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CONSTRAINTS AND ENABLERS OF EFFECTIVE KNOWLEDGE SHARING PRACTICES OF SOUTH AFRICAN CONSTRUCTION PROJECT MANAGERS

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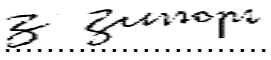
30 August 2018

DECLARATION

I declare that this research report is my own unaided work. It is being submitted for the BUQS7027 course for the Degree of Master of Science to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.



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30th day of August 2018

ABSTRACT

Due to budget and time constraints, construction projects are fast paced and rely heavily on quick but sound knowledge input and application by the different participants in a project team. This requires accurate information retrieval and management of the social interactions between different project participants through knowledge sharing. Although knowledge sharing between construction project managers working within the same organisation exists, the knowledge sharing practices of construction project managers are ineffective and that has a negative impact on the development of innovative ideas, the way project members deal with changes, cope with crisis, deal with coordination and complex tasks, define plans, and make decisions. The aim of this research report was to examine the factors constraining effective knowledge sharing practices among construction project management colleagues working within the same organization with a view to developing recommendations to improve the effectiveness of the knowledge sharing practices. A quantitative research methodology was applied in the examination of the factors constraining and enabling effective knowledge sharing of South African project management colleagues working within the same organization. The main findings indicate that, the reluctance to share knowledge, the lack of affiliation and time limitations are the knowledge sharing constraints faced by most construction project managers. Conversely, the findings also reveal that the allocation of time (in the form of organisational systems), team member relationships, and sense of self-worth would equally motivate the sharing of knowledge. Main conclusions indicate that companies need to formalise the knowledge sharing process through structured mentorship programmes and facilitate team building activities.

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GLOSSORY OF CONCEPTS

A suitable definition of the numerous concepts used in the study is necessary as they may have different meaning to the readers or have different applications in different contexts:

Knowledge

Davenport and Prusak (1998:5) give a comprehensive definition of knowledge as "*a fluid mix of framed experience, values, contextual information, and expertise insight that provides a framework for evaluating, and incorporating new experiences and information. It originates and is applied in the minds of knowers*".

Organizational knowledge

Organisational knowledge is the knowledge/know-how/experties that the members of an organization have developed to draw distinctions in the process of carrying out their work, in particular concrete contexts, by enacting sets of generalizations whose application depends on historically evolved collective understandings (Frost, 2010).

Knowledge Management

The creation and utilization of knowledge resources that exist within an organization in order to meet the organization's objectives (Talukhaba and Taiwo, 2009).

Knowledge Sharing

Knowledge sharing refers to the delivery of work related information and expertise with the intention to assist others and to work with others to find solutions to problems, brainstorm or implement policies or procedures (Wang and Noe, 2010).

Explicit Knowledge

Knowledge that is transmittable in forma, systematic language and can be abstracted and stored in information systems (Chen and Mohamed, 2010).

Tacit Knowledge

Tacit knowledge is the subconsciously understood and accumulated experience and learning of a person which is highly practical and situation specific. Tacit knowledge is difficult to articulate and usually shared through interactive conversation and shared experience (Chen and Mohamed, 2010).

Knowledge Areas

A knowledge area represents a complete scope of specialization including jargon, tools, concepts and tasks (Project Management Institute, 2013). In this research report, the knowledge area is the complete scope of specialization with reference to the ten project management knowledge areas stipulated by the Project Management Institute that a project manager needs to have knowledge about in order to be able to successfully manage a project.

Project Manager

The Project Management Institute (2013) defines project management as the *application of knowledge, skills, tools, and techniques to project activities to meet the project requirements*. For this study, the project manager is defined as the employee responsible for defining the scope of work, allocating the resources for execution of the work, planning the of the work, monitoring the progress of the work and adjusting the plan for any deviations in the work (Munns and Bjeirmi, 1996).

Colleagues

The Oxford English Dictionary (ud) defines a colleague as "*A person with whom one works in a profession or business*". For the purposes of this research report, a colleague shall refer to a person with whom one works with in a business and not a profession.

Organization

The Oxford English Dictionary (ud) defines an organization as "*An organized group of people with a particular purpose, such as a business or government department*". For the purposes of this research report, an organization shall refer to an organized group of people with a particular business purpose, specifically construction project management organisations.

CHAPTER ONE: INTRODUCTION TO THE STUDY

1.1 Introduction

This study reports the findings of a research report on the factors constraining effective knowledge sharing among project management colleagues working within the same organization.

Within the South African context, due to the lack of knowledge management strategies, businesses are confronted with the challenge of finding ways to leverage and manage organizational knowledge as a strategic resource Hourigan (2017). Furthermore, the lack of effective management of the knowledge resources that exist within an organization has a severe impact on that organization's ability to grow, gain competitive advantage, remain sustainable and to innovate (Eg. Davenport and Prusak, 1998; Wang and Noe, 2010; Roth 2016)

Numerous authors have noted knowledge sharing among employees working within the same organization as critical for business success (eg. Davenport and Prusak, 1998; Ajmal and Koskinen, 2008; Connelly, Zweig, Webster and Trougakos, 2012; Santos, Soares and Carvalho, 2012; Roth, 2016). The sharing of knowledge by colleagues has also been identified as one of the factors that contribute to a business organization's performance in relation to its profitability, innovativeness and competitiveness by numerous researchers (Fong and Chu 2006; Zhang and Ng, 2012).

Despite the importance of effective knowledge sharing among employees and the efforts expended by organisations to improve it, organizations are still challenged with the ineffectiveness in the knowledge sharing practices of employees and it is becoming evident that in many instances, employees are

reluctant to share their knowledge (Connelly, et al., 2012; Zhang and Ng, 2012).

In their extensive review of studies on the general subject of knowledge sharing in organizations, Wang and Noe (2010) highlight the importance of taking advantage of the existing organizational knowledge, through the transfer of knowledge from the employees who possess specific knowledge to the employees who require that specific knowledge for the execution of their tasks. This means that organizations need to emphasize and exploit knowledge resources that already exist within the organization (Spender & Grant, 1996; Davenport & Prusak, 1998).

There are organizations within the construction industry that deal with the management of construction projects. The management of such projects by project management professionals requires the effective application of organizational knowledge gained from the execution of various projects within the organization and the lessons learned from the portfolio of projects within the firm. Since each individual project management professional is only responsible for the management of certain parts of the organization's project portfolio, knowledge sharing among project managers working within the same organization is essential for professional capacitation, learning lessons and successful delivery of projects.

Ajmal and Koskinen (2008), in their study of knowledge transfer amongst employees working in project-based organizations, identified two dimensions of knowledge concerning complex construction projects. Firstly, the technical knowledge about the product to be constructed and the production specifications which are required in development of a design that meets the product requirements. Secondly, the knowledge required to manage the execution of the project, that is, work and management structure, schedules,

teams and skills involved, relevant scientific and technical knowledge, systems, and all interfaces. This research report will focus on the knowledge concerning the management of the execution of the project.

In another explorative study to uncover the knowledge sharing barriers in complex projects, Santos, Soares, and Carvalho, (2012) found knowledge sharing amongst colleagues to be constrained by the classification of knowledge, time limitations, lack of initiative and strategy by employees, inadequate information technology, competitive environment, mistrust of others and ignorance of other people's work.The conclusion of this study proposed that organizations focus on the elimination or mitigation of the above knowledge sharing constraints as a strategy for improving the knowledge sharing process of an organization which would ultimately lead to the success of future business endeavors that organization. This research report will focus on the knowledge sharing constraints specific to construction project management colleagues working within the same organization.

The absence of formal policies for knowledge management in South African companies was noted by Mohsam and Van Brakel (2011). The result of their study, which was aimed at establishing the extent to which South African small enterprises from the engineering sector embrace their knowledge sharing activities and the management thereof, showed that although there are a few South African companies who are already implementing knowledge management processes such as sharing, creating and leveraging of information and knowledge. This study also revealed each company possesses unique skills that could be applied to their advantage when formal knowledge management systems are implemented successfully. The two authors also deduced that the extent of tacit and explicit knowledge sharing contributes to the successes of small enterprises in South Africa and determines the level of competitiveness.

This research report presents the issues, difficulties and practices of knowledge sharing articulated by construction project managers in South Africa. The study particularly identifies and describes several knowledge sharing constraints in the context of the management of construction projects and proposes recommendations to improve the effectiveness of the knowledge sharing practices of construction project managers working within the same organization.

1.2 Theoretical Context of the Study

Amongst other critical organizational resources, knowledge is a vital asset and is instrumental in the attainment of a sustainable competitive advantage over other organizations in a competitive and vigorous economy (e.g., Grant, 1996; Spender and Grant, 1996; Davenport and Prusak, 1998; Foss and Pedersen, 2002).

To maintain a competitive advantage over other organisations, it is necessary for organizations to consider how to manage the knowledge their employees have (Brown and Duguid, 1991; Hinds, Patterson and Pfeffer, 2001).

Reich (2007), in a conceptual framework and guidelines for knowledge management principles, describes knowledge management in the context of a project as the application of principles and processes designed to make relevant knowledge available to the project team. Effective knowledge management facilitates the creation and integration of knowledge, thereby assisting in the minimization of knowledge losses and fills knowledge gaps throughout the duration of the project.

One of the components of the knowledge management process is knowledge sharing. Knowledge sharing is a practice whereby two or more employees

engage in an exchange of information, experiences, best practices and philosophies in order to create new knowledge, improve the current knowledge or store the knowledge for future use by the recipient of the knowledge (Roth, 2016).

Knowledge sharing is the necessary means through which employees can contribute to knowledge application, innovation, and ultimately the competitive advantage of the organization (Jackson, Chuang, Harden, Jiang, & Joseph, 2006). Knowledge sharing between employees allows organizations to exploit and take advantage of knowledge-based resources (Davenport & Prusak, 1998; Damodaran & Olphert, 2000; Cabrera & Cabrera, 2005).

1.3 Rationale for the Current Investigation

The South African business environment is primarily a service economy that requires a high level of competency and breadth of skill among its workforce (Hourigan; 2017). The construction industry is fast paced and requires quick but sound decision making from project team members (Zhang and Ng, 2012).

In an article examining the importance of knowledge management practices within the South African business and service environments, Hourigan (2017) highlights the growing need for professional skills in South Africa. The increased focus on skills development is supported by the current legislation implemented in order to develop the skills of the South African workforce (South Africa, 1998). Notwithstanding the importance of tangible assets, Hourigan (2017) notes the shift of reliance on tangible assets to intellectual assets by organisations.

Farooq (2018), in the quest to develop a conceptual model of knowledge sharing and how knowledge sharing is linked to business performance, found that knowledge sharing is a significant predictor of business performance. In this study, the role of knowledge sharing on business performance is particularly conceptualised in the context of both manufacturing and service organizations. This context feeds into the rationale of this study in that the study focuses on project managers who are working for service organisations and the fact that the construction industry bears some similarities to the manufacturing industry.

As with all the other industrial sectors, the construction industry is one where knowledge is a major input to the final product as professional know-how plays a big role in the planning, execution problem solving and value creation processes of a construction project (Zhang and Ng, 2012). Moreover, this implies that the project team members need to possess knowledge of past experiences as well as present standard while being able to factor innovation in day to day tasks (Talukhaba and Taiwo, 2009).

Notwithstanding the role of knowledge management within the construction industry, the construction industry has been criticized for its resistance to knowledge management activities (Robinson, Carrillo, Anumba and Al-Ghassani, 2001).

It has been argued that, while managers of small organisations, this including knowledge intensive ones, acknowledge that adequately sharing knowledge may lead to greater innovation and productivity, these small organisations are not prepared to invest in the relatively high effort of long term knowledge management goals for which they have difficulty in establishing the added value (Nunes, Ananasingh, Eaglestone and Wakefield, 2005). It is therefore important to change organizational leaderships attitudes and beliefs in order

to steer organisations into supporting knowledge management with appropriate and purposefully designed strategies.

The necessity of knowledge sharing originates from the requirement to transform tacit knowledge into explicit knowledge (Roth, 2016). Since tacit knowledge exists in the mind of the creator, it is essential to convert the tacit knowledge into explicit knowledge in order to be able to manage it (Chen and Mohamed, 2010). Tacit knowledge is the only renewable and sustainable resource that a construction organization has that can be used as a base for competitiveness (Chen and Mohamed, 2010). Organizations are only able to leverage the tacit knowledge of their employees for competitiveness if that knowledge is shared with other employees and stored in the organization before the departure of the individuals creating that tacit knowledge (Zhang and Ng, 2012).

Knowledge sharing within organizations is essential for a number of reasons including continuous improvement of both the individual and the organization, the mitigation of knowledge losses that may occur, the innovativeness and the competitiveness of the organization, all of which may lead to the profitability of an organization. Knowledge sharing is also important in the value creation of organizations because project managers may apply organisational knowledge to make business decisions, respond quickly to change and remain competitive (Talukhaba and Taiwo, 2009). The knowledge sharing process facilitates sharing of expertise across projects with the portfolio of projects of an organisation and maintaining knowledge created during the execution of a project (eg. best practices) within the organisation which may improve project success (Santos et al., 2012; Roth, 2016).

Various research studies have revealed that knowledge sharing is positively

related to production cost saving, faster completion of projects, team performance, firm innovation capabilities, and sales growth and revenue from new products and services (e.g., Hansen, 2002; Cummings, 2004; Arthur & Huntley, 2005; Collins & Smith, 2006; Lin, 2007; Mesmer-Magnus and De Church, 2009).The benefits of knowledge sharing amongst employees include innovative ideas, enhanced capabilities, enhanced personal capability and better decision making. Moreover, the benefits of knowledge sharing may expand to client satisfaction which is why knowledge sharing should be promoted in organizations within the construction industry (Zhang and Ng, 2012).

In order to improve knowledge sharing among construction project management colleagues and reap the benefits above, it is essential to first understand the issues, difficulties and practices of knowledge sharing articulated by construction project managers.

1.4 Statement of the Research Problem

Professional services form a notable part of economic activity in South Africa (Siyaya, 2016). These services are intangible by nature but are regarded as being necessary for problem solving, decision making and leading innovation which all require the application of knowledge (Hourigan, 2017). Furthermore, due to the high demand of these intangible goods and services, there is also a higher demand for educated workers and their ability to apply knowledge. The reality however, that this is a scarce resource in the South African business environment (Hourigan, 2017).

Effective knowledge sharing between colleagues working within the same organisation is essential for the successful application of organisational knowledge in the management of construction projects. It has an impact on

the development of innovative ideas, the way project members deal with changes, cope with crisis, deal with coordination and complex tasks, define plans, and make decisions (Davidson and Voss, 2002).

Despite efforts to improve knowledge sharing between employees, organizations are still challenged with ineffective knowledge sharing among employees and it is becoming evident that in many instances, employees are reluctant to share their knowledge with each other (Connelly, et al., 2012; Zhang and Ng, 2012). The failure of knowledge management systems in the facilitation knowledge sharing has been attributed to the lack of consideration of how the organizational and interpersonal context as well as individual characteristics influence knowledge sharing (Carter and Scarborough, 2001; Voelpel, Dous, and Davenport, 2005).

In an explorative study on the perceptions and barriers in implementing knowledge sharing strategies in large construction organisations by Robinson, Carrillo, Anumba and Al-Ghassani (2001), the results revealed that although the benefits of knowledge sharing are recognized in project-based organizations, the effectiveness of such knowledge sharing amongst the employees within these organizations is still inadequate.

The value creation process and service delivery of organizations in the construction industry relies on the application of existing organizational knowledge by their employees (Fong and Chu, 2006; Zhang and Ng, 2012). Employees working within project management organisations are unable to fully apply the existing organizational knowledge on their projects due to ineffective knowledge sharing among the employees (Roth,2016). This is partly attributable to the limited integration of knowledge sharing concepts within the project management function.

Ineffective knowledge sharing has a number of effects on a project, some of which include; lost best practices, increased costs, wastage of resources for future projects, repetition of mistakes, duplication of work, dependence on a few key individuals and slow introduction of new ideas and lower efficiency of the project team (Ajmal and Koskinen, 2008; Wang and Noe, 2010; Zhang and Ng, 2012; Roth, 2016; Ferradaa, Núñezb, Neyemb, Serpellc and Sepúlvedab, 2016).

The capability to manage the organizational knowledge is often constrained by the organisations ability to generate, appreciate, absorb, and share knowledge. It is for this reason that an effective understanding of knowledge sharing, with respect to how project based organizations utilize and integrate their dispersed knowledge, is important (Ajmal and Koskinen, 2008).

Robinson, Carrillo, Anumba and Al-Ghassani (2001) argued that the implementation of strategies to improve knowledge sharing within construction organizations will not be successful unless the major knowledge sharing constraints are identified and addressed.

The specific problem in this research report is that although knowledge sharing between construction project managers working within the same organisation exists, the knowledge sharing practices of construction project managers are ineffective and that has a negative impact on the development of innovative ideas, the way project members deal with changes, cope with crisis, deal with coordination and complex tasks, define plans, and make decisions. This has an adverse effect on construction project outcomes.

1.5 Research question

What are the factors constraining effective knowledge sharing practices

among project management colleagues working within the same organization, and how can the effectiveness the knowledge sharing practices be improved?

1.6 Aim of the Study

The purpose of this study is to examine the factors constraining effective knowledge sharing practices among construction project management colleagues working within the same organization with a view to developing recommendations to improve the effectiveness of the knowledge sharing practices.

The research results may contribute to project success by improving the application of organisational knowledge to the management of construction projects. Construction organization leaders may use the findings to effect change by implementing new knowledge sharing strategies to improve employees' knowledge sharing practices.

1.7 Specific objectives

The following are the specific objectives of this study:

1. To identify the factors constraining effective knowledge sharing among construction project managers working within the same organisation.
2. To examine the knowledge sharing practices of construction project managers working within the same organisation.
3. To develop recommendations to improve the effectiveness of knowledge sharing practices of construction project managers working within the same organisation.

1.8 Brief overview of the research design and method

After the statement of the research problem, a literature review of all similar research in this area was undertaken to formulate arguments and the research questions posed.

The research philosophy used in this study was positivism and the study adopted the deductive approach as the goal of the researcher was to test concepts from theory using new empirical data.

Empirical data was collected using an internet administered questionnaire and telephonic interviews. Quantitative methods where used to analyse the results. This study adapted a standardised instrument, Behavioural Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social Psychological Forces and Organizational Climate by Bock, Zmud and Kim (2005). The reliability of the research instrument developed by Bock et al. (2005) was initially tested for applicability in this study through a pilot test.

To maintain the reliability of the results of this study, the researcher adapted the standard instrument and utilised a similar survey protocol as the one used with the original instrument by approaching the participants via electronic communication.

Ethical clearance was applied for and obtained from the School of Construction Economics and Management at the Witwatersrand prior to data collection.

The data obtained from the questionnaire and telephonic interviews was

collated and analysed using statistical methods and a comprehensive discussion of these results was presented in Chapter Five.

Scope of the study

The following section includes definitions and descriptions related to the assumptions, limitations, and the scope of the research report.

Assumptions include beliefs that are understood to be factual but not verified (Leedy and Ormrod, 2010). The limitations of the study are the factors not in the control of the researcher that restrict the research findings (Leedy and Ormrod, 2010). The scope defines the parameters of the research which articulates what the research will do and what is excluded (Leedy and Ormrod, 2010).

Research Assumptions

The first assumption is that the knowledge sharing between project management colleagues is ineffective because project managers do not understand the specific knowledge that they should share with each other. The second assumption is that the ineffective knowledge sharing among project management colleagues has an adverse effect on the organization. The third assumption is that survey participants will be objective and honest when answering the survey question

Research Limitations

This research report only includes participants in the project management role of construction organizations located in South Africa. Therefore, the results of

the research report may not represent the entire population of project managers in the global construction industry. Another limitation is that the survey and interview method of data collection is sensitive to the way in which the questions are phrased. The survey method does not allow for clarification of questions and this may limit the understanding of the participants which will impact the results of the study.

Research Scope

Like all other professionals on a project, construction project managers play an important role in the success of projects. Project managers are the single point of responsibility on construction projects (PMI, 2013) and are therefore privy to knowledge across all fields of knowledge throughout the project (Powl and Skitmore; 2005).

The scope of the study includes the understanding of the factors constraining effective knowledge sharing among project managers working within the same organisation and the ideal knowledge area that should be shared by construction project managers with other project management colleagues. The participants of this study included construction project managers of project management organizations in the Gauteng province of South Africa registered with the Association of Construction Project Managers (ACPM).

1.9 Organization of chapters

This research report documents the investigation of the factors influencing knowledge sharing between construction project management colleagues,

the appropriate knowledge required to be shared by the project managers and the manner in which this knowledge is shared. The summary of the structure to be adopted in this research report is as follows:

Chapter 1: Introduction

The introduction sets out the background to the study, the problem statement, the research questions and the research methodology. The chapter also provides the objectives of the study as well as the assumptions, limitations and scope of the study. This chapter will provide the rationale for the study.

Chapter 2: Literature Review

This chapter presents a literature review of research conducted on the knowledge sharing, theories associated with knowledge sharing, knowledge sharing in the construction industry with specific reference to construction project managers and the factors influencing knowledge sharing intentions of employees.

Chapter 3: Research Design and Methodology

This chapter describes the methodology used to collect the data from the participants. This chapter also includes the method of data analysis of the data collected from the participants.

Chapter 4: Research Findings

This chapter presents the research findings and the analysis of those findings.

Chapter 5 Discussion of Results

This chapter presents the interpretation of results and explains the implications of the findings.

Chapter 6: Conclusion and Recommendations

This chapter offers a conclusion on the findings in the data analysis, recommendations for future research and provides a final reflection of the study.

