

## **KNOWLEDGE TRANSFER IN PROJECT-BASED ORGANISATIONS: A META-ANALYSIS OF THE CURRENT ISSUES**

**GANZA TRESOR BIGABWA**

University of Pretoria, Department of Engineering and Technology Management, South Africa  
bigabwag@yahoo.com

**CORNELIS CRISTO VAN WAVEREN**

University of Pretoria, Department of Engineering and Technology Management, South Africa  
corro@up.ac.za (Corresponding)

**KAI-YING CHAN**

University of Pretoria, Department of Engineering and Technology Management, South Africa  
alice.chan@up.ac.za

Copyright © 2015 by the University of Pretoria. Permission granted to IAMOT to publish and use.

### **ABSTRACT**

The aim of this work is to provide an overview of the research regarding different issues of knowledge transfer in project-based organisation. It intends to map the existing body of knowledge, but also to identify and classify major theme of research. This work is a meta-analysis of some research done in leading journals over the last decade. However, the core of the study is based on the articles published in the international journal of project management dataset relevant to the topic, thus leaving out an array of works that investigated the subject but did not appear in these journals. It extends from these previous researches where a model was proposed to visualize what project-based organizations need to address in order to successfully achieve knowledge transfer. On the other hand, by defining “knowledge sharing and lesson learnt” as search keywords rather than limiting the search to “knowledge transfer” and by defining “barriers and challenges” as synonyms to “issues”; a group of articles that were not focused on the specific issue of transferring knowledge could enter the research dataset. Also, the descriptive analysis overlooks the quality of the published articles and classifies them based on a counting technique used to draw the patterns on a using radar graph type. The meta-analysis in this study resulted in identifying five prevailing issues and quantified patterns with drawn inferences from the diversity of results, and detected possible regularities association to knowledge transfer challenges in project-based organisations. In this way, by aggregating and consolidating existing research, the study not only reveals new insights in to the levers and outcomes of knowledge transfer in project-based organisation, but also provides meaningful directions for future research.

**Key words:** Knowledge transfer; knowledge sharing, lesson learnt, project-based organisation, project management; and meta-analysis.

### **INTRODUCTION**

Organizations increasingly depend on projects to execute their business activities (Midler, 1995; Whittington et al., 1999). Although projects are considered temporary organisations, they are often regarded as an efficient means for combining knowledge and thereby optimising value from investments (Pemsel and Wiewiora, 2012). If most or all business activities of an organization are carried out in the form of projects, these organizations are referred to as project-based

organizations (Hobday, 2000). As more and more industries adopt a project-based mode of operation, project-based organisations (P-BO) are gaining rapid importance in management science (Engwall, 2003; Janowicz-Panjaitan et al., 2009; Schindler and Eppler, 2003; Söderlund, 2005). The discipline of project management (PM) is not only important for project-based industries but also for many other industries where projects are employed to generate innovative products and services and to bring about organizational change. Fuelled by the importance of knowledge management for its success (Sense and Antoni, 2003; Sense, 2007), a significant line of research on project-based organizations has emerged (e.g. Cacciatori, 2008; Midler and Silberzahn, 2008; Sense and Antoni, 2003).

For more than a decade, lessons learnt from projects have received much attention in practice and research (Hartmann and Doree, 2014). Numerous studies of project-based organisations have been conducted to identify barriers and enablers for learning from projects (e.g. Holzmann, 2013; Kumaraswamy and Thorpe, 1996; Shokri-Ghasabeh and Chileshe, 2014; Swan et al., 2010). Yet despite the efforts made, progress in improving the learning from projects appears to be slight. Besides identifying problems and difficulties in cross-project knowledge, previous studies investigated a number of tools for extracting and disseminating lessons learned (Hartmann and Doree, 2014). The majority of these studies, often implicitly, argue particularly that knowledge is a transferrable commodity accounts for the little observable progress in understanding and enhancing project learning activities, thus Project-based organisations seem to be caught in the learning paradox of projects (Bakker et al., 2011). There has been a variety of studies on the effects of knowledge transfer in project management but unfortunately, the existing empirical studies do not individually provide definitive answers on the relationship between knowledge transfer and project-based organisation. The conclusions drawn are broadly similar but the problem remains that they are mostly qualitative and they may suffer from what Stanley (2001) calls “casual methodological speculation.” therefore, based usually on opinion, and analyses are made largely from subjective interpretation of the available evidence.

The objective of this paper is to provide an overview of the research on issues of knowledge transfer in project-based organisation. It is a meta-analysis of the subject matter as researched, analysed, and discussed in the literature during the latest ten years. The study intends to map the existing body of knowledge, and to identify and classify major theme of research, thus contributes to the research community as a platform and basic layout for future studies. The key research objective has further been subdivided into three sub-objectives: (i) to identify knowledge transfer challenges in project-based organisations; (ii) to evaluate the predominant knowledge transfer barriers and the leading knowledge transfer channels in project-based organisations; (iii) to recognise meaningful directions for future research.

This paper is laid out as follow: Section 2 discusses the challenges of knowledge transfer in project-based organisation found in the literature. Section 3 describes the methodology and the data used for the current research. Section 4 presents the meta-analysis results and findings. Section 5 concludes with a summary and recognizes the research limitations.

## **CHALLENGES OF KNOWLEDGE TRANSFER IN PROJECT-BASED ORGANISATIONS**

The literature set the issues of knowledge transfer in project-based organisations around the factors affecting and/or facilitating knowledge transfer; the channels of transfer; the transfer process; the

problem in measuring effective transfer; and the risks related to knowledge transfer in project-based organisation.

**i. Factors affecting and/or facilitating knowledge transfer**

Duan, Nie and Coakes (2010) grouped factors that affect or facilitate knowledge transfer and they included, not limited to, the following:

- a. **Actors:** issues related to cultural awareness, motivation, knowledge distance and trust of team members.
- b. **Context:** issues related to inter-organisation relationship, selection of appropriate partners and flexibility of transnational organisation.
- c. **Content:** issues related to the objectives, focus and nature of knowledge to be transfer with the organisation.
- d. **Medium:** issue of language for example.

