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Organisational Learning in Project Based Organisation

Case of Lessons Learned Initiative

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Masters of Science in Management

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Submitted to the National College of Ireland, August 2017

Abstract

The research examines organisational learning (OL) and knowledge management (KM) literature about public and private sector project based companies' learning from construction projects through new knowledge generation. Research explores "Company X's" aim for continuous improvement through lessons learned initiative's implementation. "Company X's" initiative consists of two processes, lessons learned collection (LLCP) and lessons learned application. The research examines the LLCP through a cultural and structural perspective. The research value is in its contribution towards better understanding of the organisational learning in public sector project based companies in Ireland, given that the majority of scholars examine private sector companies refer with location in Asia, the United Kingdom and the US (Rashman, Whithers and Harley, 2009).

The research uses a qualitative research method, employing a holistic, single design, case study. Two data collection methods are used to increase the research construct validity (Yin, 2014) i.e. documentation and face-to face interviews that are semi-structured and non-standardised.

The research results indicate, that "Company X" learned through the use of the organisational learning values, which are embedded in its culture. The matrix structure of "Company X" is a barrier to learning from projects due to dual reporting. The LLCP atmosphere is improved due to the neutral facilitator involvement. Further improvement is needed to enhance the LLCP storing and sharing activities.

Declaration

National College of Ireland

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(Thesis/Author Declaration Form)

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Chapter 1 – Introduction

Companies learn using various learning types and processes, which are embedded in the company's structure and culture. The research aim is the exploration of a specific organisational learning process as an organisation learning mechanism (OLMs). This involves learning from projects by generating and capturing knowledge from completed projects within this researcher's employer company. The company is referred to as "Company X" to ensure confidentiality and data protection. "Company X" defines the practice as a lessons learned initiative containing two separate processes of lessons learned, collection and lessons learned application. This research is confined to examination of lessons learned collection process (LLCP).

1.1 Research Rationale

Three factors contributed to the rationale for research in this topic. Firstly, this case study refers to this researcher's own organisation. This researcher is part of department that conducts LLCP on completed projects. Therefore it was possible to identify data generated during the LLCP within "Company X". This allowed the elimination of reported weaknesses in the documentation collection method of irretrievability issues and incomplete document collection (Yin, 2014). Secondly, "Company X" is public sector project based company in Ireland that has been carrying out the LLCP over ten years yielding a source of rich data. Thirdly, there is a limited amount of research in relation to project based companies' learning in public sector organisations in general and far less in relation to projects in the construction industry. The majority of studies in this area relate to private sector project based companies in the United Kingdom, Australia and Asia and no studies have been conducted in Ireland. Therefore this study may contribute towards filling the gap by providing an insight into the managerial practices of the "Company X",

and provide a view of organisational learning from a different country's perspective, and contributing towards a better understanding of organisational learning in public sector project based companies.

1.2 Overview of the Research Chapters

This section overviews this research chapters.

The literature review chapter examines OL and KM literature about public and private sector project based companies' learning from projects, particularly in the construction industry, and new knowledge generation at a post project review meetings. Further to this, the organisational structure and culture are explored.

The next chapter defines the research aim, question and its three objectives by linking them to the literature.

The research methodology chapter explains this researcher's choices of the research paradigm, the research strategy and its limitation, a sample selection criteria and sampling techniques, methods used for data collection, analysis and reasons behind these choices.

The narrative case study chapter links models by Crossan, Lane and White (1999), Nonaka and Takeuchi (1995) and Pemberton and Stonehouse (2000), knowledge generation from projects, post project and after action reviews, organisational routines and OLMs concepts with LLCP implementation in "Company X". Further, term "knowledge" is linked to term "lessons learned" widely used by "Company X" and a situational context is linked to "Contract Z" environment. This chapter also describes the background of "Company X", its structure, background of the LLCP and its stages.

Analysis and discussion chapter consists of two parts. The first part explains each objective findings, which are categorised under factor sub-headings. This chapter guides

the reader through the findings without congesting the text with supporting passages. Instead the small number of passages supporting each of the findings are displayed in appendix. Second part analyses the research findings through four discussion paragraphs including learning in the organisation versus learning by organisation, accessibility and application of the current lessons learned, revision of current knowledge assets and learning in public sector versus learning in private sector companies.

Conclusion chapter explains the concluded findings. The research findings are consistent with studies about private construction project based companies (Julian, 2008; Scarbrough, Swan, Laurent, Bresnen, Edelman and Newell, 2004). “Company X” learned through the use of the organisational learning values, which are embedded in its culture. The matrix structure of “Company X” is a barrier to learning from projects due to dual reporting. The LLCP atmosphere is improved due to the neutral facilitator involvement. However, further improvement is needed to enhance some elements of the LLCP such as storing and sharing activities. Furthermore, this chapter provides some further research suggestions.

Chapter 2 – Literature Review

This section reviews relevant OL and KM literature to answer the research question and objectives. Firstly, this researcher examined OL and KM studies in relation to public sector learning from the projects specifically focusing on knowledge generation processes. Rashman et al. (2009) and Bate and Robert (2002) found that there was a limited amount of research done in relation to this topic in the public sector. Most studies referred to information technology (Lin, Wang and Kung, 2015), health care (Milne and Larkin, 2015; Miller, 2015; Lipshitz and Popper, 2000), education (Prelipcean and Bejinaru, 2016; Pogodaeva, Zhaparova and Efremova, 2015; Berbegal-Mirabent, Sobatè and Cańabate, 2012) or local government sectors (Phillipson, Lowe, Proctor and Ruto, 2012; Girard and McIntyre, 2010; Sotirakou and Zeppou, 2004). Some authors noted, that the OL and knowledge generation context was an important factor and should be considered, therefore knowledge generation in different industry sectors or geographic locations could be less generalised and transferable (Rashman, et al., 2009; Newell, Edelman, Scarborough, Swan and Bresnen, 2003). This was the reason why this literature was excluded from this review. However, organisational learning similarities could be found within companies in similar sectors and with similar structures. This was the reason, why research was conducted to review studies in relation to how public and private sector project based companies learn and generate the knowledge from projects, particularly in construction industry, from period of 2000 to 2017. As noted by Bapuji and Crossan (2004), scholars from 2000 started to interlink KM and OL disciplines. One hundred studies of project learning, knowledge generation in both sectors were reviewed by this researcher and were slowly reduced to forty five studies relevant to this research in the table 1.

Table 1: Relevant Studies

Scholar's Literature Source	Studies Location
Examination of Public Sector Companies	
Baird, Henderson and Watts (1997)	US
Gardiner (2016)	Australia
Girard and McIntyre (2010)	US
Greiling and Halachmi (2013)	US
Khan (2009)	Pakistan
Laycock (2005)	United Kingdom
Lipshitz and Popper (2000)	Israel
Lipshitz, Popper and Friedman (2002)	Israel
Popper and Lipshitz (2000; 1998)	Israel
Yeo (2007)	Malaysia
Examination of Public and Private Sector Companies	
Newell, Bresnen, Edelman, Scarbrough and Swan (2006)	UK
Pemsel and Widén (2010)	Sweden
Examination of Private Sector Companies	
Abdul-Rahman, Yahya, Berawi and Wah (2008)	Malaysia
Brady and Davies (2004)	United Kingdom
Bresnen, Goussevskaia and Swan (2005)	United Kingdom
Carrillo, Ruikar and Fuller (2013)	United Kingdom
Chinowsky and Carrillo (2007)	United Kingdom
Eliufoo (2008)	Africa
Fong (2003)	China
Fong and Yip (2006)	China
Jordan, Upright and Gibson (2015)	US
Julian (2008)	US
Keegan and Turner (2001)	United Kingdom
Koskinen (2012)	Finland
Keeble Kululanga (2009)	US
Ma, Huang, Wu, Dong and Qi (2014)	China

Scholar's Literature Source	Studies Location
Ma, Qi and Wang (2008)	China
Magnier-Watanabe and Benton (2013)	Japan
Navimipour and Charband (2016)	Iran
Osipova and Eriksson (2013)	Sweden
Pemsel and Müller (2012)	Norway
Rhodes and Dawson (2013)	United Kingdom
Ruikar, Anumba and Egbu (2007)	United Kingdom
Sarshar and Isikdag (2004)	Turkey
Schindler and Eppler (2003)	Switzerland
Senaratne and Bacic (2015)	Australia
Sense (2007)	Australia
Shokri-Ghasabeh and Chileshe (2014)	Australia
Söderlund (2008)	Norway
Swan, Scarbrough and Newell (2010)	United Kingdom
Venkateswaran and Audhe (2013)	India
Von Zedwitz (2002)	Switzerland
Wiewiora and Murphy (2015)	Australia
Yin, Tserng and Tsai (2008)	China

This review found that a dominant part of studies, 32 related to private sector project based companies and 11 to public sector companies. Most of the identified studies refer to geographic locations within the United Kingdom, the US, Australia or Asia. Public sector studies mainly referred to knowledge generation in Israel and the US as can be seen from table 1. None of these were conducted in Ireland. Therefore this researcher's study will contribute towards OL from a different country's perspectives and will contribute towards a better understanding of OL in public sector companies. Walczak (2008) concluded, that OL and KM processes were dissimilar in companies with different geographical and cultural backgrounds and languages. Therefore it's possible that the

findings generated from the research conducted on English speaking companies, in for example the United Kingdom, the US and Australia, could have more similarities to the findings of this study.

Secondly, OL literature review was conducted to identify relevant OL concepts. As a result the following concepts were identified:-

Table 2: Relevant Concepts

Scholar's Name	Concepts
Learning Types and Levels	
Argyris & Schön (1978) and Argyris (1999)	Single and double loop learning
Dodgson (1991)	Tactical and strategical learning
Fiol and Lyles (1985)	Lower level learning and higher level learning
Isaacs (1993)	Triple loop learning
Kolb (1984)	Experiential learning
March (1991)	Exploitation and exploration learning
Swieringa and Wierdsma (1992)	Three levels of OL: single, double and triple loop learning
Organisational Learning and Knowledge Management Taxonomies	
Bhatt (2001)	KM phases: knowledge creation, validation, presentation, distribution and application
Crossan et al. (1999)	OL through feedforward and feedback learning levels
Huber (1991)	OL through acquisition, distribution, interpretation and organisational memory
Lam (2000)	Learning model which combines organisational structure with knowledge generation processes
Lipshitz and Popper (2000)	organisational learning through application of organisational learning values

Scholar's Name	Concepts
Nonaka (1994)	Explicit and tacit knowledge
Nonaka and Takeuchi (1995)	Knowledge creation through SECI model
Nonaka and Toyama (2003)	Knowledge creation through SECI model and concept of Ba
Pemberton and Stonehouse (2000)	Organisational learning through new knowledge generation by using knowledge management tools
Senge (1990)	Organisational learning through system thinking, personal mastery, mental models, shared vision and team learning
Shaw and Perkins (1992)	Organisational learning model

2.1. Defining the Knowledge

There are various definitions of knowledge and its understanding. According to the systematic approach knowledge is an entity which was constrained by an organisation's structure and procedures or routines (Choi and Lee, 2003). The opposite view belonged to human orientated scholars, they saw knowledge as an organisational asset which may be accumulated on an individual, group or organisational level (Pemberton and Stonehouse, 2000; Brooking, 1997; Penrose 1959; Peters 1922). A third view saw knowledge as the capacity to act, because of its link to situational context and action (Sveiby, 2001). Further to this, some authors referred to the construction projects' generated knowledge as lessons learned (Julian, 2008; Brady and Davies, 2004). This research will explore knowledge as "Company X's" owned asset and capacity to act, because of its dual nature: reflection, as task to capture accumulated knowledge created during learning within projects, and action to use this knowledge to improve the

organisational performance. Therefore it could be beneficial to acknowledge mandatory features of the knowledge and the relevant knowledge types.

Some authors linked the knowledge benefits to a generated value for its users and the company, because of its usability and correctness mandatory features (Lipshitz et al., 2002; Grover and Davenport, 2001; Popper and Lipshitz, 1998). Therefore the main features of knowledge were its significance, correctness and applicability (Kamsu Foguem, Coudert, Bèler and Geneste, 2008). Further, different types of knowledge, including the relevant knowledge types will be noted. Kakabadse, Kakabadse and Kouzmin (2003) and Van Lohuizen (1986) distinguished three types of knowledge: a descriptive, which referred to content of the knowledge, procedural, which provided answers to "what" and "how" questions, and reasoning, which provided insight information of conclusions. The knowledge generated from a project belonged to reasoning knowledge category. But the explanation of the past events, the situational context, would fall under the descriptive knowledge type. During the project lifecycle the individuals and contract team generated a large amount of tacit and explicit knowledge (Nonaka, 1994; Polanyi, 1966). Tacit knowledge accumulated and retained by individuals could be defined as "know-how knowledge" (Nonaka, 1994), learning by doing or concrete experience (Kolb, 1984), but explicit knowledge could be defined as "what-to-do knowledge" or "who knows what" (Zou, 2004). Explicit knowledge could take various written forms. From an outcome point of view, this researcher was interested in learning from an experience as an explicit knowledge form. From the process perspective, the aim of objective 2 was the exploration of method used by "Company X" to generate and transfer its knowledge to a repository of organisational memory. From this perspective this researcher's main concern was the knowledge conversion from one form to other and

its movement from an individual to group and company, which will be described in paragraph below.

2.2. Knowledge Management and Organisational Learning Concepts

This researcher identified three dominant organisational learning concepts, which linked both disciplines: Crossan's et al. (1999) dynamic process organisational learning model, Nonaka's and Takeuchi's (1995) knowledge creation through SECI model, and Pemberton's and Stonehouse's (2000) new knowledge generation model. Application of Nonaka's and Takeuchi's (1995) SECI model was identified as a dominant concept in explanation of organisational learning from construction projects (Lee and Kelkar, 2013; Fong, 2003). According to this model learning by company occurred, by conversion of one form of knowledge to other through: socialisation, externalisation, combination and institutionalisation processes. During the project lifecycle the members of a project team were using socialisation processes many instances, for an example as communications about project issues or error detection and correction. These activities could be defined as single loop learning process (Lipshitz et al., 2002; Popper and Lipshitz, 1998; Swieringa and Wierdsma, 1992). However, the socialisation process examination was excluded from the research scope, because this researcher was interested in a process after socialisation phase: how did learning occur at the project close out phase. Externalisation process comprised of tacit knowledge conversion to explicit. This process was a core element of the post project review. The main process feature was tacit knowledge articulation (Fong, 2003; Zollo and Winter, 2002) and an appropriate format discussion (Kari, 2009; Koskinen and Vanhoranta, 2002; Nonaka and Konno, 1998). Externalisation process belonged to double loop learning type (Swieringa and Wierdsma, 1992), since its focus was on a reflection of completed project insights similar to Shaw and Perkins

(1992) organisational learning model fourth element, reflection. The greatest advantage of externalisation as a collaboration platform was in its ability to support capturing process of individual's experiences and the knowledge content enhancement (Feller, Parahankangas, Smeds and Jaatinen, 2013). Further, combination process could be explained as a new knowledge generation process in which explicit knowledge was converted into an additional explicit knowledge, and transferred to the organisational repository for storing and sharing purposes (Nonaka and Takeuchi, 1995). Some authors defined the new knowledge generation as a knowledge codification (Zollo and Winter, 2002) or a knowledge presentation (Becerra-Fernandez and Sabherwal, 2001; Bhatt, 2001). Further, in internalization process the explicit knowledge was converted into tacit. The internalisation process was mostly linked to its application by an individual. The research will only slightly touch this process, because this researcher's purpose was examination of "Company X" knowledge generation process and its effectiveness according to objective 2 and 3.

In turn, Crossan's et al. (1999) model connected two OL processes: feedforward and feedback, through three learning levels: an individual, group organisational. Conduction of the feedforward process could be identified as the knowledge generation process from projects. Where an individual tacit knowledge was moved through intuition and interpretation sub-processes to group. Further, from a group level the knowledge moved, through an integration sub-process, to the company repository, where it became an organisational knowledge through institutionalisation sub-process. The knowledge generation process examination at an individual learning level was not included in this study scope. Feedforward process: intuiting and interpreting sub-processes, were similar to socialisation in the Nonaka's and Takeuchi's (1995) SECI model. The research aim

was exploration of the group and OL levels, integration and institutionalisation, similarly to SECI model externalization and combination processes. The explicit knowledge in feedback process moved in opposite direction, from a company to group or individual, similarly as in SECI model internalisation process. Feedback process implications were in its link to the knowledge usability. This aspect will be slightly touched upon when the knowledge generation and its transfer process will be explored in "Company X". Some authors argued, that a knowledge transmission process from integration to institutionalization was not clearly evident and should be acknowledged as a weakness (Swan et al., 2010; Bennet and Tomblin, 2006; Mohammed, Klimoski and Rentsch, 2000). This researcher argued that, even without transmission process transparency, the result would be obvious: the knowledge content enhancement from project team discussions. This argument also should be applied in relation to SECI model externalisation and combination processes.

The third, Pemberton and Stonehouse (2000) conceptual model linked organisational learning and knowledge management through the new knowledge generation process. During the organisational learning the new knowledge was generated and added to current knowledge assets, to existing organisational memory. This was consistent with the post project review process aim and with three organisational learning levels. Examination of how this process was done, as noted before, was this study's aim. According to this model, certain processes of the new knowledge generation and organisational learning were embedded in a company's structure and procedural arrangements, most likely through KM practice implementations. Literature in relation to private and public sector companies referred to these processes as an organisational routines (Bresenen et al., 2005; Nonaka and Konno, 1998) and OLMs. OLMs included KM tools and techniques to support the new knowledge generation and its embeddedness in the organisational

memory for a future application. This model was very similar to Crossan's et al. (1999) feedback and Nonaka's and Takeuchi's (1995) SECI model combination process.

In summary, it should be noted, that a common and a core element in all three models was collaboration activities, which had capability to facilitate a knowledge value. Collaboration had been found as the most valuable method of generating and capturing the knowledge (Kane, Robinson-Combre and Berge, 2010). Further, the project team environment could be defined as the community of practice (Wegner, 2000; Brown and Duguid, 1991; Lave and Wenger, 1991) or self-organising teams (Nonaka, 1994) which were found as a best place for sharing due to its member's awareness of project issues and topic (Zablith, Faraj and Azad, 2016; Laycock, 2005). Sense (2007) challenged this argument, by noting, that belonging to the group may develop over time. This researcher questioned how long should be long enough to develop the feeling of belongingness. Since a time frame was not defined by scholars, this researcher bends towards Wegner's (1998) view that members of project team would most likely belong to few communities of practice, which would make useful collaboration more a challenging task. However, an organisational context as additional element was included only in the Pemberton's and Stonehouse's (2000) model. The organisational context itself included few aspects: culture, structure and infrastructure. Examination of the infrastructure's aspect was excluded from the research scope. However, culture and structure were dominant elements of knowledge generation and OL. Next paragraph will discuss the importance and role of OLMs in organisational structure. The learning from the projects, a theoretical framework, learning supportive factors and possible challenges will be discussed.

2.3. Learning from Projects

Scholars noted two different types of learning forms in relation to project context: learning in the project and learning from the project (Scarbrough et al., 2004; DeFillippi, 2001; Kotnour, 2000). OLMs were institutionalised through procedural arrangements, procedures or policies (Bresnen et al., 2005), and embedded in the company memory through its structure. Further, Lipshitz et al. (2002), Lipshitz and Popper (2000), Popper and Lipshitz (1998) noted, that the OL as OLMs resolved the issue of anthropomorphism, because it included learning in the company through an individual learning: tacit knowledge generation and learning by company, which implied the learning through interaction processes and explicit knowledge. This researcher adopted this view and therefore Pemberton's and Stonehouse's (2000) model was selected as an initial theoretical framework for gathering data to answer the research question. Learning from projects had very specific content, therefore this type of learning was implemented through special OLMs such as post project or after action reviews (Julian, 2008; Lipshitz et al., 2002; Popper and Lipshitz, 1998; Baird et al., 1997; DiBella, Nevis and Gould, 1996). Further, scholars noted, that the post project reviews and OLMs aim was to identify, what did work, what did not and how it could be improved (Julian, 2008; Kotnour and Vergopia, 2005; Lipshitz et al., 2002; Von Zedtwitz, 2002; Popper and Lipshitz, 1998). This highlighted few aspects: the project team reflection of past events: successes and failures, and the new knowledge generation, as a lesson learned, with aim to escape the avoidable mistakes. This implied that this knowledge should be used in the future. The benefits of this process were in continuous learning (Azmi, 2008) or productive learning (Lipshitz et al., 2002) through continuous improvement, and in avoidance of costly potential errors (Popper and Lipshitz, 2000). Further, Lipshitz et al. (2002) and Popper and Lipshitz (2000) noted two different types of OLMs: integrated and

non-integrated. Integrated OLMs were linked to performance reviews. Non-integrated OLM's distinguished two involved parties: a knowledge generator and its implementer. Scholars noted a tendency to conduct reviews at the end of the project, therefore these lessons learned were drawn from completed projects and used by members of new project team (Swan et al., 2010; Schindler and Eppler, 2003; Disterer, 2002; Von Zedtwitz, 2002). This meant, that companies managing construction projects used non-integrated OLM's, because of its easy implementation (Lipshitz et al., 2002; Popper and Lipshitz, 2000). "Company X" was no an exception. The need to conduct this process was also recognised. However, non-integrated OLM's weakness may be seen in the need for process flexibility to satisfy company needs to ensure process effectiveness (Lipshitz and Popper, 2000). Some of the scholars' findings identified, that some of the private construction companies had managed to avoid this post project review conduction by disregarding its established procedural requirements. It was a result of perception of the process, which led to feelings of un-satisfaction (Julian, 2018; Schindler and Eppler, 2003; Von Zedwitz, 2002; Keegan and Turner, 2001). This was in line with public sector and construction project authors, who noted, that the examination of OL phenomena, including the process of knowledge generation, could be fragmented without consideration of organisational structural, procedural and cultural aspects. The same view was acknowledged by this researcher.

2.4. Theoretical Framework

The structural and cultural approach was adopted, because they were main supporters or inhibitors in the knowledge generation process (Rashman et al., 2009). Structural and cultural facets were successfully used by Lipshitz et al. (2002), Lipshitz and Popper (2000). This researcher adopted the modified version of Pemberton's and Stonehouse's

(2000) model in conjunction with Lipshitz and Popper (2000) organisational learning values as can be seen in figure 1. This initial theoretical framework was used as guidance tool at the data collection phase.