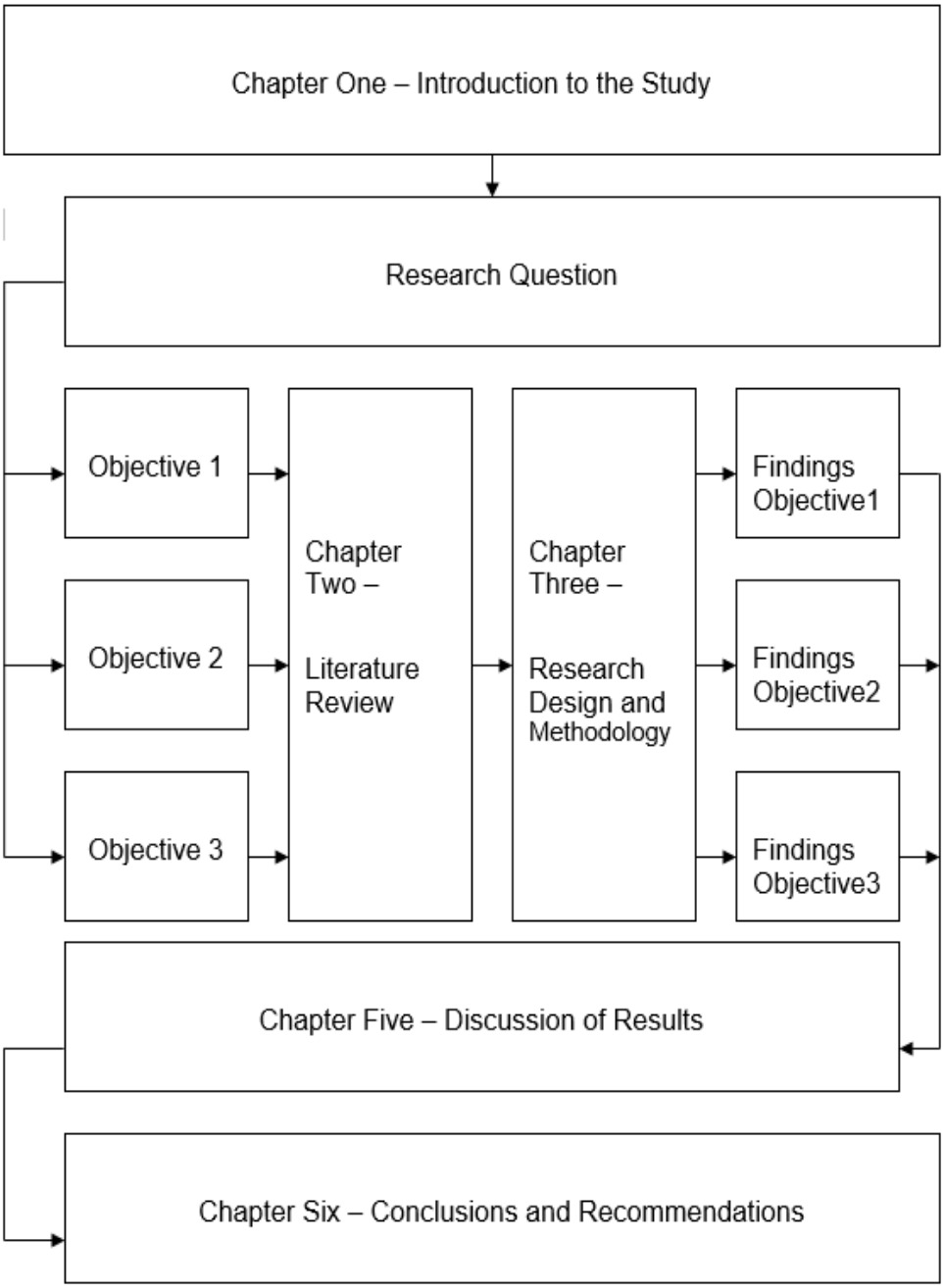


Figure 1.1: Structural Mapping of Thesis

CHAPTER TWO: LITERATURE REVIEW

This chapter presents the knowledge found in literature regarding knowledge sharing. The literature review includes a critical analysis and combination of the literature obtained from various academic sources. It presents the historical research conducted on knowledge sharing, factors influencing knowledge sharing of employees, the knowledge areas associated with construction project management and the methods used to share knowledge.

2.1 Knowledge sharing research history

Splender and Grant (1996) were among the first researchers (Coleman, 1988; Brown and Duguid, 1991; Lave and Wenger, 1991; Ajzen and 1991) to recognise knowledge as a critical organizational resource that is required in order for an organization to maintain a sustainable competitive advantage in a vigorous economy. This notion was later reinforced by other researchers who understood the role of knowledge in the success of a business (Davenport and Prusak, 1998; Weiss, 1999; Foss and Pedersen, 2002).

In their study of organizational learning and communities-of-practice Brown and Duguid (1991) argued that, in the bid to sustain a competitive advantage, it is not enough for organizations hire employees with the required expertise to give the business a competitive, but organizations should also consider transferring the knowledge from employees who possess it to employees who need it (Hinds, Patterson & Pfeffer, 2001). That is, organizations should not only consider finding knowledge from external sources but should capitalize on the knowledge that already exists within the organization (Davenport and Prusak, 1998). The knowledge existing within an organization may be transferred from one employee to the other through knowledge sharing

among employees.

Over the years, knowledge sharing research has given evidence that there is a positive link between knowledge sharing and cost reduction, faster completion of projects, team performance, innovation capabilities of an organization and maximizing revenue (eg; Hansen, 2002; Cummings, 2004; Collins and Smith, 2006).

2.1.1 Areas of emphasis in knowledge sharing research

Wang and Noe (2010) in their review of knowledge sharing research designed a framework of knowledge sharing research which puts forward five areas of emphasis on knowledge sharing. The five areas are; organizational context, interpersonal and team characteristics, cultural characteristics, individual characteristics and motivational factors.

2.1.1.1 Organizational context

Within the area of organizational context, four dimensions were identified by Wang and Noe (2010) which were covered in knowledge sharing research. The four dimensions are listed as:

- organizational culture and climate
- management support
- rewards and incentive
- organizational structure

Organizational culture and climate

The effect of organizational culture on knowledge sharing has been explored in many studies. In an empirical study involving fifty companies, De Long and Fahey (2000) found that the success of new technology infrastructure is dependent on organizational culture and practices supporting knowledge sharing.

In the organizational context, amongst other cultural dimensions, trust has attracted the most research attention from knowledge sharing researchers (eg, Collins and Smith, 2006; Liao, 2006; Willem and Scarbrough, 2006; Wang and Noe, 2010). A culture that emphasizes trust has been found to improve knowledge sharing by diminishing the adverse effects of the perceived cost of knowledge sharing (Kankanhalli, Tan, and Wei, 2005). An organizational culture that supports trust between individuals has also been linked to a firm's ability to exchange and combine knowledge from different individuals (Wang and Noe, 2010). Similarly, an organizational culture that encourages individual competition may be a barrier to knowledge sharing as individual competition is not conducive for the formation of trust which is an essential element for knowledge sharing (Wang, 2004). In addition to trust, organizations with a culture emphasizing innovation are more likely to successfully implement electronic knowledge management systems which encourage knowledge sharing through subjective norms (Bock, et al., 2005).

Lin and Lee (2006) found that organizational climate and an organization's intention to stimulate knowledge sharing is aided by the executive's perceptions of the relative benefit of knowledge sharing for the business, appropriateness to existing business process, and intricacy to encourage knowledge sharing.

Varied results have been found in studies analysing the relationship between the learning culture of an organization and knowledge sharing. Taylor and Wright (2004) found that a climate that motivated learning from failure was positively associated to effective knowledge sharing. Hsu (2006) examined the effect of continuous learning initiatives on knowledge sharing and found it to be positive. In another study, however, Lee, Kim, and Kim (2006), could not find a link between knowledge sharing and an organizational climate focusing on learning and trying new approaches.

The association between norm of reciprocity and knowledge sharing has been studied in the framework of communities of practice (Wang & Noe, 2010). A community of practice is a work-related group of individuals who share mutual interests or problems, and learn from each other through constant relations (Lave and Wenger, 1991).

Norm of reciprocity is knowledge exchanges that is mutual and observed as fair by all parties involved (Nahapiet & Ghoshal, 1998). The studies conducted to verify the link between norm of reciprocity and knowledge sharing were inconsistent (Wang and Noe, 2010). Chiu et al. (2006) found norm of reciprocity to be confidently associated with individuals' sharing knowledge whereas Wasko and Faraj (2005) found a negative relationship.

The varying results suggest that the relationship may be dependent on other dynamics such as participants' personality and perceived usefulness of the community (Wang and Noe, 2010). This is further demonstrated by Kankanhalli et al. (2005) who found supposed reciprocity to be confidently associated to participants' likelihood to add knowledge to the community under weak rather than strong pro-sharing norms. The study by Kankanhalli et al. (2005) suggests that strong pro-sharing norms may compensate for the low level of reciprocity in the community.

Management Support

In knowledge sharing research history, management support has been observed to be positively linked with workers' perceptions of a knowledge sharing culture and willingness to share knowledge (Connelly & Kelloway, 2003; Wang and Noe, 2010).

Lee et al. (2006) found that top management support affected not only the level, but also the quality of knowledge sharing through influencing staff commitment to knowledge management. Moreover, research has shown that perceived overseer and colleague support and their inspiration of knowledge sharing also play a part in growing employees' knowledge exchange and their opinions of the usefulness of knowledge sharing (Cabrera, Collins and Salgado 2006; Kulkarni, Ravindran and Freeze, 2006). Other studies, however, failed to find a significant effect for perceived management support after monitoring for ease of use and usefulness of knowledge management systems (King and Marks, 2008).

Knowledge sharing research has shown that supervisory control, which is the perceived supervisor influence over applying knowledge management systems in the organization appropriately, was a significant predictor of individual effort which was associated to the frequency of knowledge sharing (King and Marks, 2008). Management support, specific to knowledge, sharing is a better predictor of employee knowledge sharing (Wang and Noe, 2010). Similarly, Liao (2008) found that a manager's control of rewards for anticipated behaviour and the employees' belief that the manager possessed knowledge and expertise in the area were related to employees' self-confessed sharing of knowledge.

The social exchange theory has been in use in studies examining the

management support–knowledge sharing relationship where the results of the studies show that management support likely influences knowledge sharing (Wang and Noe, 2010)

Rewards and incentive

Knowledge sharing research history suggests that a lack of incentives has been a major barrier to knowledge sharing across cultures (Yao, Kim, & Chan, 2007). Researchers have recommended incentives such as recognition and rewards as interventions to aid knowledge sharing and help build a supportive culture (Hansen, Nohria and Tierney, 1999; Liebowitz, 2003; Nelson, Sabatier and Nelson, 2006).

Notwithstanding the expected positive impact of incentives on knowledge sharing, the observed results of studies examining the effects of extrinsic rewards have not been conclusive (Wang and Noe, 2010). Based on the social exchange theory, rewards such as promotion, bonus, and higher salary have been shown to be positively related to the frequency of knowledge contribution made to knowledge management systems, especially when the workers identify with the organization (Kankanhalli et al., 2005). Equally, employees who observe a higher level of incentives to share and use knowledge are more likely to report that the content of knowledge management systems is useful (Kulkarni et al., 2006). Kim and Lee (2006) also found that an organization that emphasises a performance-based pay system contributed to knowledge sharing in Korea.

Opposing the expected positive effect of rewards, Bock et al. (2005) found that predicted extrinsic rewards had an adverse effect on attitudes toward knowledge sharing. Numerous studies also found no relationship between extrinsic motivation and knowledge sharing intentions or attitudes toward

knowledge sharing (Kwok and Gao, 2005). In another study by Chang, Yeh, and Yeh (2007), the results also showed that outcome-based rewards and sufficient rewards for effort did not encourage knowledge sharing among product development team members.

Researchers have also scrutinised how different types of rewards, rather than the existence of rewards, influence knowledge sharing (Wang and Noe, 2010). Studies that have examined the influence of group-based incentives commonly found affirmative results when compared to those that examined individual incentives, piece-rate and tournament incentives (Taylor, 2006).

Weiss (1999) highlighted the necessity to align incentives with knowledge sharing. Weiss (1999) also explained that the billable hour system used by many professional jobs such as consultants or lawyers is a disincentive for knowledge sharing. Consultants or lawyers are unable to bill clients for time devoted to knowledge sharing because clients are reluctant to pay for services from which they do not receive an exclusive benefit (Weiss, 1999). This means that the incentives support billing clients and not sharing knowledge (Weiss, 1999). Arthur and Aiman-Smith (2001) examined a gain sharing plan designed to increase employees' suggestions. The size of suggestions increased rapidly following implementation of the plan, but then levelled and started to decline over time.

Organizational Structure

Lam (1996) stated that a functionally segmented structure likely inhibits knowledge sharing across functions and communities of practices. Researchers have demonstrated that knowledge sharing may be encouraged by having a less centralized organizational structure (Kim & Lee, 2006) and constructing a work environment that inspires interaction among employees

such as through the use of open workspace, use of fluid job descriptions and job rotation and encouraging communication across departments and informal meetings (Liebowitz, 2003; Jones, 2005; Yang & Chen, 2007).

Overall, the outcomes of these studies suggest that organizations should create chances for employee interfaces to occur and the barriers formed by employees' rank, position in the organizational hierarchy, and seniority should be broken down to facilitate knowledge sharing (Wang and Noe, 2010).

2.1.1.2 Interpersonal and team characteristics

There has not been much research in the role of interpersonal and team characteristics on knowledge sharing. However, three themes that are contemporary are team characteristics and processes, diversity and social networks (Wang and Noe, 2010).

Team Characteristics and Processes

There is a gap in research regarding team characteristics and processes in relation to knowledge sharing (Wang and Noe, 2010). Furthermore, in the few studies that have been conducted, the results suggest that team characteristics and processes do play some role in knowledge sharing among colleagues. Kim and Lee (2006) stated that the longer a team has been together, the more likely it is that team members will share knowledge. The results of a study by Srivastava, Bartol, and Locke (2006) which studied management teams in hotel properties showed that empowering leadership facilitated knowledge sharing among team members. In a study to examine team communication styles, De Vries, Van den Hooff, and de Ridder (2006) found that they were positively linked with knowledge sharing willingness and behaviours.

Diversity

There has been some research into how the diversity of team members contributes to knowledge sharing (Wang and Noe, 2010). Ohja (2005) used the similarity-attraction paradigm to explore how team members who considered themselves unusual to a group of individuals shared knowledge with the group and found that the minority was less likely to share knowledge with the majority. Sawng, Kim and Han (2006) looked at diversity from a gender based view and found that in large organizations with higher female–male ratios were more likely to engage in knowledge sharing.

The role of social connections with other group members in knowledge sharing has been explored by a few researchers (Wang and Noe, 2010). The results of the studies examining the role of social connections on knowledge sharing show that socially isolated members are more likely to disagree with others and contribute their unique knowledge within a mixed team (Wang and Noe, 2010). Thomas-Hunt, Ogden and Neale (2003) attribute this result to the fact that team members want their expertise to be acknowledged by the team.

Social networks

Networks such as communities of practise play a pivotal role in knowledge sharing within an organization (Wang and Noe, 2010). The bonds between individuals within a community of practice can facilitate knowledge transfer and improve the worth of information received (Hansen, 1999). Chen (2007) found that it is the individuals' expectation of continuing and strengthening their community of practice by frequently participating in knowledge sharing that increases the intention to share knowledge in a community of practice.

Findings from research suggest that the existence of network connections and the associated social capital can motivate knowledge sharing within a

community of practice (Nahapiet & Ghoshal, 1998).

2.1.1.3 Cultural characteristics

Ford and Chan (2003) suppose that organizations with employees from different cultural backgrounds, with reference to national cultures and languages, may have trouble with knowledge sharing. Chow, Deng, & Ho (2000) also found that Chinese participants were less likely than American participants to share their own knowledge with participants from a different cultural background. The cultural dimension of collectivism was examined n a study by Hwang and Kim (2007). The findings revealed that individuals were more inclined to share knowledge with people from cultural groups with whom they shared values rather than with individuals from cultural groups with completely different values.

2.1.1.4 Individual Characteristics

Although there have been studies which suggest that individuals are susceptible to certain work attitudes and behaviours, there has been insufficient studies that have empirically observed the role of individual characteristics in knowledge sharing (Wang and Noe, 2010).

In a study to examine openness to experience, Cabrera et al. (2006) found it to be positively related to individuals' self-report of knowledge exchange. Furthermore, Cabrera et al. (2006) suggested that individuals with high eagerness to learn tend to have a high level of curiosity which leads to seeking others' ideas and insights.

Research has shown that employees' level of comfort and ability to use computers likely influence the use of collaborative electronic networks for

information sharing (Jarvenpaa and Staples, 2000). Knowledge sharing research suggests that the sharing of information is contingent on individuals' confidence of sharing useful knowledge with others (Wang and Noe, 2010).

2.1.1.5 Motivational factors

The research on the area of motivational factors revealed four themes that helped give a better understanding on what motivates individuals to share knowledge (Wang and Noe, 2010). These themes are; beliefs of knowledge ownership, perceived benefits and costs, interpersonal trust and individual's attitudes.

Beliefs of knowledge ownership

Research has found that when employees believe that knowledge belongs to them rather than the organization, they are more likely to share that knowledge with others in the organization because of the internal satisfaction of sharing one's own knowledge (Jarvenpaa and Staples, 2000). Jarvenpaa and Staples (2001) further researched this subject and found that it is the dimensions of organizational culture such as solidarity and the need for achievement that play a role in the belief of owning knowledge.

Perceived benefits and costs

One of the most studied antecedents of knowledge sharing is the perceived benefit and cost that comes with sharing knowledge (Wang and Noe, 2010). Wasko and Faraj (2000) found that online communities of practice are linked with increased internal satisfaction of knowledge sharing and a perceived obligation to share the knowledge gains from the forum.

Interpersonal trust

Research found that individuals share knowledge when they have a sense of honesty, fairness and integrity (Wang and Noe, 2010). Researchers have used the social exchange theory to examine how trust and justice, two key components in interpersonal relationships relate to knowledge sharing (Wang and Noe, 2010). Wu et al. (2007) acknowledged the importance of trust and justice is important because knowledge sharing involves exchanging knowledge with another person or a collective such as a team or community of practice with expectations for reciprocity.

Individual attitudes

Positive knowledge sharing attitudes have been shown to be related to individuals' perceptions of the practicality of their knowledge (Bock and Kim, 2002). Furthermore, positive knowledge sharing attitudes are related to knowledge sharing intentions and behaviours.

2.1.2 Emerging themes in knowledge sharing research

This subsection presents the emerging themes in knowledge sharing research obtained from the body of knowledge.

The results of the studies that have examined knowledge transfer from strong/weak tie perspectives suggest that departments connected by weak ties may be less likely to share intricate knowledge because they are reluctant to exert more effort for sharing (Wang and Noe, 2010). Furthermore, knowledge sharing research will benefit from explicitly examining the mechanisms through which social network characteristics such as tie strength and the number of different types of ties relate to knowledge sharing.

Although knowledge sharing research has explored the influence of attitudes toward knowledge sharing on knowledge sharing intentions and behaviour extensively using the theory of reasoned action, the antecedents to the attitude formation have not been investigated (Wang and Noe, 2010). It would be beneficial for knowledge sharing literature if researchers focus on understanding how to enhance positive attitudes toward knowledge sharing.

The role of motivation on knowledge sharing has been documented and highlighted in knowledge sharing research (Davenport & Prusak, 1998; Hansen et al., 2005). The studies examining the role of motivation on knowledge sharing have however not used the traditional motivation theories such as the expectancy theory and social cognitive theory in their investigations (Wang and Noe, 2010). The insights offered by these theoretical frameworks should be used in future studies on knowledge sharing (Wang and Noe, 2010).

Although a lot of research has focused on the importance of organizational culture on knowledge sharing, more pragmatic research needs to be conducted on how to promote a positive knowledge sharing culture that will enhance the practice of knowledge sharing in organizations (Wang and Noe, 2010). Furthermore, most of the research on knowledge sharing to date has been in the form of qualitative research, more qualitative research which specifically focuses on core issues is needed in order for quantitative studies to be better designed for future research.

2.1.3 Theories associated with knowledge sharing intentions

Knowledge sharing research has given rise to a variety of theoretical frameworks. The three theories which have guided most knowledge sharing

studies are noted as:

- the theory of social exchange (Wang and Noe, 2010),
- the theory of reasoned action (Zhang and Ng, 2012) and
- the theory of planned behaviour (Roth, 2016).

Social Exchange Theory

The social exchange theory (SET) has been used to investigate perceptions of benefits and costs by employees as well as the effects of organizational justice and trust on knowledge sharing (Wang and Noe, 2010).

People could share knowledge with the aim of receiving something in return (Zhang and Ng, 2012). Therefore, knowledge sharing can be viewed from a social exchange perspective.

The SET suggests that people behave a certain way expecting rewards that bring benefits, and they are likely to choose alternative behaviours that maximize benefits (Zhang and Ng, 2012). Furthermore, if a person does not receive any benefit after providing a favour to other people, that individual may terminate the favour. However, if other people reciprocate with a benefit, more cycles of exchange may be originated. Therefore, the SET is characterized by reciprocal interdependence (Zhang and Ng, 2012).

The Theory of Reasoned Action

The theory of reasoned action (TRA) is largely recognized and has been engaged to predict and describe numerous behaviours in social psychology (Zhang and Ng, 2012).

The TRA suggests that an individual's behaviour is predicted by the individual's behavioural intention, which is formed by the individual's attitude and subjective norm toward the behaviour (Zhang and Ng, 2012). Moreover, the individual's attitude and subjective norm is guided by a set of the individual's prominent points of view. Zhang and Ng (2012) state that an individual may have a large number of opinions about a given behaviour, but the individual can only be mindful to a relatively small number of opinions at a point in time. The theory of planned behaviour in an extension of TRA (Roth, 2016)

The Theory of Planned Behaviour

The theory of planned behaviour (TPB) was established by Ajzen (1991) and was developed in order to understand motivational factors associated with knowledge sharing behaviour through interpreting characteristics such as attitude, intentions, perceived behaviour controls and subjective norms (Roth, 2016).

Ajzen (1991) suggests that because individuals' actions and behaviours are a result of individuals' intentions, knowledge sharing actions would therefore be a result of knowledge sharing intentions. In order to determine whether an employee would behave in a certain way, the author of TPB attempted to understand whether the intention to behave in a certain way was existent in the employee by examining the factors related to attitude, subjective norms, and behaviour controls (Roth, 2016). The characteristic of attitude may be defined as the extent to which an individual may find a behaviour favourable (Ajzen, 1991). Behaviour controls suggest the required abilities, resources, and opportunities to take part in the behaviour (Roth, 2016). Subjective norms are the perception of social pressure and reception when choosing to behave in a certain way (Roth, 2016).

The TPB may be applied in the study of knowledge sharing because consideration of psychological elements such as willingness and ability has been included in the development of the theory (Roth, 2016).

2.1.4 Knowledge sharing in the construction industry

There has been an increase in knowledge management as the leaders of project organizations have seen the importance of organising the knowledge that employees possess (Roth, 2016). Moreover, with the passage of time, it has become evident that organizational knowledge is a key resource needed by leaders for successful project management.

The management of knowledge in an organization brings with it benefits of increased competitive advantage, innovativeness, continuous improvement, efficiencies and knowledge storage (Roth, 2016).

The benefits of knowledge sharing within project organizations includes; using common resources to reduce work duplication, allowance for review of project objectives with prior projects, documentation of lessons learnt at each milestone, keeping transparent communication and includes a debriefing session during project closeout to archive challenges and successes for future use (Hanisch, Lindner, Mueller and Wald, 2009).