**ii. Channels of transfer**

Wang and Lu (2010) explored the knowledge transfer channels during organisational crisis in Table 1 where the different knowledge transfer channels, their definition and supporting literatures are illustrated.

Table 1: Summary of knowledge transfer channels in PBO

| Knowledge transfer channels    | Definitions   | Supporting literatures  |
|--------------------------------|---|---|
| <b>Communities of practice</b> | Formal or informal groups where individuals come together for common purposes or interest and share information and knowledge with one another  | Davenport and Prusak (1998), Haslam et al (2003), Rothaermel and Sugiyama (2001)    |
| <b>Documentation</b>           | A set of activities of transforming, coding, and preserving the expertise of individuals in the form of paper-based documents in filing cabinets or electronic files in computer information systems for reference and reuse by other individuals | Davenport and Prusak (1998), Grover and Davenport (2001)                            |
| <b>Mentoring system</b>        | A mechanism in which a mentor (an individual who is relatively experienced) conducts a set of activities for a mentee (an individual who is relatively inexperienced) in which the mentor monitors and coaches the mentee's practice in           | Canavan and Doherty (2007), Davenport and Prusak (1998), Nonaka and Takeuchi (1995) |

| Knowledge transfer channels | Definitions   | Supporting literatures      |
|-----------------------------|---|-----------------------------|
|                             | order to help the mentee do the job more effectively and/or to progress in his or her career  |                             |
| <b>Job transfer</b>         | A lateral socialization mechanism in which employees are moved between two or more jobs in a planned manner in order to expose the employees to different experiences and a wider variety of skills to cross-train them | Davenport and Prusak (1998) |

Source: Wang and Lu (2010)

### iii. Process of transferring knowledge in P-BO

The existence of knowledge and its identification are not sufficient for initiating knowledge transfer. It requires a great level of participation from the source and the receiver and also implicates a strong association or relationship between them. Thus, Liyanage et al. (2009) described the transfer process in a project based organisation around the following four elements where benefits are gained at both ends (i.e. source and receiver):

- a. **Identification:** also called knowledge awareness where the most suitable source should be recognisable;
- b. **Accessibility:** related to the direction of the transfer process where the sources should be willing to share;
- c. **Acquisition:** requires some sort of a conversion of knowledge in order to make it “useful” for the receiver where they can produce new knowledge or improve existing knowledge, skills or capabilities; and
- d. **Absorption:** related to the intensity and rate of the transfer where the receiver should have the necessary capability.

### iv. Problem in measuring the effectiveness of knowledge transfer in project-based organisations

Gardner, et al. (2007) established that at the present time that there were no global evaluation standards of measuring the impact of knowledge transfer, due in part to the lack of a central authority, within each jurisdiction. He identified four fundamental problems that organisations encounter by when attempting to measure the effectiveness of knowledge transfer activities:

- a. **Timing:** the lapse between completion of transfer and effects on the organisation;
- b. **Attribution:** The issue of unspecified role specially for the crediting some portion of impact to sources used in transferring the knowledge;

- c. **Appropriation:** the difficulty in identifying all parties affected by the transfer, most in the case of unclear purpose of the transfer;
- d. **Inequality:** skewed results from the lack of attention to contrasts in project size, most effects are ascribed to large-scale transfer.

v. **Risks related to knowledge transfer in project-based organisations**

Reich (2007), as quoted by Karapetyan and Otieno (2011: 33), depicted ten knowledge-based risks within the project process of a project-based organisation. The model presented in figure 1 links knowledge management and project management, thereby proving a strong basis for this paper.

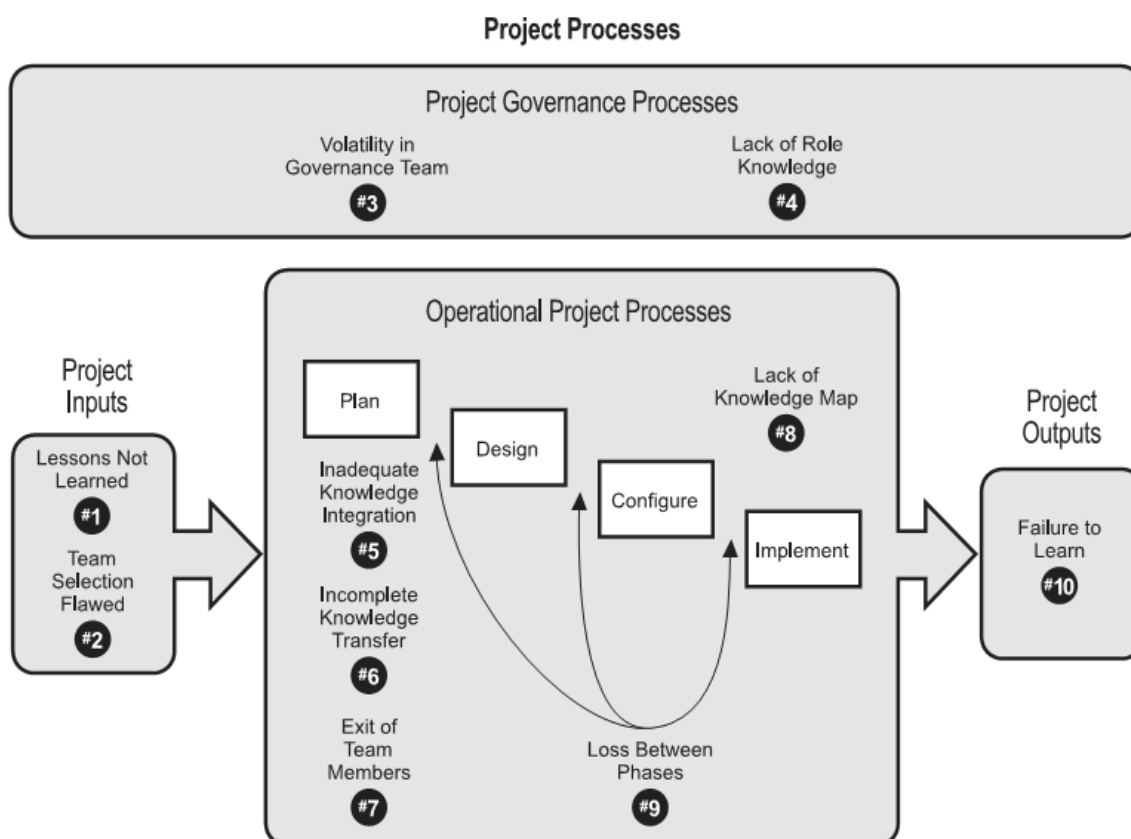


Figure 1: Knowledge transfer challenges in projects, Source: Reich (2007)