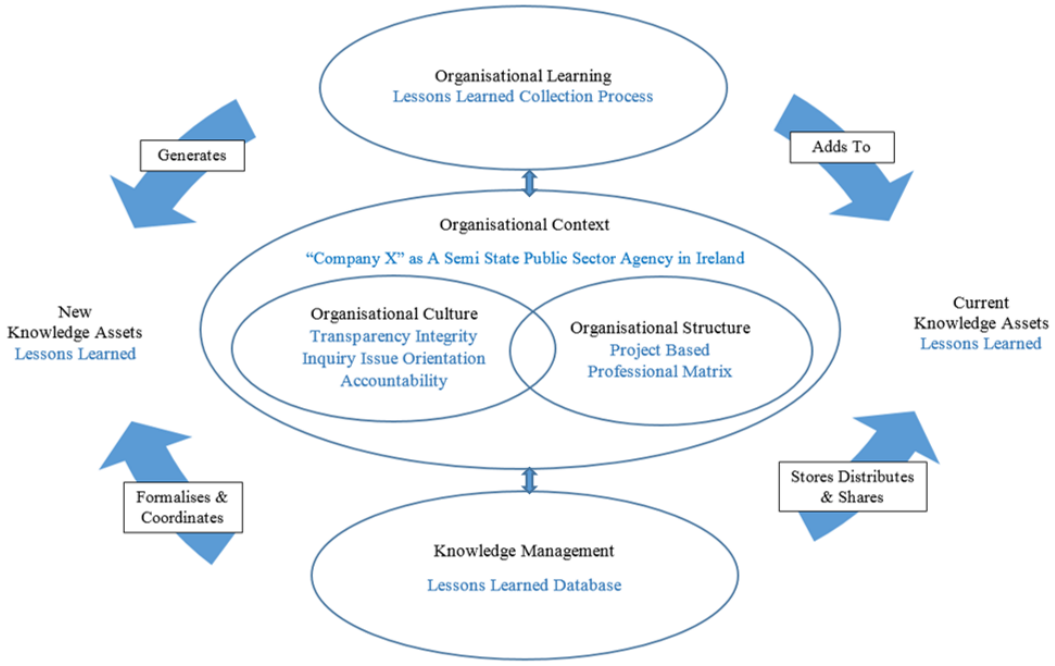

Figure 1: The OL and KM environment

Amended Pemberton and Stonehouse framework (2000, p. 186)

In accordance with this model organisational context was defined as "Company X", a semi state public sector agency in Ireland, which contained of culture and structure. Infrastructure was excluded from organisational context. Lipshitz and Popper (2000) values: transparency, integrity, inquiry, issue orientation, accountability, exploration were included in the company's culture, because of its influence on company's capability

to productively learn (objective 1). Lipshitz and Popper (2000) value definitions were adopted by this researcher as shown in table 3.

Table 3: Organisational Learning Values

Adopted from Lipshitz and Popper (2000, p. 348)

Value	Definition
Transparency	Exposing one's thoughts and actions to others in order to receive feedback
Inquiry	Persisting in a line of inquiry until a satisfactory understanding is achieved
Integrity	Giving and receiving full and accurate feedback without defending oneself and others
Issue orientation	Focusing on the relevance of information to the issues regardless of the social standing (e.g., rank) of recipient of source
Accountability	Assuming responsibility both for learning and for implementing lessons learned

Second element of organisational context was structure. Scholars noted that project based companies, specifically in construction industry (Swan et al., 2010; Eliufoo, 2008; Knight and Pye, 2005; Bryman, 2001; Lipshitz and Popper, 2000) worked in specific context and had specific organisational structure, as most activities were carried within the project boundaries (Pemsel and Widén, 2010; Lindkvist, 2004). Public sector companies' structure was mostly linked to professional bureaucracy according with Mintzberg (1979) typology, because of characteristics of their resources: highly independent professionals. However, more and more project based private sector companies organically developed a matrix organisational structure to efficiently manage their projects through multi-disciplinary functions (Debrah and Ofori, 2006, p. 442; Rees and Porter, 2004; Sy and Côtè, 2004; Kuprenas, 2003; Knight, 1977). Rees and Porter (2004, p. 189) linked this structure development with "need to become more market orientated". In ideal

environment multi-disciplinary function commitment and corporation would create the project environment as the best place for learning and lessons generation after the project completion. But in reality without a project management support and cooperation this could be a challenging task. One of the challenges raised from presence of two types of commands: functional and project, which needed to be balanced, as some of employees could be involved in multiple projects (Ruikar et al., 2007; Kuprenas, 2003; Gobeli and Larson, 1986). Further, Gobeli and Larson (1986) defined three type of matrix organisational forms: functional, balanced and project. “Company X” belonged to the project matrix, as departmental functions assigned certain resources to support a specific project needs. Project managers were responsible for solving project related issues and ensure project completion.

This researcher selected one of OL processes of “Company X”. According to objective 2: this researcher will explore learning from individual’s experience as OLMs: how did “Company X” generate the new knowledge assets and add to current knowledge assets through use of KM tools such as lessons learned database. New knowledge piling on top of existing knowledge could create the possibility of not learning, if obsolete knowledge was not identified and discarded (Rashman et al., 2009; Hedberg, 1981). Therefore scholars noted, the need for revision of current knowledge assets to make conscious decision about their value and usefulness for the company (Dodgson, 1993; Hedberg, 1981). Dismissing this step could leave to a learning incompetence (Bhatt, 2001). Therefore there could be need for unlearning inclusion in the OL process (Hedberg, 1981).

2.5. Facilitators of Organisational Learning

Scholars argued, that some of the factors were learning facilitators and some were creating barriers or challenges for the OL. Facilitators of OL were: culture, management support, resource position, structure and organisational capability (Tseng, 2010; Julian, 2008; Zolo and Winter, 2002; Keegan and Turner, 2001; Fiol and Lyles, 1985). Scholars noted, that a learning culture, in both sector companies, could positively influence companies aim for continuous improvement (Laycock, 2005), through facilitation of openness (Hult, Hurley, Giunipero and Nichols, 2000; Schein, 1993), inquiry, trust or psychological safety and tolerance for errors (Nutley and Davies, 2001; Davenport, De Long and Beers, 1998; Davenport and Prusak, 1998; DiBella et al., 1996; Beer and Spector, 1993; Argyris and Schön, 1978). Companies' tolerance for errors should be established as a mandatory requirement for effective use of transparency, integrity, issue orientation and avoidance of defence routine appearance (Lipshitz et al., 2002). The post project review conduction had dual purpose nature. Firstly, facilitation of the learning from experience of others through accountability value should help the next project to avoid the previous mistakes, and effectively capture the project lessons learned. This implied the requirement to reflect on past project events without blame allocation. Some authors noted, that highly sufficient OLMs could not be achieved without effective OL value, such as transparency, inquiry, integrity, issue orientation and accountability, implementation. Lipshitz et al. (2002) defined this process a productive OL. However, Morris and Moore (2000) disagreed in relation to use of accountability value. In their mind, this value application could have negative influence on OL, due to occurrence of individual's defensive routines since the organisational accountability required critical self-reflection on their actions and responsibility for its consequences.

Their point of view was acknowledged. However, “Company X” culture will be explored through Lipshitz et al. (2002) values application perspective according with objective 1 and objective 3.

The next facilitator of the learning was resources, because the company learn through its employees. Construction project high complexity nature required resources with specific knowledge and skill set and created the need for continued professional development (CPD) to ensure the knowledge generation upon a required company standard and maintenance of their qualification and competence (Julian, 2008; Wall and Ahmed, 2008; Sobiechowska and Maisch, 2007). Swan et al. (2010) noted, that learning within projects, more precisely knowledge usability, was heavily influenced by its members’ theoretical background and knowledge accumulation. Further, employees’ willingness and commitment for self-development could be very effective combination, if coupled with management commitment (Swan et al., 2010; Julian, 2008; Lipshitz et al., 2002; Popper and Lipshitz, 1998). Since OL from projects was complex processes the scholars noted some challenges. Some challenges were specifically arising from a construction project nature and project learning, but some from public sector additional constraints.

2.6. Challenges of Organisational Learning

Swan et al. (2010, p. 327) noted that construction projects had “temporary, fluid, time-bounded and discontinuous nature”. This led to two challenges. The first challenge was to capture fully all valuable knowledge while project team had not moved to the next project. If the post project reviews were conducted at the end of the project, there was risk

to forget some of lessons, because the project environment was so fast moving. It was also noted, that the end of project was the best time to collect these lessons, because this was the time when project team would own the richest data (Swan et al., 2010; Lindkvist, 2004).Therefore it could be useful to write down the knowledge as it appears during the project (Julian, 2008). The second challenge was to pursue the next team to consider this existing knowledge to avoid previous errors (Brady and Davies, 2004; DeFillippi, 2001; Keegan and Turner, 2001). The challenge was to use the most suitable storing, distributing tools, so that the coded knowledge could be easily accessible and categorisation would be in the format suitable to end-user. This required the certain capturing format, template implementation and easy accessibility (Julian, 2008; Ruikar et al., 2007; Newell et al., 2006). Most of construction companies in the United Kingdom used corporate intranet sites (Ruikar et al., 2007) or lessons learned databases (Carrillo et al., 2013; Julian, 2008; Newell et al., 2006; Kotnour, 2000), which were recognised as a central location for distribution purposes. Microsoft Office programmes was used as lessons learned capturing method (Ruikar et al., 2007). Some companies used e-mail as lessons distribution tool (Fong and Yip, 2006). However, none of these methods could guarantee, that these lessons will be read and applied. This required the project teams to balance lack of time with responsibility to consider available knowledge from other projects or requirement to participate in this process. The project learning literature noted project pressure as the most common barrier of construction project, which raised from the need to meet project deadlines and milestones (Swan et al., 2010; Julian, 2008; Schindler and Eppler, 2003; Disterer, 2002; Von Zedwitz, 2002; Keegan and Turner, 2001). This juggling could lead to compromises being made. For example, a decision could be based on “logic of consequentiality”, which implied “quickest acceptable outcome” instead of “logic of appropriateness”, which implied “optimal

outcome in the long term" (Swan et al., 2010, p. 340; Lindkvist, Soderlund and Tell, 1998). Further, the third challenge was to raise the low priority by top management of this OLMs to meet the requirement for their support. This lack of support was seen as main reason for difficulties to gain full commitment of project team to share their knowledge (Anthoni, Nilsson-Witell and Dahlgaard, 2005; Swan et al., 2010; Julian, 2008). This caused interests dis-balance between the organisation structure (matrix) and the project aim (Pemsel and Widèn, 2010; Rees and Porter, 2004). The fourth challenge related to the post project review sensitive nature, because of its need to determine project errors made during the project. This had high potential of destructive features appearance such as defensive routines or fear to admit the mistakes, blaming culture (Julian, 2008; Keegan and Turner, 2001). The challenge was to avoid the appearance of these features, by stimulating a mutual understanding, trust and openness development or through the neutral party involvement (Julian, 2008; Fong and Yip, 2006; Bapuji and Crossan, 2004). Julian (2008) study found, that 25 percent of participants thought that the neutral facilitator had positive effect on a post project review atmosphere. The study was conducted in relation to private construction companies in the United Kingdom. "Company X" used the neutral facilitator during knowledge generation from its projects. This research findings in relation to objective 3 should show if the neutral party involvement was beneficial and suited the participant needs.

Further, OL literature in relation to public sector companies highlighted, that public sector companies had additional constraints, because of their need to the create value for citizens and stakeholders. Rashman et al. (2009, p. 470), noted that these additional constraints were created by "professional boundaries, professional training and development, and the nature of the public management role, tension between demands of political actors, citizens and stakeholders" (Newell et al., 2006; Nutley and Davies, 2001; Vince, 2000;

Finger and Brand, 1999; Miller, 1996). Therefore the public sector companies needed to balance these different interests. It may be achieved through collaboration activities with stakeholders. Stakeholder's input inclusion in the project review process (El-Gohary, Osman and El-Diraby, 2006) or capturing their thoughts may be beneficial for the company, but it's involvement in review process could be challenging task because of stakeholders' diverse expectations or interests, (Mathur, Price and Austin, 2008; Olander, 2007; McAdam, Hazlett and Casey, 2005; Thomson, Austin, Devine-Wright and Mills, 2003). Collaboration as knowledge sharing platform could be ideal method for getting stakeholder's to buy in and to improve future project execution process, because this would allow to gain better understanding or highlight the issues not evident to project team (Greenwood and Kamoche, 2013; Gao and Zhang, 2006; O'Dwyer, 2005; Healy, 1997; Orr, 1996; Harashima, 1995). However, stakeholder's involvement in the process required some additional process steps to ensure that their view had been heard or considered. It should bring positive changes for involved stakeholder's (Dey, 2007). The practical suggestions and the application of this method in the relation to public sector and private construction based companies were not specified in the current literature (Greenwood and Kamoche, 2013). Therefore further research would be needed in relation to stakeholder's direct involvement in the knowledge generation from construction projects and the successful implementation of these methods.

Chapter 3 – Research Question and Objectives

3.1 Research Aim and Research Question

Research will explore OL from projects. More precisely research focus will be on how a project based company learns through its lessons learned initiative, LLCP. LLCP is new knowledge generation and capturing process. Scholars noted, that this process should not be examined in isolation, the organisational context should be considered (Rashman et al., 2009; Kelman, 2005). This suggestion was adopted in research question, by specifying the "Company X's" organisational context: sector and industry, from which knowledge was generated. It's consistent with previously discussed initial theoretical framework, which will be adopted and used as guideline during the data collection process.

Therefore the research aim was to answer following research question:

> An examination of organisational learning from construction projects in the context of the provision transport infrastructure: using this researcher employer's company, a semi-state public sector agency involved in the provision of transport infrastructure in Ireland, as a case study.

Studies about knowledge generation from public sector were limited, the literature which was available mainly referred to information technology, health care, education and local government sectors (Rashman et al., 2009, p. 487). Further, the studies about learning from construction projects were mainly linked to private sector project based companies with geographical location mainly to the United Kingdom, Asia and the US as it was shown in table 1. The research value will be in contribution to existing research in relation to knowledge generation in public sector project based companies in Ireland. Further, the research question will be answered through exploration of three research objectives.

3.2 Research Objectives

Research question will be answered through following research objectives:-

Research Objective 1

How an organisation's culture affect its organisational learning in the knowledge generation context?

This researcher adopted the view of authors in the field of project learning, that the investigation of OL phenomena, including process of knowledge generation, could be fragmented without consideration of cultural aspects. Culture was found to be one of the OL facilitators (Julian, 2008; Keegan and Turner, 2001; Fiol and Lyles, 1985), because of its ability to positively influence companies aim for continuous improvement, through facilitation of openness (Hult et.al., 2000; Schein, 1990) and trust (Nutley and Davies, 2001; Davenport et al., 1998; Davenport and Prusak, 1998; DiBella et al., 1996; Beer and Spector, 1993; Argyris and Schön, 1978). Therefore this objective aim is exploration of "Company's X" culture, through five OL values (Lipshitz and Popper, 2000), similarly to Lipshitz's et al. (2002), Lipshitz's and Popper's (2000) studies. Further this researcher explores these value's influence on specific OL process, because of its possibility to influence "Company X's" capability to productively learn. This means, that the "Company X" culture has potential to be that positive force. Analysis and discussion chapter will show if this was the case within "Company X".

Research Objective 2

What processes are used to generate knowledge and transfer to a repository of organisational memory?

As noted before, this researcher is exploring one of OL processes of "Company X". According with objective 2: this researcher explores learning from experience as OLMs, similarly as it was done by Lipshitz and Popper (2000), Popper and Lipshitz (1998) and Lipshitz et al. (2002). This researcher explores learning from experience, during which "Company X" generates the new knowledge and adds it to current knowledge assets through use of KM tools such as lessons learned database as shown in theoretical concept figure 1. This researcher's aim is to look for evidence about participant's perception i.e. what type of knowledge is generated? How do they see the process? Is company's process changed? Where is the knowledge stored? How knowledge is distributed? This researcher aim is to identify "Company X's" practice and to see if this practice is consistent with scholar's literature findings and suggestions. Scholars noted, that the knowledge generation during post project reviews should include both types of learning: successes and failures. Exploration of this objective will discover current practice in the "Company X". This researcher focus is on individual tacit knowledge conversion to explicit knowledge, a written form, and how this knowledge is transferred to an organisational memory. Therefore objective 2 links to next objective.

Research Objective 3

What is the knowledge collection process efficiency?

Literature in relation to learning from construction projects in private sector noted, that even knowledge generation from projects embeddedness in the procedural facet did not

guarantee this process conduction or productive learning (Lipshitz et al., 2002). For example, Von Zedwitz (2002) research in relation to the research and development projects identified the tendency to skip the post project review conduction. Therefore the process efficiency and effectiveness was linked with companies' capabilities to learn and overcome dozens of challenges such as risk to missing the opportunity to collect a valuable knowledge due to decreased participants motivation, a lack of time (Julian, 2008; Brady and Davies, 2004), without the top management support (Chinowsky and Carrillo, 2007; Julian, 2008; Chong, 2006; Antoni et al., 2005; Chong and Choi, 2005), a defensive routine appearance (Julian, 2008; Hult et al., 2000) or if storing and distribution tools used were not aligned with company needs, and therefore not ensuring a easy knowledge accessibility and usability (Julian, 2008; Ruikar et al. , 2007; Newell et al., 2006). On top of that the public sector companies had to deal with some additional constraints (Rashman et al., 2009) such as professional boundaries (Newell et al., 2003; Miller, 1996), a management of diverse interests (Finger and Brand, 1999) and a need for continuous professional development (Nutley and Davies, 2001).

OLMs improvements could also provide an opportunity to improve the OL. Therefore the process efficiency was included in the research scope. Objective 3 will be explored by inquiring participant's thoughts in relation to following questions: Is this OLM's needed? Is everything in OLMs working as expected? Does storing and sharing activities require any improvements? Does this OLMs structure and content require any improvements?

Chapter 4 – Research Methodology

Research methodology chapter explains this researcher choices of research paradigm, research strategy, used methods for data collection and analysis to answer the research question and objectives (Sounders, Lewis and Thornhill, 2009). Burrell's and Morgan's (1982) summarisation of research paradigms, from ontology, epistemology, axiology and data collection techniques perspective, was used to determine how this researcher viewed the OL phenomena and how the research question will be explained. From ontology perspective, which implied this researcher assumptions about the "nature of reality", the subjectivism was found as most suitable research paradigm to explore the research participants perceptions about "Company X's" OLMs and culture in which these interactions occur, because their perception shaped their behaviour and level of involvement in this process (Sounders et al., 2009, p. 110; Lipshitz and Popper, 2000). Further, "Company X's" culture was explored as a phenomena with fluid nature, which could not be deliberately manipulated as per Smircich's (1983) view. From epistemology perspective, interpretivism's view of an acceptable knowledge was more suitable for purpose of this study. This study captured the subjective meaning of participants of "Company X's" OLMs to better understand "reality behind these details" (Sounders et al., 2009, p. 119), as individuals were gathered together at a specific time and at particular circumstances, which could provide the richest results (Burke, 2007). An axiology perspective confirmed interpretivism suitability for this study, because even when all potential bias were excluded subjectivity of this study couldn't be eliminated. This researcher was part of this research, as data collection and explanation of finding's meaning was still conducted by this researcher. Data collection techniques perspective confirm the previous conclusion. This researcher determined, that a qualitative research

method would be used in this study in relation to small sample size, which were main features of interpretivism data collection techniques (Burrell and Morgan, 1982).

Quantitative and mixed research methods were considered before qualitative research method was preferred. Quantitative research method were considered, as 43 authors, from 1990 to 2002, used this method to study similar topic (Bapuji and Crossan, 2004). Even now this method was highly popular and was used by following authors: Downes and Marchant (2016), Noruzy, Dalfard, Azhdari, Nazari-Shirkouhi and Rezazadeh (2013), Keeble Kululanga (2009), Ranjbarfard, Aghdasi, López-Sàez and Emilio Navas López (2014), Shokri-Ghasabeh and Chileshe (2014), Yin et al. (2008) and Fong and Yip (2006). Mixed method was used by Abdul-Rahman et al. (2008) and Eliufoo (2008) to explore learning from projects, including construction. These authors highlighted mixed method possibility to enhance the studies richness. However, qualitative method was selected, because of the data collection techniques flexibility, local groundedness and richness of data (Miles and Huberman, 1994, p. 298). This was in line with authors who studied a similar phenomenon's: OL through knowledge generation from projects in public sector (Girard and McIntyre, 2010; Yeo, 2007; Lipshitz and Popper, 2000) and private sector (Jordan et al., 2015; Wiewiora and Murphy, 2015; Osipova and Eriksson, 2013; Rhodes and Dawson, 2013; Chinowsky and Carrillo, 2007, Brady and Davies, 2004). The non-availability of quantitative and mixed research methods was acknowledged due to research topic sensitive nature and participant's availability.

Following sub-chapters explains selection of research strategy, secondary, primary data collection from sample: "Company X", used knowledge generation from projects process as research instrument, applied analytic approach and methodological limitations.

4.1 Selection of Research Methodology

Research strategy selection was determined through considerations of accessibility to possible data and specific nature of the research question and its objectives. This researcher was limited to the research conduction within single company's boundaries. This limitation is acknowledged in 4.5. This resulted in consideration of two possible research strategies: action research and case study. These strategies were used by authors, who studied similar phenomenon of knowledge generation from projects. Action research was identified as relevant to this study, as it allowed this researcher to answer the "how" question: objective 1. However, this strategy choice was eliminated as "Company X" knowledge generation from projects process was already conducted and its conduction to the next project was not planned in near future. Therefore case study strategy was chosen instead. It allowed to zoom in on particular process in "Company X" to gain a better understanding about an OL within this company organisational context (Yin, 2014; Chinowsky and Carrillo, 2007). Multiple units of analysis were considered, but this option was dismissed as it did not provide additional benefits to this study. As result the holistic, single design case study was selected similarly to Jordan et al. (2015), Rhodes and Dawson (2013) and Lipshitz and Popper (2000) who explored OLMs. Possible limitations are acknowledged and discussed in 4.5.

4.2 Data Collection Methods

This researcher conducted data collection from two sources, documentation and interviews to increase the research construct validity (Yin, 2014). Interview protocol was used during interviews to increase the research reliability (Yin, 2014). The pilot interviews were conducted to increase the research quality (Yin, 2014) and to better understand the research question.

4.2.1 Secondary Data

This researcher had direct involvement into knowledge generation from projects. LLCP was initiated once the project or contract reached it completion phase. This researcher was part of “Company X” Quality team, who conducted this process. Access to use all data generated during LLCP and existing data from LLCP was received from data owner prior to knowledge generation from the projects. This allowed to identify all possible documentation types generated during LLCP and eliminated documentation collection method weaknesses such as access and retrievability issues, incomplete document collection (Yin, 2014). This researcher acknowledged, that data was generated during LLCP for different reasons and now it was used in this research. There were lots of data available, but not all of it was relevant to this research. Therefore each of identified data types were linked to possible retrievable evidence as shown in table 4. It allowed to narrow the task, provided some structure to collection activity and to augment the evidence by looking for specific details in each of document types.

Table 4: Data Type Linked with Possible Evidence

Document Type	What information was expected to be retrieved?
Meeting Invitations	• How many participants were invited to the workshops? • Who exactly were invited to participate? Members of which functions were invited to participate? • How many workshops were held? What was their main aim? • Were invitees asked to carry out any activity before the attending the meeting?
Meeting Minutes	• What was the content of the meeting, decisions made, collection method chosen by the contract team?

Document Type	What information was expected to be retrieved?
Notes from the Meetings	• Who participated? • Which lessons were discussed? • Was there required action and decision made?
E-mails with Draft Lessons	• By who and when the contribution were made?
E-mails with Submitted or Revised Draft Lessons	• To gain better understanding about the process of knowledge generation from projects and activities involved
SharePoint Folder for Submitting or Revising the Draft Lessons	• Which departmental functions contributed their draft lessons? • When the contribution was made?
SharePoint: Current Project Lessons Learned Database	• How many processes of knowledge generation from projects had been conducted? • How many lessons were published?
Lessons Learned Report from "Contract Z"	• What was the LLCP for "Contract Z" • What disciplines and project phases were assigned to lessons?
Cemar for Submitting or Revising Draft Lessons	• How many lessons were approved during project execution process? • Who were contributors?