The Project Management Institute's (PMI, 2013) published Project Management Body of Knowledge (PMBOK) included requirements for capturing lessons learned throughout a project and describes lessons learned as the knowledge that is gained throughout a project that demonstrates how members dealt with or should deal with project actions in the future with the purpose of improving future performance.

The PMBOK goes on to explain that during project management, project managers and team members should record information around causes of problems, reasoning for actions, process recommendations, and experiences, which would prove useful for future projects (PMI, 2013).

When organizational leaders exploit the intellectual capital tied to projects, the probability of repetition of previous mistakes is reduced and the efficiency for future projects is (Hanisch et al., 2009)

Schedule, budget, and functionality restraints remain a challenge for project leaders (Roth, 2016). A method for achieving consistent project success is learning from experience (Petter, Mathiassen & Vaishnavi, 2007). Furthermore, in order to learn from experience, leaders should take advantage of employees' experiences, insights, and knowledge within projects; and encourage sharing of knowledge with colleagues and throughout the organization (Petter et al., 2007). Due to the transient nature of projects, it is imperative that leaders capitalise on knowledge gained from projects (Hanisch et al., 2009). The lack of knowledge sharing increases the risk of mistakes when project teams encounter problems (Hanisch et al., 2009).

Hanisch et al. (2009) surveyed project managers and found that some respondents acknowledged the need for sharing knowledge, but the respondents acknowledged to a limited application of knowledge sharing.

There is a need for leaders of organizations to support formal knowledge sharing in projects; however, even without leaders' support, if an organizational culture supports knowledge sharing, it is easier for employees to take personal responsibility for engaging in knowledge sharing between project teams based on trust (Roth, 2016).

2.2 Factors influencing knowledge sharing

It is important to recognise that the decision to share or not to share knowledge ultimately rests with the employee (Wang and Noe, 2010). It is therefore important to appreciate the factors that play a role in employees' willingness to share knowledge with each other (Amayah, 2013). In order for organizations to be able to encourage knowledge sharing among employees, the management of business organizations should prioritise their understanding of the factors that influence an employees' willingness to share knowledge (Roth, 2016).

Over the years, knowledge sharing researchers (Coleman, 1988; Bock et al. 2005; Ardichvili, 2008; Amayah, 2013; Wang and Noe, 2010) have proposed three categories of factors that influence an individual's willingness to share knowledge:

- Motivational factors (personal benefits, community-related considerations, and normative considerations);
- Limiting factors (interpersonal, procedural, technological, cultural); and
- Enabling factors (supportive corporate culture, trust, tools).

2.2.1 Motivational factors

Lai (2011) defines motivation as the "*reasons that underlie behaviour that are characterized by willingness and volition*". Motivation can be separated into two forms; intrinsic motivation and extrinsic motivation. Intrinsic motivation is driven by personal enjoyment, interest, or pleasure, whereas extrinsic motivation is governed by external incentives. Motivation includes a collection of closely related beliefs, perceptions, values, interests, and actions.

The motivational factors that influence an individual's willingness to share knowledge can be classified into three broad groupings (Colemann, 1988; Bock et al. 2005):

- Economical: Anticipated Extrinsic Rewards
- Social-Psychological: Anticipated Reciprocal Relationships and Sense of Self-Worth
- Sociological: Fairness, Innovativeness and Affiliation

2.2.1.1 Anticipated Extrinsic Rewards

Economical Science assumes that rational selfish behaviour plays a role in social interactions between individuals (Granovetter, 1985). Anticipated extrinsic rewards in an organization may be described as the monetary or career elevating incentives implemented by organizational leadership in order to motivate employees to behave in a certain way (Bock et al. 2005). These rewards may be in the form of an advantage such as status, job advancement, reputation or emotional benefits (Amayah, 2013).

Various researchers (Roth, 2016; Yao, Kim, & Chan, 2007; Nelson, Sabatier and Nelson, 2006) found that rewards may contribute to the participation in knowledge sharing of employees. Notwithstanding this finding, there have been contradictory findings on whether rewards have an influence on knowledge sharing behaviour (Roth, 2016).

Although some research found that there is no link between the existence of rewards and knowledge sharing intentions, it must be noted that the lack of rewards may negatively affect knowledge sharing intentions (Roth, 2016).

It is therefore evident that rewards and acknowledgement increase the knowledge sharing of employees and reduce knowledge loss which may occur as a result of employees leaving an organization (Zhang & Ng, 2012).

2.2.1.2 Anticipated Reciprocal Relationships and Sense of Self-Worth

Anticipated Reciprocal Relationships

Anticipated reciprocal relationships encompass an employee's desire to maintain ongoing relationships with other individuals with specific reference to the giving and receiving of knowledge (Bock et. al; 2005).

Anticipated reciprocal relationships differs from anticipated rewards in that social exchange involves undetermined obligations (Bock and Kim; 2001). Furthermore, in contrast to economic commodities, the benefits involved in social exchange are not quantifiable in terms of a single quantitative medium of exchange, and the nature of the return cannot be negotiated about. This is the reason why social exchange tends to prompt feelings of personal obligation, gratitude, and trust.

For instance, the initial offering of knowledge to a newcomer in an organization requires a friendly relationship, and the reciever of the knowledge feels a responsibility to reciprocate. If the newcomers reciprocate properly, they will prove themmselves trustworthy and exchange relations will be established (Gouldner, 1960; Blau, 1967).

The construct of anticipated reciprocal relationships is demonstrated in Amayah's (2013) study which found that co-worker reciprocity has a positive influence on knowledge sharing behaviour.

Sense of self-worth

A person's attitude and behaviour are predisposed to self-produced influences (Bock and Kim, 2001). Stajkovic and Luthans, (1998) state that an employee's judgment of their capabilities to deal effectively with different environmental realities is the most central type of knowledge that an employee can derive from self-reflection. Bandura (1975) fined this capability as 'self-efficacy', a person's judgement of their capability to organize and execute tasks.

Bock and Kim (2001) proposed that, based on the self-efficacy construct, the individual's judgment of his capabilities to contribute to the organizational performance is a major influencer of knowledge sharing. That is to say that the idea that if employees believe they could make contributions to the organization's performance, they would develop a more positive attitude toward knowledge sharing.

An employee's sense of self-worth encompasses an employee's self-esteem with regards to the value they add to the organization by sharing the knowledge they possess (Bock et al; 2005). The key element in this construct of self-worth is the degree to which the individual values his/her competence, power or efficacy regarding conduct (Gecas; 1971). Huber (2001) found that anticipated reciprocal relationships and sense of self-worth had a major influence on an individual's knowledge sharing inclination.

There is perceived loss of power associated with knowledge sharing by some employees who feel that knowledge provides power and are hesitant to share knowledge because of fearing to become replaceable doing so may cause a sense of being replaceable (Roth, 2016). When organizational leaders encourage high individual competition between employees it is less likely that

those employees will share information with each other (Amayah, 2013).

Employees are often reluctant to share knowledge because of the risk of feeling embarrassed or ashamed that the knowledge shared is useless, wrong, or inadequate (Zhang & Ng, 2012). Goh and Hooper (2009) argued that knowledge should be recognized based on value rather than personal source and emphasizing accuracy while making allowances for mistakes.

2.2.1.3 Fairness, Innovativeness and Affiliation

Coleman (1988) stated that sociologists view social action as largely governed by organizational structures such as rules and obligations. Bock et al (2005) derived three organizational climate factors for knowledge sharing related to organizational structures from interviews. The three organizational climate factors are;

- fairness (a trusting climate)
- innovativeness (a climate that is tolerant of failure and within which information freely flows), and
- affiliation (a climate characterized by pro-social norms).

Fairness

Wu, Hsu, & Yeh, (2007) state that examining trust and justice is important because knowledge sharing involves providing knowledge to another person or a collective such as a team or community of practice with expectations for reciprocity.

Bakker et al. (2006) in their study examining three dimensions of honesty

(capability, integrity, and benevolence), found that people are inclined to share less information with individuals who were perceived to be competent and share more knowledge when they believed other team members were honest, fair and had integrity.

Although research has generally shown a positive relationship between interpersonal trust and knowledge sharing, Sondergaard, Kerr, and Clegg (2007) insightfully argued that unjustified trust may cause the receiver of the knowledge to refrain from interrogating the helpfulness of the knowledge and its framework for application, leading to misapplication of the knowledge.

Procedural justice has been found to be positively related to knowledge sharing among employees and had positive indirect effects on tacit knowledge sharing via organizational commitment (Lin 2007;Schepers and van den Berg; 2007).

Innovativeness

Only a few studies have examined team characteristics and processes in relation to knowledge sharing (Wang and Noe, 2010). The results of these studies suggest that team characteristics and processes have a role to play in knowledge sharing among team members. Bakker et al., (2006) found that the members of a team that has been working together for longer and has established team cohesiveness is more likely to share knowledge and display continuous improvement that a team that has just been established. De Vries, van den Hooff, and de Ridder (2006) examined team communication styles and found that they were positively associated with knowledge sharing willingness and behaviors. Srivastava, Bartol, and Locke (2006) found that empowering leadership fostered knowledge sharing among team members.

Affiliation

In this study affiliation refers to the state of being associated or affiliated with other individuals. Knowledge sharing may also be entrenched in broader organizational networks such as communities of practice (Wang and Noe, 2010).

The relationships among individuals within social networks can enable knowledge transfer and improve the value of information shared and received (e.g., Cummings, 2004; Hansen, 1999; Reagans & McEvily, 2003).

In some networks, personal relationships with other affiliates have been shown to be positively related to the perceived helpfulness of knowledge shared (Chiu et al., 2006). Chen (2007) found that an individual's expectation of continuing and firming up their social ties by frequently participating in a professional network positively affects their intention to continue participating in the professional network.

Reagans and McEvily (2003) found social cohesion to be positively linked to the effortlessness of knowledge transmission as perceived by the knowledge source, which suggests that the affiliations with knowledge recipients may motivate providers to share knowledge.

The findings of the above studies suggest that the existence of affiliations can facilitate knowledge sharing within a community of practice.

2.2.2 Limiting factors

Project team members often need to apply knowledge acquired in past

projects in the execution of their roles (Santos, Soares and Carvalho, 2012). In other words, project participants are supposed to apply organisational knowledge from the organisations project portfolio (Ajmal and Koskinen, 2008). In an exploratory study of knowledge sharing in contracting companies, Fong and Chu (2006) argued that it is a challenge to access the knowledge stored within the employee who creates it and that there is a loss of organizational knowledge when the employee departs from that construction organization.

Given the tacit, contextual and subjective characteristic of knowledge, it is expected that culture would play an essential role in knowledge sharing (Finestone & Snyman, 2005). Unlike other countries where several cultures exist but only one or two cultures are viewed as the dominating culture, South Africa is set apart from these culturally diverse countries in that South Africans intend to create a unified culture (Finestone & Snyman, 2005).

In order for the reader to envisage the variety in the cultures that exist in South Africa, the South African population and its diversity need to be examined. According to the South African Government (2018), the South African population consists of Black at 76.4 per cent, White at 9.1 per cent, Coloured at 8.9 per cent, Asian at 2.5 per cent, and Other/Unspecified at 0.5 per cent. The ethnical groups are further separated into language clusters which are primarily based on the individual's origin. Majority of the White population is Afrikaans-speaking (Dutch origin) or English-speaking (British origin). Just among the Black population, there are nine dominant language groups, namely; Zulu, Xhosa, South Sotho, North Sotho, Tswana, Venda, Ndebele, Swazi and Tsonga. This diverse population has led to South Africa having eleven official languages.

Due to the diverse cultures in South Africa, language difficulties can easily

result in misunderstandings and frustration (Finestone & Snyman, 2005). Furthermore, perceptions of intelligence can be influenced by a person's command of English, which is the language used in the business sector. Language barriers, resultant from having so many official languages, influence knowledge sharing because people are reluctant to share knowledge if they cannot comprehend the concepts in a language very well or communicate their opinions clearly (Finestone & Snyman, 2005).

Mian, Takala and Kekale (2008) in their research paper discussing the role of organizational culture for knowledge sharing in projects, argue that knowledge sharing in some projects is subjective to the organizational culture that concerns the norms, values, and procedures associated to the organization and their members. Akgün, Keskin, Ayar and Okunakol (2017), in their study investigating knowledge sharing barriers in the software development team context, found results supporting the subjectivity of knowledge sharing to organizational culture by showing that the reluctance of team members to sharing knowledge arises from obstacles which organization-related. This study however also highlighted the role of individual and knowledge based barriers to knowledge sharing.

Ruuska and Vartiainen (2005) in their study of the characteristics of knowledge sharing communities in project organizations, identify two main problems faced by project organizations in the bid to improve knowledge sharing. Firstly, project teams are typically temporary, as a result, when the project is complete and the team is disbanded, the knowledge attained from the execution of the project may be lost. Secondly, there is a communication challenge between team members that work in different projects or locations.

In the formulation of knowledge sharing strategies, it is important to understand the knowledge sharing barriers that need to be addressed. Roth

(2016) identified five knowledge sharing constraints:

- reluctance to knowledge sharing,
- culture norms, lack of trust,
- poor management support,
- absence of reciprocity, and
- the fear of losing power.

There are many knowledge sharing factors and influencers that discourage employees from sharing knowledge (Robinson, et al. 2001). These factors include: lack of manager commitment, attitude, organizational culture, time, job security, trust, training and lack of rewards.

In another explorative study to uncover the knowledge sharing barriers in complex projects, Santos, Soares, and Carvalho, (2012) found knowledge sharing amongst colleagues to be constrained by the classification of knowledge, time limitations, lack of initiative and strategy by employees, inadequate information technology, competitive environment, mistrust of others and ignorance of other people's work.The conclusion of this study proposed that organizations focus on the elimination or mitigation of the above knowledge sharing constraints as a strategy for improving the knowledge sharing process of an organization which would ultimately lead to the success of future business endeavors that organization.

It is argued that knowledge sharing strategies are not likely to be implemented successfully, unless major barriers due to organisational culture, lack of standard work processes, time constraints are identified and addressed (Robinson et al. 2001).

2.2.3 Enabling factors

Knowledge sharing behaviour has been associated with perceived support from co-workers and supervisors, openness to experience, and self-efficacy (Borges, 2012). Other factors that may encourage knowledge sharing amongst employees include; identifying efficient work procedures, finding information quickly, and reducing time investments for employees to learn new things (Roth, 2016).

Community-related considerations characterise moral accountabilities that people may have to benefit others for the purpose of building a strong community (Amayah, 2013; Wang and Noe, 2010).

Organizational leaders require employees to familiarise themselves with normative considerations with respect to organizational and cultural norms so that this will give rise to employees with shared goals and visions and to sharing knowledge (Amayah, 2013).

Amongst other knowledge sharing factors, researchers have identified the following as enablers of knowledge sharing:

- Management support of knowledge sharing activities
- Employee attitude
- Sense of trust
- Organizational Culture

Management support of knowledge sharing activities

Employees' willingness to share knowledge is positively influenced by

knowledge sharing support from the management (Fong and Chu, 2006; Roth, 2016). Wang and Noe (2010) recognised support from managers as a crucial factor for the success of knowledge sharing. Furthermore, the leadership of any organization should organizational leaders should necessitate and incentivise managers to provide support for encouraging knowledge sharing among employees (Roth, 2016).

Leaders who provide incentives for knowledge sharing experience improved opportunities to allow an informal exchange of knowledge and information within the organization (Goh and Hooper, 2009). Moreover, employees showed greater enjoyment and engagement in knowledge sharing when this activity was supported by managers (Goh and Hooper, 2009).

Wang and Noe (2010) found that management support does not play a role in employees' intention to share knowledge despite anticipating that management support would be crucial to knowledge sharing.

Employee attitude

Employees' attitudes toward knowledge sharing have been on the forefront of numerous research studies (Roth, 2016). Key factors that influenced employees' attitudes toward knowledge sharing included; maintaining a reputation and receiving knowledge in return, possessing self-confidence, receiving joy from helping others and being part of a sharing culture (Zhang and Ng, 2012). Employees with a high self-worth were successful in overcoming knowledge sharing barriers (Zhang and Ng, 2012).

Employees' attitudes may be separated into eagerness and willingness (Roth, 2016). Willingness suggests that an employee would allow other access to personalised intellectual capital (Roth, 2016). Eagerness suggests that

employees are self-motivated to share personalised intellectual capital (Roth, 2016). Borges (2013) states that positive influences toward attitude may lead to increased knowledge sharing intentions.

Sense of trust

Researchers have found a positive link between employees' sense of trust and knowledge sharing (Roth, 2016). Furthermore, the level of trust enables knowledge sharing, especially when knowledge sharing is voluntary, because sharing knowledge is a social interaction, thus sharing will not occur if employees are distrusting of the recipient's objectives for use of the knowledge (Roth, 2016).

Organizational Culture

Project Management and knowledge sharing success has been found to be related to organizational culture because cultures that adopt knowledge sharing characteristics have increased knowledge sharing intentions (Roth, 2016; Amayah, 2013; Borges, 2013; Wang & Noe, 2010).

2.3 Knowledge Sharing Practices

As discussed in the introductory chapter of this study, organizations are only able to leverage the tacit knowledge of their employees for competitiveness if that knowledge is shared with other employees and stored in the organization before the departure of the individuals creating that tacit knowledge (Zhang and Ng, 2012).

The expertise of an individual, which is the know-how of how to accomplish

tasks well, is essential for organizational functioning and should be managed by managers (Mayfeild; 2010).

Dixon (2000) emphasised that the selection of the appropriate knowledge sharing process within an organisation depends on the type of knowledge (explicit or tacit), the routine and frequency of the sharing process, and the knowledge receiver (individual, group or the whole organisation). Piktalia and Greenes (2008), in their research on how to transfer knowledge in today's multigenerational workplace, also argue that in order for the knowledge sharing process to be effective, the appropriate knowledge sharing technique should be utilised by the knowledge source. They provide three approaches that should guide the knowledge source in selecting the appropriate method;

i. Select a knowledge sharing method based on user needs

This approach can be used when an individual, team, or organization has specific needs in mind.

ii. Select a knowledge transfer method by context and types of knowledge

This approach can be used when an individual, team, or organization has a specific type of knowledge to be transferred.

iii. Select a knowledge transfer method by level of experience

This approach can be used when the potential receiver of the knowledge has a specific level of experience.

Research has identified various techniques used to practise knowledge sharing and gain the benefits that flow from the sharing of expertise by employees. Such techniques include; action reviews, communities of practice (cops), instant messaging, knowledge capture, knowledge elicitation, knowledge distillation, mentoring, peer assist, retrospect, wikis, rotational programmes, town hall meetings and reward programmes.

Action Reviews

Piktalia and Greenes (2008) define an action review as a rapid and simple team-learning process undertaken while work is being performed, typically during a break in a process, activity, or task. Its aim is to help teams learn in the moment and transfer knowledge immediately into the work at hand, rather than learning after a project or activity has been completed. It focuses on four simple issues; the planned activity, the actual activity, discrepancies between the planned and actual activity and lessons learnt from that activity. An action review is intended to quickly recognise key lessons and immediate actions and to build relationships, trust, and confidence among team members (Piktalia and Greenes, 2008).

Communities of Practice

Lave and Wenger (1991) defined a Community of practice as "*an activity system about which participants share understandings concerning what they are doing and what that means in their lives and for their community*".

Communities of practice are one of the most effective organizational forms for sharing knowledge between people with a common profession, practice area, or domain (Piktalia and Greenes, 2008). This is a voluntary group of peers, practitioners, and other individuals whose members regularly engage in

sharing and learning to improve their performance as individuals, teams, and organizations. The leader and members establish a commission and collectively decide on best procedures in a given situation. They are the custodians of capability in that practice within a business and often codify their collective know-how in a form that can be reused and adapted by other practitioners (Piktalia and Greenes, 2008).

Instant Messaging

Instant messaging is a form of instantaneous communication between two or more people based on typed text. The text is conveyed through electronical devices connected over a network such as the internet. A typical conversation involves two or more individuals sending each other very short, sharp messages in dialog form (Ou, Leung and Davidson, 2011). Instant messaging allows participants to see who is connected or online in their network at any moment, and can be a powerful enabler for one-on-one informal learning at the moment its needed (Piktalia and Greenes, 2008).

Knowledge Capture

Knowledge capture is a very common method of transferring knowledge. Knowledge capture is a process that involves identification, elicitation, distillation, packaging, and publishing of knowledge. Although time-consuming, when done right, it enables knowledge to move from one to many regardless of time and space (Nonaka, 1994).

Knowledge Elicitation and Distillation

Knowledge elicitation is primarily accomplished through conversations between people with relevant knowledge to share and a person responsible

for eliciting this knowledge. The distillation of this knowledge is the extraction of meaningful knowledge from recorded conversations, interviews, or informational events (Piktalia and Greenes, 2008).

Mentoring

Mentoring is becoming an emergent tool in facilitating knowledge creation and sharing (Bryant; 2005). Mentorship programs offer more personalized knowledge sharing and allow senior employees to directly transfer their expertise to the new employees who require it (Bryant, 2005). Although, mentoring often occurs in an unstructured manner in organizations, it can be more successful in the transfer of knowledge when it is a systematic process which provides a more equitable distribution of mentoring opportunities and allowing organizational guidance in the knowledge exchange process (Mayfield, 2010).

Mayfield (2010), in his paper proposing knowledge sharing techniques for encouraging workers' tacit knowledge, suggests that it is important that the mentoring efforts of an organization are also reformed to embrace succession planning.

In his empirical test of the relationship between knowledge sharing and mentoring, Bryant's (2005) results suggested that a peer mentor training course increased perceived levels of peer mentor knowledge and skills. The increased perceived levels of peer mentoring were related to higher perceived levels of knowledge creation and sharing. Mayfield (2010) pointed out that although formalized mentoring facilitates cross-unit mentoring, thus augmenting worker skill sets, all successful mentor programs require participation rewards and support for the worker and mentor in order to be effective.

Peer Assist

A peer assist is a facilitated meeting or workshop where peers from different teams share their experiences, insights, and knowledge with a team that has requested help in meeting an upcoming challenge or problem (Piktalia and Greenes, 2008). Its aimed at;

- targeting a specific technical, mission, or business challenge,
- acquiring assistance and insight from people outside your team,
- promoting sharing of learning, and
- developing strong, and often new, connections among staff

Retrospect

A retrospect is a simple tool for capturing a team's new knowledge after completion of a piece of work (Piktalia and Greenes, 2008). It is a team meeting or workshop held after an event, activity or major milestone in a project or program. Goffin and Koners (2011) acknowledge the recognition of valuable lessons learnt and improved team openness and cooperation as benefits of retrospect.