**DATE COLLECTION AND SAMPLING**

The first stage focused on searching scholarly peer-reviewed articles in the major online database, namely Science Direct for the subject focus as “challenges of knowledge transfer in project-based organisation” accessed between May and August 2014. In total, the search process yield 40 134 results from 20 different journals. Thereafter, the refine filters search resulted to 57 articles for criteria including three parameters:

- i. **Year:** the time frame was defined for ten years period, between 2004 and 2014. This time frame was selected because it is narrow enough to include only contemporary interpretations and implementations of knowledge transfer in project management and it is extensive enough to encompass a wide range of themes.

- ii. **Publication Title:** *the International Journal of Project Management identified to be the main academic and practitioner journal and at the same time the most relevant to this paper. It also was selected to narrow the investigation and limit it to the field of the study.*
- iii. **Topic:** *in order to gather articles that are related to management and to filter articles that describe projects in other disciplines, the database topic was set to project management and knowledge management. It was also selected again to narrow the investigation and limit it to the field of the study.*

The change between search 1 (initial) and search 2 (refined) was examined in order to make sure that the sample is representative of the population. It was found that the proportions of publication per year of the two search results were still capture as illustrated in figure 2 that shows low publications in terms of proportion in the beginning of our time frame increasing progressively with its highest in the present year.

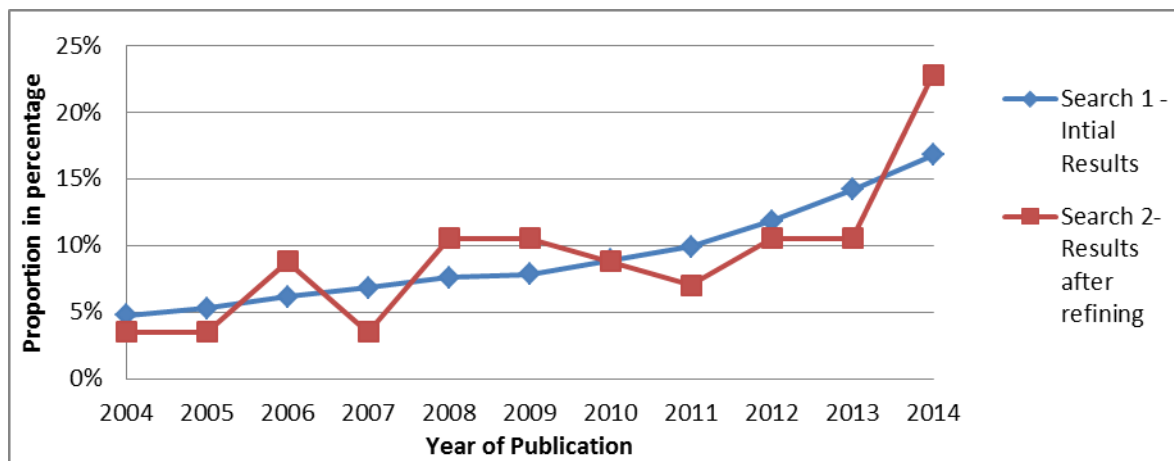


Figure 2: Search results proportion per year of publication

In the second stage of the study, each one of the articles was downloaded and read. During this review process 27 articles of the 57 articles collected in the preceding phase were excluded due to the keywords that did not include knowledge transfer, lesson learnt, or knowledge sharing, cross-referenced with project-based organization in the title, abstract or keywords of the published paper. The decision to include the keyword of lesson learnt and knowledge sharing was taken due to the notion of lesson learnt and knowledge sharing in projects deals in essence with issues of transferring knowledge.

In the third stage, articles go through a further selection on the criteria such as the papers must have been identified as academic or research paper, irrelevance to the study objectives or research questions, and the availability of the full paper. The final dataset was interpreted and an analytic summary of it was presented depending on the form of the outcome data and the amount of information available from the dataset.

## ANALYSIS AND DISCUSSION

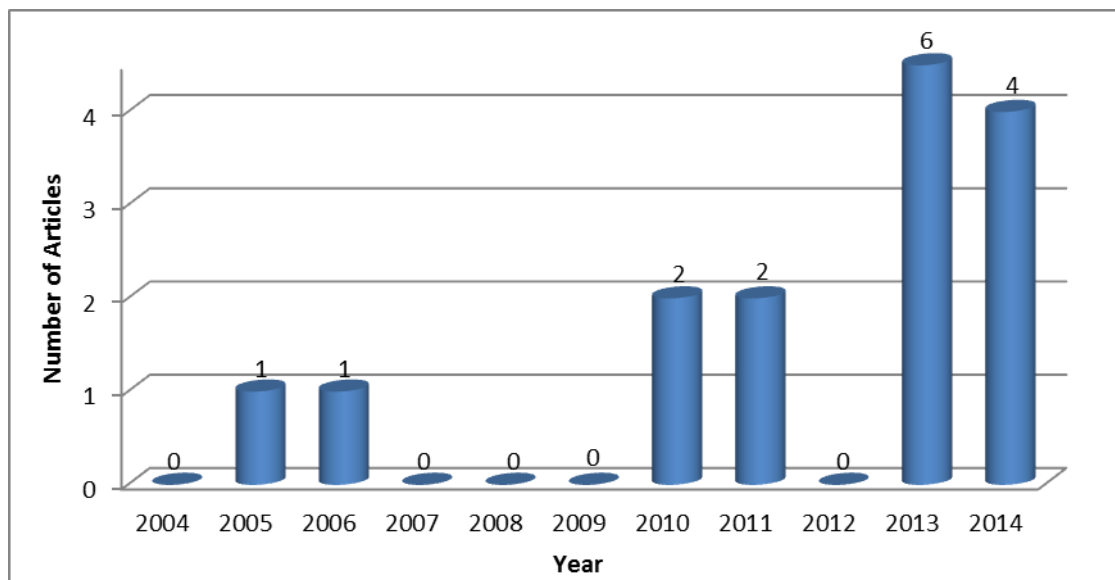
The meta-analysis of the literature is an established technique in the project management field of study (Achterkamp and Vos, 2008; Betts and Lansley, 1995; de Bakker et al., 2010). It is used to implement a quantitative synthesis of the available research and, where possible, to generalise from

the results derived from the numerous singular studies and it is a scientifically valid procedure that has been developed to qualify associations drawn from existing body of literature (Doucouliagos and Laroche, 2003).

