had experienced different exposures and cultures.

The task was accomplished effectively with the regular encouragement and interactions with the parent organisation and also facilitated by the commitment demonstrated by the leaders of both the organisation. The frequent and regular review of the action plan enabled in resolving the pressing issues, and with the formation of a capable team to oversee the implementation of the ongoing corporate initiatives greatly helped. Further providing access to the existing intranet as it is a repository to the organisation-wide database, quickly adopting the existing systems and processes, nominating employees to internal and external training and rewarding employees for collaboration/teamwork greatly facilitated the merger and that also provided learning opportunities for its team. The outcome of the change initiatives and interactions resulted in deciphering the underlying KM processes that were supposedly present and operated in a subtle way, even though no formal KM intervention ever initiated across the large organisation. Below are some of the linkages that emerged between each of the elements of KM and that also facilitated in project performance improvement.

KNOWLEDGE ACQUISITION

Knowledge acquisition is associated with the process of identification, discovery and accumulation of knowledge, it assists in obtaining new knowledge and also in recognising existing knowledge, and the knowledge capture can be performed through internal and external sources, and acquisition process can also be effective for searching and learning (Darroch, 2003; Lindsey, 2002). Over the years, the large organisation had already developed formal systems for capturing and uploading best practices and lessons learned during project management cycle. Also, the so-called Gate System that comprises of the idea, study, design, implement, operate and monitor stages is readily available on the intranet to all its

employees. This in-house initiative provided the much-needed exposure and new perspectives regarding managing the various phases involved in project management cycle to the new entrant.

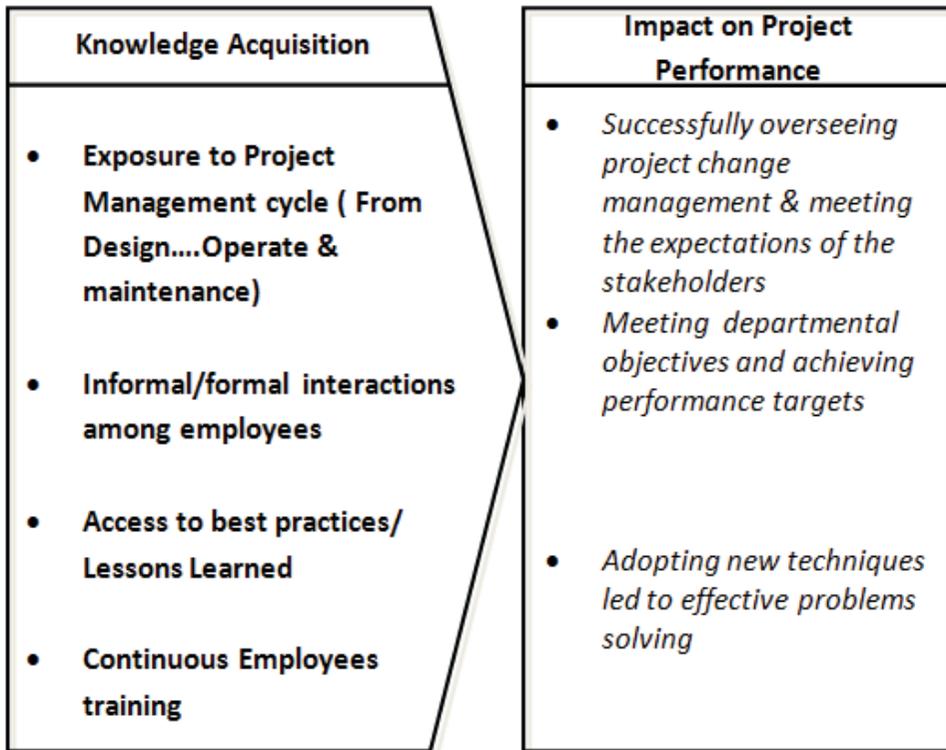
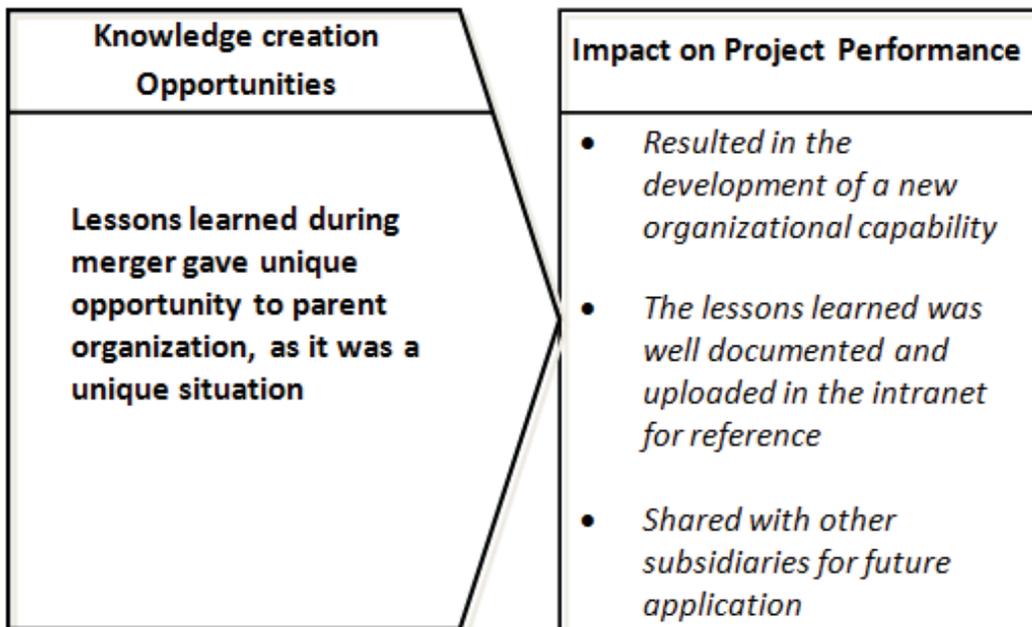
Once the successful merger took place, the project faced new challenges as the expectations of the new stakeholders changed. Like in some areas the functionality of the buildings had changed, and that called for a redesign, and as the project was in the implement (execution) stage thus managing this change was a difficult task. As it called for modification in the scope, engagement of external consultant for redesign and also needed an additional budget. In the premerger scenario, it would have been a tough task since the processes were not defined to carry out such a magnitude of change and would be easily considered unfeasible. However the interactions within the organisation and accessibility of processes in the intranet provided new knowledge and a direction to overcome this situation, thus enabled to meet the expectations of the stakeholders and easily managed to mitigate a major project risk.