Wikis

One evident and important method used for sharing tacit knowledge is a wiki (Mayfield, 2011). A Wiki is a major component of Web 2.0, which is the emergent generation of web tools and applications (Adie, 2006). A wiki is a web communication and collaboration tool where individuals can upload information (knowledge) and edit each other's entries (Adie, 2006). It may be used to engage a group of individuals to share knowledge with others within a

collaborative environment (Adie, 2006). In this manner, knowledge is distributed and extended through a collective effort which may occasionally be systematized into special interest groups known as communities of practice (Mayfield, 2011). Mayfield (2006) explains this method by way of an example. When an employee creates an online platform requesting input from other colleagues regarding a specific issue. Another employee may then list effective methods learnt from their personal experience, and other employees may expand on these ideas based on their own experiences.

This method of ensures that knowledge sharing is stimulated and developed in a continuing manner. The uses of such wikis are still emerging, but some organizations have begun utilising wikis for sharing global information, and many software companies use wikis for technical knowledge sharing and tracking emerging customer needs (Mayfield, 2011).

Rotational programs

This is a formal program in which a person or group of persons experiences a variety of tasks and responsibilities in several different positions (Piktalia and Greenes, 2008). They are typically designed to develop an individual's knowledge base to prepare him or her for positions of increasing responsibility and scope.

Best Practices Meetings / Studies

Best practices meetings/studies look for different processes or systems to perform work that have had measurable success and effectiveness and are likely transferable. Best practices are found in a variety of ways; through meetings of similar functional groups, polling employees, or surveying for best practices (Piktalia and Greenes, 2008).

Town hall meetings

Town hall meetings ensue when employees attend an unstructured assembly where ideas and issues are deliberated across organizational levels, and receptive actions are presented (Mayfield, 2011). These meetings encourage cooperative knowledge sharing, and are complimentary to wikis because of the enhancement of the learning cycle through free and direct worker exchanges and instantaneous feedback (Mayfield, 2011). In order for these meetings to be effective, the objectives thereof need to be clear and set from the beginning and must involve management support.

Reward programs

Numerous establishments have introduced reward systems to inspire employees to share their knowledge with other employees (Bartol and Srivastava; 2002).

Mayfield (2010) suggests that targeted rewards are the most effective means to increase worker tacit knowledge sharing. Bartol and Srivastava (2002) support this notion and argue that the system of contributing knowledge to databanks is predisposed to rewards that are conditional on knowledge sharing behaviours.

Since human behaviour is shaped by incentives, Mayfield (2010) argues that an individual's tacit knowledge sharing will respond accordingly. Beyond obvious motivation, rewards are a symbol of management's commitment to tacit knowledge sharing, and thus help develop an organization's knowledge sharing culture (Mayfield, 2010).

Bartol and Srivastava (2002) suggest that rewards are important for most

mechanisms of knowledge sharing. Bartol and Srivastava (2002) do however caution that, simply introducing the rewards will not achieve their intended results unless basic guidelines for the effective use of rewards, such as clear goals, rewards of value, and sufficient employee self-efficacy are also followed. This notion is resonated in Mayfield's (2010) statement that these rewards should be well-communicated, relevant, attainable, and integrated to reflect a cohesive knowledge management strategy.

2.4 Construction project management knowledge requirements

Kelly, Edkins, Smyth and Konstantinou (2013) state that construction practitioners have been concerned with the fact that project teams are constantly required to solve similar problems on an ongoing basis. The application of knowledge management and organizational learning theories could support the retention of knowledge and overcome the problem of the loss of knowledge and ensure that projects are completed successfully (Ayas, 1996).

Management literature has had a long-standing discussion concerning the explanations for and mechanisms that allow organizations to develop and mature by collecting and using knowledge (Kelly, Edkins, Smyth and Konstantinou, 2013). The interest on knowledge management is centred on the firm belief that organizations seek to achieve continuous improvement leading to improved profits and business performance (Kelly, Edkins, Smyth and Konstantinou, 2013).

The importance of "the collective thoughts of the people within the organization as knowledge contributors" was highlighted by Bredillet (2004) who also suggested that being able to appropriate knowledge towards the benefit of project sponsors and other organizational purposes becomes a

critical aspect of the management of the organization. This notion is echoed for project businesses and particularly those engaged in selling intangible services. Bayer and Gann, (2006:6) stated that:

“The key assets for the project-based professional services firm are considered to be its staff, knowledge, financial resources and its reputation.”

The discussion on the definition of knowledge is extensive and beyond the scope of this contribution, however an understanding of the concept is essential for this study. Kelly, Edkins, Smyth and Konstantinou (2013) argue that knowledge and its management are seen to contribute to organizational change and adaptability. Furthermore, through an emphasis on learning, past experiences can be re-interpreted and lead to effective action and improved bottom-line overtime.

The discussion on the definition of knowledge has concentrated on the distinction between tacit and explicit knowledge and on processes of knowledge creation (Kelly, Edkins, Smyth and Konstantinou, 2013).

However, the comprehension of knowledge and its role in modern organizations has slightly leaned towards a more relational view and emphasizes the interaction between action and experience (Cavaleri, 2004). Brown and Duguid (2001) have re-interpreted the strict distinction of explicit and tacit types of knowledge as proportions which co-exist and characterise all knowledge, even though they argue that it is the more tacit dimension of knowledge which is more challenging to share and therefore harder to transform ineffective action.

The Project Management Institute (2013) lists ten knowledge areas which a project manager must practice and master to manage a project efficiently.

Knowledge areas are the skills a project manager must practice and master to manage a project efficiently. The Project Management Institute (2013) lists ten knowledge areas which a project manager must practice and master to manage a project efficiently. These knowledge areas are listed and briefly defined by the Project Management Institute (2013) as follows:

Project Integration Management

This knowledge area is dedicated to the identification and definition of the work in the project. This knowledge area also deals with efficiently integrating changes into the project.

Project Scope Management

This knowledge area is dedicated to the definition of the project scope, project requirement scope, project work, creating the work breakdown structure, creating the scope baselines and managing the scope of the project. This is area where the project manager defines the procedures for keeping the project within the established project limitations.

Project Time Management

Project managers are responsible for estimating the duration of the tasks to be executed in a project. This knowledge area is focused on the sequencing of the tasks and selecting the appropriate quantity of resources required to achieve the objective of the project. Based on the sequencing and resourcing, a project schedule is designed. The managing and monitoring of this schedule is also dealt with in this knowledge area.

Project Cost Management

This knowledge area deals with the estimation of costs and the establishment of the budget baseline. The plan by which the project manager plans to manage the costs is also categorized into this knowledge area.

Project Quality Management

This is the knowledge area where the quality requirements for the project deliverables are planned and tracked. In this knowledge area, all the quality issues are monitored and corrected as required by the project specification.

Project Human Resources Management

This knowledge area deals with the management of human resources of the project. It comprises of the processes whereby human resources will be utilized, developed, acquired and managed.

Project Communications Management

This knowledge area defines how communications within the project will be done. In this knowledge area, the project manager makes the communication management plan, ensures the plan is followed, and controls information flow within the project.

Project Risk Management

This knowledge area is dedicated to the identification of project risks, planning how these risks will be managed, conducting risk assessments, and

controlling these risks. This knowledge area concentrates on identifying, analysing, planning responses to project risks.

Project Procurement Management

This knowledge area deals with the processes utilised by project managers to acquire required resources for the successful completion of the project. In this knowledge area, project managers plan for executing, controlling and closing out project procurement.

Project Stakeholder Management

This knowledge area encompasses all the processes used by the project manager for identifying and satisfying the parties affected by the project. The affected party can either be internal or external, in nature. The project manager focusses on those stakeholders who can have a powerful impact on the project.

Although all these ten knowledge areas are required to be mastered by a project manager, this research will focus on uncovering which of these knowledge areas need to be shared by construction project management colleagues in order to develop recommendations for improving the effectiveness of knowledge sharing.

2.5 Summary

The objective of this literature survey was to critically analyse and combine the knowledge sharing literature obtained from various academic sources. It presented the historical research conducted on knowledge sharing, factors

influencing knowledge sharing behaviours of employees, the knowledge required by construction project managers and the knowledge sharing techniques available.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

In order for knowledge sharing to be effective within an organization, the leadership of that organization needs to comprehend the factors that influence knowledge sharing among employees (Roth, 2016). The primary objective and aim of this study is to determine the factors influencing the willingness of construction project managers to share knowledge with other project management colleagues.

This chapter presents the data collection methods applied in this study. The theoretical background to research approach and the research approach adopted in this study is discussed. Furthermore, this chapter defines the method of data collection within the boundaries of the chosen sample. The chosen data collection approach is critically described and evaluated in terms of its application for this study. Finally, this chapter presents the methods adopted for data analysis and interpretation.

3.1 Theoretical background to research approach

Leedy and Ormrod (2005) stated that there are two fundamental methods of research design; namely qualitative and quantitative methods.

Kumar (2011) acknowledges the importance of using the appropriate methods in research. The determination of the appropriate method is critical for the researcher as the chosen method must compliment the proposed problem (Leedy & Ormrod, 2013).

The research philosophy adopted covers important assumptions regarding the way in which the problem will be addressed (Saunders, Lewis and Thornhill, 2009). Furthermore, these assumptions will reinforce the research

strategy and the methods chosen as part of that strategy (Saunders et al., 2009).

Although hard to achieve, all researchers endeavour to produce a study with faultless validity and reliability (Kumar, 2011 and Roth, 2016). The reliability of an instrument is assessed by obtaining the same results from the repeated use of that research instrument (Neuman, 2011). The validity of an instrument supposes that the instrument measures what the researcher means to measure without any other influencing circumstances (Neuman, 2011).

There are two types of validity in a study, namely; internal and external validity (Leedy & Ormrod, 2013). When researchers measure internal validity, the aim is to comprehend the extent to which the design and data yields conclusions about the cause-and-effect relationship (Leedy & Ormrod, 2013). Researchers measure external validity in order to determine how the results compare when tested with a larger population (Neuman, 2011).

The results from this study may be used as a stepping stone to analysing the knowledge sharing intentions of project managers.

3.1.1 Qualitative approach

Qualitative research applies many techniques that may be different from one another. The similarity in all qualitative research methodologies is that qualitative research methods focus on phenomena that occur in natural settings and involve studying those phenomena in all their complexity (Leedy, 2005).

The principle of qualitative research is that it does not accept observations of the senses but it determines the underlying issues or factors causing the

reality (Leedy and Ormrod, 2010). Qualitative research considers the emotions behind the thoughts and actions of a certain phenomenon or occurrence (Leedy and Ormrod, 2010). Furthermore, qualitative research is not one dimensional, it is diverse and encompasses a variety of research methods as it involves paradigm positions, discussions and debates. Punch (2009) states that qualitative research continues to develop paradigms throughout the research.

Qualitative researchers postpone drawing inferences and findings about the data collected until later in the research (Punch, 2009). Qualitative researchers strive for objectivity which is the resistance to be influenced by perceptions, impressions and biases which may be imposed on the researcher (Leedy, 2005). Furthermore, qualitative researchers recognise that there isn't necessarily a single ultimate truth to be discovered. Leedy (2005) notes how revealing the nature of the multifaceted perspectives may be a goal of qualitative research. Since qualitative research poses open-ended questions at the beginning, it is difficult to point out the exact method of research to be used. Initially, case study, ethnography or content analysis may be selected only to realise during the course of research that the method selected is not specific or suited to the research question. This is the reason for the continuation of the evaluation of qualitative research methodology over time (Leedy, 2005).

Punch (2009) lists the following as features of qualitative research:

- Qualitative research is conducted through fieldwork,

- The qualitative researcher must gain a holistic view of the study,

- The perceptions of the participants are recorded for analysis

Qualitative research is useful for the following purposes:

- Describing the nature of certain situations, settings, processes, relationships, systems or people.

- Interpreting the studied phenomenon through gaining new insights about a particular phenomenon, developing new ideas about the phenomenon and discovering the problems that exist within the phenomenon.

- Verifying certain assumptions, claims, theories or generalisations within natural settings.

- Evaluating the effectiveness of particular policies, practices or innovations.

Leedy and Ormrod (2005) list the methodologies of qualitative research as follows:

- Case study

- Ethnography

- Phenomenological study

- Grounded theory

- Content Analysis

In a case study, a specific situation is studied in depth for a defined period of time. A specific case is intensively studied due to its distinctive nature or exceptional qualities. The focus can increase understanding and provide information for similar situations (Yin, 2014). A case study research approach may be suitable for understanding a situation that is poorly understood. It may also be used to investigate how a specific phenomenon changes over time as a result of circumstances or interventions. The major flaw of a case study is that there is uncertainty as to whether the findings can be generalised, as only one case is considered (Leedy, 2005). Leedy (2005) stated that in order to assist the researcher to ascertain the extent to which the results may be generalised to other situations, the researcher records details about the context surrounding the case, such as information about the physical environment and any historical, economic and social factors that have bearing on the situation.

Through ethnographic study a whole group that shares a common culture is studied in depth over an extended period of time (Leedy, 2005). The researcher studies a setting or environment for a period of time noting events and occurrences, and can ask questions throughout the process (Punch, 2009). The investigation concentrates on everyday events in which the people in the group are active in, with the objective of identifying cultural patterns. The researcher seeks to gain understanding of the complexities of a certain culture (Leedy, 2005). Data is collected through site based fieldwork. Data collection is through participant observation, structured and unstructured interviews with participants and may include review of historical data (Leedy, 2005).

A phenomenological study seeks to understand people's perspectives,

perceptions and understandings of a particular situation. The purpose of the study is to understand and experience from the participants' point of view (Leedy, 2005). Data collection is in the form of thorough, unstructured interviews as well as purposeful sampling of participants. Data is analysed through searching for meaningful units of analysis that reflect various aspects of the experience and integration of the meaning units into a typical experience (Leedy, 2005).

The purpose of a grounded theory study is to gather data first and then develop a theory (Leedy, 2005). This form of study is useful when theories about a phenomenon are not adequate or do not exist. It is a process that includes human actions and interactions and how they result from and influence one another (Leedy, 2005). The word "grounded" means that the theory will be generated from the collected data. The word "theory" stems from the objective of the research which is to generate a theory and explain data (Punch, 2009).

A content analysis is a detailed and systematic examination of the contents of a particular body of material for the purpose of identifying patterns, themes or biases. The purpose of content analysis is to seek out specific characteristics from a body of material. Content analysis research focuses on any verbal, visual or behavioural form of communication. Data is collected through the identification and possible sampling of specific material to be analysed (Leedy, 2005). Furthermore, the coding of the material is in terms of predetermined and precisely defined characteristics

Research methodologies in qualitative studies involve sampling, observations and interviewing (Leedy, 2005).

The identification of a sample must be undertaken in relation to the research

questions posed in the study. In order to make deductions about an entire population, a sample that represents the whole must be selected. In qualitative research, the sampling is purposeful rather than random. The sample is selected according to the value of information it will yield with regards to the research question (Leedy, 2005).

During observations the researcher observes either as an outsider or a participant observer. There is no structure followed when making observations in qualitative research (Leedy, 2005). The researcher can shift focus from one phenomena to another as data sources reveal new concepts and views (Leedy, 2005). The association between data collection and research questions takes place during the observations (Punch, 2009).

Interviews are a more personalized form of data collection method than questionnaires and are conducted by trained interviewers using the same research protocol as questionnaire surveys (Bhattacherjee, 2012). Interviews can be structured, unstructured or open ended. Structured interviews are interviews where all respondents receive the same questions in the same order. Unstructured interviews are non-standardised interviews (Punch, 2009).

The interviews in a qualitative study are mostly semi structured and open ended. Open ended interviews are flexible and the respondents to the interviews may reveal information that the researcher had not anticipated. This flexibility may however lead to different and incomparable responses from the interviewees if control measures are not applied (Leedy, 2005).

3.1.2 Quantitative approach

Quantitative or descriptive research involves identifying the characteristics of

an observed phenomena and/or exploring possible correlations between two or more phenomena (Leedy and Ormrod, 2010). Quantitative research examines the situation as it is. In the quantitative approach, observations are recorded in detail using various research instruments, for example, field notes and video recording, to capture interactions between phenomena and variables. Quantitative research methods tend to have a particular or pre-specified focus of study (Leedy and Ormrod, 2010).

The focus of quantitative studies is a specific feature of conduct. The conduct needs to be measurable against a benchmark. The quantitative researcher has to remain objective when making assessments (Leedy, 2005).

Survey research aims to evaluate the characteristics of a large population. A quantitative survey questions poses the questions; who, what, where, how many and how much. The survey questions participants and summarises the respondent's responses as percentages, frequencies, statistical indexes and deduces conclusions about a population from those conclusions (Leedy, 2005).

It is noteworthy that in survey research, respondents indicate their perceptions of the truth, or the relative truth, which may not necessarily be the absolute truth (Leedy, 2005). Another disadvantage associated with survey research is that individuals might purposefully misrepresent facts in order to please the researcher. Data in survey research is normally collected in the form of face-to-face interviews, telephone interviews or a written questionnaire (Leedy, 2005).

3.2 Research approach adopted in this study

After the statement of the research problem, a literature review of all similar

research in this area was undertaken to formulate arguments and the research questions posed. The literature review included work published from the year 1981, which was when research on knowledge management began, up to and including the year 2016.

The research philosophy used in this study was positivism. When using positivism as a philosophy, the researcher works with an observable social reality, and only occurrences that can be observed lead to the production of credible data (Saunders et al., 2009).

The study adopted the deductive approach as the goal of the researcher was to test concepts from theory using new empirical data (Bhattacherjee, 2012).

Empirical data was collected using an internet administered questionnaire and telephonic interviews in which quantitative methods where used to analyse the results.

This study adapted a standardised instrument, Behavioural Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social Psychological Forces and Organizational Climate by Bock, Zmud and Kim (2005). The reliability of the research instrument developed by Bock et al. (2005) was initially tested for applicability in this study through a pilot test. The pilot test involved interviewing senior practitioners.

To maintain the reliability of the results of this study, the researcher adapted the standard instrument and utilised a similar survey protocol as the one used with the original instrument by approaching the participants via electronic communication. The research instrument applied in this study was initially tested by Bock et al. (2005) for content validity, convergent validity and discriminant validity.

Ethical clearance was applied for and obtained from the School of Construction Economics and Management at the Witwatersrand prior to data collection.

The methodology applied was appropriate to obtain reliable data for answering the research question posed in Chapter One.

3.2.1 Rationale for choice of approach applied in this study

The quantitative method, which aligns to the positivist philosophy, is appropriate for developing an understanding of the factors influencing project manager's knowledge sharing with colleagues. In addition, the quantitative method is suitable where the researcher aims to analyse numerical data and generalise the findings to a larger population (Leedy & Ormrod, 2013).

There are several available research strategies appropriate for quantitative data collection, namely; experiment, survey, case study, ethnography, action research, grounded theory, archival research.

Numerous research strategies were explored as research methods for this study. A number of strategies were inherently unsuitable for this study at the planning and design stage of this study, for example, experiments and ethnography. Others were considered appropriate but were not viable. The research strategy applied in this study was the survey method in the form of questionnaires and telephonic interviews.

Table 3.1 summarises the selection criteria for the research strategy applied in this study and illustrates why the survey method was the chosen method to be adopted in this study.

Table 3.1: Research Strategy Selection

Research Strategy	Viability of the strategy for this study	Perceived suitability of the returned data	Extent of control over strategy	Appropriate-ness in meeting objectives, answering research questions and testing hypothesis	Possibility of completion within required time frame
Experiment	Low	Low	Low	Low	High
Survey	High	High	Medium	High	High
Case Study	High	High	Medium	Low	High
Action Research	Low	Low	High	Low	Low
Ethnography	Low	Low	High	Low	Low

In order to answer the research question posed in Chapter One, the quantitative method using the survey strategy was deemed appropriate for application in this study.

3.2.2 Survey research – a critique

Survey research involves the use of standardized questionnaires or interviews to collect data about participants and their inclinations, opinions, and actions in a methodical manner (Bhattacherjee, 2012). Moreover, the survey method is suitable for research that has individual people as the unit of analysis (Bhattacherjee, 2012).

Surveys have numerous intrinsic strengths compared to other research

methods (Bhattacherjee, 2012). Bhattacherjee (2012) states that surveys are:

- A viable means for assessing a wide variety of unobservable data such as participants' preferences, characteristics, attitudes, beliefs, actions as well as factual information,

- Ideally suited for remotely collecting data from a large population deemed too large to observe directly,

- Flexible, in that questionnaires are unobtrusive in nature and more convenient for the respondent,

- A method of accessing certain population groups such as the homeless or illegal immigrants where there is no sampling frame,

- Permissive for discovery of minor effects even while analysing multiple variables. Depending on the survey design, the survey instrument may also allow relative analysis of population subgroups,

- Economical in terms of researcher time, effort and cost,

Bhattacherjee (2012) notes that survey research also has a number of unique disadvantages and can be prone to a large number of biases such as non-response bias, sampling bias, social desirability bias, and recall bias.

3.2.3 Selection criterion for sample

Bhattacherjee (2012) defines a population as all people or items (unit of analysis) with the characteristics that one wishes to study. A purposive sample was utilised to access the population. In purposive sampling, a

nonprobability technique is employed and is based on the judgement and selection of the researcher (Leedy & Ormrod, 2013; Roth, 2016). Purposive sampling is justified by the incapability of the researcher to do an accurate random sample (Kumar, 2011).

The population for the survey questionnaire and telephonic interviews utilised for data collection in this study included project managers within the construction industry based in Gauteng, South Africa and working for organizations which are registered with the South African Association of Construction Project Managers (ACPM). The Gauteng province was selected due to the fact that it is one of South Africa's major provinces and contains the country's largest city, Johannesburg (Gauteng Online, 2010). Notwithstanding the fact the Gauteng is the smallest province in South Africa, it is highly urbanized and is the most densely inhabited province in South Africa. The ACPM is an association of project management professionals working in the construction industry. Membership is not automatically granted to applicants and therefore, membership may be considered to be an additional qualification. The ACPM was selected to ensure that the professional level of participants was the same.

The population was purposefully selected as it aligned with the research question which is to develop an understanding of the factors influencing a project manager's knowledge sharing with project management colleagues. Project managers were selected as the population of this study as the research study addressed knowledge sharing in the construction industry and project managers are possess more knowledge about a project than any other professional working on that project.

The suitability of the participants was determined by pre-qualification questions on the research instrument. The pre-qualification questions were to

ensure that the participants were construction project managers based in Gauteng and working for organizations registered with the ACPM.

3.2.4 Data collection – the approach and structure

Ethical clearance from the School of Construction Economics and Management at the University of the Witwatersrand was applied for and granted before data was collected.