The advantage of using meta-analysis is that it addresses research questions that remain unresolved for the following reasons:

- i. *Empirical data are in disagreement as to the direction or magnitude of an effect,*
- ii. *Sample size used in the primary research are too small to detect an effect, or*
- iii. *The large trials necessary are not logistically feasible.*

Content examination of the remaining 30 articles from the sampling process was adopted as a major tool for analysis of the published literature on knowledge transfer and project management to highlight trends and patterns. The descriptive analysis overlooks the quality of the published articles and classifies them based on a counting technique. Sixteen articles were identified as academic or research paper, relevance to this study objective, and accessible to the full paper. These articles are given in Appendix A and they constituted the dataset of the current study as shown in Figure 3.



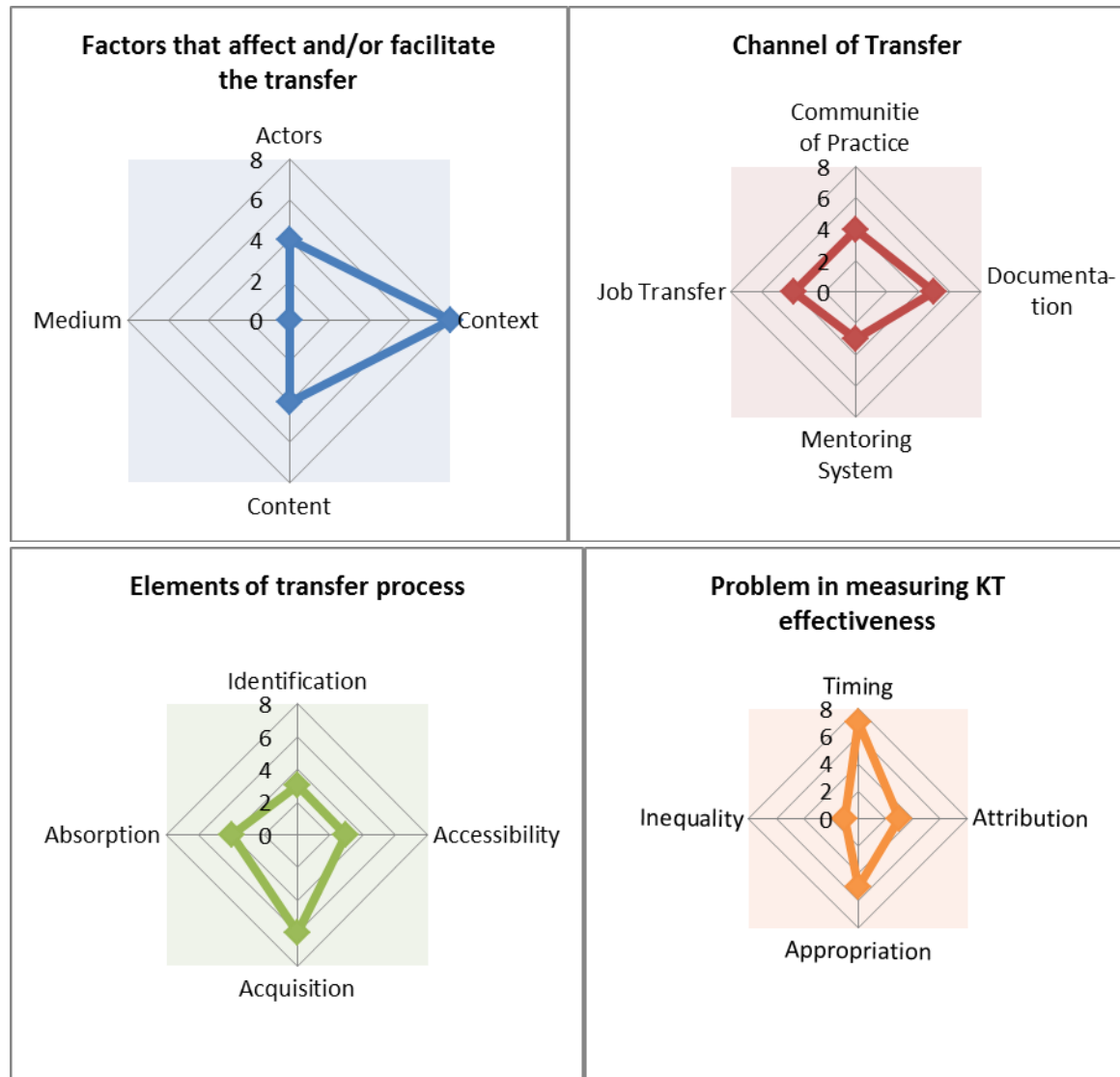
*Figure 3: Number of articles published each year selected for the study*

It can be deduced that, the subject on issue of knowledge transfer in project-based organisation is in increase number as anticipated. Although there were few publications as early as 2005, the topic is gaining research interest and presents potential directions for future research. It is important to point out that the relatively low number of published papers in 2014 can be attributed by the fact that the current study was conducted in July 2014.