As result table below illustrated documentation found relevant to this study:-

Table 5: Reduced and Displayed Data

Sent Date	Subject	Code
	Meeting Invitations	
20-JAN-2016	Initial General Workshop for "Contract Z"	MINV-01
02-MAR-2016	Mini workshop for Project Services Group	MINV-02
02-MAR-2016	Mini workshop for Site Construction Team	MINV-03
02-MAR-2016	Mini workshop for Health and Safety, Environmental and Structural and Utilities Design Team	MINV-04
23-MAR-2016	Mini workshop for Structural and Utilities Design Team	MINV-05

Sent Date	**Subject**	**Code**
	Meeting Minutes	
26-FEB-2016	The first "Contract Z" Lessons learned workshop	MM-01
04-MAY-2016	Request to Commercial function to amend the draft lessons	MM-02
	Meeting Notes	
04-APR-2016	Notes from mini workshops with Site Construction Team	MN-01
14-MAR-2016	Notes from mini workshops with Project Services Group	MN-02
11-APR-2016	Notes from mini workshops with Health and Safety, Environmental Team	MN-03
04-MAY-2016	Notes from mini workshops with Commercial Team	MN-04
20-JUN-2016	Notes from mini workshops with Design Team	MN-05
	Reminders to Submit Draft Lessons	
12-APR-2016	Reminder to contribute: add suggestions, corrections and changes	REM-01
18 -APR-2016	Reminder to contribute: add suggestions, corrections and changes	REM-02
21-JUN-2016	Reminder to contribute: add suggestions, corrections and changes	REM-03
18-SEP-2016	Reminder to Design function to conduct last amendments	REM-04
19-OCT-2016	Reminder to Site Team to conduct last amendments	REM-05
	Submitted/Revised Draft Lessons through e-mail	
18-MAR-2016	Submission made by Contract Manager	RDL-01
02-MAR-2016	Submission made by Design function	RDL-02
14-MAR-2016	Submission made by Programme function	RDL-03
01-MAR-2016	Submission made by Site Team	RDL-04
	Submitted/Revised Draft Lessons through SharePoint	
26-SEP-2016	Combined lessons learned collection sheet	DSHP-01
	Current Project lessons Learned Database (SharePoint)	
18-OCT-2016	Passages of all lessons from current project lessons learned database	SHP-01
	Lessons Learned Collection Report from "Contract Z"	
18-OCT-2016	Lessons Learned Collection Report from "Contract Z"	LLCR-01
	Submitted/Revised Draft Lessons through Cemar	
26-FEB-2016	Passages of lessons from Cemar	LLC-01

4.2.2 Primary Data

4.2.2.1 Sampling

Research sample chosen included “Company X” employees, which participated or contributed during the LLCP from completed, construction projects. It was established, that six projects or eight contracts had been conducted over ten year period. Probability and non-probability sampling techniques were considered. Non-probability, purposive sampling was preferred, as research was orientated to a small sample with a rich data (Sounders et al., 2009). This was in line with Sounder’s et al. (2009), Neuman’s (2005) views, that the small sample was more suitable in case studies, due to it possibility to receive more insight data. This researcher agreed with Neuman’s (2005) and Patton’s (2002) views, that purposive sampling may not be a good representative of total population. But the quality of the research may be improved by further this researcher choices e.g. selection of data rich cases (Sounders et al., 2009; Patton, 2002). Therefore a homogeneous strategy was selected to focus on contract member’s similarity to study them in depth and collecting richer data from them (Sounders et al., 2009). The sample selection criteria were defined to increase the case study validity. The first criteria referred to identification of the projects completed after 2015, to ensure that the project execution and the knowledge generation process were fresh in the minds of the project team. Three contracts or two projects, met the first criteria. The second criteria required the presence of knowledge collection report with aim to ensure large amount of useful data availability. Since the knowledge report was introduced only in 2015 two contracts from one project, met both the criteria. LLCP for both contracts was similar, therefore the latest completed “Contact Z” was selected as a sample with aim to gain the more in-depth information. Sample size was selected after secondary data analyses completion. Purposive sampling

technique was used to select the appropriate sample size (Eliufoo, 2008, p. 312; Layder, 1998; Bless and Higson-Smith, 1995). It was established, that 26 members contributed in the LLCP from "Contract Z". With term "contributions" this researcher meant an actual participation during the initial general meeting, mini workshops or submission of a draft lesson. Figure 2 indicated high level of management involvement in LLCP.

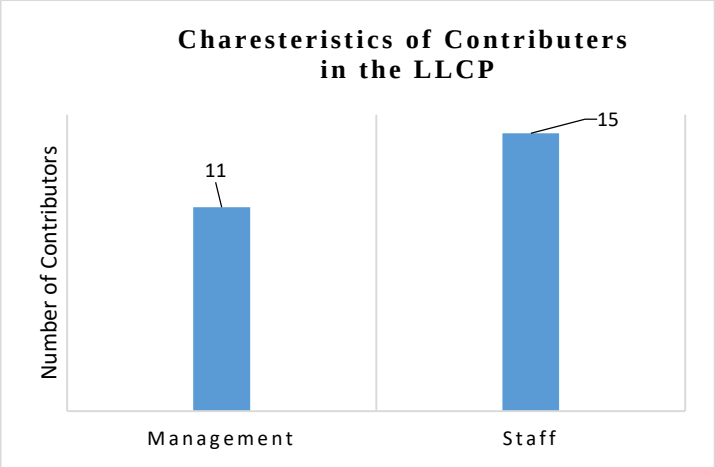

Figure 2: Characteristics of Contributors in the LLCP

Appendix 1 illustrated who and which functions participated in each of the workshops and allowed to identify patterns important for selection of an appropriate sample size and participants. Management dominance was evident in two workshops: Design and Project Services Group mini workshops. In other two, Site Construction and Environmental, Health and Safety and Architecture team mini workshops - the situation was opposite. The Commercial team mini workshop was an exception, as it had the same amount of participants from both sides. The second pattern indicated, that participants from two functions, Contract Management and Quality, participated in each of the workshops. The third function, Commercial, participated in four workshops out of five with exception of Constructions team's workshop. As a result two decisions were made. Firstly, it was decided to interview one member of each workshop, as it may be seen in table 6.

Secondly, the decision was made to interview two contract managers from the same project, but from two different contracts to gather more insights.

Table 6: Participant Selection for Interviews

Mini Workshop	Selected Function
Project Services Group	Quality
Site Construction Team	Site Construction
Health and Safety, Environmental and Architecture Team	Environmental
Commercial Team	Commercial
Structural and Utilities Design Team	Utilities Design

They both had contributed, one thorough direct participation other through lessons submission. Preference was given to participants with largest contributions, who had participated in few LLCP, including “Contract Z” and had over five years’ experience within “Company X”. For example, two managers from different design sections were main participants at the design workshop as evident in appendix 1. Preference was given to participant, who not only fulfilled criteria, but also was heavily involvement in follow up activities in relation to removal of duplications or softening the knowledge language.

4.2.2.2 Interview Protocol

Interview protocol was generated with aim to assist this researcher in data collection process by ensuring the consistency during the interviews and increasing the case study reliability, by making the study replicable (Yin, 2014). Interview protocol could be seen in appendix 2.

4.2.2.3 Pilot Interviews

The pilot interviews were conducted to refine the interview questions with aim to improve the study quality (Yin, 2014). The pilot interviews were completed three weeks before interview conduction to ensure the sufficient time for reflection to its outcome. Two interviews were conducted with one week difference between them. Limitation from using only two participants was acknowledged, but it was due to lack of resource availability. As result, participants noted, that the terminology used in two questions was quite complicated and hard to understand. These questions were amended, simplified and complicated terminology was replaced by widely known terms in the "Company X". Terms "valid knowledge" were replaced by "lessons learned", "knowledge gathering process" by "lessons learned collection process". Further, it was noted, that the questions were closed not open-end e.g. a previous question stated: Are these lessons learned easily accessible? In amended version the question did not change, but "yes" or "no" and "please explain more" were added. Other questions were similarly amended. Further, original questions were previously strictly linked to each of the research objectives, but in the latest version questions were linked to possible theme and subtheme.

4.2.2.4 Interviews

The aim of the interview was "to probe deeply into the respondents' thoughts and feelings about issues they were most familiar with" (Yeo, 2007, p. 349) such as process of knowledge generation, sharing and storing, process efficiency from participant's perspective to answer objectives 2 and 3 (Cunningham and Gerrard, 2000). Interview aim was also to collect information about the company's culture, including five OL values, their impact on the process and discover the meaning of a facilitator role. This was in line with objective 1 in relation to company's culture's affect on the organisational

learning in the knowledge generation context. As result, seven semi-structured, non-standardised, face-to face interviews were conducted during two week period. The strength of this method was in the possibility to change the order of the questions, make necessary amendments or add the some additional questions (Sounders et al., 2009). During three interviews the order of the questions was changed to ensure the smooth flow of questions. During the first interview two new aspects occurred, which were considered and two questions were added: How do you see "Company X" culture into relation to lessons learn process? Do you think lessons learned process should include external parties such as stakeholders?

This method's weakness was determined as time and workload pressure on this researcher. The transcript production was very time consuming process. It took over 10 hours to produce each of the transcripts. Data reduction, display, coding and categorisation was completed in approximately four weeks, using 40 hours per week. A total of 160 hours were spend on this task. The interview protocol and a mobile interview recorder were used to ensure the studies reliability such as collection of valid, reliable data and elimination of bias from misinterpretations. Interviews were conducted in approximately 45 minutes. Fifteen minutes were used for introduction purposes: explanation of the research aim, objectives, the theoretical framework and ethical considerations. Thirty minutes were needed to respond twenty six interview questions with exception of one interview, which required an hour and ten minutes. Interview questions, as per appendix 2, were created under three initial themes of participant characteristics, organisational context and OLMs. Interview questions were structured into two parts. The first part covered participant characteristic questions, which consisted of three questions with provided options with aim to exclude any bias, to ensure studies

credibility and to illustrate that the appropriate sample was selected, as shown in table 7 (Patton, 2002).

Table 7: Sample Characteristics

Participant Name	Participation in other workshops	Participant Role	Age group	Working years in "Company X"
Participant 1	Yes	Staff	35 to 44	5 and more years
Participant 2	Yes	Management	45 to 64	5 and more years
Participant 3	Yes	Management	45 to 64	5 and more years
Participant 4	Yes	Staff	35 to 44	5 and more years
Participant 5	Yes	Management	45 to 64	5 and more years
Participant 6	Yes	Management	45 to 64	5 and more years
Participant 7	Yes	Management	35 to 44	5 and more years

Results confirmed, that the selected participants met the selected criteria, had high familiarity with the process, and were highly experienced to be able to provide the rich data. Second part of interviews, included 10 questions about the company's culture and 13 questions about OLMS. Questions were open end and participants were asked to agree or disagree and provide further explanation or an example.

4.3 Analytic Approach

This section describes analytic approach applied in relation to documentation and interview analysis. Data was analysed by using Braun and Clarke (2006) interpretative thematic analysis framework, because of its flexibility and easy accessibility by unexperienced researchers. At data analyses stage the data reduction and its displaying was applied as suggested by Miles and Huberman (1994) interactive model. An excel database was developed in relation to interview transcripts analysis to increase the research reliability (Yin, 2014).

4.3.1 Documentation Analysis

Braun and Clarke (2006) thematic analysis' six phases were used to analyse the collected documentation:-

First Phase: Familiarization with data was achieved by repeatedly reading each of the document types.

Second Phase: Generation of initial coding was used to identify initial possible potential semantic themes and patterns (Braun and Clarke, 2006; Boyatzis 1998). Aim for semantic thematic analysis was to help this researcher identify the valuable source of information: experts, and select the appropriate sample size as described in 4.2.2.1. More precisely, this researcher was looking for answers to following questions: How did the "Company X" conduct the knowledge generation process from "Contact Z"? Who did participate and contribute during this process? Who was invited to the meetings? How was the process started? Who started the process and why? What was the outcome? What was the historical sequence of the process stages? Further, documents were coded by highlighting and taking the notes on the hard copies.

Third Phase: Searching for themes was used to look for clear meaning from the data, which was in line with a semantic approach. Braun and Clarke (2006, p. 84), noted that this researcher was "not looking for anything beyond what a participant has said or what has been written". The coded data related to the two themes. The first theme referred to participant characteristics for each of the process phases with aim to identify: the role of the participant, would it fall in a staff or a management category, how many departmental functions participated and how many employees participated from each function. Second theme referred to OLMs: actual facts, which would allow to describe the process in the meaningful way.

Fourth Phase: **Revision of themes** led to bringing forward only one theme, OLMs, to describe the narrative case study chapter and to identify the appropriate sample size for the interview conduction.

Fifth Phase: **Defining the themes** led to generation of workshop and participant's characteristics table as shown in appendix 1 for pattern identification.

Sixth Phase: Report production: after final data reduction and display phase completion, this researcher was able to describe knowledge generation process applied to "Contract Z" in narrative case study chapter.

4.3.2 Interview Analysis

Braun and Clarke (2006) thematic analysis six phases were used for interview analysis:-

First Phase: Familiarization with collected data: was used by repeatedly reading the interview transcripts with aim to identify potentially emerging patterns, specific meanings and interpretive themes (Boyatzis, 1998). Transcripts for this study were produced by this researcher herself to gain a better understanding as per Riessman (1993) suggestion. This is in line with interpretative approach: to identify "the features that gave it that particular form and meanings……..rather than simply a mechanical act of putting spoken sounds on paper" (Braun and Clarke, 2006, p. 88, 84; Bird, 2005; Lapadat and Lindsay, 1999). High quality of data was ensured by comparison of audio recordings with transcripts to ensure an accuracy of the data.

Second Phase: Generation of initial coding: was used to identify initial possible interpretive themes. All interviews were coded from INT_01 to INT_07 as shown in the table 8.

Table 8: Interview Schedule and Coding

Participant	Interview Date	Code
Participant 1	29-MAY-2017	INT_01
Participant 2	29-MAY-2017	INT_02
Participant 3	02-JUNE-2017	INT_03
Participant 4	02-JUNE-2017	INT_04
Participant 5	06-JUNE-2017	INT_05
Participant 6	07-JUNE-2017	INT_06
Participant 7	08-JUNE-2017	INT_07

The data from each of interview transcript's was transferred to the separate excel sheet. Following columns were filled: question number, question and response. Further each response from each question in sequential order was inductively analysed. Braun and Clarke (2006) view of inductive analysis was adopted to ensure that the initial themes or questions were not linked during the response analysation process to keep this process data driven. As the result, data passages from each of the responses was taken and coded by replicating the same question number, question and its response. This ensured elimination of losing the context (Bryman, 2001). Table 9 illustrated used method:-

Table 9: Example of Initial Coding from Interview 2

Question No 11
Could you please describe the lessons learned collection process?
Data Extract: Response

It comes to me for my input and variably I am couple of weeks late with it, so by the time I get to the spreadsheet other people have put into it, so then I get to top it up, after little bit of reminding and then its collated by yourselves and duplications are highlighted and its sent back to us all highlighting duplications so then we can collaborate with each other trying make the duplications in single outlining, if there two lessons, and once that done. It's re-distributed amongst peer group to make sure that everything is captured, is nothing missing. Goes for one final review and then quality circulate as necessary.

Coded: Extract of Key Phrases or Sentence
1. It comes to me for my input and variably I am couple of weeks late with it
2. I get to top it up, after little bit of reminding
3. then its collated by yourselves and duplications are highlighted
4. Its sent back to us all highlighting duplications
5. So then we can collaborate with each other trying make the duplications in single outlining
6. It's re-distributed amongst peer group to make sure that everything is captured, is nothing missing
7. Goes for one final review
8. Then quality circulate as necessary

Third Phase: Searching for themes: task here was to link each of the coded phrases or sentences to the potential theme and sub-theme from all transcripts. During the process themes and sub-themes were revised many times. It was evident, that big part of sub-themes were relating to few themes not exclusively linked to only one theme.

Fourth Phase: Revision of initially allocated themes and subthemes. As the result of revision the sub-themes and themes categorisation was changed, sub-themes were renamed to factors. This change helped to achieve that one theme related to the few factors but not other way around. This task was conducted to all seven spreadsheets. In the next step a special code was added in front of each coded passage. This ensured that coded passages were linked with an information source. Table 10 illustrates, how the first

two coded passages as evidential from table 9, were coded more specifically: to specific respondent, interview 2, and linked to its response, theme, factor and questions.

Table 10: Example of Revision of Initially Allocated Themes from Interview 2

Question	Themes	Factors	Coded Key Phrase/Sentence
Q11	OLMS	Knowledge Generation	INT_02_Q11_ It comes to me for my input and variably I am couple of weeks late with it
Q11	OLMS	Knowledge Generation	INT_02_Q11_I get to top it up, after little bit of reminding

The combined spreadsheet were created. It included only three columns: themes, factors and coded passages with aim to ensure that "candidate themes adequately capture the contours of the coded data" (Braun and Clarke, 2006, p. 91). The combined excel sheet advantage was in ability to allow to oversee the entire data set in one location and to see all coded passages from one factor or one theme. This helped to conduct multiple re-coding and categorisation exercises with the displayed data, because of coding continuous and organically developing nature (Braun and Clarke, 2006).

Fifth Phase: Defining the themes. Braun and Clarke (2006) noted the importance to see the bigger picture created by the each theme and its link with the research question, objectives and each of the factors. As a result, 662 displayed data were divided into two themes: organisational culture and OLMs as shown in figure 3. The dominant part of displayed data fell under OLMs theme: 593 items. Further, themes were linked to sub-themes, which were similarly defined as research objectives. As a result three sub-themes were developed. Organisational culture was linked to one sub-theme: affect of culture on the process, objective 1.

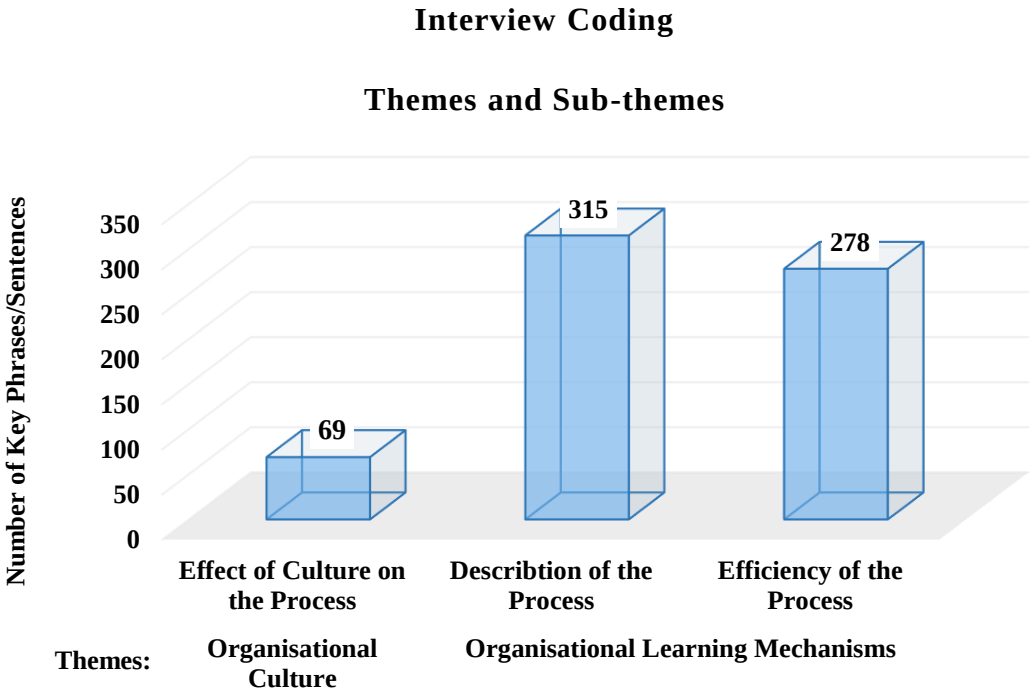

Figure 3: Interview Coding

OLMs theme was divided into two sub-themes: description of the process, objective 2, efficiency and effectiveness of the process, objective 3. Further, each theme and sub-theme was linked to few factors. Organisational culture theme and sub-theme was linked to three factors: perception of culture, integrity and leadership as shown in figure 4. OLMs theme's sub-theme: description of the process were linked to three factors: accountability, knowledge generation and transparency, which were further linked to sub-factors as shown in figure 5. Accountability factor was linked to application and consequences sub-factors. Knowledge generation factor was linked to four sub-factors: activity, benefits, change and process. The most of displayed evidence related to process sub-factor. Transparency sub-factor was linked to perception and sharing thoughts sub-factors.

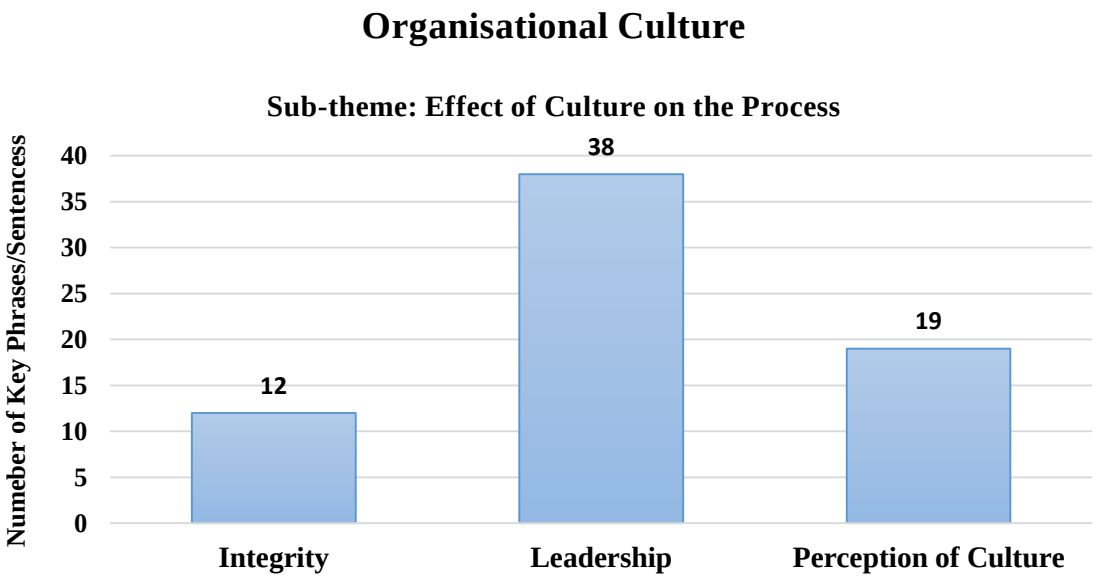

Figure 4: Theme: Organisational Culture

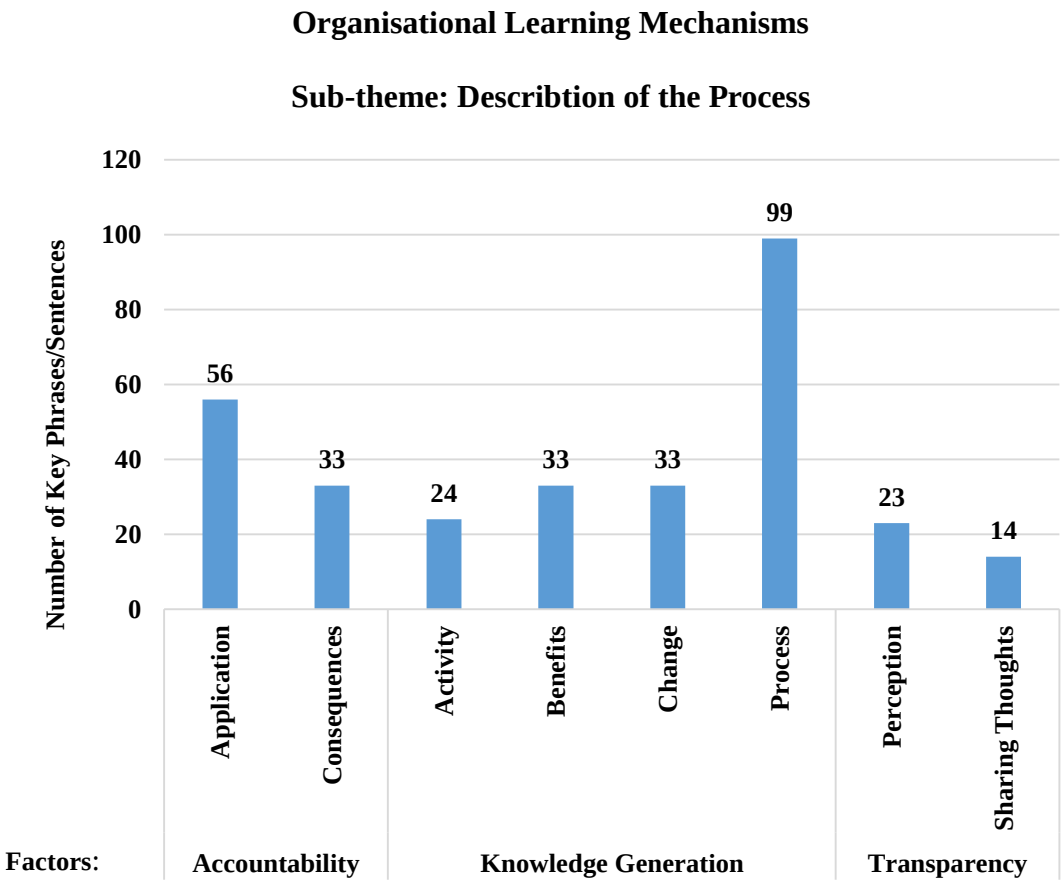

Figure 5: Theme: OLMs Sub-theme: Description of the Process

OLMs theme's sub-theme: efficiency of the process was linked to three factors: challenges, suggestions for improvement and training as shown in figure 6. Challenges and suggestions for improvement sub-factors contained large amount of displayed evidence.