Data in this study was collected in two methods:

i. Using an internet administered adapted survey, originally authored by Bock, Zmud and Kim (2005) titled: *Behavioural Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social Psychological Forces and Organizational Climate* (see Appendix 3 for questionnaire). The approach was to send out 100 questionnaires to construction project management participants in Gauteng with and expected response rate of thirty percent (30%).

   The instrument was originally designed to examine the relationship of multiple variables to the dependant variable of knowledge sharing intention thus aligning to the research question (Roth, 2016 and Bock et al., 2005). The changes to the original survey included altering wording to be aligned to the research question and removing questions not related to this study.

   The link to complete the survey on Typeform®, a third party data collection tool, was emailed to participants where permission was granted by the organizational leaders. The participant information

sheet was attached to the email to allow participants to make an informed decision on whether to proceed with the survey. Participants had to acknowledge informed consent and fulfil the qualifying criteria before beginning with the survey.

Participants were given 14 days in which to complete the survey. Typeform® did not allow participants to submit incomplete surveys. Once survey period lapsed, the researcher downloaded the results from Typeform® onto the researcher's personal computer for analysis.

The downloaded results will be securely kept in a password controlled personal computer for five years after the publication of the research report and permanently destroyed thereafter.

ii. Conducting telephonic interviews

In order to to gather valid and reliable data that are relevant to the research question and objectives, structured telephonic interviews were conducted with ten respondents. The respondents were first asked for permission and the ethical declaration was given and accepted.

3.2.5 Data processing and analysis

In order for research data to be useful, the data collected needs to be analysed and interpreted (Saunders, Lewis and Thornhill, 2009). Leedy and Ormrod (2013) list presenting the data, interpreting the data, and testing hypotheses as part of the data analysis process.

The research instrument encompassed rating questions where the

respondents were asked how strongly they agree or disagree with a series of statements using a five-point Likert scale. In order to understand the knowledge sharing activities taking place in construction companies during projects, the research instrument also included a statement question where the respondents were required to state the knowledge sharing activities in their organizations.

The benefits of knowledge sharing and the impact of poor knowledge sharing was investigated using yes or no questions.

The telephonic interview questions provided supplementary data to the internet administered survey. The quantitative coding of the interview questions was a deductive process. The likely responses from the literature review were assigned numerical values. The participants' responses were then reviewed and assigned the numerical value that most closely matched the value of expected response. This supplementary data was used to obtain more meaningful results and provide a well-educated discussion of results.

3.2.5.1 Units of Analysis

Bhattacherjee (2012) defines the unit of analysis referring to the person, collective, or object that is the target of the investigation. The aggregate unit of analysis for this study is knowledge sharing between construction project managers.

3.2.5.2 Data Processing

Before undertaking any analysis of the data, the researcher prepared the data from the Likert-scale questions to align with the knowledge sharing constructs found in the literature review namely; anticipated extrinsic rewards,

anticipated reciprocal relationships, sense of self-worth, affiliation, innovativeness, fairness, attitude toward knowledge sharing, subjective norms and intentions to share knowledge. The data from the demographic questions were separated for use in demographic profiling of the respondents. The rest of the data was separated into the units of analysis that it was allocated to and numerically coded for quantitative analysis.

Descriptive statistics was used to analyse the survey data from the Likert-scale type questions. Descriptive statistics allow the description and comparison of variables numerically (Saunders, Lewis and Thornhill, 2009). The research questions and objectives guided this choice of statistics. The statistical techniques used to describe variables focussed on two aspects; the central tendency and dispersion. The median (M) was used to describe central tendency and the interquartile range (IQR) was used to describe dispersion. The findings from descriptive statistics were presented in tabular format depicting the summary of results with an explanation of the findings below the table.

The theory of planned behaviour was examined using significance testing techniques to determine to what degree motivational factors may relate to knowledge sharing intentions. Such motivational factors included sense of self-worth, subjective norms, and attitudes toward knowledge sharing.

The findings were then reported in the summary of findings drawing inferences to literature reviewed in Chapter Two where necessary and addressing the research question and research objectives.

3.2.5.3 Data Analysis

The purpose of this study was to develop an understanding of the factors

influencing a construction project manager's willingness to share knowledge with project management colleagues. The research question that guided the study was: "What factors influence the willingness of construction project managers in the same organization to share professional knowledge with each other, and how is the knowledge shared?"

3.3 Ethical Considerations

The ethical considerations for this study are detailed in this subsection through the definition of the role of the researcher and the role of the participant.

The Researcher

The role of the researcher includes the collection and analysis of the data in an ethical and unbiased manner (Bhattacherjee, 2012). Although employed in the construction industry, the researcher, has no relationship with the participants of the study. The researcher adhered to all ethical standards as mandated by the University of the Witwatersrand School of Economics and Management Ethics Committee. The researcher protected participants' rights by ensuring that informed consent was acknowledged by the participants before any data is collected from the participants, participation was voluntary and that respondents were aware that they could withdraw from the study at any time without adverse consequences.

The Participants

Upon receiving ethical clearance from the University of the Witwatersrand School of Economics and Management Ethics Committee, authorisation to survey project managers of construction organizations from was obtained

from organizational leaders (See Appendix 1).

Participants were requested to acknowledge reading informed consent form prior to participating in the survey (See Appendix 2).

The survey was administered through Typeform®, an online data collection tool accessed via the internet which ensured anonymity as the survey instrument itself did not include the collection of the participant's name or organization.

The researcher is the only person with administrative access to the data collected from the survey. The data and the permissions will be kept in a secure manner for five years after publication of the study.

3.4 Summary

This chapter presented the process for data collection applied in this research. The research approach, research design and the theoretical approach undertaken in this study was also presented. This chapter outlined the rationale for adopting the survey method, and the rationale underlying the chosen sample of participants for this study. Finally, this chapter presented the methods adopted for data analysis and interpretation.

CHAPTER FOUR: DATA PRESENTATION AND ANALYSIS OF RESULTS

This chapter presents and analyses the data collected from the survey questionnaire and telephonic interviews. The research findings are related and compared to the literature reviewed in Chapter Two.

4.1 Profile of Sample / Respondents

Participants answered prequalification questions regarding job role, location and indicating whether their organization was registered with the ACPM. Amongst the participants considered in the analysis, 100% were project managers working for construction organizations located in the Gauteng province in South Africa. The participants were further requested to indicate their gender, age group and job level within their organizations. Table 4.1 to Table 4.4 illustrate the demographics of the study participants.

4.1.1 Standardised Telephonic Interviews

Table 4.1 Profile of the Interview Respondents

	R1	*R2*	*R3*	*R4*	*R5*	*R6*	*R7*	*R8*	*R9*	*R10*	
Female			✘			✘		✘	✘	✘	*50%*
Male	✘	✘		✘	✘		✘				*50%*
Age 22-35 years	✘	✘	✘					✘	✘	✘	*60%*
Age 36-45 years					✘	✘	✘				*30%*
Age 46+				✘							*10%*
Junior	✘									✘	*20%*
Intermediate		✘					✘		✘		*30%*
Senior			✘	✘	✘	✘		✘			*50%*

Table 4.1 Notes

Whilst some of the responses from the telephonic interviews were similar, the results obtained from each respondent from a demographic group cannot be applied to the results from the entire demographic group. Therefore, the results obtained from the telephonic interviews cannot be generalized for the wider demographic groups but rather the generalization is based on the population.

4.1.2 Internet Administered Survey Questionnaire

Table 4.2 Gender Profile of the Participants

Gender	***Number***	***Percentage***
Female	7	23
Male	23	77
Total	**30**	**100**

Table 4.2 Notes:

The results of this study indicate that only 28.6% of the female respondents are willing to share their expertise with other team members and also look for ways to improve their knowledge sharing. A majority of 57.1% of females indicated and unwillingness to participate in knowledge sharing with the remaining 14.3 % having a neutral stance on the whether they would share knowledge with other colleagues. A majority of 71.4% of the male respondents indicated a willingness to share knowledge with other team members. Only 9% of the male respondents indicated that they had no intention of sharing their knowledge with other colleagues while the remaining 14.4% indicated a neutral stance on knowledge sharing. This study revealed

that male project managers are more inclined to share knowledge when compared to female project managers.

Table 4.3 Age Profile of the Participants

Age Group	*Number*	*Percentage*
22-35	17	56.7
36-45	8	26.7
46+	5	16.6
Total	**30**	**100**

Table 4.3 Notes:

The results of the study revealed that the willingness to share knowledge increased with the age group of the participants. Participants aged 46 years and above had the highest percentage (80%) of project managers willing to share knowledge, followed by the participants aged between 36 and 45 years with 71% of project managers willing to share knowledge. The participants aged between 22 and 35 years were the least willing to share knowledge with only 60% indicating a willingness to share knowledge.

Table 4.4 Job Level of the Participants

Job Level	*Number*	*Percentage*
Management	10	33
Senior	8	27
Junior	5	17
Intermediate	4	13
Leadership	1	3
Total	**30**	**100**

Table 4.4 Notes:

In terms of job level of the participants, the results showed no distinguishable relationship between the job level of the participant and the willingness to share knowledge.

4.2 Summary of Research Findings

The research question that guided this research report was:

“What are the factors constraining effective knowledge sharing practices among project management colleagues working within the same organization, and how can the effectiveness the knowledge sharing practices be improved?”

In order to obtain the data required to answer the research question, two research instruments, in the form of structured interviews and an internet administered questionnaire were used. The summary of the research findings is tabulated in Table 4.5 and Table 4.6.

The main findings indicate that; although construction project managers value knowledge sharing and an essential tool to gaining the organisational knowledge that is applicable to the management of construction projects for successful outcomes, the reluctance to share knowledge, the lack of reciprocal relationships and time limitations are the biggest constraints to effective knowledge sharing practices of construction project managers. Conversely, the findings reveal that the allocation of time (in the form of organisational systems), team member relationships, and sense of self-worth would equally motivate the sharing of knowledge.

The recommendations for the improvement of knowledge sharing, articulated by the study participants are; the formalisation of the knowledge sharing process (when, what and how to share), team building events, team knowledge sharing workshops and the introduction of structured mentorship programmes.

4.2.1 Summary of Research Findings from the Telephonic Interview

Table 4.5 Knowledge Sharing Perceptions of Construction Project Managers

	R1	***R2***	***R3***	***R4***	***R5***	***R6***	***R7***	***R8***	***R9***	***R10***
Perception of Knowledge Sharing Value to Project Success	Critical	Critical	Critical	Important	Critical	Critical	Critical	Critical	Critical	Critical
Preferred Knowledge Area	Quality Management	Cost Management	Cost Management	Integration Management	Programme Management	Integration Management	Cost Management	Quality Management	Programme Management	Cost Management
Preferred Knowledge Source	Contract Managers	Contract Managers	Senior Managers	Project Planners	Contract Managers	Everyone	Contract Managers	Senior Managers	Senior Managers	Senior Managers
Knowledge Sharing Practices	Project Meetings	None	Lessons Learnt Quiz	Mentorship	Project Meetings	Project Meetings	Project Meetings	Advice Seeking	Mentorship, Lessons Learnt Quiz	Project Meetings
Knowledge Sharing Participation	Active	Inactive	Active	Inactive	Active	Active	Active	Active	Active	Active
Knowledge Sharing Motivators	Preventing duplication of Work	Receptive Attitude	Self-Worth	Professional capacitation of team members	Affiliation	Professional capacitation of team members	Self-Worth	Self-Worth	Rewards	Self-Worth
Knowledge Sharing Constraints	Sharing incriminating knowledge	Non-receptive Attitude	Time, Non-receptive Attitude	Time	Affiliation	Time	Non-receptive Attitude	Organisation Culture	Time	Self-Worth
Knowledge Sharing Strategies	Attendance of meetings by all staff	Workshops and team building functions	Workshops, Rewards	Pairing, Project Shuffling	Workshop on importance of knowledge sharing	Building relationships	Formal knowledge sharing process	Debating	Formal knowledge sharing process	Mentorship

4.2.2 Summary of Research Findings from the internet administered questionnaire

Table 4.6 Factors Promoting Knowledge Sharing of Project Managers

Factors influencing knowledge sharing	*Strongly Agree*	*Agree*	*Neutral*	*Disagree*	*Strongly Disagree*	*M*	*Md*	*IQR*
Anticipated Extrinsic Rewards	6.5%	9%	17%	27%	40.5%	2.15	2	2
Anticipated Reciprocal Relationships	31.75%	52.5%	8.25%	1.5%	6%	4	4	1
***Sense of* Self-Worth**	45.6%	37.6%	8.6%	4.4%	3%	4.2	4.30	1.20
Affiliation	14.25%	44.75%	18.5%	37.5%	3%	3.49	3.75	1.25
Innovativeness	23.7%	38.5%	16.7%	16.7%	4.4%	3.6	3.67	1
Fairness	20.33%	32.33%	21.33%	13.33%	11.33%	3.38	3.83	1.67
Attitude toward Knowledge Sharing	23.5%	50.25%	8.5%	15.25%	2.5%	3.76	4	1.50
Subjective Norm	27.83%	44.17%	18.17%	7.33%	1.67%	3.88	4	1.67
Intention to share knowledge	27.8%	42.2%	9%	18%	3%	3.73	4	2

4.3 Presentation and Analysis of Data

4.3.1 Factors constraining effective knowledge sharing

The main objective of this research report was to identify the factors constraining effective knowledge sharing among construction project managers working within the same organisation. Pursuant to the achievement of this objective, the respondents to the telephonic interviews were requested to indicate the knowledge sharing constraints they faced within their organisations. In the literature review, the general knowledge sharing constraints were identified (Robinson, Carrillo, Anumba and Al-Ghassani, 2001; Santos, Soares, and Carvalho, 2012; Roth, 2016;).

Table 4.7 Knowledge Sharing Constraints

	R1	***R2***	***R3***	***R4***	***R5***	***R6***	***R7***	***R8***	***R9***	***R10***	
Reluctance to knowledge sharing		✘		✘			✘	✘			*40%*
Anticipated reciprocal relationships	✘				✘	✘				✘	*40%*
Time Limitations			✘	✘		✘			✘		*40%*
Attitude		✘	✘				✘				*30%*
Organizational Structure			✘				✘		✘		*30%*
Fear of losing power	✘		✘							✘	*30%*
Competitive environment					✘			✘			*20%*
Lack of rewards			✘						✘		*20%*
Lack of trust		✘						✘			*20%*
Ignorance of other people's work							✘			✘	*20%*
Classification of knowledge								✘			*10%*
Culture norms		✘									*10%*
Poor management support											
Inadequate information technology											

The knowledge sharing constraints reported by the respondents are similar to that found in literature, with the exception of two issues;

- Respondent 1, stated that incriminating knowledge was a barrier to knowledge sharing. The type of knowledge to be shared was not considered as a knowledge sharing constraint in the literature reviewed.
- None of the respondents mentioned management support or inadequate information technology as a barrier to knowledge sharing.

The results indicate that the knowledge sharing practices of majority of construction project managers are constrained by the reluctance to share knowledge, the lack of reciprocal relationships and time limitations. Respondent 1, stated that incriminating knowledge was a barrier to knowledge sharing. The type of knowledge to be shared was not considered as a knowledge sharing constraint in the literature reviewed.

4.3.2 Knowledge sharing practices

The second objective of this study was to identify the techniques that construction project managers use to share their knowledge with each other. The literature review identified numerous commonly used knowledge sharing methods.

The study respondents were asked to indicate the knowledge sharing techniques utilised in their organizations. The results show that the following knowledge sharing techniques are being employed in South African construction project management organisations:

- Progress meetings
- Emails
- Project audit results
- Mentoring Programmes
- Informal Chats
- Staff Workshops/Training Sessions
- Brainstorming Sessions
- Lessons Learned Workshops

The results indicate that the most prevalent techniques used by project managers for knowledge sharing are meetings and mentorship programmes. Although these were the customary knowledge sharing methods used by the respondents' organisations, the telephonic interviews revealed that these methods are not effective in eliciting the knowledge required for professional capacitation.

With the background of all the knowledge sharing methods available from the literature review, the results show that construction project management organisations are not fully utilising the knowledge sharing methods available.

4.3.3 Recommended strategies to improve knowledge sharing

In order to develop recommendations to improve the effectiveness of knowledge sharing practices of construction project managers working within the same organisation, the research instruments set out to identify three things:

i. The motivational factors promoting knowledge sharing

ii. The preferred knowledge area required to be shared
iii. The knowledge sources for the preferred knowledge area

4.3.3.1 Motivational factors promoting knowledge sharing

Data from 30 internet administered surveys was collated and prepared for analysis. A total of 100 surveys were sent out to eligible participants of construction organizations and 30 responses were received before the survey period lapsed. None of the responses received were eliminated and therefore all responses were considered in the analysis.

As depicted in Table 4.1 below, a five-point Likert scale was used in all areas of agreement and numerical values 5 to 1 were assigned to the respondents' position on each question. Colour coding was also allocated to each numerical value. So the scale reads: Strongly Agree: 5, green; Agree: 4, blue; Neutral: 3, yellow; Disagree: 2, red; Strongly Disagree: 1, purple.

Numerical values and colour coding were applied in providing a graphical representation of the results. The numerical values from the responses were used in the weighting of those responses, which informed the aggregated analysis of responses for each factor discussed in the literature review. At a quick glance, the colour coding assists readers to establish whether the majority of the respondents agreed or disagreed with the statement in a particular question.

Table 4.8 Key for Analysis of Likert Scale Questions

View	*Numerical Value*
Strongly Agree	**5**
Agree	**4**
Neutral	**3**
Disagree	**2**
Strongly Disagree	**1**

Figure 4.1 to Figure 4.9 show the results of the study variables on motivational factors promoting the respondent's knowledge sharing. The descriptive statistics present the measure of central tendency (Median) and the measure of dispersion (Inter-Quartile Range). The median shows what the average respondent might think and indicates the most likely response. The Inter-Quartile Range (IQR) shows whether the responses are close together or spread across the range of possible responses.

In the literature review, a range of factors influencing knowledge sharing were discussed, these factors were used to develop a framework for the data collection. The survey questionnaire examined the following nine motivational factors promoting knowledge sharing derived from the literature review:

i. Anticipated Extrinsic Rewards (AER)
ii. Anticipated Reciprocal Relationships (ARR)
iii. Sense of self-worth
iv. Affiliation
v. Innovativeness
vi. Fairness
vii. Attitude toward Knowledge Sharing

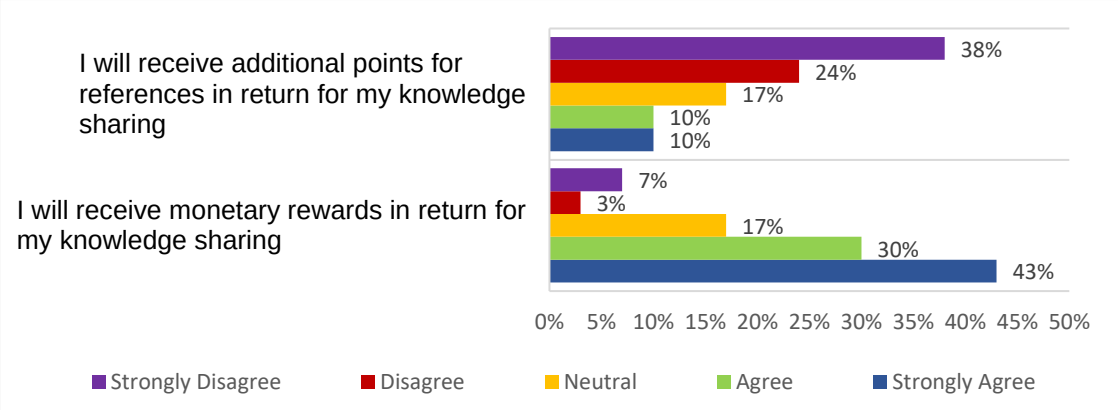
viii. Subjective Norm

ix. Intention to share knowledge

4.3.3.1.1 Anticipated Extrinsic Rewards (AER)

In the literature review, anticipated extrinsic rewards was described as the monetary incentives or career advancement incentives implemented by organizational leadership in order to motivate employees to behave in a certain way. The research instrument examined the relationship between anticipated extrinsic rewards (in the form of monetary rewards and organizational recognition) and the construction project manager's willingness to share knowledge.

Figure 4.1: Anticipated Extrinsic Rewards (n=30)



The modal response on anticipated extrinsic rewards was that it was unlikely that receiving monetary rewards or recognition would influence the respondents' willingness to share knowledge. The IQR for anticipated extrinsic rewards as a factor that influences construction project manager's willingness to share knowledge amongst each other indicated that the respondents were at a general consensus.

The literature review showed inconsistent research findings from researchers with regards to the relationship between extrinsic rewards and the willingness to share knowledge.

Bartol and Srivastava (2002) highlighted that simply introducing rewards would not yield the intended results unless basic guidelines for the effective use of rewards, such as clear goals, rewards of value, and sufficient employee self-efficacy are also followed.

In the telephonic interviews, Respondent 5 indicated competition within colleagues in the same organization as a barrier to knowledge sharing.

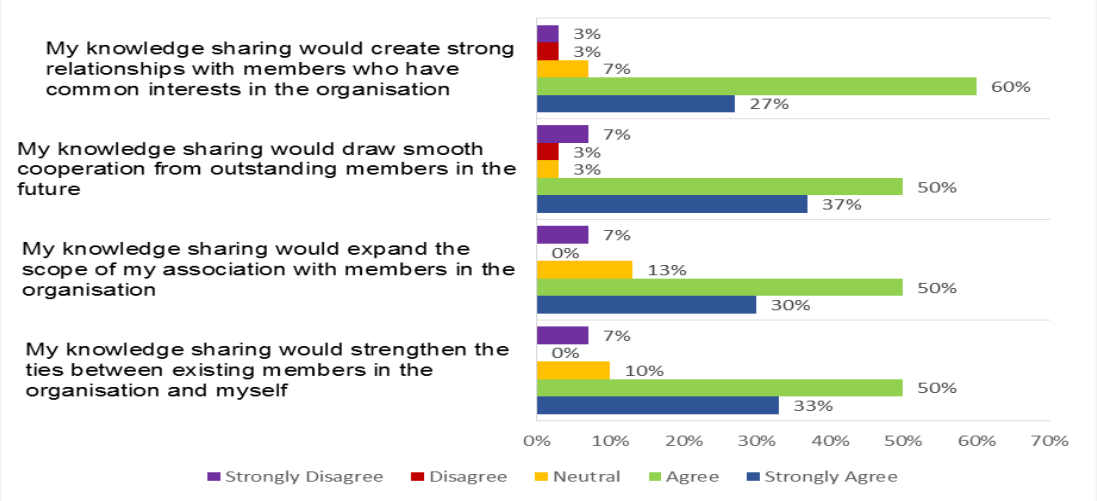
The results in this study indicate a positive relationship between monetary rewards and the willingness to share knowledge and a converse finding for career advancement incentives.