Each article was considered as a case study and the method of content analysis was implemented by following the common methodology phases including data collection, coding, analysis of contents, and interpretation of results (Dariu, et al., 2007; Weber, 1990). The results are given in Appendix A for each individual article and the summary table of issue scores are given in Appendix B which lead into drawing patterns on issues around the factors affecting and/or facilitating knowledge transfer;

the channels of transfer; the transfer process; the problem in measuring effective transfer; and the risks related to knowledge transfer as discussed in Section 2 with the results given in figure 4.

It can be established from the pattern of factors that affect and/or facilitate the transfer of knowledge in project-based organisation that the issue of context that relates to the objectives, focus and nature of knowledge to be transfer with the organisation of major concern. But at the same, attention should be given to the issue medium, even though no article has debated on it, it cannot be assumed that it does not present any barrier to KT in P-BO, in the contrary it presents an opportunity for future research on the subject.





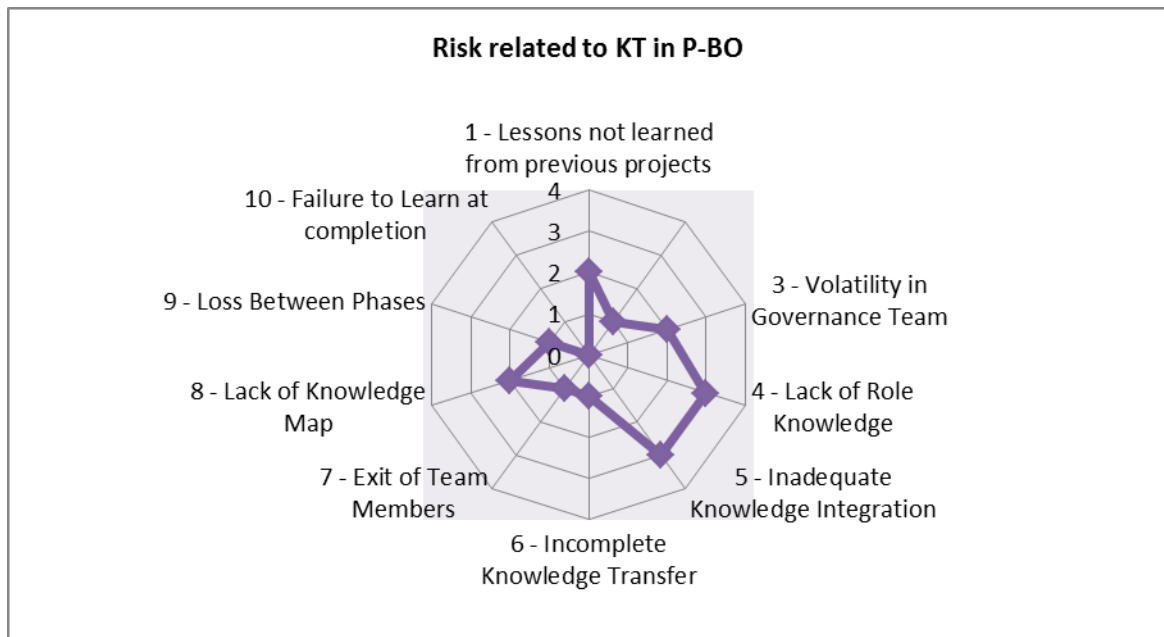


Figure 4: Patterns results of issues drawn from analysis

The pattern on channels of transfer was fairly distributed and shows *that* all four channels are well researched with the documentation presenting the most critical issue followed by the community of practice. Documentation is regarded as an explicit form of knowledge that is formal and systematic. It is easy to communicate, store, and distribute while the community of practice uses most tacit knowledge type which is highly personal, hard to formalise and difficult to communicate to other. In general, knowledge found at 5 % in explicit form and the remaining 95% is tacit (Cognitive Design Solutions, 2003). The biggest challenge is to identify which elements of tacit knowledge can be capture and made explicit.

The transfer process issues were dominated by acquisition and absorption which lay on the receiver exposure and capability. It can also be assumed that knowledge source is fairly accessible and indified in project-based organisations. The project-based organisation environment plays a big role in the process of sharing common perspectives.

The issue of time was strongly presented as being the most pertinent when it comes to measure the effectiveness of KT in P-BO. Time is also found to be the basis of knowledge generation from information and data collected from a process. It was followed by the issues of unclear role and purpose of the transfer. Inequality was only found in the case of inter-organisation or transnational projects due to contrasts in project size.

All ten risk are been addressed in the current literature except for the “failure to learn at completion”. This can be considered correct because there is always KT happening formally or informally with in P-BO no matter the barriers. The largest risks are “lack of role knowledge” and “inadequate knowledge integration”, and they reside at strategic and high management level in the organisation.

## CONCLUSIONS

The current study surveyed the existing body of knowledge in the field of knowledge management and project management. It offers an investigation into diverse issues related to knowledge transfer in project-based organisation in the literature. It draws developing patterns of interest and suggests insights regarding future research directions in this field, hence presenting a comprehensive set of concepts, terms and activities that make up this professional domain.

The main conclusion that can be drawn is that none of the issues discussed are in itself sufficient for successful knowledge transfer. It implies that successful knowledge transfer and its management are inherently complex processes. This conclusion fits the stream of research in project management on project complexity, chaos, and uncertainty as quoted by Bakker et al (2011).

However, the current research has several limitations. First, the dataset of research articles is not complete and at the same time might include redundant data. The study was limited to articles that were found in the Science Direct databases, thus leaving out an array of works that investigated the subject but did not appear in this database. It cannot be assured that an exhaustive list of research related to the topic have been identified and incorporated in this study. On the other hand, by defining “knowledge sharing and lesson learnt” as one of the search keywords rather than limiting the search to “knowledge transfer” and by defining “barriers and challenges” as synonyms to “issues”; a group of articles that were not focused on the specific issue of transferring knowledge could enter the research dataset. Future studies could refine the searching criteria and method to produce a more reliable dataset.

Second, the quantitative research approach was applied, thus assigning articles based on the identification of categories method. This descriptive analysis overlooks the quality of the published articles and classifies them based on a counting technique. Although this method followed Weber's (1990) protocol for coding texts thus providing consistent profiles and a comprehensive overview of the topic researched, additional research into the quality of the publications might offer deeper understanding of the subject.

