THE ROLE OF KNOWLEDGE TRANSFER IN THE SUSTAINABILITY OF A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA

by

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DECLARATION

I, Ursula Franelin Riddles, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signed *Ursula Franelin Riddles*　　　　**Date** 11 November 2021

ABSTRACT

The skills required to transfer knowledge successfully in an organisation is vital for creating a competitive advantage. Because of the constant changes in the external organisational environment, organisations are required to make internal changes such as employee training and improving organisational processes to achieve an increase in business performance. Knowledge transfer (KT) in the organisation adds value to the growth of the organisation, fostering knowledge and skills within the organisation, which are pivotal to sustainability.

Organisations are challenged to transform data into valuable and implemented knowledge to be used to create a competitive advantage. However, it is unclear how the lack of KT affects the sustainability in organisations in South Africa.

The aim of the study was to explore the role of KT in the sustainability of a petroleum, oil and gas (POG) organisation in South Africa. The following research questions were asked: 1) What are the factors affecting KT in a selected petroleum organisation in South Africa? and 2) How can KT be sustainable in a selected petroleum organisation?

The research undertaken was an exploratory study and analysed the factors that influence the KT process. The research was guided by interpretivist epistemology and subjectivist ontology. The research method employed was inductive and the research strategy was a case study. The case used was a (POG) organisation in Cape Town, South Africa. A qualitative approach was used by means of a case study. Data were collected using semi-structured questionnaires, interviews and an interview guide, and then analysed by means of summarising, categorising and thematic analysis.

In this study, thirty-seven findings and seven themes were identified. Themes developed were education, financial management, human resources, information technology, knowledge management, management and risk management.

The findings suggest that the implementation of the KT methodologies alone will not ensure success unless they are backed up by the organisation's culture. To properly implement KT, organisations must have the necessary infrastructure and support systems in place. KT can play an important role in supporting the sustainability of the organisation by retaining expert knowledge, transferring knowledge and creating a KT culture within the organisation. Guidelines are proposed to assist the organisation with managing KT through implementation and by identifying the challenges, whilst adding knowledge to the research area. The research contributes to the body of knowledge of knowledge management (KM) and KT. This contribution is based on the skills gap of practical understanding, the interaction between

knowledge and an engineer's role in the knowledge transfer process inside a POG organisation, as well as the effectiveness of such a process.

Before interviews were conducted, the research ethics committee of the Cape Peninsula University of Technology (CPUT) approved the study to ensure ethical principles such as honesty, objectivity, carefulness, integrity, transparency, intellectual property and confidentiality were satisfied.

Keywords: knowledge management, knowledge transfer, knowledge assets, community of practise, knowledge sharing

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GLOSSARY

Abbreviation	Full Word / Term
KM	Knowledge Management
KT	Knowledge Transfer
KA	Knowledge Assets
CoP	Communities of Practise
KS	Knowledge Sharing
POG	Petroleum, Oil and Gas

DEFINITIONS

Word/Term	Definition
Knowledge management	Bolisani and Bratianu (2018:30) state that "KM is the process of having people within the organisation having the correct information at the correct time and in the correct format".
Knowledge transfer	Martinkenaite (2011:54) defines knowledge transfer as "the process through which one organisation learns from the experience and knowledge of another for gaining or sustaining a competitive advantage".
Knowledge assets	Hughes et al. (2019:528) define knowledge assets as "intellectual capital or intangible assets such as copyright or patents which can generate income".
Communities of practice	Wenger et al. (2002:136) define a community of practice as "a group of individuals who get together to achieve both individual and group goals by sharing a shared concern, a set of difficulties, or an interest in a topic".
Knowledge sharing	Knowledge sharing is defined as "a process of sharing and consolidating organisational members' competencies through knowledge exchange or information sharing" (Kim & Bang, 2021:5).
Tacit knowledge	Tacit knowledge is defined as "the knowledge that underpins competent performance while the performer is unaware of all performance details" (Aoued & Mansouri, 2020:106).
Explicit knowledge	Documents, rule books, databases and other record forms are all examples of explicit knowledge (Petana & Rosa, 2020:183).