4.3.3.1.2 Anticipated Reciprocal Relationships (ARR)

In In the literature review, anticipated reciprocal relationships were described as an employee's desire to maintain ongoing relationships with other individuals with specific reference to the giving and receiving of knowledge (Bock et. al; 2005).

The research instrument examined the relationship between anticipated reciprocal relationships (the desire to create strong relationships, draw smooth cooperation for future colleagues, expend the scope of association with other colleagues, and strengthen the ties between colleagues) and the construction project manager's willingness to share knowledge.

Figure 4.2 Anticipated Reciprocal Relationship (n=30)



The modal response on anticipated reciprocal relationships was that it was likely that anticipated reciprocal relationships would influence the respondents' knowledge sharing. The IQR for this construct indicates that there was a consensus among the respondents. In the telephonic interviews, respondent 2 and respondent 6 stressed the importance of formation of relationships in the knowledge sharing process. Respondent 2 indicated that it was easier to share knowledge with colleagues who he cares about and respondent 6 indicated that more team building efforts would aid the formation of relationships and thus improve the knowledge sharing of individuals within an organization.

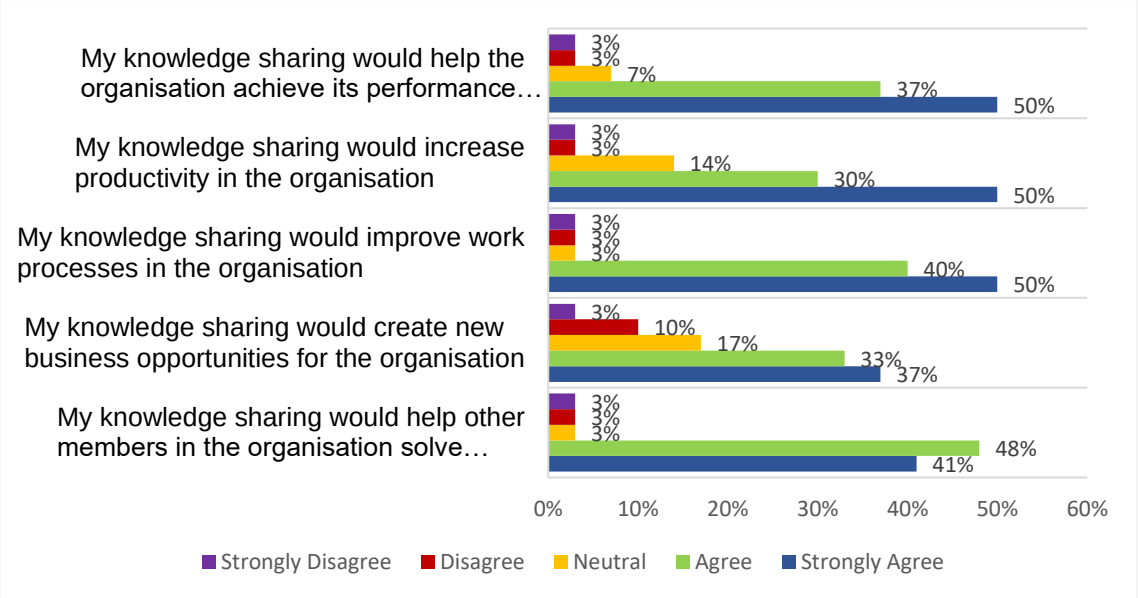
These results reinforce Chiu et al.'s (2006) finding that the norm of reciprocity is confidently associated with individuals' knowledge sharing.

4.3.3.1.3 Sense of self-worth

In the literature review, sense of self-worth was described as the degree to

which an individual values his/her competence, power or efficacy regarding conduct (Gecas; 1971). The research instrument examined the relationship between the participants' sense of self-worth and the participants' willingness to share knowledge. The instrument tested how the participant's self-worth with specific reference to how the participant valued his/her own expertise influenced the participant's willingness to share knowledge.

Figure 4.3 Sense of self-worth (n=30)



The modal response for the sense of self-worth construct was that it was likely that a sense of self-worth would influence the respondents' intention to share knowledge. The findings of this knowledge sharing construct positively reaffirmed the findings from the literature review which also highlighted the importance of sense of self-worth in the decision to share knowledge. In the literature review, it was stated that, if employees believe they could make contributions to the organization's performance, they would develop a more positive attitude toward knowledge sharing (Bock and Kim; 2001). Huber (2001) also noted a sense of self-worth as a major influence on an individual's knowledge sharing inclination.

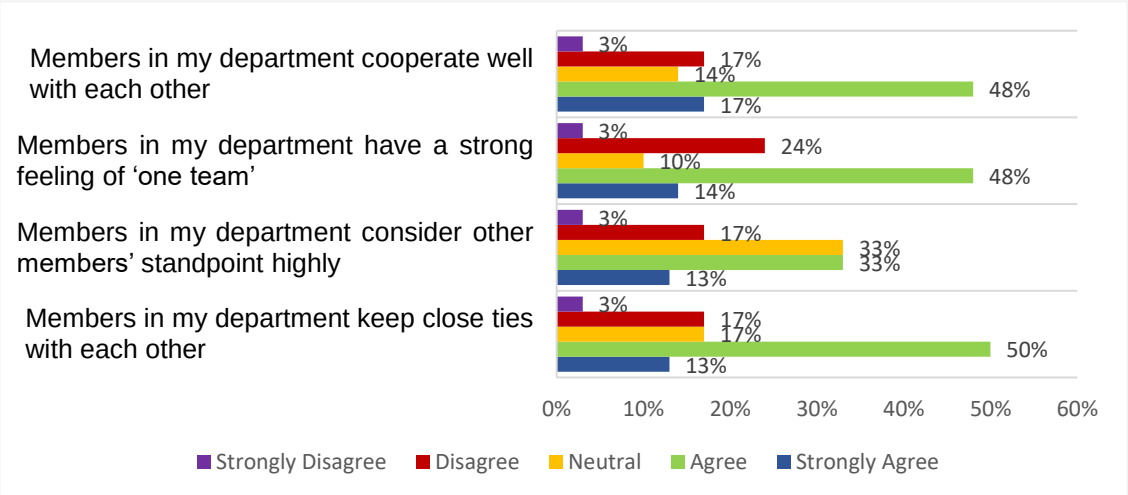
The respondents who are in senior, management and leadership positions indicated that sense of self-worth influenced their intention to share knowledge whereas the junior and intermediate respondents were not confident of themselves with regards to the knowledge they possessed and therefore did not indicate that a sense of self-worth would influence them to share knowledge. Respondent 1 from the telephonic interviews, who is a junior project manager indicated that it is easier for him to receive knowledge than to share it due to his inexperience.

These findings are consistent with Zhang and Ng's (2012) findings which suggested that employees are often reluctant to share knowledge because of the risk of feeling embarrassed or ashamed that the knowledge shared is useless, wrong, or inadequate.

4.3.3.1.4 Affiliation

Research in the literature review indicated that the existence of affiliations can facilitate knowledge sharing within communities. The research instrument tested the relationship between affiliation and the willingness to share knowledge by the participants.

Figure 4.4 Affiliation (n=30)



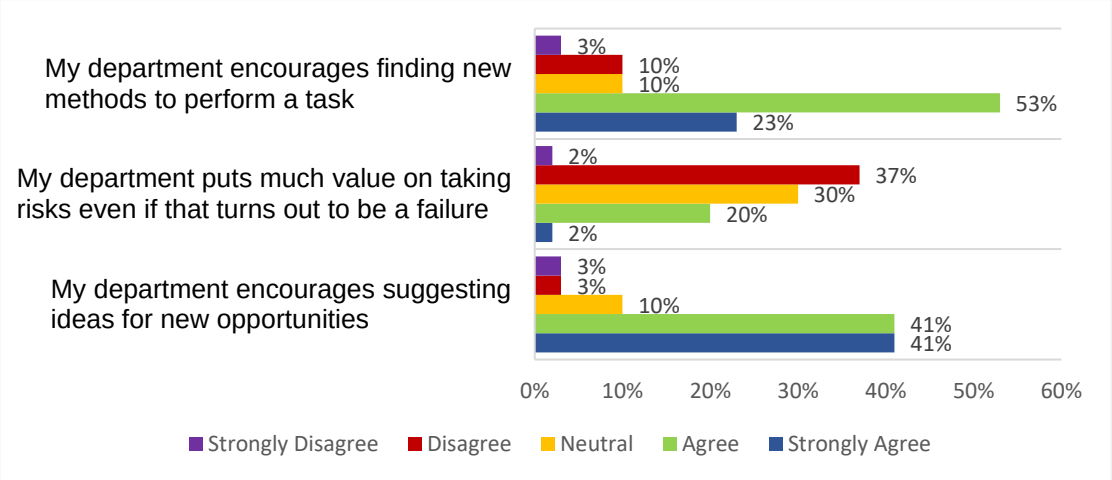
The modal response for affiliation was that it was likely that a sense of one team within the organization would influence the respondents' intention to share knowledge.

Wang and Noe (2010) stated that in the few knowledge sharing studies investigating team characteristics that have been conducted, the results suggest that team characteristics and processes do play some role in knowledge sharing among colleagues. This result further validates Wang and Noe's (2010) statement.

4.3.3.1.5 Innovativeness

The research studies reviewed in chapter two suggested that team characteristics and processes have are influential in the effectiveness of knowledge sharing among team members. The research instrument examined how different departmental characteristics with regards to innovativeness influenced the participants' willingness to share knowledge.

Figure 4.5 Innovativeness (n=30)



The results indicated that a department that finds new methods to perform a task and encourages suggesting ideas for new opportunities positively influenced the participants' willingness to share knowledge. It is evident from the results that an organization that emphasises innovativeness improves the knowledge sharing of its employees. Although the results indicate that innovativeness positively influence the willingness to share knowledge, it must be noted that the relationship changed to a negative one when the innovative ideas make the project high risk.

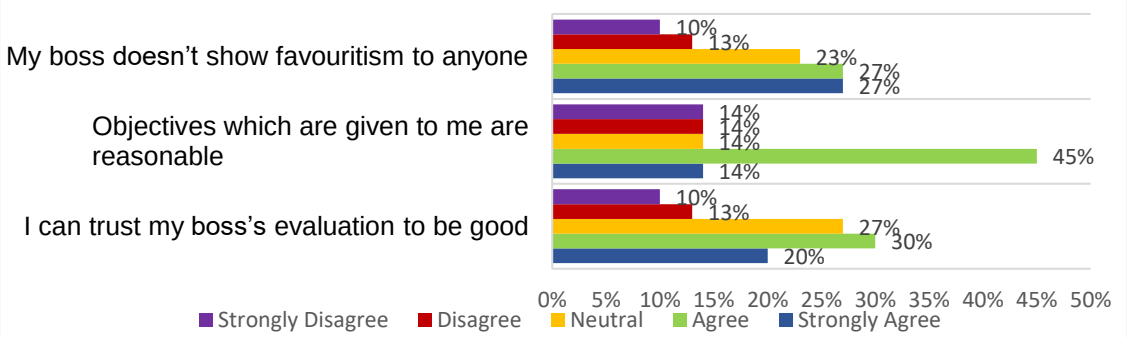
4.3.3.1.6 Fairness

The literature review revealed that procedural justice within an organization is positively related to knowledge sharing among employees and had positive indirect effects on tacit knowledge sharing via organizational commitment (Lin 2007;Schepers and van den Berg; 2007).

Connelly and Kelloway (2013) found management support to be positively linked with workers' perceptions of a knowledge sharing culture and willingness to share knowledge.

The research instrument evaluated the relationship between management fairness and the willingness to share knowledge.

Figure 4.6 Fairness (n=30)



Although other studies reviewed in chapter two failed to find a significant effect for perceived management support on knowledge sharing, the results of this study indicate a positive link between the leadership style of an organization and knowledge sharing between colleagues. Liao (2008) found that a manager's control of rewards for anticipated behaviour and the employees' belief that the manager possessed knowledge and expertise in the area were related to employees' self-confessed sharing of knowledge. Many of the respondents (50%, n=30) agreed that trust of their bosses evaluation influenced them positively to share knowledge.

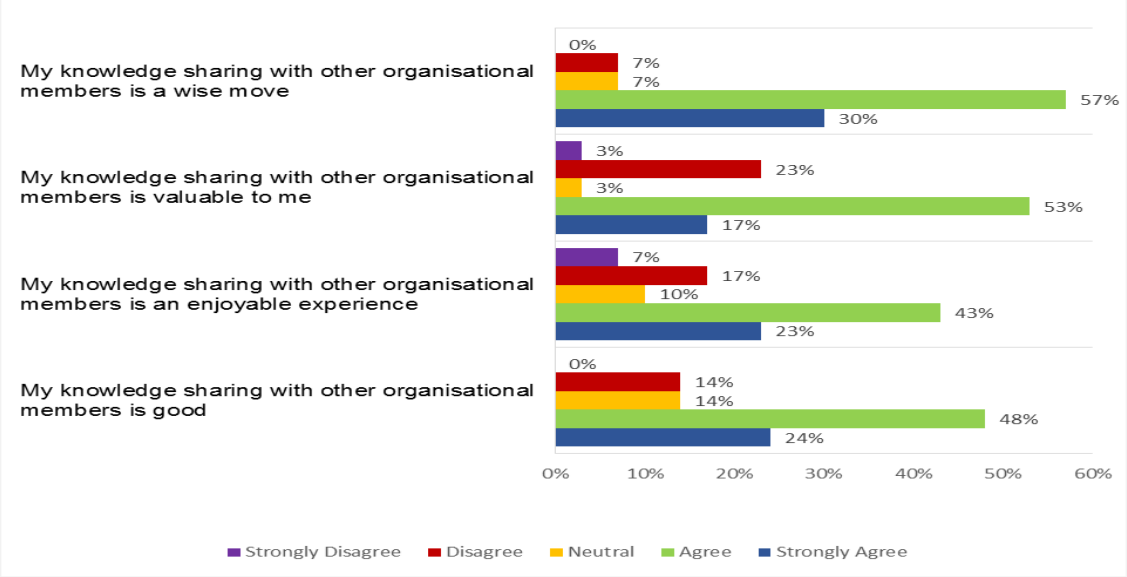
The social exchange theory has been employed in studies examining the management support–knowledge sharing relationship where the results of the studies show that management support likely influences knowledge sharing (Wang and Noe, 2010). The results from this study support the social exchange theory.

4.3.3.1.7 Attitude toward knowledge sharing

In the literature review, research highlighted that positive knowledge sharing attitudes are related to knowledge sharing intentions and behaviours (Bock and Kim, 2002). The results of this study positively reinforced the above finding in that all the participants who showed a positive attitude towards knowledge sharing also indicated a willingness to share their knowledge.

The research instrument tested the participants’ attitude towards knowledge sharing.

Figure 4.7 Attitude towards knowledge sharing (n=30)



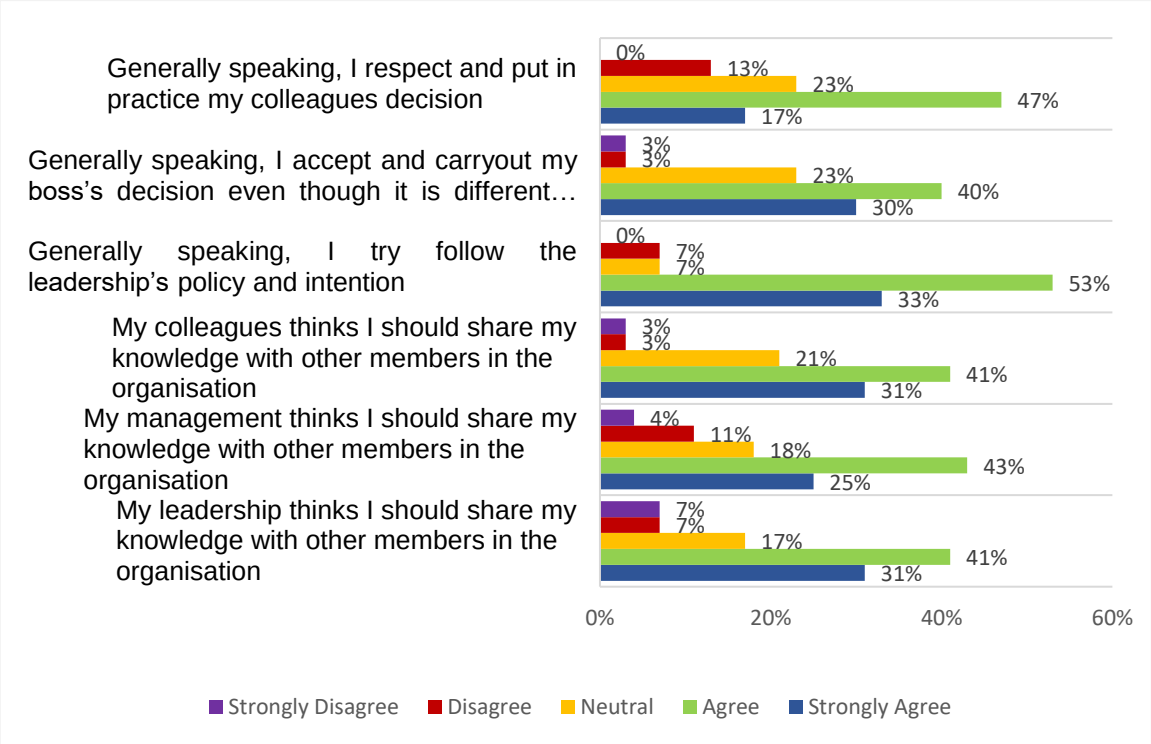
The results indicate that most South African Construction Project Managers in Gauteng value and enjoy sharing knowledge and this attitude towards knowledge sharing positively influences the sharing of knowledge.

4.3.3.1.8 Subjective norms

In the literature review, subjective norms were defined as the perception of social pressure and reception when choosing to behave in a certain way (Roth, 2016).

The research instrument tested how the participant's different perceptions of their colleagues, managers and company leadership influenced the participant's willingness to share knowledge.

Figure 4.8 Subjective Norms (n=30)



The results of the study indicate a positive relationship between subjective norms and the participants' willingness to share knowledge.

4.3.3.1.9 Intentions to share knowledge

The theory of planned behaviour (TPB) authored by Ajzen (1991), described in the literature review as the predisposition of individuals to act a certain way based on their intentions. Based on this theory that because individuals' actions and behaviours are a result of individuals' intentions, the research instrument tested whether knowledge sharing actions would therefore be a result of knowledge sharing intentions.

Figure 4.9 Intention to share knowledge (n=30)



The results of the study indicate a positive relationship between the participants' intention to share knowledge and the participants' knowledge sharing. This result is in agreement with the theory of planned behaviour.

4.3.3.2 The preferred project management knowledge areas required to be shared

The literature review indicated that one of the major constraints of effective knowledge sharing was the ignorance of what specific knowledge is required to be shared by project managers in order to improve the effective of the knowledge sharing practices. It is not enough to promote knowledge sharing alone, in order for the knowledge shared to be effective, the required knowledge needs to be shared. In Chapter Two, the ten knowledge areas of Project Management as listed by the Project Management Institute (2013) were stated. The ten knowledge areas are:

1. Project Integration Management
2. Project Scope Management
3. Project Time Management
4. Project Cost Management
5. Project Quality Management
6. Project Human Resources Management
7. Project Communications Management
8. Project Risk Management
9. Project Procurement Management
10. Project Stakeholder Management

These knowledge areas were presented to the respondents to indicate which of the project management knowledge areas are required to be shared more in order to increase the likelihood of project success. The results from the survey questionnaire, with specific reference to the knowledge area required to be shared, as indicated by the respondents is depicted in Table 4.6.

Table 4.9 Preferred Project Management Knowledge Areas

Knowledge Area	Rank	Percentage (%)
Integration Management	1	31
Cost Management	2	28
Communications Management	3	21
Scope Management	4	7
Procurement Management	5	3
Quality Management	6	3
Risk Management	7	3
Stakeholder Management	8	3

The survey questionnaire results indicate that Integration Management, Cost Management and Communications Management respectively ranked the highest against other knowledge areas. Human Resources Management and Time Management were not among the preferred knowledge areas required to be shared.

The results from the standardised telephonic questionnaire, however, were not the same as the survey questionnaire results. The four knowledge areas identified by the respondents as essential are Cost Management, Quality Management, Integration Management and Programme Management. In giving a preference for a knowledge management area, all the telephonic respondents related their choice to the projects they were managing at the time. This indicates that the preferred knowledge area changes with the knowledge required for a specific project.

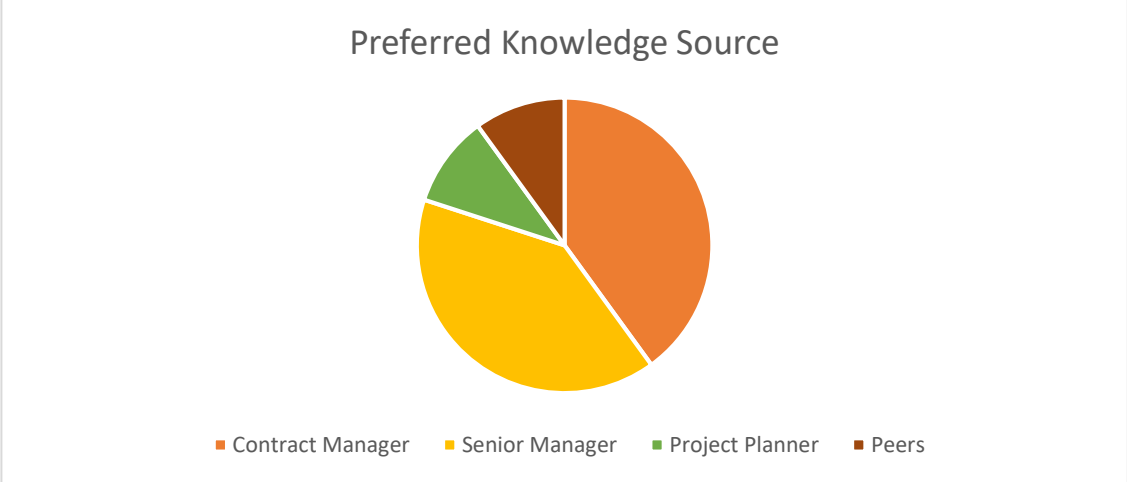
4.3.3.3 Sources of Knowledge within the Project Management Organisation

Against the background of the factors that promote knowledge sharing and the specific knowledge to be shared, it is equally important to identify the knowledge sources within the organisation where knowledge may be sought.