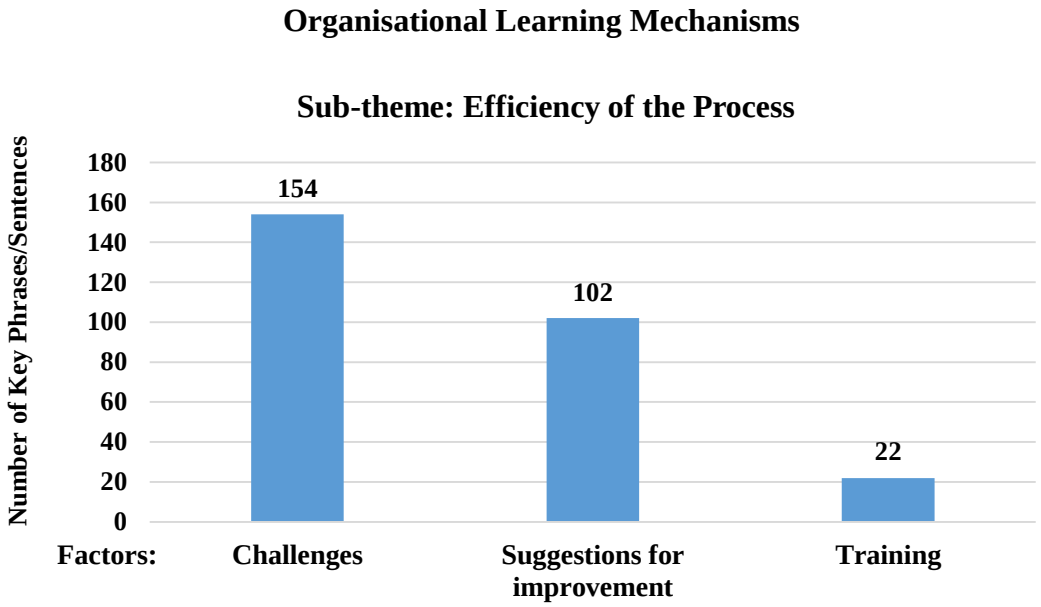

Figure 6: Theme: OLMs Sub-theme: Efficiency of the Process

Sixth Phase: Report production. Format for displaying the findings and chapter of discussion was strongly influenced by four dominant authors in learning from projects field, such as Swan et al. (2010), who had been citated 135 times, Julian (2008), citated by 114 authors and authors such as Lipshitz et. al. (2002), Lipshitz and Popper (2000), who studied cultures affect on OL through OL values perspective. Lipshitz et al. (2002) had been citated by 331 times, Lipshitz and Popper (2000) had been citated by 190 authors. It was decided to adopt Julian (2008) finding representation format, when objectives, as sub-themes, were linked to each theme and its factor findings.

4.4 Methodological Limitations

Scholar literature noted few possible limitations of the research such as difficulties to an access rich data, its interpretation, time limitations, generalisability (Sounders et al., 2009), limited sample size, use of purpose sampling method (Neuman, 2005) and single design case study (Yin, 2003). Each of these limitations were considered. Limitation in relation to access to the rich data and its interpretation was considered, but was excluded as this researcher had deep understanding of "Company X's" OLMs, its steps, had full access to generated data and knowledgeable experts with the rich data. Time limitation also was excluded as documentation collection and analysis were conducted during last year. Limited generalisability of the research findings and the conclusion from single company was noted. However, this researcher's aim was not to generalise but to provide insight information about the specific "Company X's" LLCP. Therefore this limitation was also excluded. Limitation from only 7 interviews was acknowledged. However, after 6 interviews it was noticed, that the new themes were not emerging anymore and no new rich data was received. The data saturation phase was reached. Last interview confirmed the previous conclusion. Therefore this limitation was also excluded. Use of purpose sampling method as a limitation also was considered. This limitation was eliminated by selecting the experts with the rich data. Single design case study as last possible limitation was considered. Yin (2014, p. 16) noted that "the boundaries between the phenomenon and context may not be clearly evident". According to his view: multiple case studies should be selected and single case study should be avoided. But this option was not available to this researcher. Single case study was successfully used by various authors such as Osipova and Ericksson (2013), Rhodes and Dawson (2013), Espedal (2008) and Lipshitz and Popper (2000). Use of holistic single design case study was accepted as this study limitation.

Chapter 5 – Narrative Case Study

Research will use theoretical concepts of Crossan's et al. (1999), Nonaka's and Takeuchi's (1995) and Pemberton's and Stonehouse's (2000) mentioned in the literature review and will link them to "Company' X" practice. Knowledge generation from projects, post project reviews, after action reviews and concepts of organisational routines and OLMs from literature review will be linked to "Company X" implemented lessons learned initiative. This initiative contains of two separate processes, LLCP and lessons learned application. Research explores only LLCP: how does "Company X" generate and gather its knowledge from "Contract Z" team individuals, their accumulated experiences. Term "knowledge" is linked to company used term "lessons learned" and the situational context is linked to "Contract Z" environment". Further, the company's name is anonymised and is referred to as "Company X".

5.1 Background of the Semi-State Public Organisation

In 1998, Action Group was formed to support the Irish government commitment towards public transport projects such as reduction of Dublin traffic congestion. "Company X" was one of the involved parties to support this initiative. In 2001, the "Company X" became part of new organization, which was established under Transport (Railway Infrastructure) Act, 2001 (Government of Ireland, 2001). The new organization, a state agency, was responsible of specific type of public transport project implementation. "Company X" was responsible for supervision of various construction projects and compliance with legislative and regulative requirements. Construction works were carried out by awarded construction companies. In the August 2015, the agency was transformed to a semi-state public sector agency. This meant that "Company X" is project based agency who works in the construction industry.

5.2 Organisational Structure

"Company X" has matrix organisational structure, which allows it effectively manage its projects. All its resources are highly independent professionals. LLCP is carried out by one of "Company' X's" directorates', which contains of various departmental functions e.g. Quality Assurance through the Quality department, Design function through the Utilities and Structural Design. Members from departmental functions are included in the each project team. This mean that the project work is organised through cross functional team members. Project team members are varying from project to project, but involved functions are constant. This mean, that these members are part of multiple communities of practice: their departmental function and project team (Julian, 2008). This also lead to reporting two managers: functional and project, that itself could be a challenge.

5.3 Background of LLCP

According with "Company X" lessons learned guideline (Company X, 2007, p. 2), the LLCP, as management initiative, was implemented in March 2007 towards end of every project. LLCP was implemented as part of a continuous improvement to discover the root causes of problems (Company X, 2007, p. 2). During LLCP project team's aim was to look for answers on following questions: "What worked well – or didn't work well – either for this project or for the project team? What needs to be done over or differently? What surprises did the team have to deal with? What project circumstances were not anticipated? Were the project goals attained? If not, what changes need to be made to meet goals in the future?" (Company X, 2007, p. 2).

The first LLCP was conducted in relation to three completed contracts or one project. LLCP was guided by a project manager. As a result 389 lessons were collected and forwarded to Quality manager for processing and recording. In 2011, the newly approved legislation introduced new requirement: compliance with "Project Management Guidelines for Projects Funded by the National Transport Authority (Up to €20 Million in Value)". As a result, the "Company X" needed to follow the National Transport Authority (NTA) Funded Project Life Cycle Phases according with figure 7 (National Transport Authority, 2011, p. 4).

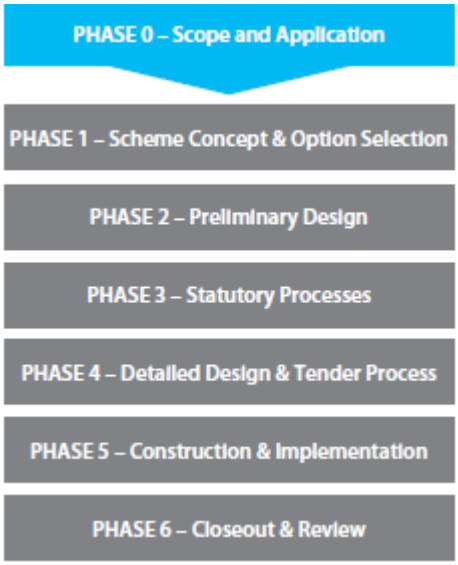

Figure 7: Phases of an NTA – Funded Project Lifecycle

Adopted from National Transport Authority (2011, p. 4).

LLCP were slightly amended NTA phases were incorporated as a mandatory field. LLCP conduction was part of NTA phase 6 - closeout and review. Recent, new organisational status change, from state to a semi-state public sector agency, had brought a change in company's structure, some departments were re-structured requiring stricter requirements to demonstrate that lessons from previous projects had been considered, applied to ensure compliance with Common Appraisal Framework for Transport Projects and Programmes

2009. This caused the need to illustrate process transparency and accountability. As result, the lessons learned collection report production, as a formal record, was included in the LLCP. Further, the application process was fully changed, from being individual orientated to being orientated to the particular project and departmental functions. This meant formal introduction of the lessons learned application process, and formal report generation. In the future each new project team will be asked to answer two questions i.e. which lessons are applicable to this project? How relevant lessons will be applied to this project? This process examination was excluded from research scope due the lack of sufficient data to reduce any possible threats to this research validity (Robson, 2002).

At the moment "Company X" holds the 970 lessons, on its Quality Management Systems (QMS) intranet site, from six projects or eight contracts, including the lessons from the "Contract Z". The collection reports were stored on Quality department intranet site, in lessons learned folder. Further, Quality departmental function, which contained of two employees and Quality manager, took over the process facilitation to proceed with tasks of coordinating the communication processes, organising and minuting the meetings, following up the required actions, gathering and combining individual submissions, seeking formal approval of generated lessons, publishing the lessons collection report and adding new lessons into current database. Conduction of LLCP by the neutral party helps to speed up the process and to improve the atmosphere at the workshops. However, involved functions remain responsible for their lesson's content.

5.4 Description of LLCP

Documentation analysis allows to identify LLCP stages conducted to “Contract Z” and as illustrated in Figure 8:-

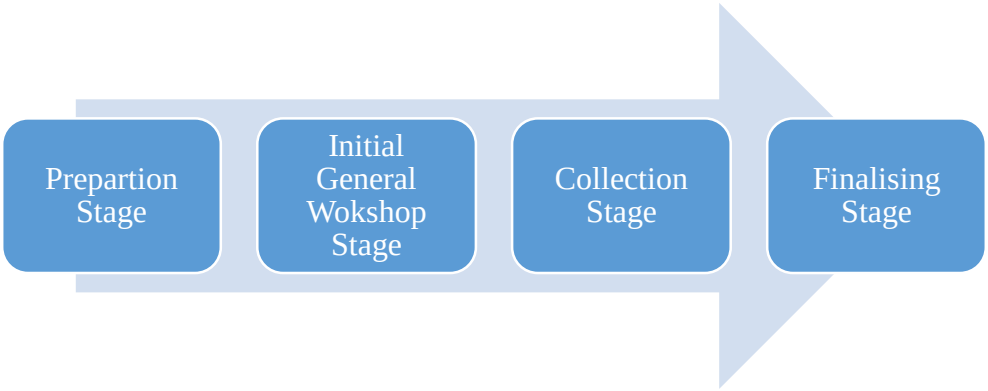

Figure 8: LLCP of “Contract Z”

- **Preparation Stage**

On the 20th January 2016, “Contract Z” LLCP was initiated by Quality manager after the agreement with project and contract manager. After the approval of the participation list, this researcher, member of Quality team, issued the 26 invitations to 12 functions, with request to attend initial general meeting, as illustrated in Table 11.

Table 11: Number of Invitations Issued per Function

Function	Invitees
Contract & Project Management	3
Architecture	1
Drawing Control	1
Environmental	3
Health & Safety	2
Public Relations	1
Site Construction	5
Traffic	2
Project Services Group Function	
Planning	1
Commercial	2
Quality	2

Function	Invitees
Design Function	
Structural Design	1
Utilities Design	2

The participants were asked to contribute their function's lessons by filling the issued spreadsheet with four columns: reference, driving event, lessons learned and discipline. Reference columns contained lessons sequential number, driving event column referred to a description of situational context of the lesson, the lessons learned column included suggested action for improvement and a discipline column referred to a relevant dispute area. Meeting invitations indicated, that invitees were given month and six days to submit their draft lessons to the member of the Quality function.

- **Initial General Workshop Stage**

Completion of preparation stage indicated the beginning of the next stage. Meeting, was held on 26th February, 2016, and it was attended by less than half of invited participants. Only twelve employees attended the meeting from seven departments. Employees from Planning, Utilities, Drawing Control, Traffic functions did not attend the meeting. Public Relations department was excluded from this process as requested. Their suggestions had been incorporated through the different communications channel. According to the meeting minutes, this workshop aim was to outline the purpose of the process: build up a comprehensive list of lessons learned from "Contract Z" to be added to the existing database of Project Lessons Learned, and to establish suitable lessons collection method. Participants was also informed about new, formal lessons learned application process implementation at the beginning of the 2016. It was noted that the future projects teams will be asked to demonstrate these lessons application where relevant. This resulted in a decision to conduct three mini workshops by common focus groups: Project Services

Group, which included Risk, Planning, Commercial and Quality functions, Site Construction team, which contained of members of South and North Side site engineers. The third focus group included members of Health and Safety, Environmental, Architecture, Drawing Control, Structural and Utilities Design.

- **Collection Stage**

Collection stage contained of collaboration activities of gathering valuable lessons for a future project purposes. Workshops were used as a platform for focus group discussions. During three month period five mini workshops, as illustrated in figure 9, were held instead of three as previously planned.

Figure 9 : LLCP Collection Stage

Members of Structural and Utilities Design functions did not attended workshop in April. This was the reason why separate workshop was held on 20th June 2016. Commercial team submitted large number of draft lessons, therefore the additional workshop was scheduled. In total 26 employees contributed during this stage. By contributions this researcher meant an actual participation during the initial general meeting, mini workshops or through their submissions. Figure 10 showed high level of functional

management involvement 11 managers contributed during this stage.

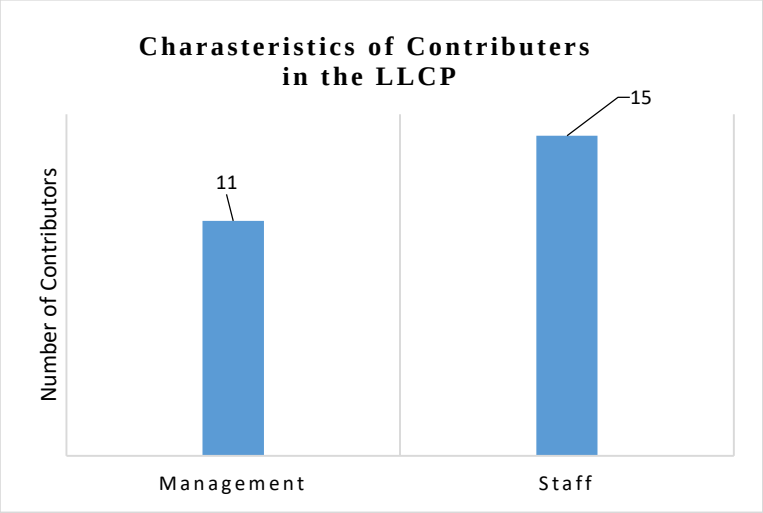

Figure 10: Characteristics of Contributors in the LLCP

Invitees of these workshops were asked to submit their draft lessons prior the workshops. At the first workshop, it was noted that 12 lessons were recorded in the contractual database, Cemar, and needed to be included in the LLCP. During the collection stage participants in various instances were asked to submit their suggestions, draft lessons, or amend the submitted lessons through e-mail or available intranet facility. Submitted lessons were discussed during the workshops. The owner of the draft lesson was asked to explain why this lesson was useful for future projects by providing examples of past events, including what decision was made at the time and what was the outcome. Delivery of voluntary explanations aiming to provide a better understanding of the situational context were clear example of process transparency, integrity and issue orientation value application. Everyone at the meetings was able to express and share their thoughts regardless of rank or grade (Lipshitz and Popper, 2000). Owner of draft lessons was responsible for conduction of necessary amendments after the workshops. All the actions after the meetings were followed. This stage was completed once the content of each lesson were agreed by using inquiry value and overlapping lessons were combined and

submitted to Quality function for recording purposes.

- **Finalising Stage**

Finalising stage included final activities such as adding new lessons to current project lessons learned database, publishing lessons collection report after formal contract manager approval. This report was a formal record of the identified, collected, shared and transferred lessons learned from "Contract Z". This stage was completed on 18th October 2016: the report and 116 lessons were published. These lessons were relevant to three NTA project phases as illustrated in Figure 12. Phase four and five were most applicable to these lessons. Seventy-six lessons were applicable to phase four and thirty-eight lessons to phase five.

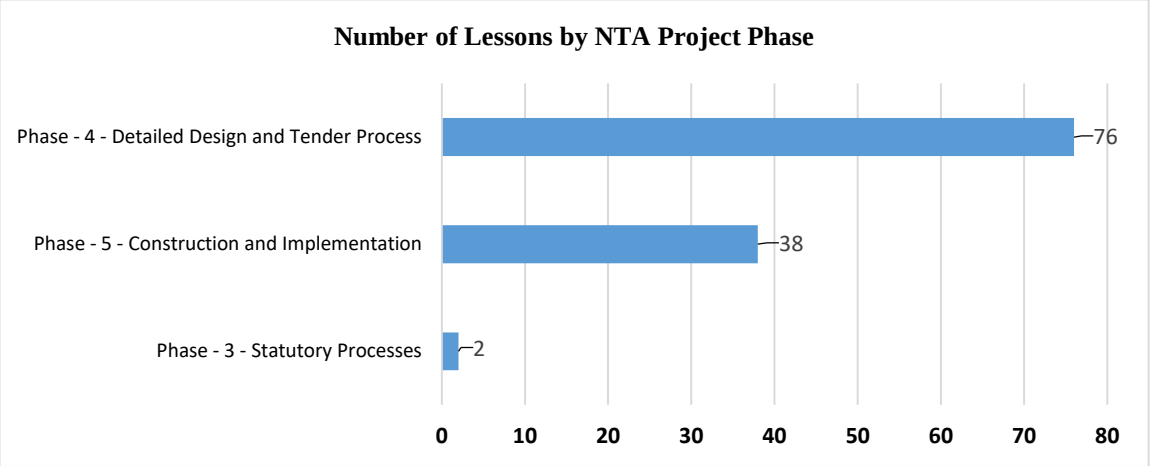

Figure 12: Number of Lessons by NTA Project Phase

Figure 13 showed, that eighty three percent of new lessons fell under design discipline, ten percent belonged to contract management and seven percent to other disciplines such as Commercial, Health and Safety, Environment, and Project Management.

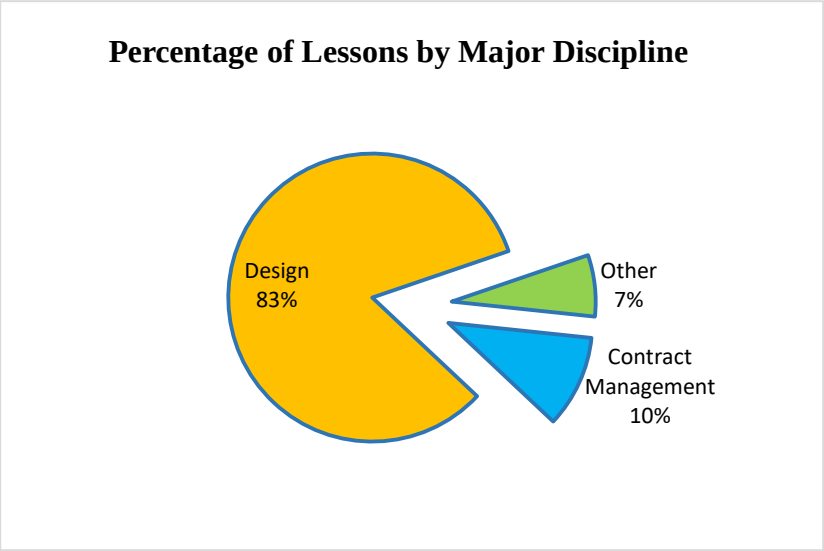

Figure 13: Percentage of Lessons by Major Discipline

Project team was notified by e-mail that lessons have been added and were available through the database on the QMS intranet site.