CHAPTER 1: INTRODUCTION
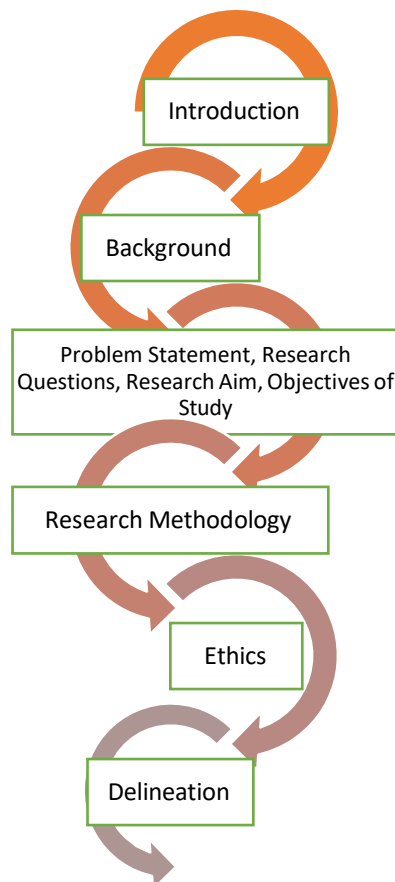
Figure 1.1: Layout of Chapter 1

1.1 Introduction

The goal for the petroleum, oil and gas (POG) industry to achieve sustainable commercial success, to ensure long-term viability and to repay shareholders has become difficult and challenging (Abreu, Webb, Araújo, & Cavalcante, 2020:9). The POG industry consists of complicated systems that involve technical, social, organisational, human, managerial and environmental factors (Ifelebuegu, Martins, Theophilus & Arewa, 2019:1). The nature of business has been described as chemically complex processes of high-risk. Knowledge is an imperative to successfully navigate through these high-risk environments. According to Testa (2019:1), knowledge management (KM) is an innovative and effective tool for organisations to use to manage the economic and organisational ever-changing environment. Organisations are not able to internally develop all the knowledge required (intra- and inter-organisational).

Knowledge is one of the main sources of competitive advantage (Testa, 2019:1). Scarce, appropriable, specialised resources and capability are among the competitive advantages that are difficult for competitors to trade and replicate (Hossain, Hussain, Kannan, & Nair, 2021:3). A competitive advantage could provide organisations with an opportunity to achieve greater profitability and sustainability. Xiao et al.

(2017:1330) suggest that a "knowledge-based economy" or a "knowledge society" is an input to economic processes that rests on the advancement in information technology—directing to a "paradigm shift". This indicates that changes in economic functioning and/or changes in the economic rules of the game operate in a system of an exchange of knowledge and experiences (Testa, 2019:10).

Knowledge transfer (KT) is an important issue for most organisations (Demeter & Losonci, 2019:211). In the POG industry, the transfer of knowledge is slow and many times, non-existent (Asghari & Rakhshanikiab, 2013:266). The POG industry and organisations are very secretive about the advancement of technology and critical skills. The KT process is reasonably slow, and KS or transfer is highly confidential. Information and knowledge leaking embody a significant risk to organisations if information and knowledge is not managed properly (Tan, Wong & Chung, 2016:622). The danger of not documenting knowledge or the lack of KT is further exacerbated when critical employees (employees with experience, job specific knowledge and skills) are leaving the organisation.

According to Wu, Zhu, Yu and Sun (2021:6), there is a brain drain in the chemical business as a result of recent accidents and increased industry risk, with a result that demand for chemical specialists has outstripped supply. Mueller and Mueller (2019:5673) state that "the loss of knowledge is relevant to competition and can even be a threat to the existence of the company". Employees leaving the organisation can weaken teams or departments and unnerve employees. The risk identified when critical employees leaves an organisation has a financial impact and leads to a brain drain. This brain drain is associated with a gap that exists once critical employees leave an organisation or the country. When employees leave the organisation, they take the implicit knowledge with them, leaving the organisation at risk (Panagiotakopoulos, 2020:246). The brain drain comprises the transfer of human capital, classified as a scarce resource and a factor of economic growth and poverty reduction (Bredtmann, Martínez Flores & Otten, 2019:1455). The lack of KT combined with the brain drain could negatively impact on the sustainability of the organisation.

Fernández (2018:6) describes KT as the situation where "human needs are met through organisations, which include procreation, addressing existential problems, passing on critical knowledge". For knowledge to be transferred from existing employees to current or future employees, a relationship of a willing sender and willing receiver must exist. KT is also known as knowledge continuity management (Hana, 2012:39). The process of KT involves more than just on-the-job training or job-shadowing. The KT process enables the willing receiver to add their own

understanding to the topic, which means that the knowledge transferred to the next employee would have increased.