Overall, reviewing and analysing a decade of research on the subject of knowledge transfer in project-based organisation yielded a valuable understanding of this developing topic. The paper provides a platform for future research by highlighting interesting issues to be explored by further studies.

**APPENDIX A - FINAL DATA AND ANALYSIS**

| FINAL SAMPLE |   |   | META-ANALYSIS                              |   |                              |                                       |                                      |
|--------------|---|---|--|---|------------------------------|---------------------------------------|--------------------------------------|
| Case No      | Article Details (References)  | Keywords  | Factors affecting and/or Facilitating KT   | Channels of Transfer                    | Elements of Transfer Process | Problem in measuring KT effectiveness | Risk related to KT in P-BO           |
| 1            | Holzmann, V., 2013. A meta-analysis of brokering knowledge in project management. International Journal of Project Management 31, 2-13  | Brokering knowledge; Knowledge transfer; Project management; Research trends; Discipline reviews; Meta-analysis | Actors - Team members                      | Communities of Practice / Collaboration | Identification               | Timing                                | 8 - Lack of Knowledge Map            |
| 2            | Ruuska, I & Vartiainen, M., 2005. Characteristics of knowledge sharing communities in project organizations. International Journal of Project Management 23, 374-379  | Knowledge sharing; Communities; Projects  | Actors - Team members                      | Communities of Practice / Collaboration | Acquisition                  | Appropriability / Unclear Purpose     | 7 - Exit of Team Members             |
| 3            | Duffield, S. & Whitty S. J. Developing a systemic lessons learned knowledge model for organisational learning through projects. International Journal of Project Management 7, 1-14   | Project management; Knowledge management; Lessons learned; Organisational learning; Swiss cheese model          | Content - Organisational Culture           | Mentoring System / Interaction          | Absorption                   | Attribution / Unspecified Role        | 5 - Inadequate Knowledge Integration |
| 4            | Adenfelt, M. & Lagerstro, K., 2006. Enabling knowledge creation and sharing in transnational projects. International Journal of Project Management 24, 191-198  | Managing projects; Competence   | Context - Inter-organisation/Transnational | Job Transfer / Rotation                 | Identification               | Timing                                | 2 - Team selection flawed            |
| 5            | Eriksson, P E., 2013. Exploration and exploitation in project-based organizations: Development and diffusion of knowledge at different organizational levels in construction companies. International Journal of Project Management 31, 333-341 | Ambidexterity; Exploration; Exploitation; Innovation; Procurement; Construction industry                        | Content - Organisational Culture           | Mentoring System / Interaction          | Acquisition                  | Timing                                | 9 - Loss Between Phases              |
| 6            | Adenfelt, M., 2010. Exploring the performance of transnational projects: Shared knowledge, coordination and communication. International Journal of Project Management 28, 529-538  | Coordination; Communication; Multinational corporations; Knowledge sharing; Transnational project performance   | Context - Inter-organisation/Transnational | Job Transfer / Rotation                 | Absorption                   | Timing                                | 1 - Lessons not learned              |

| FINAL SAMPLE |   |   | META-ANALYSIS                              |   |               |                                   |                                      |
|--------------|---|---|--|---|---------------|-----------------------------------|--------------------------------------|
| 7            | Park, J-G. & Lee, J., 2014. Knowledge sharing in information systems development projects: Explicating the role of dependence and trust. <i>International Journal of Project Management</i> 32, 153-165   | Systems development; Knowledge sharing; Knowledge management; Dependence; Trust; Project management; IT services; Information systems   | Actors - Team members                      | Mentoring System / Interaction          | Accessibility | Appropriability / Unclear Purpose | 3 - Volatility in Governance Team    |
| 8            | Hartmann, A. & Dorée, A., 2014. Learning between projects: More than sending messages in bottles. <i>International Journal of Project Management</i> 7, 1-11.   | Project-based organisation; Knowledge transfer; Social learning; Case study   | Content - Organisational Culture           | Documentation / Support System          | Absorption    | Timing                            | 4 - Lack of Role Knowledge           |
| 9            | Dutton, C, Turner, N. & Lee-Kelley, L., 2014. Learning in a programme context: An exploratory investigation of drivers and constraints. <i>International Journal of Project Management</i> 32, 747-758  | Cross-programme learning; Programme management; PMO; Knowledge transfer   | Content - Organisational Culture           | Communities of Practice / Collaboration | Acquisition   | Attribution / Unspecified Role    | 4 - Lack of Role Knowledge           |
| 10           | Bartsch, v., Ebers, M. & Maurer, I., 2013. Learning in project-based organizations: The role of project teams' social capital for overcoming barriers to learning. <i>International Journal of Project Management</i> 31, 239-251               | Social capital; Learning; Project-based organizations; Learning barriers; Market knowledge; Product and technological knowledge; Project management knowledge                           | Content - Organisational Culture           | Job Transfer / Rotation                 | Acquisition   | Appropriability / Unclear Purpose | 4 - Lack of Role Knowledge           |
| 11           | Bakker, RM., Cambré, B., Korlaar, L. & Raab, J., 2011. Managing the project learning paradox: A set-theoretic approach toward project knowledge transfer. <i>International Journal of Project Management</i> 29, 494-503                        | Project-based learning; Knowledge transfer; Inter-organizational project; Temporary organization; Comparative case study research; Project complexity; Qualitative comparative analysis | Context - Inter-organisation/Transnational | Documentation / Support System          | Accessibility | Attribution / Unspecified Role    | 5 - Inadequate Knowledge Integration |
| 12           | Wiewiora, A., Trigunaryah, B., Murphy, C. & Coffey, V., 2013. Organizational culture and willingness to share knowledge: A competing values perspective in Australian context. <i>International Journal of Project Management</i> 31, 1163-1174 | Australian context; Competing values framework; Knowledge sharing; Project based organizations; Organizational culture  | Content - Organisational Culture           | Communities of Practice / Collaboration | Acquisition   | Inequality                        | 6 - Incomplete Knowledge Transfer    |