Based on the interactions and exposure to the systems and processes the project team successfully managed the current challenges. Encouraged by this success, a need was felt to give more exposure to the team on the other systems and processes that were already present. So that the team can interact and easily retrieve the available knowledge assets, make the best use of it and apply to their project, further participation in internal and external training helped in learning new techniques to solve problems. The Exhibit I summarises the various interactions.

Also in the large unit as a part of performance management system, each unit's performance targets are tied to corporate and departmental goals and the strategic objectives, which also facilitates in meeting the overall performance and in realising its mission. Hence, the effectiveness and meeting objectives of the individual division become of utmost importance.

KNOWLEDGE CREATION

Knowledge creation is "a process that organizationally amplifies the knowledge created by individuals and crystallizes it as part of the organization knowledge network" (Takeuchi and

Exhibit I Knowledge acquisition and impact on project performance**Exhibit II** Knowledge creation and impact on project performance

Nonaka, 2004). Therefore, the knowledge creation processes also facilitate the production of new knowledge or to modify the existing knowledge, and that can include the individual, group, organisation and inter-organisation.

The merger was a unique situation, and such a restructuring not heard of in the past, and the entire sequence of events involved complex interactions between existing and new stakeholders and that also resulted in changes to the governance model. A complete due diligence performed before the merger, and it involved taking over of the unfinished project, reconciliation of budget utilised/unspent, the decision on manpower deployment, legal implications and obtaining of all the necessary statutory approvals. In the event of not addressing any of the issues promptly it would have delayed the project and resulted in huge cost overruns. However, managing each of the elements involved in the merger was also a source of new knowledge and learning to the team. Post the merger, the challenges, and obstacles it faced and successfully managed was captured and well documented, and uploaded on the company intranet for reference, and even shared with other subsidiaries as the best practice

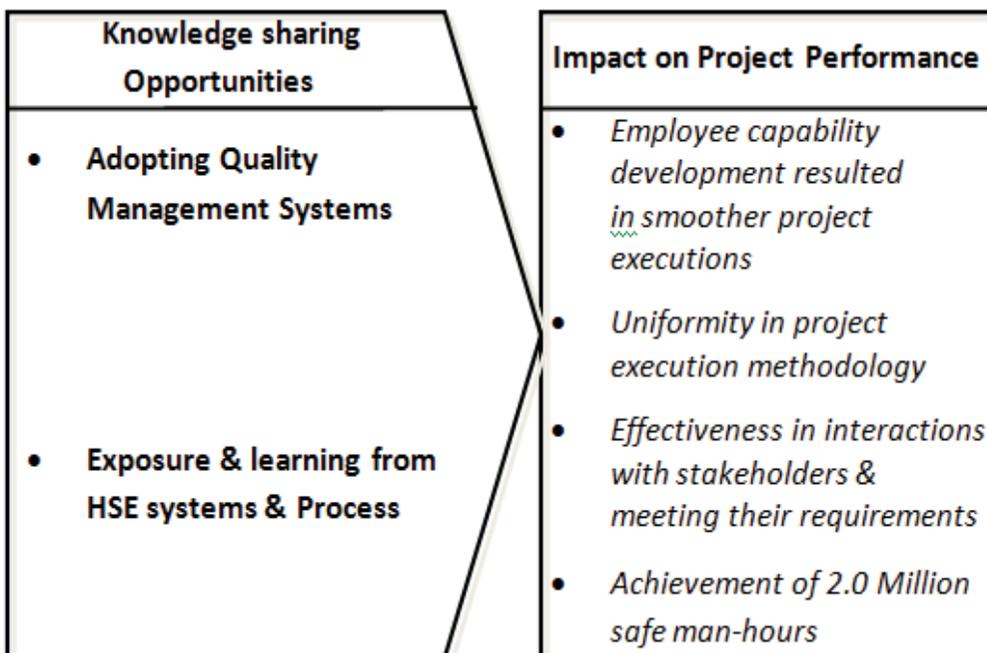
for future reference. This experience itself resulted in the development of a unique capability, and otherwise hard to evolve without a real time experience. The Exhibit II summarises the various interactions.

KNOWLEDGE SHARING

Knowledge sharing is a process through which the acquired and created knowledge of the organisation can be continuously and efficiently applied, utilised and also disseminated throughout the organisation (Rusly et al., 2012). Thus the effective utilisation of the shared knowledge can support decisions, and problem solving may result in improvement of organisational efficiency and in building innovation capacity of the firm (Goldoni and Oliviera, 2006; Lin, 2007).

Both the organisations had put in great efforts to develop an effective Quality Management System in line with ISO 9001 requirements and further strengthened by the inputs received from successive internal/external audits. The system had brought uniformity in the larger organisation and particularly across the project department, and the successful execution of multiple projects

Exhibit III Knowledge sharing and impact on project performance



that are also highly capital intensive has been an essential requirement for the growth of the organisation. Moreover, from the study of the quality management systems some unique elements that are not having conflicts with the existing system were incorporated in the merged project unit, as it could not fully adopt the complete system. This initiative provided some flexibility and enabled to overcome the proposed changes in the project scope that also satisfied the new stakeholders requirements.

One of the other notable impacts on the project is due to the exposure to an advanced Health, Safety and Environment (HSE) systems. The associated challenges of adopting and exposure brought in a new set of knowledge and perspectives related to the handling of HSE aspects, and on successful implementation the results were commendable as 2.0 Million safe man-hours during the execution of the project achieved so far. The Exhibit III summarises the various interactions.