Before this researcher moves to analysis and discussion of the findings it would be benificial to sumarise this chapter. LLCP, as discussed in the literarture review links OL and KM through new knowledge assets creation process. In context of this research through lessons learned generation from projects at its close out and review phase. OL occurrs through LLCP as OLMs as it is applied to all projects. Use of KM occurs through lessons learned database for lessons learned application purposes. Further, LLCP implementation is result of "Company X" aim for continious improvement and recognition of project team capabilities not only reflect on past events, but also bring forward suggestions for improvement in the lessons learned format for future project use. Scholars literature noted, that other project management companies also implemented this initiative, post project reviews, for the same reason (Julian, 2008; Kerzner, 2004; Keegan and Turner, 2001). The content of asked questions and focus on problem insights during LLCP indicates, that LLCP aims for double loop (Balbastre and Moreno-Luzon, 2003;

Kim, 1993; Swieringa and Wierdsma, 1992; Argyris and Schön, 1978) or higher order learning (Espedal, 2008; Senge, 1990).

Further LLCP for "Contract Z" contains four stages. LLCP is initiated by the neutral involved party, Quality departmental function involvement is linked with aim to improve the process efficiency, effectiveness and provide certain structure. The collection stage, through focus workshops, is the main element of LLCP, which required function involvement and cooperation to articulate and code the knowledge (Grover and Davenport, 2001). This is consistent with Wenger, McDermott and Snyder (2002, p. 4) view, that project team, as community of practice, are "in the best position to codify knowledge, because they can combine its tacit and explicit aspects", because during the project life cycle they are living in the same environment, experiencing the similar problems and know the project constraints. They are also looking at the situation through their departmental function narrow prism, therefore collaborative aspect and inquiry are import aspect for reaching the mutual understanding. LLCP completion resulted in the lessons learned and a report generation. Distribution activities were carried through documentation publishing on corporate intranet sites to be used company widely. "Company X's" current practice is in line with 41 construction companies in the United Kingdom who also used an intranet for their lessons distribution purposes (Carrillo et al., 2013).

Chapter 6 - Analysis and Discussion

6.1 Analysis

This section guides the reader through the findings without congesting the text with supporting passages, because each factor finding was concluded from large number of displayed passages. To show this fact few passages supporting each of factor findings were displayed in appendix 3 under each objective, factor heading and relevant finding number. Defined findings for each factor was numbered starting with Finding 1. The easiest way to find the appropriate passages in relation to the finding is to look for relevant objective, then identify under which factor the finding falls. For example, Perception of Culture Factor finding 2 supporting evidence were displayed in appendix 3 under Objective 1, Perception of Culture Factor Finding 2 category. Transcripts of the interviews are not included in this study, but can be provided on a request.

6.1.1 Research Objective 1

How an organisation's culture affect its organisational learning in the knowledge generation context?

6.1.1.1 Perception of Culture Factor

Finding 1:

Most of the respondents agreed that "Company X" culture was orientated towards OL. Although it was noted by some participants, that the learning culture was not naturally developed, but had more imposed nature as additional public sector constraint, because of political pressure: -

Participant 3: the lesson learn is a dictate coming from government: to have good

governance of projects, evidence has to be shown that there is a good governance in the projects. The lesson learned is one of the major aspects to show that yes we are learning from the lessons.

Finding 2:

Participants 1 and 2, raised concern about the presence of two different cultures in the company. “Company X” managed two different type of projects, used various management styles and attitudes towards educational training. However, it may be arguable, use their different management projects methods would negatively influence LLCP productivity or submitted lessons quality. This researcher acknowledged that employees who were working in department with both cultures were in less favourable situation as their contribution in the LLCP was mainly based on their good will and commitment:

> **Participant 1:** As the project is coming you want to get lessons learned as best as possible. There can be the attitude from the individual, including myself or the manager it’s gone, but obviously there is still work to do. Don’t be worrying about the past.

This meant that “Company X’s” structure was not encouraging learning from experiences of others. Scholars such as Laycock (2005), Bapuji and Crossan (2004), Dodgson (1993) and Hedberg (1981) noted, the culture is as one of the learning facilitators with positive influence to learning by individuals, which were in line with both research findings. This meant, that the “Company X” culture had potential to be the force, that will influence the learning positively. However, it’s down to the company to maintain the learning friendly environment which allows to generate the new knowledge (Downes and Marchant, 2016; Chong, 2006; Debowski, 2006).

6.1.1.2 Integrity Factor

Finding 1:

Most of the respondents identified occasional need to defend themselves. It was due to need to explain the situational context or individual's sensitivity towards defined lesson content. Particular finding's emphasis were on occasional need to provide wider explanation, more on an exception bases than as a rule. There wasn't any evidence indicating that participants would hold back any useful lessons during the LLCP. Therefore, this finding was supported and consistent with Perception of Culture Factor Finding 1, which noted "Company X's" culture's possibility to positively effect on the individuals feelings, thoughts and behaviours (Popper and Lipshitz, 2000; Schein, 1990), which would further lead to continuous learning i.e. their willingness to provide full and an accurate feedback for the valuable lesson creation (Lipshitz and Popper, 2000).

6.1.1.3 Leadership Factor

Finding 1:

Most of the respondents saw the role of the Quality function as a leader, driver or process facilitator that managed and coordinated the process by prompting for input, gathering all data and producing the database of lessons learned.

Finding 2:

The benefits of the involvement of the Quality function were seen in its capability to add the structure and format to the process and outcomes, to implement improvements to the LLCP, and to decrease the pressure on project team members.

Both findings were consistent with Fong and Yip (2006), Bapuji and Crossan (2004) suggestion to use the neutral party involvement in the knowledge generation process to increase the process productivity. The benefits were acknowledged by participants and Quality departmental function direct involvement during the LLCP were appreciated.

6.1.2 Research Objective 2

What processes are used to generate knowledge and transfer to a repository of organisational memory?

6.1.2.1 Knowledge Generation Factor

Finding 1:

All respondents agreed, that LLCP was the reflection on past events: what worked and what did not. Mostly it was about conducted mistakes during the contract execution process. The positive reflection was not excluded, mostly it was a diplomatic way to acknowledge project success moments. The finding agreed with Swan's et al. (2010), Fong's and Yip's (2006), Easterby-Smith's (1997) and Dodgson's (1993) recommendations regarding learning from both type of experiences i.e. a positive and a negative, which were in line with "Company X" current practice and the finding.

Finding 2:

Respondents identified five LLCP steps including process initiation by somebody, followed by contribution through excel spreadsheets, workshops, leading to task assignments completion, and quality function activities (lessons learned publishing and distribution). This finding is in line with Nonaka's and Takeuchi's (1995) SECI model of knowledge generation and conversation from tacit to explicit and explicit to an

additional explicit form of knowledge (Lee and Kelkar, 2013; Grover and Davenport, 2001; Marwick, 2001). The lessons drafting process contained of tacit "know-how knowledge" conversion to explicit "what-to-do knowledge" through externalisation. Combination process contained of collaboration process though transparency, integrity, inquiry and issue orientation values and lessons publishing in the organisational repository (Nonaka and Takeuchi, 1995; Nonaka, 1994).

Finding 3: Evidence identified that there was no significant change in the LLCP. Although, there had been positive shift in the process through ownership taken by Quality function and process improvements such as a certain structure application to the workshops. Most of respondents noted, that LLCP had become more customer friendly, process orientated and positive. Finding is in line with Wang (2013) and Azmi (2008), who saw the OL as continuous process, therefore "Company X's" process positive change is result of continuous improvement.

6.1.2.2 Transparency Factor

Finding 1:

All respondents' perceived LLCP as transparent due to its openness and possibility to contribute at various stages in the process. All respondents were able, without hesitation, to explain the aim, purpose and benefits of LLCP. The aim was, as established in Knowledge Generation Factor Finding 1: reflection from experience to achieve the process benefits: the future projects continuous improvement. This finding is in line with view of Julian (2008), Kotnour and Vergopia (2005), Bapuji and Crossan (2004) and Von Zedwitz (2002), that the continuous learning could advance company's performance through continuous improvement. Further, openness, trust, commitment and professional

development are recognized as mandatory elements for successful lessons sharing and avoidance of defensive routine application (Julian, 2008; Hult et al., 2000).

Finding 2:

The majority of the respondents noted that it was easy to share their thoughts during the process. This is in line with Lipshitz and Popper (2000) transparency definition. Further, transparency is one of mandatory elements of continuous learning according with values hierarchy of a learning culture (Popper and Lipshitz, 2000). This could possibly indicate, that the company was moving in a right direction, as efficient methods are used, since the transparency value presence is acknowledged in both findings.

6.1.2.3 Accountability Factor

Consequences Sub-factor

Finding 1:

LLCP was used to all projects at its closing phase and all respondents acknowledged the need to continue this process. This finding supports Brady and Davies (2004, p. 1605) view that: "performance can be increased through exploitative learning because firms undertake 'similar' categories of projects in mature or new product market, involving repeatable and predictable patterns or activities".

Finding 2:

Most of respondents saw the consequences as in waste of time, money and frustration of repeated mistakes. However, some of the respondents thought there was no consequences, because mistakes were repeated.

The findings 1 and 2 are in line with Lipshitz's and Popper's (2000, p. 348) accountabilities' definition's first part: "assuming responsibility for learning". Acknowledgement of need for learning from experiences indicates "Company X's" willingness to improve and take responsibility for its resource actions due to professionals' capabilities and knowledge to make the conscious decisions by selecting relevant lessons (Fong and Yip, 2006).

Application Sub-factor

Finding 1:

Most of respondents saw the need for lessons application, but they were not aware of existence of a formal lessons learned implementation process. According to Participant 3, this process were new and was implemented only this year.

Finding 2:

Evidence from most of the responses illustrated the presence of informal application practice. It was about conscious decision making to either take or not take into account current lessons.

The Findings 1 and 2 are in line with Lipshitz's and Popper's (2000, p. 348) accountabilities' definition's second part: taking responsibility "for implementing lessons learned". "Company X" is taking the first steps towards application process improvement through SECI model internalisation in relation to future projects (Nonaka and Takeuchi, 1995), including them as a part of organisational routine (Julian, 2008; Nonaka and Konno, 1998). But how effective and long living this process will be, the future will determine.

6.1.3 Research Objective 3

What is the knowledge collection process efficiency?

6.1.3.1 Training Factor

Finding 1:

Some respondents highlighted the "Company X's" intensive focus on its employee's professional development and its upskilling by encouraging learning through an internal and external knowledge: lunch talks, seminars and courses. Company-wide CPD training programme and Project Management and Development (PM&D) reviews were main individual development enhancement tools as their aim was to positively enhance desired mind-set creation to successfully implement knowledge management initiatives, including LLCP (Chong, 2006; Yahua and Goh, 2012). Scholars argued that only highly knowledgeable professionals are able to generate the knowledge upon high quality standard (Chong, 2006). Active knowledge sharing through lunch talks may make this knowledge practical and relevant to the situation or a role (Downes and Marchant, 2016; Islam, Kunifuji, Miura and Hayama, 2011; Kane et al., 2010).

Finding 2:

Employees on secondment were excluded from training offers although training opportunities were implemented company-wide. Scholar literature doesn't confirm or disagree with the finding 2. Relevant research results are not available for analysis, therefore future research would be highly appreciated.

6.1.3.2 Challenges Factor

Finding 1:

Some respondents noted, a need for top management support to recognize LLCP as priority for company, similar to PM&D process. This finding is line with Julian (2008), Chinowsky and Carrillo (2007), Antoni et al. (2005), who noted that successful knowledge sharing process requires the management support and commitment. Further, Chong (2006) and Chong and Choi (2005) link management support with creation of knowledge friendly culture and reduction of organisational challenges. Research about private construction project based companies agrees with finding as it was noted, that a categorisation as a low priority task may lead to process participant's resentment towards sharing, participation and ultimately a quality of lessons learned (Julian, 2008; Chinowsky and Carrilo, 2007; Antoni, et al., 2005). Research in relation to this subject in public sector construction project management companies has not been conducted, but would be beneficial.

Finding 2:

Most of respondents noted high possibility that some of the lessons context have been forgotten, if the lesson was not captured during the project execution process. This meant, that the opportunity to capture the knowledge was missed. Participants 1 and 2, linked this issue to the fact, that LLCP was seen as close out document with activities being carried out at the end of the project. Similar finding was conducted by Brady and Davies (2004), who also highlighted the importance of good timing. LLCP conduction at the end of the project includes the risk of missing opportunity to collect valuable knowledge, which obviously may leave to recurrence of avoidable mistakes. Brady and Davies (2004)

link this fact with decreased participants motivation and lack of time. However, too early process initiation may have the similar impact as noted by **Participant 3**:-

> If you come in at the wrong stage at the project when people are raw and blaming each other or rest of it. Yes, there is barrier there……..If you pick the correct stage when the lesson have been corrected and everybody is feeling little bit more out it. So the barrier may be to be chosen the wrong stage.

Therefore, it may be more useful to conduct at least two cuts of these processes during the project. This is in line with Suggestions for Improvement Factor Finding 1.

Finding 3:

Most of respondents highlighted the importance to consider the situational context in relation to lessons interpretation. It was noted, that in most cases there were a reason behind why the lessons were not learned or why certain decisions were made:

> **Participant 6:** For example, the issue in the "Contract Z", we selected the particular contract strategy, because of the pressure on programme. It was massive pressure from "Stakeholder B" at that time to get this works done and dusted, quickly, and off the streets quickly, therefore we have to take the particular approach. That may be, if you had the year or two years on the street, may be you have totally different approach. It's suppose the putting that decision in the context.

Finding is in line with Eliufoo (2008, p. 322), who acknowledged the same challenge, where context in which it was used was defined as an "essential component of knowledge". He noted that each construction project had their own particular, unique context and this created the challenge itself. This researcher also agrees, that the project team under these circumstances may be pressured to settle for actions which "produce quickest acceptable outcome instead" instead of "the optimal outcomes in the long term" (Swan et al., 2010, p. 340).

Finding 4:

Most of respondents identified requirement to create the lessons learned in the particular format, with correct English, correctly describing situational context, which was marked as driving event column in the process, including both positives and negatives, but excluding any blame allocation. This was seen as possibility to improve the use of integrity value. Finding is in line with Eliufoo (2008), Julian (2008), Newell et al. (2006), and Von Krogh, Ichijo and Nonaka (2000), who agreed that knowledge codification activities may be additional challenge in organisational learning, because of relevant lessons need to reach the new project team at the right time (Tzortzaki and Mihiotis, 2014). Further it also agrees with Lipshitz and Popper (2000) OL values as they enhanced this process successful implementation.

Finding 5:

Some respondents noted need to overcome process sensitivity because of lessons nature to capture learning from mistakes. This is in line with Julian (2008), who also noted construction project's sensitive nature link with participants fear to publicly admit their errors made.

Finding 6:

Some respondents raised concern of possible challenges in relation to this process extension to stakeholders, mainly being concerned about the potential collection, the lessons learned, or a formal feedback format, questionnaire. However, Participant 2 highlighted the need for evaluation of received responses to ensure alignment with company's processes and constraints, because of diverse needs and expectations of different stakeholders. Scholars mainly link this aspect to different value systems or

conflicting interests (Mathur et al., 2008; Olander, 2007; McAdam et al., 2005; Thomson et al., 2003). Collaboration may be ideal platform for building the trust for external knowledge sharing, improving the current practices while generating new knowledge and getting stakeholders to buy in (Mathur et al., 2008; Greenwood, 2007; Gao and Zhang, 2006; O'Dwyer, 2005; Healy, 1997; Harashima, 1995). But these social interactions definitely need to bring positive changes into stakeholders' life's (Dey, 2007).

Finding 7:

The majority of the participants were not aware of the lessons learned location. The guesses were made, that they could be stored somewhere on the intranet under Quality department. No sufficient evidence was found, why they were not aware of the lessons learned location, as they had been part of this process in a few instances. Literature argued about the best storing location for lessons learned dissemination. Some authors such as Julian (2008), Newell et al., (2006) and Kotnour (2000) saw the database on intranet site as suitable method for lesson distribution. However, Fong and Yip (2006) disagreed and indicated e-mail or written document as better method to be used. The "Company X" is currently using both methods: the database and the formal record, the lessons learned report. This challenge may be overcome only through Suggestions for Improvement Factor Findings 2 and 3 implementation.

6.1.3.3 Suggestions for Improvement Factor

Finding 1:

Some of the respondents highlighted the need for LLCP conduction on continuous bases: collecting them during the project execution process. Suggestion was made to add some additional lessons learned workshops or ask contract team members to take notes during

the project life cycle. It was evident from some interviews that this practice was already in place by some of the functions. However, there was no sufficient evidence indicating how widely this practice was spread through other projects and team members. Fong and Yip (2006) conclusion is in line with this researcher's finding, that continuous lessons recording may help to preserve and retain the useful knowledge. This suggestions implementation would allow to preserve the value of individual's owned tacit knowledge (Downes and Marchant, 2016; Debowski, 2006; Nonaka, 1994).

Finding 2:

Nearly all of participants indicated need to improve lessons learned usability by formalising this process. Finding is in line with LLCP aim for continuous improvement by producing useful, needed lessons, which included value creation for end users and for "Company X" (Grover and Davenport, 2001) and by using current knowledge assets as guide for further actions: conscious decision making (Brady and Davies, 2004).

Finding 3:

Some of the participants saw the need for LLCP advertisement through SECI model internalisation activities (Nonaka and Takeuchi, 1995) such as lunch time talks, pop quiz or spot prize competitions (Lee and Kelkar, 2013). Advertisement importance is also highlighted by Chinowsky and Carrillo, (2007) and Fong and Yip (2006) as this may lead to greater process effectiveness and better outcomes. The process advertisement may also influence the learning culture, process participant's attitude towards perception of lesson learned, seeing it as part of their role. Although the individuals' attitude change would be slow process. This was not the case at the moment:

> **Participant 2:** For some reason. The other members of my team would not see it as being part of their role. It a tough one.

However, there was no evidence found proving that this would actually happen in the "Company X", therefore further research will be beneficial.

Finding 4:

All respondents agreed, that there was a need to gather stakeholder's thoughts about the contract execution process to use the provided opportunity for improvement. This is in line with El-Gohary et al. (2006), who noted importance to capture stakeholder inputs. Participant 6 provides an example illustrating clearly the possible advantages:

> **Participant 6:** During the "Contract Z", we included in the procurement process …….. and we brought them in and they became part of the team for doing the assessment of tender submissions and everything. It worked very well. Actually they were very constructive. They knew, they have to work in procurement structures. When we got to the construction stage we have already their buy in immediately, because they are part of the process that signed off with this particular contractor.

Although the present literature acknowledged the advantages of key stakeholder engagement such as improved organisational knowledge creation (Greenwood and Kamoche, 2013; Orr, 1996), the method of "incorporation of stakeholders' interests in …….the organisation's social and environmental outcomes" were not specified (Greenwood and Kamoche, 2013, p. 740).

Finding 5:

Most of the respondents thought that lessons content could be improved. But opinions how it may be achieved were not consistent. Most favourable suggestions were: to improve lessons learned sharing and storing methods, lessons learned content, including categorisation and setting out more concrete process deadlines, including process beginning and end date. There were also three very specific suggestions such as selection

of the right people, inclusion of minor works and work requirement amendments in this process. Captured evidence has so many aspects in relation how to improve this process as noted in this finding. The biggest challenge in Grover and Davenport (2001) view was current knowledge assets structuring in end-user friendly format to improve knowledge transaction process, which required lot of effort up front.

This is in line with **Participant 3**:

> At the moment you literally taking a block of text and you are trying to categorise that it make sense out of it. Turning it into lesson. Whatever you can educate everybody to put their lessons in certain format or not and so on I am not sure at that stage. May be with help of application or small bit of software what already broke the lesson into: what was the lesson, what was the categories this lesson in, where do you see it.

6.2 Discussion

The previous section outlined the findings from interviews and linked them to research objectives and scholar's literature. This chapter analyses these findings through learning in the organisation versus learning by organisation, accessibility and application of the current lessons learned, revision of current knowledge assets, and learning in public sector versus learning in private sector companies.

6.4.1 Learning in the Organisation versus Learning by Organisation

"Company X" has various ways of generating the knowledge and learning. The research focus was on LLCP from construction project at its closing phase with aim to full fill legislative requirements and procedural arrangements, which were institutionalised in the lesson learned guideline. The need for this process was directly linked with the wishful outcome, new, valuable knowledge asset, in the form of lesson, generation. LLCP

conduction at project close out and review phase allowed looking at bigger picture, because all processes were nearly completed, all errors were corrected and solved through non-conformance process. This meant, that individual single loop learning had already happened during the project life cycle and the individuals had accumulated sufficient tacit knowledge, which could also be defined as "know-how-knowledge" (Nonaka, 1994) or concrete experience (Kolb, 1984). LLCP itself was not interested in how the individuals or team as community of practice learned within the project. Process, as OLMs, was focused on the two mechanisms of learning in organisation and learning by organisation, consistent with Lipshitz's and Popper's (2000) OLMs understanding. As mechanism of learning in organisation, the process was concerned with two aspects. Firstly, the reflection of past events by asking what happened, why it happened, what can we do differently in the next project? This is in line with Kolb (1984) models of learning from experience observation and reflection element and Shaw and Perkins (1992) OL model reflection element. Secondly, how individuals learn from their mistakes or mistakes of others was not examined. Team discussions were used as platform to collect the articulated knowledge, individual and team insights, in to explicit or "what-to-do knowledge" form (Nonaka, 1994) through the collaborative, focus group workshops by using issue orientation and inquiry value. This was in line with Grover and Davenport (2001) who acknowledged team knowledge sharing as one of the best ways to generate the new, valuable knowledge. As result the new generated lessons were institutionalised, recorded and disseminated through the company's intranet. This meant, that final reports were available and accessible company-wide. Generated lessons from "Contract Z" were added to current knowledge assets to existing 854 lessons to be taken into account by future project teams. "Company X's" implemented LLCP is similar to models described and suggested by Bapuji and Crossan (2004) feedforward process, Pemberton and

Stonehouse (2000) knowledge creation through KM tool application, Popper and Lipshitz (1998) OLMs and Nonaka and Takeuchi (1995) SECI model of knowledge generation, externalisation and combination processes. Therefore LLCP, which contained of four stages, may be defined by Popper and Lipshitz (1998) OLMs definition. OLMs as "institutionalized structural and procedural arrangements that allowed organisations to systematically collect, analyse, store, disseminate and use information relevant to performance of the organisation and its members" (Popper and Lipshitz, 1998, p. 170). This researcher acknowledged LLCP effectiveness and put in effort to collect these lessons, resource and time wise. The knowledge sharing process is democratic and open, everyone may share their thoughts, and process is flexible, which allows contributing during any stage.

6.4.2 Accessibility and Application of the Current Lessons Learned

The total number of 970 lessons were recorded in the database, as a knowledge "who knows what" (Zou, 2004), and were available to be used. Were they widely used? Research findings found, that most the respondents hesitated to discuss the lessons accessibility as they were not aware of exact location, even though they have been involved in LLCP few times. Some participants would use e-mail search facility or go to the dedicated project location for lessons learned. It was evident, that the lessons were read and used, when individuals were willing to put in effort to find them. The previous lessons application existed in an informal form and its usage was dependent from individual willingness, commitment, project manager or contract manager attitude towards previous lessons (Senaratne and Bacic, 2015; Espedal, 2008). The need to look at previous lessons at the present was not seen as part of their role and therefore some changes in the "Company X's" culture may be beneficial. "Company X's" top

management and project management support in relation to formal lessons learned application process roll-out would be essential. The top management support was missing in the “Company X”. It’s arguable, if this support could be easily gained. The formal lessons learned application process implementation could be seen as positive step towards organisational learning from the projects ensuring current knowledge assets, lessons, movement from the company to community of practice and onto individual, as feedback process (Bapuji and Crossan, 2004). Departmental functions member support may be achieved by raising the awareness about the lessons learned reports, database, processes and available support from members of Quality function, which is in line in scholar literature (Chinowsky and Carrillo, 2007; Fong and Yip, 2006). As participants did not know the lessons exact location the guess was made. Quality functions intranet site were made as obvious guess therefore it could be beneficial if reports and the database would be in the same location to exclude the confusion. This suggestion may be supported by Carrillo et al. (2013) research in relation to 41 construction companies in the United Kingdom, which also intensively used the intranet facility for storing, transferring and distribution of their lessons.