| FINAL SAMPLE |   |   | META-ANALYSIS |  |                                |                |                                   |                                      |
|--------------|---|---|---------------|--|--------------------------------|----------------|-----------------------------------|--------------------------------------|
| 13           | Pemsel, S. & Wiewiora, A., 2013. Project management office a knowledge broker in project-based organisations. International Journal of Project Management 31, 31–42               | Knowledge management; Knowledge sharing; Project management office; Project manager; Project-based organisation                                     |               | Content - Organisational Culture           | Job Transfer / Rotation        | Absorption     | Appropriability / Unclear Purpose | 3 - Volatility in Governance Team    |
| 14           | Midler, C. & Beaume, R., 2010. Project-based learning patterns for dominant design renewal: The case of Electric Vehicle. International Journal of Project Management 28, 142–150 | Electric Vehicle; Projects and programs; Organizational learning; Innovation management; Radical innovation; Sustainable development; Auto industry |               | Context - Inter-organisation/Transnational | Documentation / Support System | Acquisition    | Timing                            | 1 - Lessons not learned              |
| 15           | Lindner, F. & Wald, A., 2011. Success factors of knowledge management in temporary organizations. International Journal of Project Management 29, 877–888                         | Temporary organization; Project; Project management; Organizational learning; Knowledge; Knowledge management                                       |               | Content - Organisational Culture           | Documentation / Support System | Accessibility  | Timing                            | 5 - Inadequate Knowledge Integration |
| 16           | Carrillo, P., Ruikar, K. & Fuller, P., 2013. When will we learn? Improving lessons learned practice in construction. International Journal of Project Management 31, 567–578      | Construction; Contractors; Knowledge; Lessons learned; Roadmap  |               | Actors - Team members                      | Documentation / Support System | Identification | Appropriability / Unclear Purpose | 8 - Lack of Knowledge Map            |

**APPENDIX B1 - SEARCH RESULTS**

| Year of Publication | Search 1 - Initial Results |                          | Search 2 - Results after refining |                          |
|---------------------|----------------------------|--------------------------|-----------------------------------|--------------------------|
|                     | Number of Articles         | Proportion in Percentage | Number of Articles                | Proportion in Percentage |
| 2004                | 1584                       | 5%                       | 2                                 | 4%                       |
| 2005                | 1762                       | 5%                       | 2                                 | 4%                       |
| 2006                | 2046                       | 6%                       | 5                                 | 9%                       |
| 2007                | 2265                       | 7%                       | 2                                 | 4%                       |
| 2008                | 2518                       | 8%                       | 6                                 | 11%                      |
| 2009                | 2606                       | 8%                       | 6                                 | 11%                      |
| 2010                | 2961                       | 9%                       | 5                                 | 9%                       |
| 2011                | 3288                       | 10%                      | 4                                 | 7%                       |
| 2012                | 3927                       | 12%                      | 6                                 | 11%                      |
| 2013                | 4720                       | 14%                      | 6                                 | 11%                      |
| 2014                | 5580                       | 17%                      | 13                                | 23%                      |
| <b>Total</b>        | <b>33257</b>               |                          | <b>57</b>                         |                          |

**APPENDIX B2 - ANALYSIS FINDINGS**

| Factors that affect and/or facilitate the Transfer | No of Article |
|--|---------------|
| Actors   | 4             |
| Context  | 8             |
| Content  | 4             |
| Medium   | 0             |

| Channel of Transfer     | No of Article |
|-------------------------|---------------|
| Communities of Practice | 4             |
| Documentation           | 5             |
| Mentoring System        | 3             |
| Job Transfer            | 4             |

| Elements of Transfer Process | No of Article |
|------------------------------|---------------|
| Identification               | 3             |
| Accessibility                | 3             |
| Acquisition                  | 6             |
| Absorption                   | 4             |

| Problem in measuring KT effectiveness | No of Article |
|---------------------------------------|---------------|
| Timing                                | 7             |
| Attribution                           | 3             |
| Appropriation                         | 5             |
| Inequality                            | 1             |

| Risk related to KT in P-BO                     | No of Article |
|--|---------------|
| 1 - Lessons not learned from previous projects | 2             |
| 2 - Team selection flawed                      | 1             |
| 3 - Volatility in Governance Team              | 2             |
| 4 - Lack of Role Knowledge                     | 3             |
| Risk related to KT in P-BO                     | No of Article |
| 5 - Inadequate Knowledge Integration           | 3             |
| 6 - Incomplete Knowledge Transfer              | 1             |

|                                     |   |
|-------------------------------------|---|
| 7 - Exit of Team Members            | 1 |
| 8 - Lack of Knowledge Map           | 2 |
| 9 - Loss Between Phases             | 1 |
| 10 - Failure to Learn at completion | 0 |

## REFERENCES

- Bakker, R.M., Cambré, B., Korlaar, L., Raab, J., 2011. Managing the project learning paradox: a set-theoretic approach toward project knowledge transfer. *International journal of project management* 29, 494–503.
- Bechky, B.A., 2006. Gaffers, gofers, and grips: Role-based coordination in temporary organizations. *Organization Science* 17 (1), 3–21
- Betts, M., Lansley, P., 1995. *International journal of project management: a review of the first ten years.* *International Journal of Project Management* 13 (4), 207–217.
- Cacciatori, E., 2008. Memory objects in project environments: storing, retrieving and adapting learning in project-based firms. *Research Policy* 37, 1591–1601.
- Canavan, B., & Doherty, R. 2007. Technical education in Scotland: Fit for purpose? *International Journal of Technology and Design Education*, 17(3), 291–304.
- Cognitive Design Solutions, 2003. Explicit & tacit knowledge. Available: <http://www.cognitivedesignsolutions.com/KM/ExplicitTacit.htm>. [Accessed : 25 June 2014].
- Davenport, T. H., & Prusak, L. 1998. *Working knowledge: How organizations manage what they know.* Boston, MA: Harvard Business School Press.
- de Bakker, K., Boonstra, A., Wortmann, H., 2010. Does risk management contribute to IT project success? A meta-analysis of empirical evidence.
- Duan, Y., Nie, W. and Coakes, E. (2010). Identifying key factors affecting transnational knowledge transfer. *Journal of information and Management* 47, 356-363.
- Dairiu, V.j., Reger, R.K., Pfarrer, M.D., 2007. A Content analysis of the content analysis literature in organisation studies: research themes, data sources, and methodological refinements. *Organisational Research Methods* 10 (1), 5-34.
- Doucoulagos, C and Laroche, P., 2003. *What Do Unions Do to Productivity? A Meta-Analysis.* Published by Blackwell Publishing. *Industrial Relations*, Vol. 42 (4): 650-683
- Engwall, M., 2003. No project is an island: linking projects to history and context. *Research Policy* 32, 789–808.
- Gardner, P.L., Fong, A.Y. and Huang, R.L. 2007. *Measuring the impact of Knowledge Transfer from Public Research Organisations: A Comparison of Metric Used around the World.* Canada. Triumph media. Available: [http://www.mcgill.ca/files/senate/Impact\\_of\\_Knowledge\\_Transfer.pdf](http://www.mcgill.ca/files/senate/Impact_of_Knowledge_Transfer.pdf). [Accessed : 15 February 2014].
- Grabher, G., 2002. The project ecology of advertising: Tasks, talents and teams. *Regional Studies* 36 (3), 245–262.
- Grover, V., & Davenport, T. H. 2001. General perspectives on knowledge management: Fostering a research agenda. *Journal of Management Information Systems*, 18(1), 5–21.