SUMMARY

To the best of knowledge, no formal KM system existed in both the organisations. However, it emerged from the study that the larger organisation has a casual presence of some of the KM processes. Moreover, the same did not evolve as a part of conscious efforts to implement KM initiatives, perhaps prompted by the business needs and evolved without any conscious intervention. When the smaller project unit was frantically trying to integrate with the large organisation, the interactions, retrieval of knowledge assets and its efficient use provided the right direction and guidance, and that enabled smoother integration.

Therefore, the above suggests that organisations even before formally undertake a journey of implementation of KM initiatives, they may have been still practicing it in some form or the other. As this revelation came to light when the merger with an external entity was taking place. Now that presence of KM processes is established in the organisation, and it has experienced some visible benefits, it can further capitalise on it by quickly venturing to create a full-fledged KM systems. Moreover, this will facilitate the organisation to build the right behaviour for KM, provide more opportunities for learning and development, and

increase the level of motivation for its people. Further, it may lead to more visible improvements in business performance as it is also evident from the earlier empirical studies that KM initiatives have high potential in this arena (Kalling, 2003).

CONCLUSIONS

In the past, the organisation had not encountered such a unique situation of the merger, however by effectively managing change and deploying KM process such as acquisition, creation and sharing it was able to achieve its objective of successful merger and integration. The case presented above also provides insight on how the various challenges got translated into learning opportunities during the complex journey. Even without the presence of a formal KM initiative the organisation greatly benefited as it is evident from some of the visible improvement such as achieving 2.0 Million safe man-hours among others as discussed earlier. The merger also brought unique experience and skill to handle such a complex situation and provided a new learning and sharing platform for both the organisations. Though the magnitude of the impact is yet to assessed as the merger took place only a year ago and as more and more exposure the unit gets over a period, it may encounter more of such processes and by successfully adopting it may further improve its project performance, and enhance the capability to handle much larger projects.

REFERENCES

- Barlow, J. and Jashapara, A. (1998) 'Organizational learning and inter-firm 'partnering' in the UK construction industry', *The Learning Organisation*, Vol. 5, No. 2, pp.86–98.
- Carrillo, P.M., Robinson, H.S., Al-Ghassani, A.M. and Anumba, C.J. (2002) 'Survey of knowledge management in construction', *Knowbiz Project Technical Report*, Department of Civil and Building Engineering, Loughborough University, Loughborough.
- CIRIA (2001) *Managing Project Change: A Best Practice Guide*, CIRIA C556, UK.
- Constructing Excellence (2004) 'Teamwork guide', Available at: www.constructingexcellence.org.uk/viewfile.jsp/pdf/Teamwork_Guide.pdf.