6.4.3 Revision of Current Knowledge Assets

According with Kamsu Foguem et al. (2008) and Lipshitz and Popper (2000) lessons learned should be useful and correct knowledge that was created through application of integrity, transparency, inquiry and issue orientation values. In this sense, the lessons stored in the database were still correct. Should all of these lessons be considered at new project preparation phase? It could be arguable. This researcher did not see any evidence that there is some method implemented for selecting the valuable lessons for the next project. It’s highly possible that this task will be part of lessons learned application

process. But if selection and categorisation will be done by Quality function, then need for resources and technical expertise should be considered. Further research may benefit from exploration of this aspect. Benefits may be enjoyed by the company, if the lesson was delivered to right people and in right time (Tzortzaki and Mihiotis, 2014). However, usefulness should be linked with the need for revision of existing lessons. Do all of these lessons still create the value for projects and the company? It's arguable. As noted by Lipshitz et al. (2002, p. 80) "lessons that seems worthwhile may turn out to be seeds of disaster, because the value of knowledge may increase or decrease with time". Dismissing this important process could leave to learning incompetence (Bhatt, 2001). Knowledge usefulness for limited time had been noted before by various knowledge management authors: Dodgson (1993) and Hedberg (1981). However, there isn't any research providing the answer to this question as noted by Bapuji and Crossan, (2004). Bhatt (2001) suggested lessons validation to use as a tool for outdated lessons elimination. This process were defined as "unlearning" (Hedberg, 1981). However, it may be arguable, who will be in the best position to conduct this task, who will develop the selection criteria and put the weighting for each lesson, considering that project types, methods used, and level of project constraints differ greatly. Since review process will be very time and resource consuming, inclusion of project or contract work requirement amendments may be the alternative. This may be the possible area for the further research.

6.4.4 Learning in Public Sector versus Learning in Private Sector Company

Some scholars noted difference between public and private companies in their diverse mission and goals. Public sector companies' focus was towards value creation for citizens and stakeholders (Rashman et al., 2009; Moore, 1995). Private sector companies' focus was on competitive advantage. Common element, for both type of companies, was

orientation towards the continuous improvement. It was consistent with this researcher findings and current literature (Julian, 2008; Kotnour and Vergopia, 2005; Kerzner, 2004; Von Zedwitz, 2002; Lipshitz and Popper, 2000). This also meant that company's direct focus was on OL. Its culture had facilitation function through opportunity to enhance the learning (Laycock, 2005). Research findings indicated that "Company X" culture is orientated to learning through professional development and from experience of others: projects, by using OL values as per Lipshitz's and Popper's (2000) definitions. The findings and present researches also highlighted, that public sector companies' had to operate in stricter framework, with more complex constraints (Rashman et al., 2009; Hartley and Skelcher, 2008; Finger and Brand, 1999). However, knowledge creation steps may vary from one company to other.

Findings indicated some common elements with private sector project based (Koskinen, 2012; Söderlund, 2008; Scarbrough et al., 2004) and construction project orientated companies (Shokri-Ghasabeh and Chileshe, 2014; Osipova and Eriksson, 2013; Keeble Kululanga, 2009; Julian, 2008; Yin et al., 2008) independently of location of the country. Common elements are "Company X's" challenges such as the situational or a time pressure, process conduction at the project close-out phase, what lead to possibility that some lessons were not captured because they had been forgotten, and the process sensitivity as LLCP included mostly learning from failures. Common element is also the method used for conduction such as collaborative workshops with team members. The reason may be because "Company X" is also the project based company with focus on construction project execution.

This study contributes towards better understanding of how a public sector project based company in Ireland learns by generating knowledge in a construction environment

through non-integrated OLMs given the limited amount of studies referring to knowledge generation in the public sector (Rashman et al., 2009). There were no studies combining both elements public sector and learning from construction projects in Ireland.

Chapter 7 – Conclusion

"Company X" LLCP focus was towards continuous improvement, to not only enhance future projects performance efficiency, but also to provide some guidelines, how similar project activities had been carried out before. Findings were consistent with process aim and researches in relation to private construction project based companies (Julian, 2008; Scarbrough et al., 2004). LLCP was conducted through four process stages, which were based on collaboration principle, SECI model (Nonaka and Takeuchi, 1995), and individual experience sharing through Lipshitz and Popper (2000) OL value application. The process transparency facilitated valuable lesson sharing. The process inquiry and issue orientation helped to better understand root causes of certain events through various focus group discussions. There was evidence of integrity value application during the collaboration process. However, the participants of the LLCP felt on occasional need to defend their decisions made during the contract lifecycle. This was related to extensive use of inquiry value (Argyris, 1999) with aim to understand the context of the situation and to record it as precisely as possible for the future use. There was no formal record available to confirm that the lessons learned from "Contract Z" had been considered and applied according with Lipshitz and Popper (2000) accountability value. However, the passages from interviews illustrated, that these lessons had been considered. At the moment the lessons learned application exists as an informal process. Interview and documentation analysis confirmed, that lessons learned formal application process was implemented at the beginning of 2016 and will be applied to the future projects. This record will be available not earlier as next year, as two contracts were slowly moving to the completion phase. LLCP method had not changed with the time. However, the content had improved by reflecting on successes and made mistakes, which were in line with

other scholar literature findings (Swan et al., 2010; Fong and Yip, 2006; Easterby-Smith, 1997; Dodgson, 1993). Participants noted, that inclusion of both aspects had positively influenced workshops atmosphere. It had become friendlier, less blaming game, more process orientated, by specifically using inquiry and issue orientation values. This also meant more effective application of integrity value.

Interview findings indicated "Company X" LLCP efficiency and effectiveness, but highlighted need to overcome lots of internal challenges. The first one was requirement of top management support and commitment to support power of sharing (Chong and Choi, 2005) and the need for LLCP. The LLCP at the moment was highly reliant on project team member's good will. There was no evidence indicating, that there would be any consequences for not participating. Secondly, the process sensitivity was linked to nature of this process as most of gathered lessons were about made mistakes. The findings also illustrated need for some process improvements, which could be beneficial to be considered by "Company X". Storing and sharing method improvements raised the biggest concern. Most of participants were not aware of where the lessons could be find. This led to suggestion for LLCP advertisement company-widely. The other aspect was accessibility, including such as easy search facility, end-user friendly categorisation, and permission issues to ensure that the right people were getting the right information on time without delays (Tzortzaki and Mihiotis, 2014). Taking into account the construction process fast space this aspect would be highly important from efficiency, productivity point of view. Sharing related issues were linked with accountability: taking responsibility for lessons implementation (Lipshitz and Popper, 2000, p. 348), which could be greatly enhanced by formalising this process: pushing people firstly, to read the previous lessons and secondly, to make conscious decision to apply or not. Any form of other distribution may not guarantee these lessons applicability. It was evident that some

members were taking notes during the process on daily bases. This informal practice extension, even possibly institutionalisation to all members of project team could be very valuable for the “Company X”. Findings also indicated, that inclusion of external parties in the lessons generation process could help improve the project process and possibly even overcome some communication barriers. However, the “Company X” would need to weight which of methods, lessons learned or survey format, would be more suitable for it needs.

7.1 Avenues for Further Research

This researcher thought that further research will be beneficial in relation to four areas. Firstly, lessons learned formal application process was newly introduced and its implementation to new contracts was in progress therefore this process examination was excluded from this research. It will be beneficial to examine, if this process implementation led to positive change in participant’s perception about lessons learned consequences. Secondly, it will be beneficial to examine Pemberton and Stonehouse (2000) theoretical model in conjunction with Lipshitz and Popper (2000) organisational learning values. As examination of “Company X’s” structure’s and infrastructure’s interaction was excluded from this study. Thirdly, it will be beneficial to examine accountability values effect on knowledge generation process in relation to construction industry in Ireland. As most of the current studies referred to the US (Jordan et al., 2015; Carrillo et al., 2013; Keeble Kululanga, 2009; Julian, 2008), United Kingdom (Rhodes and Dawson, 2013; Swan et al., 2010; Brady and Davies, 2004), Australia (Gardiner, 2016; Sense, 2007) and China (Fong, 2013; Fong and Yip, 2006). The future study may specifically focus on exploration of large scale errors made during the project to discover possibly new, more valuable insights. Fourthly, most of current studies only highlighted

the possible strengths and weaknesses of stakeholder's involvement in the knowledge generation process. It will be more helpful, if there will be some research conducted about stakeholder's direct involvement in the knowledge generation from projects and successfully implemented methods.

References

Abdul-Rahman, H., Yahya, I. A., Berawi, M. A. and Wah, L. W. (2008) 'Conceptual delay mitigation model using a project learning approach in practice'. *Construction Management and Economics,* 6(1): pp. 15-27.

Antoni, M., Nilsson-Witell, L. and Dahlgaard, J. J. (2005) 'Inter-project improvement in product development'. *International Journal of Quality and Reliability Management*, 22: pp. 876-893.

Argyris, C. (1999) *On organizational learning.* Cambridge, Oxford: Blackwell Publishers.

Argyris, C. and Schön, D. (1978) *Organizational learning: a theory of action perspective*. Reading, MA: Addison-Wesley.

Azmi, F. T. (2008) 'Mapping Learn-Unlearn-Relearn Model Imperatives for Strategic Management'. *European Business Review*, 20(3): pp. 240-259.

Baird, L., Henderson, J. C. and Watts, S. (1997) 'Learning from action: an analysis of the center for army lessons learned (CALL)'. *Human Resource Management*, 36: pp. 385-395.

Balbastre, F. and Moreno-Luzon, M. (2003) 'Self-assessment application and learning in organizations: a special reference to the ontological dimension'. *Total Quality Management and Business Excellence,* 14(3): pp. 367-388.

Bapuji, H. and Crossan, M. (2004) 'From questions to answers: reviewing organizational learning research'. *Management Learning*, 35(4): pp. 397-417.

Bate, S. P. and Robert, G. (2002) 'Knowledge management and communities of practice in the private sector: lessons for modernizing the National Health Service in England and Wales'. *Public Administration,* 80(4): pp. 643-663.

Becerra-Fernandez, I. and Sabherwal, R. (2001) 'Organizational knowledge management: a contingency perspective'. *Journal of Management Information Systems*, 18(1): pp. 23-55.

Beer, M. and Spector, B. (1993) 'Organizational diagnosis: its role in organizational learning'. *Journal of Counselling and Development*, 71: pp. 642-650.

Bennet, A. and Tomblin, M. S. (2006) ‘A learning network framework for modern organizations: organizational learning, knowledge management and ICT support’. *VINE*, 36(3): pp. 289-303.

Berbegal-Mirabent, J., Sobatè, F. and Cańabate, A. (2012) ‘Brokering knowledge from universities to the marketplace. The role of knowledge transfer offices’. *Management Decision*, 50(7): pp. 1285-1307.

Bhatt, G. D. (2001) ‘Knowledge management in organizations’. *Journal of Knowledge Management*, 5(1): pp. 68-75.

Bird, C. M. (2005) ‘How I stopped dreading and learned to love transcription’. *Qualitative Inquiry*, 11: pp. 226-248.

Bless, C. and Higson-Smith, C. (1995) *Fundamentals of social research methods: an african perspective*. 2nd ed. Kenwyn Juta: Capetown.

Boyatzis, R. E. (1998) *Transforming qualitative information: thematic analysis and code development*. USA: Sage.

Brady, T. and Davies, A. (2004) ‘Building project capabilities: from exploratory to exploitative learning’. *Organization Studies*, 25(9): pp. 1601-1621.

Braun, V. and Clarke, V. (2006) ‘Using thematic analysis in psychology’. *Qualitative Research in Psychology*, 3(2): pp. 77-101.

Bresnen, M., Goussevskaia, A. and Swan, J. (2005) ‘Implementing change in construction project organisations: exploring the interplay between structure and agency’. *Building Research and Information*, 33(6): pp. 547-560.

Brooking, A. (1997) ‘The management of intellectual capital’. *Journal of Long Range Planning*, 30(3): pp. 364-365.

Brown, J. S. and Duguid, P. (1991) ‘Organizational learning and communities-of-practice: Towards a unified view of working, learning and innovation’. *Organizational Science*, 2: pp. 40-57.

Bryman, A. (2001) *Social research methods*. US: Oxford University Press.

Burke, M. (2007) ‘Making choices: research paradigms and information management: practical applications of philosophy in IM research’. *Library Review*, 56(6): pp. 476-84.

Burrell, G. and Morgan, G. (1982*) Sociological paradigms and organisational analysis*. London: Heinemann.

Carrillo, P., Ruikar, K. and Fuller, P. (2013) 'When will we learn? Improving lessons learned practice in construction'. *International Journal of Project Management*, 31: pp. 567-578.

Chinowsky, P. and Carrillo, P. (2007) 'Knowledge management to learning organization connection'. *Journal of Management in Engineering*, 23(3): pp. 122-130.

Choi, B. and Lee, H. (2003) 'An empirical investigation of KM styles and their effect on corporate performance'. *Information and Management*, 40(5): pp. 403-417.

Chong, S. C. (2006) 'KM critical success factors: a comparison of perceived importance versus implementation in Malaysian ICT companies'. *The Learning Organization*, 13(3): pp. 230-256.

Chong, S. C. and Choi, Y. S. (2005) 'Critical factors in the successful implementation of knowledge management'. *Journal of Knowledge Management Practice*, 6(1): pp. 1-21.

Company X (2007) *Lessons Learned Guideline*. Unpublished internal document.

Crossan, M. M., Lane, H. W. and White, R. E. (1999) 'An organizational learning framework: from intuition to institution'. *Academy of Management Review*, 24(3): pp. 522-537.

Cunningham, J. B. and Gerrard, P. (2000) 'Characteristics of well-performing organisations in Singapore'. *Singapore Management Review*, 22(1): pp. 35- 64.

Davenport, T. H., De Long, D. W. and Beers, M. C. (1998) 'Successful knowledge management projects'. *Sloon Management Review*, 39(2): pp. 43-57.

Davenport, T. H. and Prusak, L. (1998) *Working knowledge: how organizations manage what they know*. MA: Boston: Harvard Business School Press.

Debowski, S. (2006) *Knowledge Management*. Milton: Wiley.

Debrah, Y. A. and Ofori, G. (2006) 'Human resource development of professionals in an emerging economy: the case of the Tanzanian construction industry'. *Human Resource Management*, 17(3): pp. 440-463.

DeFillippi, R. (2001) ‘Introduction: project-based learning, reflective practices and learning outcomes’. *Management Learning,* 32(1): pp. 5-10.

Dey, C. (2007) ‘Social accounting at Tradecraft plc: a struggle for the meaning of fair trade’. *Accounting, Auditing and Accountability Journal*, 20(3): pp. 423-445.

DiBella, A., Nevis, E. C. and Gould, J. M. (1996) ‘Understanding organizational capability’. *Journal of Management Studies,* 33: pp. 361-379.

Disterer, G. (2002) ‘Management of project knowledge and experiences’. *Journal of Knowledge Management,* 6(5): pp. 512-520.

Dodgson, M. (1993) ‘Organizational learning: a review of some literatures’. *Organization Studies,* 14(3): pp. 375-394.

Dodgson, M. (1991) ‘Technology learning, technology strategy and competitive pressures’. *British Journal of Management,* 2(3): pp. 132-149.

Downes, T. and Marchant, T. (2016) ‘The extent and effectiveness of knowledge management in Australian community service organizations’. *Journal of Knowledge Management,* 20(1): pp. 49-68.

Easterby-Smith, M. (1997) ‘Disciplines of organizational learning: contributions and critiques’. *Human Relations,* 50(9): pp. 1085-1113.

El-Gohary, N. M., Osman, H. and El-Diraby, T. E. (2006) ‘Stakeholder management for public private partnerships’. *International Journal of Project Management,* 24: pp. 595-604.

Eliufoo, H. (2008) ‘Knowledge creation in construction organisations: a case approach’. *The Learning Organization*, 15(4): pp. 309-325.

Espedal, B. (2008) ‘In the pursuit of understanding how to balance lower and higher order learning in organizations’. *The Journal of Applied Behavioral Science*, 44(3): pp. 365-390.

Feller, J., Parahankangas, A., Smeds, R. and Jaatinen, M. (2013) ‘How companies learn to collaborate: emergence of improved inter-organizational process in R&D alliances’. *Organization Studies*, 34(3): pp. 313-343.

Finger, H. and Brand, S. B. (1999) ‘The concept of the ‘Learning Organization’ applied to the transformation of the public sector: conceptual contributions for theory development in organizational learning and the learning organization. in Easterby-Smith, M., Araujo, L. and Burgoyne, J. (ed) Organizational Learning and the Learning Organization: *Developments in Theory and Practice*. London: Sage.

Fiol, C. M. and Lyles, M. A. (1985) ‘Organizational learning’. *Academy of Management Review,* 10(4): pp. 803-813.

Fong, P. S. W. (2003) ‘Knowledge creation in multidisciplinary project teams: an empirical study of the processes and their dynamic interrelationships’. *International Journal of Project Management,* 21: pp. 479-486.

Fong, P. S. W. and Yip, J. C. H. (2006) ‘An investigative study of the application of lessons learned systems in construction projects’. *Journal for Education in the Built Environment,* 1(2): pp. 27-38.

Gao, S. S. and Zhang, J. J. (2006) ‘Stakeholder engagement, social auditing and corporate sustainability’. *Business Process Management Journal,* 12(6): pp. 722-740.

Girard, J. P. and McIntyre, S. (2010) ‘Knowledge management modelling in public sector organizations a case study’. *International Journal of Public Sector Management,* 23(1): pp. 71-77.

Gardiner, C. M. (2016) ‘Knowledge sharing success and resistance in an engineering department: a case study’. *Journal of Management and Organization,* 22(2): pp. 254-271.

Gobeli, D. H. and Larson, E. W. (1986) ‘Matrix management: more than and fad*’*. *Engineering Management International,* 4: pp. 71-76.

Government of Ireland (2001) *Transport (Railway Infrastructure) Act*. Irish Statute Book: Office of the Attorney General (section 9).

Greenwood, M. (2007) ‘Stakeholder engagement: beyond the myth of corporate responsibility’. *Journal of Business Ethics,* 74(4): pp. 315-327.

Greenwood, M. and Kamoche, K. (2013) ‘Social accounting as stakeholder knowledge appropriation’. *Journal of Management and Governance,* 17(3): pp. 723- 743.

Greiling, D. and Halachmi, A. (2013) ‘Accountability and organizational learning in the public sector’. *Public Performance and Management Review,* 36(3): pp. 380-406.

Grover, V. and Davenport, T. H. (2001) ‘General perspectives on knowledge management: fostering a research agenda’. *Journal of Management Information Systems,* 18(1): pp. 5-21.

Harashima, S. (1995) ‘Environmental dispute resolution process and information exchange’. *Environmental Impact Assessment Review,* 15: pp. 69-80.

Harley, J. and Skelcher, C. (2008) ‘The agenda for public service improvement’. in Harley, J., Skelcher, C., Donaldson, C. and Wallace, M. (ed.) *Managing to improve public services*. Cambridge: Cambridge University Press, pp. 3-23.

Healy, P. (1997) *Collaborative planning; shaping places in fragmented societies*. Basingstoke: Macmilan.

Hedberg, B. (1981) ‘How organizations learn and unlearn’. in Nyström, P. C. and Starbuck, W. H. (ed.) *Handbook of organizational design*. New York: Oxford University Press, pp. 3-27.

Huber, G. P. (1991) ‘Organizational learning: the contributing processes and the literatures’. *Organizational Science,* 2: pp. 88-115.

Hult, G. T. M., Hurley, R. F, Giunipero, L. C. and Nichols, E. L. (2000) ‘Organizational learning in global purchasing: a model and test of internal users and corporate buyers’. *Decision Sciences,* 31(2): pp. 88-115.

Isaacs, W. N. (1993) ‘Taking flight: dialogue, collective thinking and organizational learning’. *Organizational Dynamics,* 22(2): pp. 24-39.

Islam, M. S., Kunifuji, S., Miura, M. and Hayama, T. (2011) ‘Adopting knowledge management in an e-learning system’. *Knowledge Management and E-Learning: An International Journal,* 3(3): pp. 375-398.

Jordan, T., Upright, P. and Gibson, F. (2015) ‘Design-build case study: lessons learned from developing a neighbourhood spray park’. *Journal of Facility Planning, Design and Management,* 3(2): pp. 76-89.

Julian, J. (2008) ‘How project management office leaders facilitate cross-project learning and continuous improvement’. *Project Management Journal,* 39(3): pp. 43-58.

Kakabadse, N. K., Kakabadse, A. and Kouzmin, A. (2003) ‘Reviewing the knowledge management literature: towards a taxonomy’. *Journal of Knowledge Management*, 7(4): pp. 75-91.

Kamsu Foguem, B., Coudert, T., Béler, C. and Geneste, L. (2008) ‘Knowledge formalization in experience feedback processes: an ontology-based approach’. *Computers in Industry,* 59(7): pp. 694-710.

Kane, K., Robinson-Combre, J. and Berge, Z. L. (2010) ‘Tapping into social networking: collaborating enhances both knowledge management and e-learning’. *VINE*, 40(1): pp. 62-70.

Kari, J. (2009) ‘Informational uses of spiritual information: an analysis of messages reportedly transmitted by extra physical means’. *Journal of Information Science*, 35(4): pp. 453-468.

Keeble Kululanga, G. (2009) ‘Construction process improvement through cognitive power under team generative learning’. *Engineering, Construction and Architectural Management,* 16(4): pp. 307-324.

Keegan, A. and Turner, J. R. (2001) ‘Quantity versus Quality in Project-based Learning Practices’. *Management Learning,* 32(1): pp. 77-98.

Kelman, S. (2005) ‘Public management needs help’. *Academy of Management Journal,* 48: pp. 967-969.

Kerzner, H. (2004) *Advanced project management: Best practices on implementation.* 2nd ed. Hoboken, NJ: John Wiley and Sons.

Khan, I. A. (2009) ‘Knowledge groups: a model for creating synergy across in public sector’. *Public Organization Review*, 10(2): pp. 139-152.

Kim, D. H. (1993) ‘The link between individual and organizational learning’. *Sloon Management Review,* 35(1): pp 37-50.

Knight, K. (1977) *Matrix management*. Aldershot: Gower Press.

Knight, L. and Pye, A. (2005) 'Network learning: an empirically derived model of learning by groups of organizations'. *Human Relations*, 58: pp. 369-392.

Kolb, D. (1984) *Experiential learning: experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.

Koskinen, K. U. (2012) 'Organizational learning in project-based companies: a process thinking approach'. *Project Management Journal*, 43(3): pp. 40-49.

Koskinen, K. and Vanharanta, H. (2002) 'The role of tacit knowledge in innovation processes of small technology companies'. *International Journal of Production Economics*, 80: pp. 57-64.