Within a project management organisation, there are multiple roles for each project team member.

The respondents of the structured telephonic interviews were asked to identify the knowledge sources for their preferred knowledge area within their organisation. The results are shown in Figure 4.10.

Figure 4.10 Preferred Knowledge Sources



The results show that the preferred knowledge source among all roles within the organisation is the contract manager and senior managers.

CHAPTER FIVE: DISCUSSION OF RESULTS

This chapter presents the interpretation of the findings, relating the findings of the study to the original context of the work i.e. the literature review, explains the implications of the findings.

5.1 Summary of research results

This section presents the discussion of the study results with reference to the objectives set in Chapter One.

The three specific objectives of this study are brought forward for discussion; factors constraining effective knowledge sharing practices of construction project managers, the knowledge sharing practices of construction project managers and recommendations for the improvement of the effectiveness of the knowledge sharing practices of construction project managers. The scope of this discussion only extends to the knowledge sharing practices of South African construction project managers working within the same organisation.

In Chapter Two, the three categories of factors influencing the knowledge sharing behaviours of individuals were identified. The three categories were:

- Limiting factors (interpersonal, procedural, technological, cultural); and
- Motivational factors (personal benefits, community-related considerations, and normative considerations);
- Enabling factors (supportive corporate culture, trust, tools).

These limiting, motivational and enabling factors guided the study and formed

the framework required for answering the research question and achieving the research objective in the context of the knowledge sharing practices of construction project managers.

5.1.1 Factors constraining effective knowledge sharing

In the statement of the research problem in Chapter One, it was argued that the implementation of strategies to improve knowledge sharing within construction organizations will not be successful unless the major knowledge sharing constraints are identified and addressed (Robinson, Carrillo, Anumba and Al-Ghassani, 2001).

The main objective of this research report was to identify the factors constraining effective knowledge sharing among construction project managers working within the same organisation.

The results of this study present a noticeable high number of references to the reluctance to share knowledge as a constraint to effective knowledge sharing. Although the respondents of the study indicated an awareness of the importance of knowledge sharing, they expressed a reluctance to knowledge sharing as a result of some concerns related to organisational cultures and norms which posed a difficulty to their knowledge sharing practices within their organisations. Respondents attributed their reluctance to share knowledge to the lack of formalised knowledge sharing processes, the competitive organisational culture and the lack of rewards for sharing knowledge. It must be noted that the respondents indicated various factors which were subjective to their organisations as reasons for their reluctance to share knowledge and that in addressing this constraint, organisational leaders need to first establish the reasons for their own employees' reluctance to knowledge sharing before embarking on the development of

knowledge sharing strategies.

Organisational leaders looking to improve the knowledge practices of their employees should consider addressing employees' reluctance to knowledge sharing as this could lead to poor knowledge sharing practices and furthermore, the loss of organisational knowledge when the knowledge sources leave the organisation. Ajzen's (1991) theory of planned behaviour suggests that because individuals' actions and behaviours are a result of individuals' intentions, knowledge sharing actions would therefore be a result of knowledge sharing intentions. It can therefore be inferred that reluctance to knowledge sharing will lead to ineffective knowledge practices.

The second major constraint to knowledge sharing practices articulated by the respondents was the lack of relationships. In Chapter Two, it was stated that the relationships among individuals within can enable knowledge transfer and improve the value of information shared and received (e.g., Cummings, 2004; Hansen, 1999; Reagans & McEvily, 2003). We note in the results of this study the converse has occurred. The respondents indicated that they were reluctant to share knowledge with individuals with whom they had no affiliation to. The reasons the respondents noted for this sentiment was that there was no level of care as to whether those employees succeed or fail.

Personal relationships with other affiliates have been shown to be positively related to the perceived helpfulness of knowledge shared (Chiu et al., 2006). An individual's expectation of continuation and firming up their social ties by frequently participating in knowledge sharing has an impact on the effectiveness of the knowledge shared by that individual. It is thus recommended that construction organisations consider strengthening the ties between employees through team building initiatives since social cohesion is positively linked to the effortlessness of knowledge transmission as perceived

by the knowledge source, which suggests that the affiliations with knowledge recipients may motivate providers to share knowledge

Lack of time was pointed out as another knowledge sharing barrier by the respondents. Currently, teams consisting of professionals from different professional backgrounds in construction projects are deployed to one particular project in a short space of time. It is essential all project team members have a similar understanding of the topics of a complex project. Organisational systems should allow time for the sharing of knowledge by project participants.

Additionally, there is the issue of the competitive environment where there is some reluctance in sharing knowledge because of the notion that sharing knowledge weakens one's position. Employees understand knowledge as power, and because professional project management teams often work in geographically distributed environment and face greater difficulties in building trust, it is important to have regular meetings to diminish this issue. If this issue is not addressed, it could lead to ignorance of other people's work which in turn often leads to reinventing the wheel, because one may be on the same team but not on the other. Therefore, if a specific type of project has already been carried out by the organisation, the knowledge created should be shared with the team members not privy to that knowledge. That is, the employees should consider that is important that knowledge is not restricted to one specific project but should be accessible for the next projects, therefore having a crucial impact in the effectiveness of one or other projects.

5.1.2 Knowledge sharing practices of project managers

There are several instances where knowledge sharing practices have not been effective in achieving their objectives which are to manage an

organisation's knowledge assets and skills, which is mainly due to the large diversity of potential sharing constraints as indicated in the results of this study. Previous studies on knowledge sharing have concluded that sharing of existing knowledge contributed to the organizational performance (Wang and Noe, 2010). However, the effectiveness of sharing practices and strategies remains difficult to measure and differs between different practices. Such differences may be due to individual people or organisational structures.

Dixon (2000) and Piktalia and Greenes (2008) argued that in order for the knowledge sharing process to be effective, the appropriate knowledge sharing technique should be utilised by the knowledge source. The knowledge sharing methods used by construction project managers, as indicated by the respondents are; emails, discussions in progress/project meetings, circulation of project audit results, feedback during mentorship programmes, informal chats at the office, brainstorming sessions during problem solving, staff training workshops and lessons learned documentation.

Results of this research report indicated that although knowledge sharing practices exist in construction project management organisations, the knowledge shared through these practices is ineffective as it is not applicable to the respondent's professional capacitation needs. It is recommended that construction project management consultancies consider using knowledge sharing methods that are suited for the type of business and will promote the effectiveness of the knowledge shared such as peer assists, retrospective studies, best practice workshops, etc.

Notwithstanding the interview respondent's sentiments regarding the effectiveness of the knowledge practices used, the survey questionnaire respondents (N=29, 100%) indicated that projects under their control have benefited from knowledge shared by a colleague. When it came to the

adverse effects of knowledge not shared, the respondents (N=27, 90%) indicated that projects under their control have been delayed or ran over budget due to knowledge not being shared by a colleague.

The results of the study revealed that knowledge sharing has a positive impact on project performance and that project managers do recognise the value of knowledge sharing. Construction project management organisations should build on this background and create an enabling organisational environment for knowledge sharing.

5.1.3 Recommended strategies to improve knowledge sharing

The development of recommendations for improving the effectiveness of knowledge sharing practices was the third objective of this research report.

In the bid to enable effective knowledge sharing, it is essential for organisations to recognise that the decision to share or not to share knowledge ultimately rests with the employee (Wang and Noe, 2010). The first step in developing an effective knowledge sharing strategy, is to appreciate the factors that play a role in employees' willingness to share knowledge with other employees (Amayah, 2013). In order for organizations to be able to promote knowledge sharing among employees, the management of business organizations should prioritise their understanding of the factors that influence an employees' willingness to share knowledge.

The results of this study indicated that the allocation of time (in the form of organisational systems), team member relationships, affiliation and a sense of self-worth motivate the sharing of knowledge between construction project managers.

The recommendations for the improvement of knowledge sharing, as articulated by the study participants are; the formalisation of the knowledge sharing process (when, what and how to share), team building events, team knowledge sharing workshops and the introduction of structured mentorship programmes.

In trying to eliminate the knowledge sharing constraints and implementing the recommendations of this study, business organisations need to concurrently perform an introspection of their own organisations to ascertain what constraints lie therein and focus on those.

5.2 Implications of the research findings

Organisations, including construction management consultancies whose primary product is knowledge, are beginning to make investments into knowledge management, as knowledge is becoming progressively recognised as a dominant asset and a basis of competitive advantage to advance business performance. Knowledge is certainly central to organisational learning and innovation, and a knowledge sharing strategy should therefore be the foundation for improving performance in construction organisations.

A change in the knowledge sharing practices of construction project management organizations may take place if organizational leaders utilize the findings from this study and promote a reasonable transformation in the effectiveness of knowledge shared by employees.

Project management organisations may benefit from this change when the knowledge shared is effective creates the application of that knowledge results in improvements in individual performance and that improved

performance leads to the success of the organization.

The leadership of construction organizations should use the findings from the study to explore approaches and to improve the effectiveness of the knowledge shared, putting focus on the enabling factors of knowledge sharing, thereby contributing to social change.

The effects of knowledge sharing may yield positive results of productivity and competitiveness when management encourages knowledge sharing (Roth, 2016). It is ultimately the employees' ability and intention to effectively share knowledge that determines the success of knowledge sharing which may lead to organizational success, sustainability and competitiveness (Lin and Joe, 2012).

Creating a broader understanding of the benefits of effective knowledge sharing may motivate organizational leaders to exploit existing organizational knowledge and plan for resignations and retirements so that successors may become more efficient (Roth, 2016).

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

This chapter offers a conclusion of the Research Report and provides recommendations for future research.

6.1 Summary and study conclusions

The aim of this research report was to examine the factors constraining effective knowledge sharing practices of project management colleagues working within the same organization with a view to developing recommendations to improve knowledge sharing.

The research question that guided the study was: “What are the factors constraining effective knowledge sharing practices among project management colleagues working within the same organization, and how can the effectiveness the knowledge sharing practices be improved?

The researcher used a quantitative design instrument which adapted Likert scale questions to obtain data from 30 survey respondents who represented a sample of project managers from construction organizations based in Gauteng, South Africa as well as telephonic interviews to collect supplementary data.

The main findings indicate that; although construction project managers value knowledge sharing and an essential tool to gaining the organisational knowledge that is applicable to the management of construction projects for successful outcomes; the reluctance to share knowledge, the lack of affiliation and time limitations are the knowledge sharing constraints faced by most construction project managers. Conversely, the findings reveal that the allocation of time (in the form of organisational systems), team member

relationships, and sense of self-worth would equally motivate the sharing of knowledge.

The recommendations for the improvement of knowledge sharing, articulated by the study participants are; the formalisation of the knowledge sharing process (when, what and how to share), team building events, team knowledge sharing workshops and the introduction of structured mentorship programmes.

6.2 Recommendations for future research

One of the objectives of this study was to examine the knowledge sharing practices of construction project managers working within the same organisation. Based on the results of the study, it is evident that although such practices exist, they are not being used in an effective manner. It is therefore recommended that future researchers examine what strategies project organization leaders can utilize to encourage the effective knowledge sharing of employees and capitalize on the knowledge sharing methods already in place.

Future researchers may also want to examine the process of sharing knowledge in project organizations and suggest new and more effective ways of facilitating the knowledge sharing process.

Another emerging topic from this study is the reason why employees may be reluctant to share knowledge. Finding the cause of the reluctance to share knowledge may help organizations correct this and therefore promote knowledge sharing.

6.3 Reflections

This research report presented the issues, difficulties and practices of knowledge sharing articulated by construction project managers in South Africa. The study particularly identified and described several knowledge sharing constraints in the context of the management of construction projects and proposed recommendations to improve the effectiveness of the knowledge sharing practices of construction project managers working within the same organization.

The findings were significant as they provided a stepping stone to uncovering how to improve the effectiveness of knowledge sharing in organizations.

This research process highlighted the importance of knowledge sharing in construction projects and the current methods being utilized by organizations to share knowledge.

The findings of this research will benefit organizations by emphasizing the areas where knowledge sharing weaknesses lie within the project management function.

The study will be of value to organizational leaders as the results provide new insights to organizational leaders regarding the effective knowledge sharing practices of construction project managers.

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Appendix 1: Ethical Clearance

School of Construction Economics & Management

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SCHOOL OF CONSTRUCTION ECONOMICS AND MANAGEMENT RESEARCH ETHICS COMMITTEE

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER** CEM/16/10/ZZ1/MSC
PROJECT TITLE: construction project managers	Factors influencing knowledge sharing intentions of
INVESTIGATOR	Zamageda Zungu 328695
SCHOOL/DEPARTMENT	**SCHOOL OF CONSTRUCTION ECONOMICS AND MANAGEMENT**
DATE CONSIDERED	11/10/2016
DECISION OF THE COMMITTEE	Approved conditionally with respect to the declaration
EXPIRY DATE	28th October 2017
DATE	12 October 2016
CHAIRPERSON	Dr. Kola Ijasan

cc: Supervisor: Dr. E. Heron

DECLARATION OF INVESTIGATOR (S)

To be completed in duplicate and **ONE COPY** returned to the Secretary Mrs. M. Sithole at the CEM reception desk.

I fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the committee. **I agree to completion of a yearly progress report.**

Signature

Date 18/10/2016

Appendix 2: Informed Consent

This Research Report aims to examine the factors influencing the project manager's knowledge sharing with other project management colleagues. This study is conducted by Zamageda Zungu, a Construction Project Management MSc student at the University of the Witwatersrand under the supervision of Dr. Elizabeth Heron. This questionnaire will take approximately 20 minutes of your time.

Your decision to participate or decline participation in this study is completely voluntary and you have the right to terminate your participation at any time. You may choose not to answer some of the questions.

Your participation in this research will be completely anonymous and data will be averaged and reported in aggregate. Although your participation in this research may not benefit you personally, it will help progress the understanding of knowledge sharing in construction. We will circulate the findings of this research on request. There is no risk to individuals participating in this survey.

If you have questions about this research, or your rights as a participant you may contact: Zamegeda Zungu on +2783 480 6575/328695@students.wits.ac.zaor Dr. Elizabeth Heron (supervisor) on elizabeth.heron@wits.ac.za.

I have read and understand the above consent form, I certify that I am 18 years old or older and, by selecting agree, I indicate my willingness to voluntarily take part in the survey.

- ☐ Agree
- ☐ Disagree

Appendix 3: Questionnaire

1. Do you work for a construction organization in Gauteng, South Africa?

A construction organization is an organization that is engaged in the preparation of land and construction, alteration and repair of buildings/structures as well as other real property.

□ Yes □ No

2. Is your organization registered with the ACPM?

□ Yes □ No

3. Are you currently employed as a project manager?

You can consider yourself a project manager if you are responsible for defining the scope of work, allocating the resources for the execution of the work, planning of the work, monitoring the progress of the work and adjusting the plan for any deviations in the work.

□ Yes □ No

If all questions above were answered as “Yes” then proceed to the next set of questions. If any question were answered with a “No” then the participant does not meet the study demographic and not eligible to complete the survey

4. Please indicate your gender

□ Male □ Female

5. Please indicate your age group

□ 22 – 35 years □ 36 – 45 years □ 46+ years

6. Please indicate your job level

□ Junior □ Intermediate □ Senior □ Management □ Leadership

In the following section, “knowledge” means the individual’s know-how or something which is helpful in solving problems in the organization.

“Knowledge sharing” means providing or transferring one’s knowledge to others. Knowledge sharing is possible through various methods such as formal and/or informal meetings and information systems.

Anticipated Extrinsic Rewards

Note: Participants to answer based on how the following scenarios would influence their willingness to share knowledge.

1. I will receive monetary rewards in return for my knowledge sharing

    Strongly Agree
    Agree
    Neutral
    Disagree
    Strongly Disagree

2. I will receive additional points for references in return for my knowledge sharing

    Strongly Agree
    Agree
    Neutral
    Disagree
    Strongly Disagree

Anticipated Reciprocal Relationships

Note: Participants to answer based on how the following scenarios would influence their willingness to share knowledge.

1. My knowledge sharing would strengthen the ties between existing members in the organization and myself

    Strongly Agree
    Agree
    Neutral
    Disagree

□ Strongly Disagree

2. My knowledge sharing would expand the scope of my association with members in the organization

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

3. My knowledge sharing would draw smooth cooperation from outstanding members in the future

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

4. My knowledge sharing would create strong relationships with members who have common interests in the organization

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

Sense of Self-Worth

Note: Participants to answer based on how the following scenarios would influence their willingness to share knowledge.

1. My knowledge sharing would help other members in the organization solve problems

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

2. My knowledge sharing would create new business opportunities for the organization

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree
   □ Strongly Disagree

3. My knowledge sharing would improve work processes in the organization

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree
   □ Strongly Disagree

4. My knowledge sharing would increase productivity in the organization

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree
   □ Strongly Disagree

5. My knowledge sharing would help the organization achieve its performance objectives

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree
   □ Strongly Disagree

Affiliation

Note: Participants to answer based on how the following scenarios would influence their willingness to share knowledge.

1. Members in my department keep close ties with each other

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree

□ Strongly Disagree

2. Members in my department consider another members' standpoint highly

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

3. Members in my department have a strong feeling of 'one team'

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

4. Members in my department cooperate well with each other

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

Innovativeness

Note: Participants to answer based on how the following scenarios would influence their willingness to share knowledge.

1. My department encourages suggesting ideas for new opportunities

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

2. My department puts much value on taking risks even if that turns out to be a failure

□ Strongly Agree
□ Agree
□ Neutral

□ Disagree
□ Strongly Disagree

3. My department encourages finding new methods to perform a task

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

Fairness

Note: Participants to answer based on how the following scenarios would influence their willingness to share knowledge.

1. I can trust my boss's evaluation to be good

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

2. Objectives which are given to me are reasonable

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

3. My boss doesn't show favouritism to anyone

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

Attitude toward Knowledge Sharing

1. My knowledge sharing with other organizational members is good

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

2. My knowledge sharing with other organizational members is an enjoyable experience

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

3. My knowledge sharing with other organizational members is valuable to me

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

4. My knowledge sharing with other organizational members is a wise move

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

Subjective Norm

Normative beliefs on knowledge sharing (NOB)

1. My leadership thinks I should share my knowledge with other members in the organization

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

2. My management thinks I should share my knowledge with other members in the organization

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

3. My colleagues think I should share my knowledge with other members in the organization

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

Motivation to Comply (MTC)

1. Generally speaking, I try follow the leadership's policy and intention

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

2. Generally speaking, I accept and carryout my boss's decision even though it is different than mine

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

3. Generally speaking, I respect and put in practice my colleagues decision

    □ Strongly Agree
    □ Agree
    □ Neutral
    □ Disagree
    □ Strongly Disagree

Intention to share knowledge

Intention to share explicit knowledge

1. I will share my work reports and official documents with members of my organization.

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree
   □ Strongly Disagree

2. I will always provide my manuals, methodologies and models for members of my organization.

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree
   □ Strongly Disagree

Intention to share implicit knowledge

1. I intend to share my experience or know-how from work with other organizational members.

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree
   □ Strongly Disagree

2. I will always provide my know-where or know-whom at the request of other organizational members

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree
   □ Strongly Disagree

3. I will try to share my expertise from my education or training with other organizational members in a more effective way

   □ Strongly Agree
   □ Agree
   □ Neutral
   □ Disagree
   □ Strongly Disagree

What other factors not listed above would influence you to share knowledge with colleagues?

……
……
……
……

What knowledge sharing activities takes place in your organization during projects?

……
……
……
……

Which of the following project management knowledge areas do you think need to be shared more in order to increase the likelihood of project success?

- Project Integration Management
- Project Scope Management
- Project Time Management
- Project Cost Management
- Project Quality Management
- Project Human Resources Management
- Project Communications Management
- Project Risk Management
- Project Procurement Management
- Project Stakeholder Management

Has any project under your control been delayed or run over budget due to knowledge not being shared by a colleague?

□ Yes □ No

Has any project under your control benefited from knowledge shared by a colleague?

□ Yes □ No

Thank you for taking the time to fill out this questionnaire

Appendix 4: Email to Participate in Survey

Email Subject: Request to Complete Master's Study Survey

Dear *Employee Name* of *Organization Name*,

My name is Zamageda Zungu. I am a student at the School of Construction Economics and Management at the University of the Witwatersrand. I am conducting a research study as part of the requirements of my Master of Science in Construction Project Management and have received permission from your organization to invite you to participate. I am studying knowledge sharing of construction project managers, which includes researching about how different variables relate to intentions to share knowledge.

If you decide to participate, you will be asked to acknowledge a consent form, answer three qualifying questions and then rank a response via a 5-point scale to 36survey questions. Participation is confidential and no personally identifiable information will be asked on the survey. Taking part in the study is your discretion. You may choose to quit at any time prior to submission if you prefer not to complete. There are no ramifications for not completing the survey. If you have any questions regarding the survey, you may contact me at zamageda.zungu@students.wits.ac.za.

Your participation may help leaders realize the benefit to knowledge sharing and help bring change to the construction industry.
Thank you for your consideration. If you would like to participate, please begin by navigating to the following link: [Link inserted]. Please complete prior to [Due date inserted]

Thank You,
Zamageda Zungu

Appendix 5: Participant Information Form

Study Title: Factors influencing knowledge sharing intentions of construction project managers

Dear Prospective Survey Participant,

I, Zamageda Zungu, am conducting research on knowledge sharing of construction project managers. Research is just the process in which researchers endeavour to learn the answer to a question. In this study I want to learn what influences a project manager's intention to share knowledge with project management colleagues in order to moderate the problems that come with the loss of employees.

I invite you to participate in a research study to examine knowledge sharing within construction organizations. Construction Project Managers who work for construction organizations in the Gauteng Province are invited to participate in the survey. This information form is part of a process called informed consent and provides you information to understand more about the study before deciding whether to take part.

The study is being conducted by Zamageda Zungu, who is a master's student at the University of the Witwatersrand. Zamageda Zungu is a Quantity Surveyor and currently employed as a Senior Quantity Surveyor with AfriCostEngineering (Pty) Ltd. The study is separate from this role.

Background of the Study:
The purpose of the study is to understand the factors that may influence construction project manager's intention to share knowledge with project

management colleagues.

Procedures:

If you agree to be a participant for the study, you will be asked to answer an electronic questionnaire, with a total expected duration of 15 minutes.

Voluntary Nature of the Study:

Your participation in the study is strictly voluntary. This means that any involved parties will respect your decision of whether or not you want to be in the study. No one at your current workplace will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind during the study. If you feel stressed during the study, you may stop at any time. You may skip any questions that you feel are too personal.