- Construction Industry Institute (1994) *Project Change Management*, Special Publication 43-1, Construction Industry Institute, Austin, TX.
- Cornick, T. and Mather, J. (1999) *Construction Project Teams: Making Them Work Profitably*, London: Thomas Telford.
- Darroch, J. (2003) 'Developing a measure of knowledge management behaviors and practices', *Journal of Knowledge Management*, Vol. 7, No. 5, pp.41–54.
- Dube, L. and Pare, G. (2003) 'Rigor in information systems positivist case research: current practices, trends and recommendations', *MIS Quarterly*, Vol. 27, No. 4, pp.597–635.
- Eavitt, B.P. (2002) *Applying Knowledge Management to Oil and Gas Industry Challenges*, Americal Productivity & Quality Center.
- Egan, J. (1998) 'Rethinking Construction: Report of the Construction Industry Task Force', *Construction Industry Task Force*, London.
- Egbu, C., Kurul, E., Quintas, P., Hutchinso, V., Anumba, C.J. and Ruikar, K. (2003) 'Knowledge production, resources and capabilities in the construction industry. Work package 1 – final report', Available at: www.knowledgemanagement.uk.net/Deliverables.htm.
- Gann, D.M. and Salter, A.J. (2000) 'Innovation in project-based, service enhanced firms: the construction of complex products and systems', *Research Policy*, Vol. 29, pp.955–972.
- Goldoni, V. and Oliviera, M. (2006) 'Metrics for knowledge management process', *Paper Presented at 12th Americas Conference on Information Systems (AMCIS) 2006*, Acapulco, 4–6 August, Available at: <http://aisel.aisnet.org/amcis2006/217>, Accessed on 15 March 2011.
- Kalling, T. (2003) 'Knowledge management and the occasional links with performance', *Journal of Knowledge Management*, Vol. 7, No. 3, pp.67–81.
- KPC (2015) 'Knowledge club', Available at: <http://knowledgeclub.com/kpc>, Accessed on 25 November 2015.
- Latham, M. (1994) *Constructing the Team: Final Report of the Government/Industry Review of Procurement and Contractual Arrangements in the UK Construction Industry*, HMSO, London.
- Law, C.H. and Ngai, E.W. (2008) 'An empirical study of the effects of knowledge sharing and learning behaviors on firm performance', *Expert Systems with Applications*, Vol. 34, No. 4, pp.2342–2349.
- Leavitt, P. (2002) *Applying Knowledge Management to Oil and Gas Industry Challenges*.
- Lin, H.F. (2007) 'A stage model of knowledge management: an empirical investigation of process and effectiveness', *Journal of Information Science*, Vol. 33, No. 6, pp.643–659.
- Lindner, F. and Wald, A. (2011) 'Success factors of knowledge management in temporary organizations', *International Journal of Project Management*, Vol. 29, No. 7, pp.877–888.
- Lindsey, K. (2002) 'Measuring knowledge management effectiveness: a task-contingent organizational capabilities perspective', *Eighth Americas Conference on Information Systems (AMCIS) 2002 Proceedings of the Conference in Dallas*, pp.2085–2090.
- Nonaka, I. (1999) 'Dynamic theory of the organizational knowledge creation', *Organization Science*, Vol. 5, No. 1, pp.14–37.
- Renzel, B. (2008) 'Trust in management and knowledge sharing: the mediating effects of fear and knowledge documentation', *Omega*, Vol. 36, No. 2, pp.206–222.
- Ribeiro, F.L. (2009) 'Enhancing knowledge management in construction firms', *Construction Innovation: Information, Process, Management*, Vol. 9, No. 3, pp.268–284.
- Rusly, F.H., Corner, J.L. and Sun, P. (2012) 'Positioning change readiness in knowledge management research', *Journal of Knowledge Management*, Vol. 16, No. 2, pp.329–355, Available at: doi:10.1108/13673271211218906.
- Saleim, A.A.S. and Khalil, O.E.M. (2011) 'Understanding the knowledge management-intellectual capital relationship: a two-way analysis', *Journal of Intellectual Capital*, Vol. 12, No. 4, pp.586–614.
- Sapient Corporation (2001) *Brain Drain: Retaining Intellectual Capital in the Energy Industry*.
- Senaratne, S. and Sexton, M.G. (2009) 'Role of knowledge in managing construction project change', *Engineering, Construction and Architectural Management*, Vol. 16, No. 2, pp.186–200.
- Senge, P. (1990) *The Fifth Discipline: The Art and Practice of the Learning Organisation*, New York, NY: Doubleday.
- Takeuchi, H. and Nonaka, I. (2004) *Hitotsubashi on Knowledge Management*, Singapore: Wiley.
- Winch, G. (2002) *Managing Construction Projects*, Oxford: Blackwell Science Ltd.
- Webb, S.P. (1998) *Knowledge Management: Linchpin of Change*, The Association for Information Management, London.
- Yin, R.K. (2003) *Case Study Research*, 3rd edition, London: Sage Publications.
- Zin, M.I.N. and Egbu, C.O. (2010) 'A review of knowledge management strategies: issues, contexts and benefits for the construction industry', *Proceeding of the CIB World Congress 2010*, Salford Quays, 10–13 May.

BIOGRAPHICAL NOTES

Nagesh Tummappudi currently employed as Senior Engineer – Projects, with Kuwait National Petroleum Company (KNPC), Kuwait. He has a bachelor's degree in mechanical engineering and masters in industrial engineering, and currently pursuing PhD in Knowledge Management. In a career spanning 20+ years as

an executive and consultant gained diverse multi-cultural experience in large organisations in India and the Middle East and developed expertise in strategic planning, design and implementation of Balanced Scorecard, operations excellence and in managing projects.