Kotnour, T. (2000) 'Organizational learning practices in the project management environment'. *International Journal of Quality and Reliability Management*, 17(4/5): pp. 393-406.

Kotnour, T. and Vergopia, C. (2005) 'Learning-based project reviews: observations and lessons learned from the Kennedy Space Center'. *Engineering Management Journal*, 17(4): pp. 30-38.

Kuprenas, J. A. (2003) 'Implementation and performance of a matrix organization structure'. *International Journal of Project Management*, 21: pp. 51-62.

Lam, A. (2000) 'Tacit knowledge, organizational learning and societal institutions: an integrated framework'. *Organizational Studies*, 21: pp. 487-513.

Lapadat. J. C. and Lindsay, A. C. (1999) 'Transcription in research and practice: from standardization in technique to interpretive positioning'. *Qualitative Inquiry*, 5: pp. 64-86.

Lave, J. and Wenger, E. (1991) *Situated learning: legitimate peripheral participation*. UK, Cambridge: Cambridge University Press.

Laycock, M. (2005) 'Collaborating to complete: achieving effective knowledge sharing in organizations'. *The Learning Organization*, 12(6): pp. 523-538.

Layder, D. (1998) 'Sociological practice: linking theory and social research'. London: Sage Publications.

Lee, C. S. and Kelkar, R. S. (2013) 'ICT and knowledge management perspectives from the SECI model'. *The Electronic Library,* 31(2): pp. 226-243.

Lindkvist, L. (2004) 'Governing project-based firms: promoting market-like process within hierarchies'. *Journal of Management and Governance,* 8(1): pp. 3-25.

Lindkvist, L., Soderlund, J. and Tell, F. (1998) 'Managing product development projects: on the significance of fountains as deadlines'. *Organization Studies,* 19(6): 931-952.

Lin, Y, Wang, Y. and Kung, L. (2015) 'Influences of cross-functional collaboration and knowledge creation on technology commercialization: evidence from high-tech industries'. *Industrial Marketing Management,* 49: pp. 128-138.

Lipshitz, R. and Popper, M. (2000) 'Organizational learning in a hospital'. *The Journal of Applied Behavioral Science,* 36(3): pp. 345-361.

Lipshitz, R., Popper, M. and Friedman, V. J. (2002) 'A multifacet model of organizational learning'. *The Journal of Applied Behavioral Science,* 38(1): pp. 78-98.

Ma, Z., Huang, Y., Wu, J., Dong, W. and Qi, L. (2014) 'What matters for knowledge sharing in collectivistic cultures? Emperical evidence from China'. *Journal of Knowledge Management,* 18(5): pp. 1004-1019.

Ma, Z., Qi, L. and Wang, K. (2008) 'Knowledge sharing in Chinese construction project teams and its affecting factors'. *Chinese Management Studies,* 2(2): pp. 97-108.

Magnier-Watanabe, R, and Benton, C. (2013) 'Knowledge needs, barriers and enablers for Japanese engineers'. *Knowledge and Process Management,* 20(2): pp. 90-101.

March, J. (1991) 'Exploration and exploitation in organizational learning'. *Organization Science,* 2(1): pp. 71-87.

Marwick, A. D. (2001) 'Knowledge management technology'. *IBM Systems Journal,* 40(4): pp. 814-830.

Mathur, V. N., Price, A. D. F. and Austin, S. (2008) 'Conceptualizing stakeholder engagement in the context of sustainability and its assessment'. *Construction Management and Economics,* 26: pp. 601-609.

McAdam, R., Hazlett, S. and Casey, C. (2005) 'Performance management in the UK public sector: addressing multiple stakeholder complexity'. *International Journal of Public Sector Management,* 18(3): pp. 256-273.

Miles, M. B. and Huberman, M. (1994) *Qualitative data analysis: an expanded sourcebook.* 2nd ed. London: Sage.

Miller, D. (1996) 'A preliminary typology of organizational learning: synthesizing the literature'. *Journal of Management,* 22(3): pp. 485-505.

Miller, L. M. (2015) 'E-health: knowledge generation, value intangibles and intellectual capital'. *International Journal of Healthcare Management*, 8(2): pp. 100-111.

Milne, A. and Larkin, M. (2015) 'Knowledge generation about care-giving in the UK: a critical review of research paradigms'. *Health and Social Care in the Community*, 23(1): pp. 4-13.

Mintzberg, H. (1979) *The structure of organizations*. Englewood Cliffs, NJ: Prentice Hall.

Mohammed, S., Klimoski, R. and Rentsch, J. R. (2000) 'The measurement of team mental models: we have no shared schema'. *Organizational Research Methods*, 3(2): pp. 123-165.

Moore, M. (1995) *Creating public value: strategic management in government*. Cambridge, MA: Harvard University Press.

Morris, M. W. and Moore, P. C. (2000) 'The lessons we (don't) Learn: counterfactual thinking and organizational accountability after a close call'. *Administrative Science Quarterly*, 45(4): 737-765.

National Transport Authority (2011) *Adopted from Project Management Guidelines for projects funded by the National Transport Authority (up to €20 Million in value)* [Online] Available at: https://www.nationaltransport.ie/projects-schemes/transport-projects/ [Accessed 2 March 2017].

Navimipour, N. J. and Charband, Y. (2016) 'Knowledge sharing mechanisms and techniques in project teams: literature review, classification, and current trends'. *Computers in Human Behavior,* 62: pp. 730-742.

Neuman, W. L. (2005) *Social Research Methods*. 6th ed. London: Pearson.

Newell, S., Bresnen, M., Edelman, L., Scarbrough, H. and Swan, J. (2006) 'Sharing knowledge across projects: limits to ICT-led project review practices'. *Management Learning*, 37(2): pp. 167-185.

Newell, S., Edelman, L., Scarborough, H., Swan, J. and Bresnen, M. (2003) ''Best Practice' development and transfer in the NHS: the importance of process as well as product knowledge'. *Health Services Management Research,* 16(1): pp. 1-12.

Nonaka, I. (1994) 'A dynamic theory of organizational knowledge creation'. *Organization Science,* 5(1): pp. 14-37.

Nonaka, I. and Konno, N. (1998) 'The concept of Ba: building a foundation for knowledge creation'. *California Management Review*, 40(3): pp. 40-54.

Nonaka, I. and Takeuchi, H. (1995) *The knowledge-creating company: how Japanese companies create the dynamics of innovation*. New York: Oxford University Press.

Nonaka, I. and Toyama, R. (2003) 'The knowledge – creating theory revised: knowledge creation as a synthesizing process'. *Knowledge Management and Research Practice*, 1(1): pp. 2-10.

Noruzy, A., Dalfard, Azhdari, V. M., Nazari-Shirkouhi, S. and Rezazadeh, A. (2013) 'Relations between transformational leadership, organizational learning, knowledge management, organizational innovation, and organizational performance: an empirical investigation of manufacturing firms'. *The International Journal of Advanced Manufacturing Technology*, 64(5): pp. 1073-1085.

Nutley, S. and Davies, H. (2001) 'Developing organizational learning in the NHS'. *Medical Education*, 35(1): pp. 35-42.

O'Dwyer, B. (2005) 'Stakeholder democracy: challenges and contributions from social accounting'. *Business Ethics: A European Review*, 41(1): pp. 28-41.

Olander, S. (2007) 'Stakeholder impact analysis in construction project management'. *Construction Management and Economics,* 25(3): pp. 277-287.

Orr, J. E. (1996) *Talking about machines: an ethnography of a modern job.* Ithaca, NY: IRL Press.

Osipova, E. and Eriksson, P. E. (2013) ‘Balancing control and flexibility in joint risk management: Lessons Learned from two construction projects’. *International Journal of Project Management,* 31(3): pp. 391-399.

Patton, M. Q. (2002) *Qualitative Research and Evaluation Methods*. 3rd ed. Thousand Oaks, CA: Sage.

Pemberton, J. D. and Stonehouse, G. H. (2000) ‘Organizational learning and knowledge assets – an essential partnership’. *The Learning Organization*, 7(4): pp. 184-194.

Pemsel, S. and Müller, R. (2012) ‘The governance of knowledge in project-based organizations’. *International Journal of Project Management,* 30(8): pp. 865-876.

Pemsel, S. and Widén, K. (2010) ‘Creating knowledge of end users’ requirements: the interface between firm and project’. *Project Management Journal*, 41(4): pp. 122-130.

Penrose, E. (1959) *The theory of the growth of the firm*. New York: Wiley and Sons.

Peters, T. (1992) *Liberation management*. New York: Fawcett: Columbine.

Phillipson, J., Lowe, P., Proctor, A. and Ruto, E. (2012) ‘Stakeholder engagement and knowledge exchange in environmental research’. *Journal of Environmental Management,* 95: pp. 56-65.

Pogodaeva, T., Zhaparova, D. and Efremova, I. (2015) ‘Changing role of the university in innovation department: new challenges for Russian regions’. *Procedia-Social and Behavioral Sciences,* 214: pp. 359-367.

Polanyi, M. (1966). *The Tacit dimension*. London: Routhledge and Kegan Paul.

Popper, M. and Lipshitz, R. (2000) ‘Organizational learning: mechanisms, culture, and feasibility’. *Management Learning,* 31(2): pp. 181-196.

Popper, M. and Lipshitz, R. (1998) ‘Organizational learning mechanisms. A structural and cultural approach to organizational learning’. *The Journal of Applied Behavioral Science,* 34(2): pp. 161-179.

Prelipcean, G. and Bejinaru, R. (2016) ‘Universities as learning organizations in the knowledge economy’. *Management Dynamics in the Knowledge Economy,* 4: pp. 469-492.

Ranjbarfard, M., Aghdasi, M., López-Sáez, P. and Emilio Navas López, J. (2014) 'The barriers of knowledge generation, storage, distribution and application that impede learning in gas and petroleum companies'. *Journal of Knowledge Management*, 18(3): pp. 494-522.

Rashman, L., Withers, E. and Hartley, J. (2009) 'Organizational learning and knowledge in public service organizations: a systematic review of the literature'. *International Journal of Management Reviews,* 11(4): pp. 463-494.

Rees, W. D. and Porter, C. (2004) 'Matrix structures and the training implications'. *Industrial and Commercial Training*, 36(5): pp. 189-193.

Rhodes, L. and Dawson, R. (2013) 'Lessons learned from lessons learned'. *Knowledge and Process Management,* 20(3): pp. 154-160.

Riessman, C. K. (1993) *Narrative analysis*. Sage.

Robson, M. (2002) *Real world research: a resource for social scientists and practitioner-researchers*. 2nd ed. Oxford: Blackwell.

Ruikar, K., Anumba, C. J. and Egbu, C. (2007) 'Integrated use of technologies and techniques for construction knowledge management'. *Knowledge Research and Practice,* 5(4): pp. 297-311.

Sarshar, M. and Isikdag, U. (2004) 'A survey in the Turkish construction industry'. *Engineering, Construction and Architectural Management*, 11(4): pp. 238-247.

Scarbrough, H., Swan, J., Laurent, S., Bresnen, M., Edelman, L. and Newell, S. (2004) 'Project-based learning and the role of learning boundaries'. *Organization Studies*, 25(9): pp. 1579-1600.

Schein, E. H. (1993) 'How can organizations learn faster? The challenge of entering the green room'. *Sloon Management Review*, 34(2): pp. 85-92.

Schein, E. H. (1990) 'Organizational culture'. *American Psychologist,* 45: pp. 109-119.

Schindler, M. and Eppler, M. J. (2003) 'Harvesting project knowledge: a review of project learning methods and success factors'. *International Journal of Project Management,* 21: pp. 219-228.

Senaratne, S. and Bacic, A. (2015) ‘Knowledge management practices in small-medium sized building firms’. *International Journal of Construction Project Management*, 7(2): pp. 137-152.

Senge, P. (1990) ‘The leader’s new work: building learning organizations’. *Sloan Management Review*, 32(1): pp. 7-23.

Sense, A. J. (2007) ‘Structuring the project environment for learning’. *International Journal of Project Management*, 25(4): pp. 405-412.

Shaw, R. B. and Perkins, D. N. T. (1992) ‘Teaching organizations to learn: the power of productive failures’. in Nadler, D. A., Gerstein, M. S. and Shaw, R. B. (ed.) *Organizational Architecture*. San Francisco: Jossey-Bass, pp. 175-191.

Shokri-Ghasabeh, M. and Chileshe, N. (2014) ‘Knowledge management: barriers to capture lessons learned from Australian construction contractors perspective’. *Construction Innovation*, 14(1): pp. 108-134.

Smircich. L. (1983) ‘Concepts of culture and organisational analysis’. *Administrative Science Quarterly*, 28(3): pp. 339-58.

Sobiechowska, P. and Maisch, M. (2007) ‘Work-based leaning and continuing professional development’. *Education and Training*, 49(3): pp. 182-192.

Söderlund, J. (2008) ‘Competence dynamics and learning processes in project-based firms: shifting, adapting and leveraging’. *International Journal of Innovation Management*, 12(1): pp. 41-67.

Sotirakou, T. and Zeppou, M. (2004) ‘The ‘MATE’ model: a strategic knowledge management technique on the chessboard of public-sector modernization’. *Management Decision*, 42(1): pp. 69-88.

Sounders, M., Lewis, P. and Thornhill, A. (2009) *Research Methods for Business Students*. 5th ed. Prentice Hall.

Sveiby, K. E. (2001) ‘A knowledge-based theory of the firm to guide in strategy formulation’. *Journal of Intellectual Capital*, 2(4): pp. 344-358.

Swan, J., Scarbrough, H. and Newell, S. (2010) ‘Why don’t (or do) organizations learn from projects?*’ Management Learning*, 41(3): pp. 325-344.

Swieringa, J. and Wierdsma, A. (1992) *A becoming a learning organization*. Wokingham, UK: Addison-Wesley.

Sy, T. and Côtè, S. (2004) 'Emotional intelligence: A key ability to succeed in the matrix organization'. *Journal of Management Development,* 23(5): pp. 437-455.

Thomson, D. S., Austin, S. A., Devine-Wright, H. and Mills, G. R. (2003) 'Managing value and quality in design'. *Building Research and Information,* 31(5): pp: 334-345.

Tseng, S. M. (2010) 'The correlation between organizational culture and knowledge conversion on corporate performance'. *Journal of Knowledge Management,* 14(2): pp. 269-284.

Tzortzaki. A. M. and Mihiotis, A. (2014) 'A review of knowledge theory and future directions'. *Knowledge and Process Management,* 21(1): pp. 29-41.

Van Lohuizen, C. (1986) 'Knowledge management and policymaking'. *Knowledge: Creation, Diffusion, Utilization,* 8(1): pp. 12-38.

Venkateswaran, V. and Aundhe, S. (2013) 'Managing knowledge in construction company- a process model'. *Knowledge and Process Management,* 20(2): pp. 59-70.

Vince, R. (2000) 'Learning in public organisations in 2010'. *Public Money and Management,* 20(1): pp. 39-44.

Von Krogh, G., Ichijo, K. and Nonaka, I. (2000) *Enabling knowledge generation: how the unlock the mystery of tacit knowledge and release the power of innovation*. New York: Oxford University Press.

Von Zedwitz, M. (2002) 'Organizational learning through post project reviews in R&D'. *R&D Management,* 32(3): pp. 255-268.

Walczak, S. (2008) 'Knowledge management and organizational learning: an international research perspective'. *The Learning Organization,* 15(6): pp. 486-494.

Wall, J. and Ahmed, V. (2008) 'Lessons learned from a case study in deploying blended learning continuing professional development'. *Engineering, Construction and Architectural Management,* 15(2): pp. 185-202.

Wang, Y. Z. L. X. (2013) ‘Organizational unlearning and organizational relearning: a dynamic process of knowledge management’. *Journal of Knowledge Management*, 17(6): pp. 902-912.

Wenger, E. (2000) ‘Community of practice and social learning systems’. *Organization*, 7: pp. 225-246.

Wenger, E. (1998) *Communities of practice: learning, meaning and identity*. Cambridge, UK: Cambridge University Press.

Wenger, E., McDermott, D. A. and Snyder, W. (2002) *Cultivating communities of practice a guide to managing knowledge*. Boston, MA: Harvard Business School Press.

Wiewiora, A. and Murphy, G. (2015) ‘Unpacking ‘lessons learned’: investigating failures and considering alternative solutions’. *Knowledge Management Research and Practice*, 13(1): pp. 17-30.

Yahya, S. and Goh, W. (2012) ‘Managing human resources toward achieving knowledge management’. *Journal of Knowledge Management*, 6(5): pp. 457-468.

Yeo, R. K. (2007) ‘Organisational learning in representative Singapore public organizations’. *International Journal of Public Sector Management*, 20(5): pp. 345-365.

Yin, R. K. (2014) *Case study research: design and methods*. 5th ed. United States of America: Sage Publications.

Yin, R. K. (2003) *Case study research: design methods*. 3rd ed. London: Sage.

Yin, S. Y. L., Tserng, H. P. and Tsai, M. D. (2008) ‘A model of integrating the cycle of construction knowledge flows: lessons learned in Taiwan’. *Automation in Construction*, 17(5): pp. 536-549.

Zablith, F., Faraj, S. and Azad, B. (2016) ‘Organizational knowledge generation: lessons from online communities’. *Business Process Management*, 22(1): pp. 33-55.

Zollo, M. and Winter, S. G. (2002) ‘Deliberate learning and the evolution of dynamic capabilities’. *Organizational Science*, 13: pp. 339-251.

Zou, P. X. W. (2004) ‘Knowledge practice in two Australian AEC companies’. Australian Journal of Construction Economics and Building, 4(2): pp. 19-31.

List of Appendices

Appendix 1: Workshop and Participants Characteristics

Type of Participant	Function	Number
Initial General Mini Workshop		**12**
Management		6
	Commercial	1
	Contract Management	2
	Project Management	1
	Quality	1
	Structures Design	1
Staff		6
	Architecture	1
	Environmental	2
	Health and Safety	2
	Quality	1
Project Services Group Mini Workshop		**8**
Management		6
	Commercial	1
	Contract Management	2
	Planning	1
	Quality	1
	Risk	1
Staff		2
	Commercial	1
	Quality	1
Site Construction Team Mini Workshop		**8**
Management		3
	Contract Management	1
	Quality	1
	Site Construction	1
Staff		5
	Quality	1
	Site Construction	4
Health & Safety, Environmental & Architecture Team Mini Workshop		**9**
Management		4
	Commercial	1
	Contract Management	1
	Health and Safety	1

Type of Participant	Function	Number
	Quality	1
Staff		5
	Architecture	1
	Commercial	1
	Environmental	1
	Health and Safety	1
	Quality	1
Commercial Team Mini Workshop		**8**
Management		4
	Commercial	1
	Contract Management	2
	Quality	1
Staff		4
	Commercial	3
	Quality	1
Structural & Utilities Design Team Mini Workshop		**8**
Management		6
	Commercial	1
	Contract Management	2
	Utilities Design	1
	Structural Design	1
	Quality	1
Staff		2
	Commercial	1
	Quality	1
Grand Total		**53**

Appendix 2: Interview Protocol

Theme	Questions	Comments
Introduction	The interview focus how does "Company X" produce the knowledge from completed construction projects through the concept of OLMs and if organisational learning values are used during LLCP. Lipshitz's and Popper's (2000, p. 348) definitions of organisational learning values are used.	This research examines KM initiative, LLCP: knowledge generation and transfer to an organisational memory Consent form was signed prior the interview Permission was received to use interview audio recording
Interviewees Characteristics	• How long are you working in this company? Options: (1 to 2 years), (3 to 5 years) (5 and more years)	The question aims to describe the sample
	• Have you participated in lessons learned collection workshops from other projects, including "Contract Z"? Options: Yes or No	
	• To which age group do you belong? Options: (25 to 34), (35 to 44), (45 to 64), (65 and over)	
Organisational Culture	**Sub-theme: Transparency, Inquiry, Integrity, Issue Orientation**	
	• Do you think that the lessons learned process is transparent? Options: Yes or No; Please explain more	Looking for evidence of transparency
	• Is it easy during this process to share your thoughts? Options: Yes or No; Please explain more	Looking for evidence of transparency
	• Do you feel need to defend yourself? Do you feel are you under pressure during participation process? Options: Yes or No; Please explain more	Looking for evidence of integrity or inquiry

Theme	Questions	Comments
	• Is it a discussion of positive experiences, errors or its mixture of both? Could you please explain and give an example?	Looking for evidence of issue orientation, integrity or inquiry
	• Would you agree or disagree with following statement: this organisation is focused towards organisational learning	Looking for evidence of organisational culture
	• How do you see our organisational culture in relation to this topic?	Looking for evidence of organisational culture
	Sub-theme: Accountability	
	• Do you see any consequences if previous lessons are not learned? Give example or explain more	Looking for evidence of accountability
	• Do think the lessons learned collection process is needed? Options: Yes or No	Looking for evidence of accountability
OLMS	**Sub-theme: Knowledge Generation**	
	• If answer is positive: What are the benefits of this process?	Looking for evidence of knowledge generation
	• Do you see any benefits of lessons learned application process? Did you know about an existence of this process? Options: Yes or No; Please explain more • Could you please describe the lessons learned collection process?	Looking for evidence of sharing Looking for evidence of knowledge generation
	• Would you know the aim and the purpose of the lessons learned collection process? Options: Yes or No; Please explain more	
	• Have this process changed with time? Options: Yes or No If answer is positive: Would you know why? Could you please give example how this process has changed?	Looking for evidence of process change

Theme	Questions	Comments
	Sub-theme: Leadership	
	• How could you describe the Quality department role in this process?	Looking for evidence of leadership
	Sub-theme: Process Efficiency	
	• Is the lessons learned collection process efficient? Options: Yes or No; Please explain more	Looking for evidence of process efficiency
	• Any suggestions for improvement of lessons learned collection process efficiency?	
	• Do you think lessons learned process should include external parties such as stakeholders? Options: Yes or No; Please explain more	
	Sub-theme: Lessons Storing	
	• Do you know where could you find the stored lessons? Options: Yes or No; Please explain more	Looking for evidence of knowledge accessibility
	• Are these lessons easy accessible? Options: Yes or No; Please explain more	
	• Can it be done more efficient way? May be you have any suggestions?	Looking for evidence of process efficiency
	Sub-theme: Lessons Sharing	
	• Would you look for previous lessons? Options: Yes or No; Please explain more	Looking for evidence of knowledge sharing
	• What are the difficulties or barriers for collecting and applying the lessons?	Looking for evidence of process efficiency
	• Do you have any suggestions to improve the lessons sharing process?	