- Hartmann, A., Davies, A., Frederiksen, L., 2010. Learning to deliver service enhanced public infrastructure: balancing contractual and relational capabilities. *Construction Management and Economics* 28 (11), 1165–1175.
- Haslam, S. A., Eggins, R. A., & Reynolds, K. J. 2003. The ASPIRe model: Actualizing social and personal identity resources to enhance organizational outcomes. *Journal of Occupational and Organizational Psychology*, 76(1), 83–113.
- Hobday, M., 2000. The project-based organisation: An ideal form for managing complex products and systems? *Research Policy* 29 (7/8), 871–893.
- Holzmann, V., 2013. A meta-analysis of brokering knowledge in project management. *International Journal of Project Management* 31, 2–13.
- Janowicz-Panjaitan, M.K., Bakker, R.M., Kenis, P., 2009. Temporary organizations: the state of the art and distinct approaches toward “temporariness”. In: Kenis, P., Janowicz-Panjaitan, M.K., Cambré, B. (Eds.), *Temporary Organizations: Prevalence, Logic and Effectiveness*. Edward Elgar, Cheltenham, pp. 56–85
- Karapetyan, A. and Otieno, R. (2010). *A Study of Knowledge Management Challenges in Project Management: Case of Start-up Projects in Swedish Incubators*. Thesis of Masters in Strategic Project Management (European). Umea School of Business, Umea University. Sweden.
- Kumaraswamy, M.M., Thorpe, A., 1996. Systematizing construction project evaluations. *Journal of Management in Engineering* 12, 34–39.
- Liyanage, C., Elhag, T., Ballal, T. and Li, Q. (2009). Knowledge communication and translation: a knowledge transfer model. *Journal of knowledge management*. Emerald group publishing limited, issn 1367-3270. Vol. 13 no. 3 2009, pp. 118-131.
- Midler, C., 1995. ‘Projectification’ of the firm: The Renault case. *Scandinavian Journal of Management* 11 (4), 363–375.
- Midler, C., Silberzahn, P., 2008. Managing robust development process for high-tech startups through multi-project learning: the case of two European start-ups. *International Journal of Project Management* 26, 479–486.
- Pemsel, S., Wiewiora, A., 2013. Project management office a knowledge broker in project-based organisations. *Int. J. Proj. Manag.* 31, 31–42.
- Reich, B.H. (2007). *Managing Knowledge and Learning in IT Projects – A Conceptual Framework and Guidelines for Practice*. *Project Management Journal*, 38:2, pp. 5-17.
- Rosenthal, Robert. 1979. “The ‘File Drawer Problem’ and Tolerance for Null Results.” *Psychological Bulletin* 86: 638–41.
- Rothaermel, F. T., & Sugiyama, S. 2001. Virtual Internet communities and commercial success: Individual and community-level theory grounded in the atypical case of TimeZone.com. *Journal of Management*, 27(3), 297–312
- Shokri-Ghasabeh, M., Chileshe, N., 2014. Knowledge management: barriers to capturing lessons learned from Australian construction contractors perspective. *Construction Innovation: Information, Process, Management* 14, 108–134.



- Swan, J., Scarbrough, H., Newell, S., 2010. Why don't (or do) organizations learn from projects? *Management Learning* 41, 325–344.
- Schindler, M., Eppler, M.J., 2003. Harvesting project knowledge: a review of project learning methods and success factors. *International Journal of Project Management* 21, 219–228.
- Stanley, T. D. 2001. "Wheat from Chaff: Meta-Analysis as Quantitative Literature Review." *Journal of Economic Perspectives* 15(Summer):131–50.
- Sense, A.J., Antoni, M., 2003. Exploring the politics of project learning. *International Journal of Project Management* 21, 487–494.
- Sense, A.J., 2007. Structuring the project environment for learning. *International Journal of Project Management* 25, 405–412.
- Shenhar, A.J., Dvir, D., 1996. Toward a typological theory of project management. *Research Policy* 25 (4), 607–632.
- Söderlund, J., 2005. What project management really is about: alternative perspectives on the role and practice of project management. *International Journal of Technology Management* 32, 371–387.
- Wang, W-T & Lu, Y-C. 2010. Knowledge transfer in response to organisational crises : An exploratory study. *Journal of expert system with application*, 37, 3934-3942.
- Weber, R., 1990. *Basis Content Analysis*, 2nd ed. Sage Publications, Thousand Oaks, CA.
- Winch, G., 1989. The construction firm and the construction project: A transaction cost approach. *Construction Management and Economics* 7 (4), 331–345.
- Whittington, R., Pettigrew, A., Peck, S., Fenton, E., Conyon, M., 1999. Change and complementarities in the new competitive landscape: A European panel study, 1992–1996. *Organization Science* 10 (5), 583–600.