Risks and Benefits of Participating in the Study:

A primary benefit for being included in the study is to provide insights and personal experiences that will be summed with other's feedback with the goal of understanding knowledge sharing intentions and improving knowledge sharing that occurs within construction organizations. There is no risk involved with being in the study because the study is only asking the research participants to answer questions based on past experiences. Anonymity of the participants and information provided will be enforced.

Compensation:

No financial compensation will be offered for participating in the study.

Confidentiality:

Any information you provide will be kept anonymous at all times. The researcher will not use your information for any purposes outside of this research project. After the survey is closed, I will download data for analysis. I

will store the survey data electronically on a password secured personal computer, keeping data safe for 5 years after publication date. After 5 years, I will permanently destroy the data using applicable data shredding software.

Contacts and Questions:

You may ask any questions you have now, or, if you have questions later, you may contact the researcher via phone at +27(0)83-480-6575 or e-mail at zamageda.zungu@students.wits.ac.za

Appendix 6: Transcripts of telephonic interviews

Telephonic Interview - 8 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 1 – Interviewee (R_1)

Respondent Profile

Respondent 1 is a 24-year-old male construction project manager for a big construction firm in South Africa. He has 2 years working experience and has just gotten his first role as the site engineer on a housing project in the Northern Cape.

Informed Consent

ZZ: This Research Report aims to examine the factors influencing the project manager's knowledge sharing with other project management colleagues. This study is conducted by Zamageda Zungu, a Construction Project Management MSc student at the University of the Witwatersrand under the supervision of Prof Samuel Laryea. This questionnaire will take approximately 20 minutes of your time.

Your decision to participate or decline participation in this study is completely voluntary and you have the right to terminate your participation at any time. You may choose not to answer some of the questions.

Your participation in this research will be completely confidential and data will be averaged and reported in aggregate. Although your participation in this research may not benefit you personally, it will help progress the understanding of knowledge sharing in construction. We will circulate the findings of this research on request. There is no risk to individuals participating in this survey.

Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

R_1: I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Zamageda Zungu
Respondent 1 Interview

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a Project undertaken by your organization?

R_1: Yes, definitely. I actually think it's one of the most important

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organization, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organization?

R_1: I would say it's the more technical ones. I would say both integration and quality because maybe for instance maybe let's say there are some changes maybe to drawings or those kinds of things. Yeah, those kinds of knowledge areas need to be shared to everyone. Actually, when those changes come to one person and the rest of the guys like foremen those guys don't know and they build according to the old drawing, I'm just making an example here. So, I feel like yeah those knowledge areas.

ZZ: Who in your organization possesses this knowledge?

R_1: Contract supervisors

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc?

R_1: Yes definitely ya.

ZZ: Would you say you actively participate in knowledge sharing in your organization?

R_1: Eh I'm more on the receiving end than the giving end

ZZ: What factors influence your willingness to share knowledge with your colleagues?

R_1: Before we make mistakes that would cost us a lot. Risk mitigation.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

R_1: I don't think there are any because every morning we have meetings and stuff. Even maybe sometimes during the day we have site meetings. Although

I've never been in this situation, I wouldn't share knowledge if it would put me in trouble.

ZZ: How do you think the knowledge sharing process can be improved in your organization?

$R_{1:}$ Eh. Obviously, are you referring to site specific reasons? Do you mean my organization as a whole? Eh. Yoh. It's easy but, I can't think of anything now. I would say all the team members should come for the site meetings and not just the people with walky talkies.

Zamageda Zungu
Respondent 2 Interview

Telephonic Interview - 9 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 2 – Interviewee (R_2)

Respondent Profile

Respondent 2 is a 30-year-old male construction project manager for a mine South Africa. He has 6 years working experience and is working on a capex project for the construction of a zinc concentrator plant in the Northern Cape.

Informed Consent

ZZ: This Research Report aims to examine the factors influencing the project manager's knowledge sharing with other project management colleagues. This study is conducted by Zamageda Zungu, a Construction Project Management MSc student at the University of the Witwatersrand under the supervision of Prof Samuel Laryea. This questionnaire will take approximately 20 minutes of your time.

Your decision to participate or decline participation in this study is completely voluntary and you have the right to terminate your participation at any time. You may choose not to answer some of the questions.

Your participation in this research will be completely confidential and data will be averaged and reported in aggregate. Although your participation in this research may not benefit you personally, it will help progress the understanding of knowledge sharing in construction. We will circulate the findings of this research on request. There is no risk to individuals participating in this survey.

Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

$R_{2:}$ I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a Project undertaken by your organization?

$R_{2:}$ Yes

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organization, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organization?

$R_{2:}$ Financial, Contractual and Schedule. The cost impact on the project as a whole. I think that colleague's previous experience in pricing on project would help me benchmark pricing. If I had knowledge of market related pricing I would be able to benchmark what the price I'm getting from a bidder would be. The standard norms in terms of timing would help me assess schedules submitted by the Contractors.

ZZ: Who in your organization possesses this knowledge?

$R_{2:}$ My colleagues who have had experience in pricing and scheduling. I think because management normally oversee the high-level numbers, they wouldn't be able to give me that knowledge.

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc?

$R_{2:}$ No. Hell no!

ZZ: Would you say you actively participate in knowledge sharing in your organization?

$R_{2:}$ No.

ZZ: What factors influence your willingness to share knowledge with your colleagues?

$R_{2:}$ The willingness to listen and shifting from blame game. I would like to be able to share knowledge without other colleagues being victimized for the knowledge I have just shared.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

$R_{2:}$ Sometimes sharing my knowledge, it would be used to accuse my other colleagues of incompetence. Dealing with someone who thinks they know it all makes you not want to share knowledge.

ZZ: How do you think the knowledge sharing process can be improved in your organization?

$R_{2:}$ Workshops and team building functions to build relationships with colleagues. Atleast that way there is some level of caring.

Zamageda Zungu
Respondent 3 Interview

Telephonic Interview - 9 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 3 – Interviewee (R_3)

Respondent Profile

Respondent 3 is a 29-year-old female construction project manager consulting for at a commercial project. She has 8 years working experience and is on a managerial role in her company.

Informed Consent

ZZ: This Research Report aims to examine the factors influencing the project manager's knowledge sharing with other project management colleagues. This study is conducted by Zamageda Zungu, a Construction Project Management MSc student at the University of the Witwatersrand under the supervision of Prof Samuel Laryea. This questionnaire will take approximately 20 minutes of your time.

Your decision to participate or decline participation in this study is completely voluntary and you have the right to terminate your participation at any time. You may choose not to answer some of the questions.

Your participation in this research will be completely confidential and data will be averaged and reported in aggregate. Although your participation in this research may not benefit you personally, it will help progress the understanding of knowledge sharing in construction. We will circulate the findings of this research on request. There is no risk to individuals participating in this survey.

Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

$R_{3:}$ I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Zamageda Zungu
Respondent 3 Interview

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a Project undertaken by your organization?

R3: Well yes most definitely. Infact, without the knowledge gained from my colleagues, past and present, I don't think I would be able to add the value I'm adding on my client's projects. You see, it is impossible to know everything from only your own experience. That is why I make it a point to share my experiences and also ask my fellow colleagues for advice when I encounter a problem I have never encountered before. That saves so much time and energy of trying to research a solution that somebody already has (laughs). I did a lot of that when I started working as I was too scared to ask questions. I thought it would ruin my manager's confidence in me. Anyway, to answer your question, yes knowledge sharing is very critical for project success.

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organization, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organization?

R3: I work for an organization where although you are a project manager, you are expected to fulfil so many other functions as well for instance contract admin and qsing. I am often challenged with the management of my project budget as so many things creep up during project execution, I mean you can't plan for everything. I feel that if I had more of my experienced colleagues share their knowledge of dealing with claims and vo's, I would be in a better position to make the right decisions and control my budget expenditure.

ZZ: Who in your organization possesses this knowledge?

R3: In terms of project cost management, I feel that the more seasoned professionals in our firm would be more suited to mentor us intermediate professionals. Yes we can learn from each other as well but I think we would gain more knowledge from the older experienced generation.

Zamageda Zungu
Respondent 3 Interview

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc?

R3: It's a bit of a yes and no answer. My line manager will often ask me what I could have done better on my project during the close out. But this is not for knowledge sharing but mostly for lessons learnt. I feel a more involved (everyone in our team) workshop where we can go deeper in these issues is required.

ZZ: Would you say you actively participate in knowledge sharing in your organization?

R3: I try as much as I can to participate in knowledge exchanges when I get the opportunity, however this isn't always easy as time is an issue for our organizations and billable hours are more important to management.

ZZ: What factors influence your willingness to share knowledge with your colleagues?

R3: Feeling like I have something worth sharing or when people come directly to me to ask for advice.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

R3: Validation. Sometimes I feel like my male counterparts don't take my opinions seriously. It is difficult to share knowledge with people who don't take you seriously.

ZZ: How do you think the knowledge sharing process can be improved in your organization?

R3: Formalizing the process and maybe incentivizing people like having the whole office rating your knowledge sharing and that rating forming a part of your annual performance review.

Zamageda Zungu
Respondent 4 Interview

Telephonic Interview - 9 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 4 – Interviewee (R_4)

Respondent Profile

Respondent 4 is a 52-year-old male construction project manager. He has 31 years working experience and is a project director in his company.

Informed Consent

ZZ: This Research Report aims to examine the factors influencing the project manager's knowledge sharing with other project management colleagues. This study is conducted by Zamageda Zungu, a Construction Project Management MSc student at the University of the Witwatersrand under the supervision of Prof Samuel Laryea. This questionnaire will take approximately 20 minutes of your time.

Your decision to participate or decline participation in this study is completely voluntary and you have the right to terminate your participation at any time. You may choose not to answer some of the questions.

Your participation in this research will be completely confidential and data will be averaged and reported in aggregate. Although your participation in this research may not benefit you personally, it will help progress the understanding of knowledge sharing in construction. We will circulate the findings of this research on request. There is no risk to individuals participating in this survey.

Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

R_4: I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a project undertaken by your organization?

R4: Yes, I think it is important.

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organization, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organization?

R4: In my view, there is nothing as important as managing interfaces. I wish someone had dedicated time in my youth to teach me this. As a project manager it is your duty to make sure that all departments and subcontractors work together as a well-oiled machine, and boy is it difficult to get departments to cooperate with each other instead of blaming each other.

ZZ: Who in your organization possesses this knowledge?

R4: Definitely the people with programme management experience. Someone who has worked on multiple projects at the same time. I also don't discount the young ones' opinions. After working on the same thing for many years, one losses the fresh perspective of always trying to improve things or do them in a more efficient manner.

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc.?

R4: We tried to implement it once but it didn't last long as there was no motivation from the team.

ZZ: Would you say you actively participate in knowledge sharing in your organization?

R4: Yes. I am currently mentoring 4 graduates.

ZZ: What factors influence your willingness to share knowledge with your colleagues?

R4: To see someone applying the lessons I have shared with them and improving their performance.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

R4: I am currently on a very senior role in my organization and don't always have the time to do it.

ZZ: How do you think the knowledge sharing process can be improved in your organization?

R4: Pairing people according to their knowledge needs. For instance having two junior project managers on one project with different strengths and weaknesses so they can learn from each other. Also impromptu project shuffling.

Zamageda Zungu
Respondent 5 Interview

Telephonic Interview - 10 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 5 – Interviewee (R_5)

Respondent Profile

Respondent 5 is a 36-year-old male professional construction project manager. He has 13 years working experience.

Informed Consent

ZZ: This Research Report aims to examine the factors influencing the project manager's knowledge sharing with other project management colleagues. This study is conducted by Zamageda Zungu, a Construction Project Management MSc student at the University of the Witwatersrand under the supervision of Prof Samuel Laryea. This questionnaire will take approximately 20 minutes of your time.

Your decision to participate or decline participation in this study is completely voluntary and you have the right to terminate your participation at any time. You may choose not to answer some of the questions.

Your participation in this research will be completely confidential and data will be averaged and reported in aggregate. Although your participation in this research may not benefit you personally, it will help progress the understanding of knowledge sharing in construction. We will circulate the findings of this research on request. There is no risk to individuals participating in this survey.

Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

R_5: I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a project undertaken by your organization?

R_5: Yes, to a certain extent. The user of the knowledge still has to exercise it appropriately.

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organization, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organization?

R_5: Programme Management. How to motivate a contractor to stick to the programme.

ZZ: Who in your organization possesses this knowledge?

R_5: Contract Managers. They deal with all the notices.

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc.?

R5: Yes, although not effective. There is too much competition at the office and sometimes colleagues don't want to help each other.

ZZ: Would you say you actively participate in knowledge sharing in your organization?

R5: Yes.

ZZ: What factors influence your willingness to share knowledge with your colleagues?

R5: My relationship with my colleagues.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

R5: My relationship with my colleagues

ZZ: How do you think the knowledge sharing process can be improved in your organization?

R5: Educating staff members that individual success is company success and the same with failure.

Zamageda Zungu
Respondent 6 Interview

Telephonic Interview - 12 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 6 – Interviewee (R_6)

Respondent Profile

Respondent 6 is a 38-year-old female construction project manager. She is currently the lead project manager on a project for the construction of a zinc concentrator plant. She has 16 years working experience.

Informed Consent

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Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

$R_{6:}$ I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Zamageda Zungu
Respondent 6 Interview

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a project undertaken by your organization?

R_6: Yes, very much. I have had to work on projects where I had to fill vacancies which had been left vacant for long periods of time. It was difficult to manage those projects as the project team had no knowledge of the previous project manager's tasks and this made it difficult to find a way forward.

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organization, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organization?

R_6: Project Integration. In project environments where contractors are separated by their discipline it is important for the project team to share knowledge regarding the interfaces and the battery limits of each contractor to ensure that no part of the scope is ambiguous. Being the lead project manager, I have to interface with different project managers and being a metallurgist, im not really conversant with each discipline. For instance, although I oversee the electrical and instrumentation scope, I depend on the engineering managers knowledge to be able to make good decisions on that scope of work. If I go into a meeting with the contractor and the engineering manager is off sick or something, I need to be able to make good calls based on the brief given by the electrical engineer.

ZZ: Who in your organization possesses this knowledge?

R_6: I believe all members of the project team have a unique but significant input to make on the project, or else we wouldn't need any of them. For this reason, I think that they all possess knowledge required to be shared and this should not be limited to managers educating juniors as juniors also have a part to play.

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc?

R6: Yes. Every morning we have project meetings with people from all departments and discuss daily tasks. Because every department is there if there are issues, they are tabled and discussed by all project team members. Some team members also give advice based on previous work experience.

ZZ: Would you say you actively participate in knowledge sharing in your organization?

R6: Yes. I do, quite a lot actually. You can ask all my subordinates (laughter)

ZZ: What factors influence your willingness to share knowledge with your colleagues?

R6: The need to have competent team members making competent decisions when required, especially in my absence.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

R6: Time constraints. Its crunch time on the project and there isn't always enough time to sit down with individual people and share information. Sometimes it's limited to water cooler conversations.

ZZ: How do you think the knowledge sharing process can be improved in your organization?

R6: People who aren't certain about things should feel free to come and ask. Relationships between individuals should be strengthened through team building events.

Zamageda Zungu
Respondent 7 Interview

Telephonic Interview - 18 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 7 – Interviewee (R_7)

Respondent Profile

Respondent 7 is a 40-year-old male construction project manager. He is currently the lead project manager on a housing project.

Informed Consent

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Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

R_7: I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a project undertaken by your organization?

$R_{7:}$ Not necessarily, we should share knowledge, however I don't think that it's that critical. For instance, if you go into a meeting and I know about stuff that you need to know and I don't tell you then, obviously that will be the critical portion of sharing knowledge.

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organisation, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organisation?

$R_{7:}$ Commercial knowledge. Like contract stuff. Contract negotiation and pricing. I don't know where in our company policy it states that you as a project manager should only focus on the technical stuff, but with your experience and knowledge over the years you can have an impact on the financial side as well. Especially if your commercial team is not technically astute, you need to step in.

ZZ: Who in your organization possesses this knowledge?

$R_{7:}$ The contract manager that is on site that is dealing with the contract administration everyday.

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc.?

R7: Yes. I would say progress review meetings and informal chats. Our review meetings don't really deal with lessons learnt though. It's more for knowledge during the project and we discuss topics as they come up.

ZZ: Would you say you actively participate in knowledge sharing in your organization?

R7: Yes to a certain extent. I won't go out of my way to go to another member to teach them something. They do sometimes come to me for advice and when that happens I give it.

ZZ: What factors influence your willingness to share knowledge with your colleagues?

R7: I personally like to help and I am not looking to gain something out of it. If the opportunity is there then I will gladly do it if I can or should share. It makes you me feel good about myself.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

R7: Out there you will get people like, what they know they will just keep for themselves. I don't know if it's a fear of hmm if you also know what I'm knowing then…hmm sharing yourself out of a job. Some people will share something with you without you noticing it, you have to actively listen.

ZZ: How do you think the knowledge sharing process can be improved in your organization?

R7: More structure, organizational structure. It should be drawn in such a way that you need to review after the project and then each and everybody can share their thoughts on how we can do better next time. Like I can't do a review on my own.

Zamageda Zungu
Respondent 8 Interview

Telephonic Interview – 19 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 8 – Interviewee (R_8)

Respondent Profile

Respondent 8 is a 33-year-old female construction project manager. She is currently the lead project manager on a power plant project.

Informed Consent

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Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

R_8: I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a project undertaken by your organization?

R8: Yes, I have executed countless projects where I could have used knowledge that my colleagues have to make informed decisions but because of office politics I was kept in the dark.

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organisation, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organisation?

R8: That's a tough one. My experience has taught me that a PM needs to have the knowledge of all areas. I say it's a tough one because every challenge is different. Today I could have a technical issue, tomorrow it could be a claim on my desk. If I had to choose however, based on my current project, I definitely need the technical expertise. I have previously work on commercial projects and this is my first E&I project, the jargon alone still has me confused in meetings.

ZZ: Who in your organization possesses this knowledge?

R8: Other PMs in the organisation who have undertaken projects in the same industry.

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc?

R8: Well look, everybody wants to be seen as a leader and will give advice now and then, the only problem is that in our cores, everybody wants to be the best and to do that we sometimes hold out some information that will make my biggest competition the shining star.

ZZ: Would you say you actively participate in knowledge sharing in your organization?

R8: If somebody comes to me and asks then I do give advice, but I won't consciously go out of my way to help people. I worked hard to get where I am and I think everyone needs to find their way.

ZZ: What factors influence your willingness to share knowledge with your colleagues?

R8: In my organisation, I don't think anyone is really interested in this. But I guess it does feel good to tell somebody something they don't know. Although I don't do it to help them, but it makes me feel good about myself when the juniors call me smart.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

R8: Like I said, the highly competitive environment, I can't give away my secrets now…lol.

ZZ: How do you think the knowledge sharing process can be improved in your organization?

R8: This is an unorthodox answer, but possibly challenging someone's opinion in a public space like a meeting (laughs). The lengths some people will go to prove a point. I once had a colleague who I had argued with in a meeting send me an article and cc the whole office to try and prove their point. Haha, that also gave me the drive to read more on the subject and rebut their argument. Thinking back on that now, makes it seem petty but the good that comes sorry came out of it is that I'm now an price adjustment expert. I'm kidding though (laughs).

Zamageda Zungu
Respondent 9 Interview

Telephonic Interview - 20 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 9 – Interviewee (R_9)

Respondent Profile

Respondent 9 is a 35-year-old female construction project manager.

Informed Consent

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Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

R_9: I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a project undertaken by your organization?

R9: Yes, maybe not critical, but helpful. Definitely critical when you are starting out but not as an experienced professional. But wait, yes its critical because if I don't share my experience with my junior pms then they make me look bad. If they fail, I fail, the company fails. So…yes sharing is important.

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organisation, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organisation?

R9: Hmm, do you mean the pmi knowledge areas? (ZZ: yes) Well, I suppose planning. We are always in a rush to make promises we can't deliver to clients. If someone who has experience in a specific type of project speaks up more often we would be in the trouble we are always in.

ZZ: Who in your organization possesses this knowledge?

R9: Definitely the senior memebers. They have seen it all.

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc?

R9: Umm, yes. I can't attest to how successful it is though…(ZZ: specifically which methods?) Oh, mentorship programmes and documenting lessons learnt.

ZZ: Would you say you actively participate in knowledge sharing in your organization?

R9: No. I'm way too busy for that. Maybe I do it subconsciously when critiquing the juniors.

ZZ: What factors influence your willingness to share knowledge with your colleagues?

R9: To be honest, I don't get paid to share my knowledge. Maybe if it was my job description to do it I would make the effort.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

R9: Like I said time, it's about billable hours here, we don't have a timesheet code for teaching (laughs).

ZZ: How do you think the knowledge sharing process can be improved in your organization?

R9: I don't know maybe a formal structure, currently we do not have.

Telephonic Interview - 21 January 2017

Persons present

Zamageda Zungu – Interviewer (ZZ)

Respondent 10 – Interviewee (R_{10})

Respondent Profile

Respondent 10 is a 28-year-old female construction project manager. She is currently the working as a junior for a project management consulting firm.

Informed Consent

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Please confirm that you are above the age of 18 years, you are willing to voluntarily take part in this interview and acknowledge understanding of the informed consent terms and conditions that I just read to you.

$R_{10:}$ I confirm that I am above the age of 18, am willing to voluntarily participate in this study and I understand what informed consent is.

Questions

ZZ: Do you think knowledge sharing between you and your colleagues is critical to the success of a project undertaken by your organization?

R_{10}: Yes, I need all the knowledge I can get. School does not teach us everything.

ZZ: What specific knowledge area do you feel is required to be shared more in your organization for the organization to demonstrate continuous improvement of both yourself and the organisation, mitigate knowledge losses that may occur as a result of key employees leaving, improve the innovativeness and the competitiveness of the organisation?

R_{10}: My undergrad courses focused on the planning and technical aspects. I wish I knew more about the finance and law things.

ZZ: Who in your organization possesses this knowledge?

R_{10}: The senior project managers.

ZZ: Does your organization utilize knowledge sharing methods such as project review meetings, lessons learnt workshops, work in progress meetings, informal chats etc?

R10: Not really. Like, we have meetings and all but that's for status updates and stuff.

ZZ: Would you say you actively participate in knowledge sharing in your organization?

R10: Ah, I don't have much knowledge yet. I'm still building my profile. I don't think anybody is really interested in what I have to say. So I just keep quiet most of the time.

ZZ: What factors influence your willingness to share knowledge with your colleagues?

R10: Maybe if I had more confidence.

ZZ: What are the barriers that prevent or challenge your knowledge sharing with your colleagues?

R10: Nobody ever asks my opinion on anything

ZZ: How do you think the knowledge sharing process can be improved in your organization?

R10: It would be nice if they gave us mentors. I mean they just throw us in the deep end. And most of the stuff is like errands anyway.