Appendix 3: Interview Passages for Supporting Findings

Interview Passages Supporting Findings of Objective 1

Finding	Response Source	Factor Title
		Perception of Culture Factor
Finding 1	Participant 3	I would not say that it is naturally positive
		I think it is imposed culture
		The lesson learn is a dictate coming from government: to have good governance of projects, evidence has to be shown that there is a good governance in the projects. The lesson learned is one of the major aspects to show that yes we are learning from the lessons
	Participant 6	I think in theory we are, but I think sometimes when pressure trying to make deadlines or staying in the budgets or dealing with other political pressures what are out there. We can ignore what happened in the past or say what happed in the past. We need to forward with new ideas and new ways of thinking of that. I think, you need the balance between them two. I think generally we try to
	Participant 7	The culture to this organisation, this is project management organisation. The lesson learned is important part of project management. I think most of the people are aware of the lessons learned
Finding 2	Participant 1	They don't have experience and understanding what we done in the past
		For people who are in the department where fifty percent is "XX" and fifty percent "YY" projects. Sometimes no given time
		As the project is coming you want to get lessons learned as best as possible. There can be the attitude from the individual, including myself or the manager it's gone, but obviously there is still work to do. Don't be worrying about the past.
	Participant 2	There are theoretic, book learning. Its two different worlds. For ex-"XX" staff who is now members of "Company X". It will take number of years before we bite at that educational apple that's now is available to us, because we are still all about the projects what going on and the education that we can learn on site to suppose from books

Finding	Response Source	Factor Title
Integrity Factor		
Finding 1	Participant 1	There is climate when people would question where are you coming from but not an aggressive manner but to trying to understand
		You need to defend yourself, but it is more for betterment of the process but not in an attackable way
	Participant 3	Occasionally you would feel that the process have been used for something other than straight forward gathering the lessons
		Its more allocation of blame to the situation
	Participant 4	Personally no, at less there will be the lessons particularly related to "BB" manager at the time
	Participant 6	Of course you will get little bit defensive trying to explain the context, why that decision was made
Leadership Factor		
Finding 1	Participant 1	I see the quality department I suppose as the leader of the process, the driver, the owner of the lessons learned process
	Participant 2	Managing
		Administering
		Prompting for input
		We input and that we input in time
	Participant 3	Produces the database what has those lessons learned
		A role of facilitation
		Coordination
		Quality assurance
		To oversee the process
		To be a central pivot to the process
	Participant 4	Facilitate gathering the commercial, contract management teams in order to cool all other ideas in a constructive forum
		Proper gathering of the data
		Dissemination of it for the future procurement to start
	Participant 5	You guys are leading this process
	Participant 6	To coordinate the process and to make sure you get all the individuals together being involved in the project
		To structure, give them a proper structure
	Participant 7	Facilitating role
		The organising the meetings
		Filing

Finding	Response Source	Factor Title
		Editing
Finding 2	Participant 2	It is essential that quality need to run the document.
		Quality need to maintain responsibility of the document
	Participant 3	Follows up later with new project managers
	Participant 5	I find it very hard to manage
	Participant 6	That won't be done properly or in uniformed way in likes of me or contacts manager. It needs yourselves to come in and to run that process
		You can stand back and particularly you have seen how other lessons learned processed worked and you are probably are applying your own lessons learned, presumably. It means that the process should improve all the time

Interview Passages Supporting Findings of Objective 2

Finding	Response Source	Factor Title
Knowledge Generation Factor		
Finding 1	Participant 1	They want to hear what went well and how can we do better for future projects. Equally it don't go so well why that was, make sure it is not happening again
	Participant 2	Lessons learned document is 90 percent of issues and challenges and 10 percent of successes and positives
	Participant 3	Occasionally there is positive ones; it's really comes from people who are trying to be politically correct saying oh yeah we should talk about our good experiences
		Ninety nine, ninety five percent it is concentrating on mistakes
	Participant 4	Application of recommendations to what we can do better again in the future
		What that issue would not occur again within the same nature.
		If the contract themselves would be deemed to be with positive outcome, when you would try to focus also on positives
	Participant 5	If you don't know why something works, you can't multiply
	Participant 6	Do it in constructive way rather than complaining and mooning about everything. It's rather how could we done it better, if we had more time or if we had eyesight, or if we had more resources whatever the issue was
		It is always important, not just outline only where the negatives, where problems were crossed, but will be very clear what worked pretty well, what can be repeated again in the contract strategy
	Participant 7	Mostly the errors as it's easier to remember what went wrong and when, what went right
		I think it should less stress to whom will be the responsible here, rather than focus on an issue that the issue was here. And what we should do to avoid the issue in the future

Finding	Response Source	Factor Title	
Finding 2	Participant 1	**Initiation of the process**	Kick off discussion of your department, this is coming up
	Participant 5		Usually it somebody appointed to run the lesson learned process
	Participant 1	**Excel spreadsheets or location for submissions**	Sequentially there would be excel spreadsheet circulated or central location where we all feed in all aspects relevant to individual
	Participant 2		My input and variably I am couple of weeks late with it
			I get to top it up, after little bit of reminding
	Participant 3		There on ad hoc basis people can upload lessons learned when whatever they feel like
			To talk about the lessons and put them on the spreadsheet and get them put into by a central facilitator
	Participant 1	**Workshops**	Followed by meeting around the table discussion with either wider group or focus groups
	Participant 4		The workshops with the contract management and site management teams to gather data from what went well from the contract and what did not go so well
	Participant 5		We kind of run number of the brainstorm sessions with all the people which has been involved in the whole project, and we kind of identify good and bad things what happen. What we can learn? What is good and bad? It is kind of narrow workshops
	Participant 7		A brainstorming at the end of the project, what went wrong, what can we change next time
	Participant 1		People will go away from that meeting with actions.
	Participant 2		Its sent back to us all highlighting duplications
	Participant 2	**Assigned tasks**	So then we can collaborate with each other trying make the duplications in single outlining
			It's re-distributed amongst peer group to make sure that everything is captured, is nothing missing

Finding	Response Source	Factor Title	
			Goes for one final review
	Participant 1	Quality functions activities	Its go back to quality team to top and tail
			Consequently there they either or report is generated or it's saved in some internet location and circulated
	Participant 2		Its logged
			Recorded
			Then its collated by yourselves and duplications are highlighted
			Then quality circulate as necessary
	Participant 5		Then actually the lesson learned is sent to those departments for their implementation.
Finding 3	Participant 1	It seems gone more focused. I was normally involved in some earlier projects there was more ad hoc	
		I am not sure how much quality department were involved, very often how often or project manager was driving it	
		It is now more controlled and clear now, everybody knows now that quality department looks after lessons learned. I know, you guys are coming along and starting the process. Its clearer, and who is at charge of it now	
		I think it's improved	
	Participant 2	It's become more collaborative. Beginning it was very small bullet points almost document, then it kind of grow it more. For while it was not exactly the blame document, but it was a way of their grievances, then was the understanding actually that some persons grieve may be some persons benefit so then the collaboration came in	
		It's now so multi-disciplinary and interactive	
		I think it's changed. It's ever changing. I think it needs to be, because its needs become that positive document, there people have learned their lessons and implemented them. We are not going back: reinventing the wheel	
	Participant 5	I remember the first few, when I was at lessons learned everybody was focusing on things which went wrong, everybody was talking how, why and what actually went wrong. It was still heavy focus on bad things, but I saw that they started to bring good things as well	
		I can see what now it is more structured then before. It is more structure added, and what the fact was asked the	

Finding	Response Source	Factor Title
		project progress by stages and then was more focused on process, rather than people which I find made people more open and really to talk
		Kind of more focus on the process
	Participant 7	I think the previous ones I took part where conducted by project or contract manager. Now the Quality team is looking after it
Process Transparency Factor		
Finding 1	Participant 2	The process for those who is doing it is absolutely transparent
		Everyone gets buy in and everybody get sight of it
	Participant 3	Every project what is undertaken knows that lessons learned are going to happen
		Everybody can contribute to lessons learned process
	Participant 5	Each time I attend that type of lesson learned meeting, I knew what is about, what is purpose of that, what will going to happen to this information, how it will be used
	Participant 6	Very clear what was required
		Any formal process we always go through is always open into any participations in the project
		All views are valid
	Participant 7	It's have been done collectively
		The outcome is available
		Circulated before it has been filed
Finding 2	Participant 1	I can sit in the room with any of them whatever there is a receptionist or former director. We can have a chat like we have a chat now
	Participant 3	There is a plenty of opportunities to at various levels: meetings taking place every day, they are talking to each other
		Plenty of time to talk about lessons and share them
	Participant 4	I am not shy in tiring and always get the point across
	Participant 6	I never been shy sharing my thoughts anyway
	Participant 7	There is no one discouraging anyone from the sharing the thoughts
Accountability Factor		
Consequences Sub-factor		
Finding 1	Participant 1	There is a need for it
		I think it's a key aspect to close the project at the end

Finding	Response Source	Factor Title
	Participant 2	Yes
	Participant 3	I think its need it
	Participant 5	Definitely yes
	Participant 7	I would say hundred percent
Finding 2	Participant 1	I suppose worked in private industry for seven years. If lessons were not learned there would be accountability, there would be an issues: or you would never work on the project again or if you wore the client down we would not have you, less in "Company X"
	Participant 2	If I would take the as-builds as a main lesson. Doesn't seem that anybody is ever taking over task of the fact that as-builds are not improving, aren't at the top of the hit list
	Participant 3	The repeating the mistakes it's very costly
		Very frustrating for everybody involved
		Can be a huge consequences
	Participant 4	Its waste, spending more money on staff, what can be designed out or changed contract or changed requirements
	Participant 5	It is obviously quit costly
		If something went well, you will actually miss the opportunity
	Participant 6	If you don't listen, what have been told in previous contracts, you are being foolish really
		You will go to repeat the same mistakes again
	Participant 7	I don't see consequences. If we repeat the same mistake, and the lesson learned were available during the preparation of the project
		It's hard to take consequence, if you don't know who was to blame where before
Application Sub-factor		
Finding 1	Participant 1	I think we do the application process
	Participant 2	It depends if it's the same important as laying the tracks then it should work
	Participant 3	The formal introduction thing came in this year
		Forces people to look or involving group of the project, to look at the lessons what are from other projects and make the conscious decision to either take into account or either not take into account them

Finding	Response Source	Factor Title
		In the previous set up, there was lessons applied process, but it applied usually through the subject matter expert rather through the people carrying out the projects
		The idea of people carrying out the projects applying them to their projects I think it's better than the other one
	Participant 4	I am aware about of lessons learned
		Its theoretical application
	Participant 6	I am aware of this process
	Participant 5	I have been participated few times in that process
		It's hugely beneficial
	Participant 7	I can see the importance and benefit of it
Finding 2	Participant 2	I go so often to them to see if we implemented them
	Participant 4	Some departments are good at it, the environment is good at it. They continuously learn the lessons from the previous we would improve with them. Archaeology is similar. The hard landscaping spec with "XXX XXXX" do a lot of work with us every time there is a claim. It is related back to his core spec. He will go to rewritten the spec that is generic spec related to "X" projects.
	Participant 5	I saw the lesson has been applied to the next projects
	Participant 6	We did used lessons learned for let say: "ZZ", "YY" and we applied those in project "X" works, so we were able to avoid some fit balls what would be there
	Participant 7	That's definitely is that something we would look for the project preparation

Interview Passages Supporting Findings of Objective 3

Finding	Response Source	Factor Title
Training Factor		
Finding 1	Participant 2	This organisation is very much geared towards learning and bringing people forward and developing.
		Very much focused on up-skilling
		Keeping people on trend
	Participant 3	A formal CPD type programme in place
		It is not a week going by that where is some information meeting about something or other. But very relevant to the job and include learning in fringe areas
	Participant 5	It is quite easy to get to the stage when you feel quite comfortable: professional expertly in certain fields and you really don't feel the need to getting know something new. The same time CPD encourage or pushing you
		There is lots of forums and lots of talks
		It is already given to you. If someone is really into it is easy to kind of follow up and find a way to grow
Finding 2	Participant 6	I suppose, I am slightly at disadvantage as I am not the member of the staff of TII. So I would not be part of other elements of the organisation. I am not in all that. I have been more treated as consultant rather than as a member of the staff. You know that I mean. I don't get staff e-mails either. From that perspective my only involvement I would be through the lessons learned and methodology really. I would not be directly involved in the organisational learning. I was giving couple talks
Challenges Factor		
Finding 1	Participant 1	If it is a priority for the organisation as it is. You need buy in by senior managers look this has to be done
		It's the same way PM&D process which was driven constantly from senior managers. This is serious it has to be done. We need something similar for lessons learned
	Participant 2	At a higher level, to make sure, that they see it as important as I do
		Changes needed in the culture is purely to get buy in at much higher level

Finding	Response Source	Factor Title
	Participant 7	Sometimes I have feeling that these lessons are lost somewhere
Finding 2	Participant 1	It would help from the project manager or the contract manager, if they would be fully supportive
		If you have two, two and half or three year contract and you wait till end to collect the lessons learned you would not remember what happen at the start
	Participant 2	Some always can be the same, but you forget more than you actually remember
	Participant 3	If you come in at the wrong stage at the project when people are raw and blaming each other or rest of it. Yes, there is barrier there……..If you pick the correct stage when the lesson have been corrected and everybody is feeling little bit more out it. So the barrier may be to be chosen the wrong stage.
	Participant 6	People forget things. Even I am in the fourth year in the heritage contract at the moment, I might be forgotten why we made that particular decisions three years ago. Some people may think now, why did you do that for, but it may be very valid reason to dig all out, because it's so active and life
	Participant 6	The people do forget
		That you avoid waiting to write at the end, because people may be moved on or forgotten
	Participant 7	The knowledge is gone
		You forget about the issues which you came across
Finding 3	Participant 2	They need to make everything fit within that, and me leading in and on in the corner going, but I really need this, but they kind of well this is a small change in the ground of scheme of things, which it is to them
	Participant 5	In the lessons learned process in the different stages, different departments or different group of people actually are involved in that. Each type of group or department have a limited knowledge about the process or about the project. So from their point of view they see limit amount of that and they think
		Few times, I find that I need to defend which I don't really want to do, because to explain your limitations imposed by contract or by different type of limits
	Participant 6	For example, the issue in the "Contract Z", we selected the particular contract strategy, because of the pressure

Finding	Response Source	Factor Title
		on programme. It was massive pressure from "Stakeholder B"3 at that time to get this works done and dusted, quickly, and off the streets quickly, therefore we have to take the particular approach. That may be, if you had the year or two years on the street, may be you have totally different approach. It's suppose the putting that decision in the context
		Sometimes it get lost with the pressure of the situation. We have to get this done by next week
Finding 4	Participant 2	Make us more aware of how we writing things and saying things
	Participant 3	It might not be that easy to collect them and get them down to paper
	Participant 4	Its need to be in core document what is used consistently
	Participant 5	You have to be careful how are you formulated to actually focus on the process not on the people how they did
	Participant 6	Taking into positive, constructive way
Finding 5	Participant 2	Trying not get into blame culture
	Participant 3	If you come in at the wrong stage at the project when people are raw and blaming each other or rest of it, to be chosen the wrong stage
	Participant 5	Its quit difficult, because people always focus on the bad things what went wrong
		People are taking that very personally
		If you talk to somebody officially they would want to learn from the past and the mistakes, from success. In reality the generally the people will perceive as kind of accessing, how you been accessed, is this project went well or not
Finding 6	Participant 2	However you would need to action these lesson learned: being sitting down with stakeholder and saying I see your point, it's clearly written here, but unfortunately I don't see how we could actually do that without doing this. A compromise is required let do this going forward so. So I would be able to go agreed, happy days, let's do that. There is the other ones there you are going, absolutely not, we could not possibly. It would have their own challenges.
		Tailored specifically

Finding	Response Source	Factor Title
		Or just a questionnaire; How satisfied you was with collaboration, as-builds, did you receive them, are you happy with them, where can they be improved
	Participant 3	There are dangerous of doing that, in a exposing yourself to criticism
		Carefully worded collection process for stakeholders would be beneficial
	Participant 6	It may be slightly more difficult, because often you may have more senior positions there
		I think if people approached it, and it's very structured and very positive way. I think it could be hugely beneficial
	Participant 7	It should be clearly marked, that those issues were brought up by external stakeholders, because there are different interests. We would need to take that with pinch of salt
Finding 7	Participant 1	Would not know hundred percent
		Assuming that on intranet or under quality department aspect of the intranet
	Participant 3	There is two basic places. There is lessons learned reports, standalone reports from most projects and there is the central lessons learned database
	Participant 4	On SharePoint somewhere in quality section
		No, I don't know where exactly it is
		I could not find the lesson
	Participant 5	No. During the process I know the place, storage, where I got the link to it, as we kind of working on it, and how long we are working on that: reviewing, commenting. During the process I got the place where I got the, I know where the lessons learned are. I know they have been sent to different departments, whatever we decide which departments should be and recommendations. After that I kind of presume that it under quality department in the intranet and try to find them
	Participant 6	I don't. But I generally do read my e-mails
Suggestions for Improvement Factor		
Finding 1	Participant 1	sit on your own and form the document for yourself put a couple of thoughts as you go through the process
		To have a continual lessons learned process as we go through

Finding	Response Source	Factor Title
		But for individual thinking nearly on the daily bases as it moves through: what worked well and what is not
		As it developed any weaknesses in the contract documentation I would note myself
	Participant 2	He has a note of them there it comes to the lesson
	Participant 3	It might be useful to take two or at least three cuts at lessons learned during the project: three different stages. You aim to get one at least, but two would be good
	Participant 6	It is very important for people who are directly involved, to be writing down these lessons
		Rather than having the lessons learned at the end of the project, that there is rolling lessons learned as the things go on
		If the contact is two year contract, may be to have interim lesson learned in the first year into it and then the final one at the end
	Participant 7	May be the workshops should be done couple times of duration of the project and continuous monitoring rather than navigate at the end of the project, try to remember what was the issues what we came up across
		It could be improved by having continuous during the project. If that was done on ongoing bases
		May be doing it continuously it will help you to store the knowledge as you say as things comes up rather than at the end of the project
Finding 2	Participant 1	You don't want is sometimes you can't help we go through the process we do the lessons learned, report looks great and then its put in the shelf and its gone
		May be its needs to be a formal step in the process when a new project kicking off, when you really need people to read the lessons learned and to sign off the form to say I read in advance to stock in to the new project or perhaps rolling out annually or bi-annually, rolling out as part of "Company X" learning programs. Here is our lessons learned
		To formalise that process
	Participant 3	One of the issues is that 500 lessons learned if it isn't some way of thinking about the consequences and rate them accordingly you could find yourself applying the

Finding	Response Source	Factor Title
		same amount of efforts to frivolous lessons as you do to very important lessons.
	Participant 4	More a tick boxing and it is not a cultural application of learnings in the future contracts
	Participant 6	More formalised process is essential
		How to interpret them as well
	Participant 7	There is still less focus on them in the project preparation process to reviewing the lessons learned
		If we repeat the same mistake, and the lesson learned, they were available during the preparation of the project, maybe we should have the ownership, which department owns the lessons learned, who made the mistake
		May be the quality team should be involved in the project preparation more actively
Finding 3	Participant 2	It is not advertised
		Lunch time talk so that people understand that all this work that has gone in the background for all of these projects
		Pop quiz; now as "Company X" we have pile of 103 different documents and pop quiz at the bottom
		Spot prize
		For some reason. The other members of my team would not see it as being part of their role. It tough one.
	Participant 5	May be around lunch time sessions, at least which would remind that those projects during these last five or ten years we did
		May be remind talk, do the lunch talk: to remind people, because it's huge amount of work it's done on that.
Finding 4	Participant 1	For whole the project at the moment is only the half of the story.
	Participant 2	Part of design process is collaboration with service providers; lots of communication goes before
		Get a taste for areas where you could improve as a designer or company in order to help bring these people along
		They feel more ease going into next project
	Participant 3	In the quality system it would be a customer focused
	Participant 4	Yes it should particularly going to external influence likes of "Stakeholder C", possibly even our sanctioning

Finding	Response Source	Factor Title	
		authority, "Stakeholder B". Do we want the answer or not it is the other thing	
	Participant 5	I would say some kind of level of feedback would be beneficial, because all of our lessons learned is based on our perception of the performance.	
		Your experience may be totally different and they give you the simple answer: if you would do this and that way, it would be much easier, may be it won't be so much hassle in the beginning.	
	Participant 6	We got to the construction stage we have already their buy in immediately, because they there part of the process who signed off with this particular contractor	
		I am sure it must be thing that drive our stakeholders crazy how we do things	
		During the "Contract Z", we included in the procurement process …….. and we brought them in and they became part of the team for doing the assessment of tender submissions and everything. It worked very well. Actually they were very constructive. They knew, they have to work in procurement structures. When we got to the construction stage we have already their buy in immediately, because they are part of the process that signed off with this particular contractor.	
Finding 5	Participant 7	**To improve lessons learned sharing and storing methods**	I was trying to access the lessons learned from B1, A1 line and I have no access. They were on network, they were in folder structure under the contact management. This staff would usually have been restricted
			Might be bright works could be good idea
			I don't know what the story with permissions is, some of my team members see some folders and I see the different folders basically. Sometimes we ask for access to it. We need to get the approval of the project manager. The project manager doesn't has time to respond and it's lost. After months asking for it you give up
			The access to the lessons learned doesn't seemed to be great after the time. They kind of fade away

Finding	Response Source	Factor Title	
	Participant 3	Revise lessons learned content	May be it could screen out some items, what are barely comments but not lessons
			Experiment we can do with some project later and say we are only going to accept the lessons when they will be amended in this particular format. That's the way we want
	Participant 7		Sometimes they are too detailed and less big ticket items which sometimes could be more important about the structure, contract, about leasing with the stakeholders and staff like that, which are more important. Sometimes I feel like we are talking about this here, we should use the different covers, there is like detailed staff to collect those points rather than focusing on big ticket items
	Participant 3	Improve categories	The categorisation could be improved at the capture stage
			It is sort of pre-categorised or pre-slotted; So we don't getting the lot of information going in the wrong boxes
			At the moment you literally taking a block of text and you are trying to categorise that it make sense out of it. Turning it into lesson. Whatever you can educate everybody to put their lessons in certain format or not and so on I am not sure at that stage. May be with help of application or small bit of software what already broke the lesson into: what was the lesson, what was the categories this lesson in, where do you see it.
	Participant 4		I think lessons if not developed from the contract should be stored by topic or if rates to contract management it doesn't have specific to 101 or 100 or 107 it's relevant to contract management. The lesson should be pooled in the contract management lesson and shared to wider audience: positives and negatives. So supposed to. If people go and think they have to look at "contract Z" lessons learned they think I am doing the utility contract it's something different not related to other

Finding	Response Source	Factor Title	
			people. That I think you don't have to, if its related to contract management or project management they will be more willing to review them and see how can they apply them because it is not contract specific but more relevant to their position and role
	Participant 1	Establish the deadlines	More concrete deadline to follow through and commitment to the process. We will finish by 1st of June and report will be generated by 15th of June and it will be circulated
	Participant 2		Need a longer leading time; time in order to accommodate the amount of input that we have to do a long with other thing we are doing at the close out time
			Advance warning: we are starting, if the contract ends let say in January 2018, that you come to us, send an e-mail saying: contract ends in January 2018. We actually will start the lessons learned in December 2017. It is to be completed by March 2018
			It just means that I have dates as it more of a chance that I will buy in them; It will get done because I have to, because you told me four months before hand we starting now
	Participant 6	Select right people	To make sure you get the right people
	Participant 5	Include minor works	From that I knew this process is only for the big projects. I think it is efficient but I think it would be more beneficial if we can include that in the smaller projects as well
			The sooner the people will get into the routine of kind of use to, even the way they can exchange the information

Finding	Response Source	Factor Title	
	Participant 4	Include amendments of work requirements	I would be recommending that at the end of lessons learned process is that the works requirements is re-written to deal with a lesson as supposed to having the stand alone sheet which is, bear with me, never see the daylight again. It should be a physical document, because if you want to pick the other works requirements you should pick up the one what is redlined from issues from previous contract. That was my original work requirements. I made all these changes because all these issues to make it better for use in the future contracts