Identifying the use and application of knowledge enables greater leverage to be gained, leading to increased return on the investment. Gloet and Samson (2016:55) state that knowledge assets (KA) are determined by an organisation's ability to recognise opportunities to attain sustainable competitive advantages through the acquisition and sharing of knowledge.

Access to knowledge becomes increasingly difficult as complexity increases and dynamic coordination becomes more challenging. Nurulin, Skvortsova, Tukkel and Torkkeli (2019:10) approach to "know-what" and "know-why" signifies explicit knowledge that can be gained by reading books, attending lectures and accessing databases and other knowledge resources. "Know-how" is tacit knowledge and is connected to the direct or personal experience.

Godfroid (2016:177) expresses knowledge as "both implicit and explicit". Knowledge is both tangible and intangible. Godfroid (2016:177) further states that implicit knowledge focuses on know-how, which mainly resides in an individual's brain, whilst explicit knowledge is well documented and freely available. Ali, Selvam, Dominic, Paris & Gunasekaran (2019:1809) suggest that implicit knowledge is linearly correlated to organisational performance in the oil industry. Therefore, the ability to transfer knowledge forms part of the industry's strategic alignment. KT is imperative as the knowledge acquired is beneficial to the organisation. The negative effect KT has on an employee's willingness to participate in the process will decrease by engaging in knowledge creation (Tafkov, Towry & Zhou, 2021:3). The assumption from the previous statement implies that implicit knowledge, when freely shared, creates a competitive advantage. Lai, Lui and Tsang (2016:94) propose that leveraging the knowledge found in different parts of an organisation could increasingly become a source of competitive advantage for the organisation.

Absorptive capacity is critical for innovative knowledge inflows and worldwide innovation to respond to opportunities in the quickly changing global marketplace (Ávila, 2021:4). Lai, Lui and Tsang (2016:95) conclude that for the full effect of KT to be utilised (total flows), both knowledge inflows and outflows should be examined concurrently. Knowledge inflows refer to knowledge attained from a focus group or from peer groups within the same organisation. Knowledge outflows refer to the knowledge distributed to peer groups within the focal group. Darling-Hammond, Cook-Harvey, Barron and Osher (2020:100) state that people learn more effectively when

the learning is connected to their prior knowledge and experience and when they can apply it to raise their awareness and solve real-world problems.

Intra-organisational KT is hampered by a lack of mutual acknowledgment of qualifications and past experiences (Findlay, Rammal, Rose & Pereira, 2021:5). Bhatti, Larimo and Coudounaris (2016:1568) show that improved performance has a positive impact on KT by exploiting knowledge from other tasks in the organisation. Alfawaire and Atan (2021) argue that investment in knowledge capital, knowledge management and strategic planning in human resource management are some of the most precious assets required to improve organisational performance, creativity and gain a sustainable competitive advantage.

Previous research within a global Oil and Gas organisation suggested that the qualitative method could be extended from the perspective of professional engineers, which can provide more information and knowledge through different types of international assignments used to transfer knowledge at various stages (Jawad, 2020:74). According to Nuaimi and Jabeen (2020:184) there is room for improvement in understanding how managers in different areas relate in terms of knowledge-sharing. Seydi (2020:12) added that, there is need to examine KM strategies tailored to technical jobs in the oil and gas industry.

This study used a case study strategy to explore the role of KT in the sustainability of a POG organisation in South Africa. The organisation is the largest gas and oil company in South Africa and is recognised by government as a strategic asset.

1.2 Background to research problem

The POG industry is a capital-intensive industry where financial, technological and capability shortages must all be assessed. Because of the extremely high level of cooperation and engagement between employees, KT and the dissemination of management methods across departments is critical. The KT process is challenging due to the different types of knowledge. According to Ali et al. (2019:1811), the POG industry has a huge impact on the global economy and the knowledge within this industry must be managed properly, given the vast amounts of data and information that needs to be captured and used for decision-making. However, KS has not been a priority in this industry. The lack of KS or KT leads to knowledge loss and, more specifically, a sustainability risk.

KM can aid in the correct identification, acquisition, application and dissemination of critical knowledge, ensuring the organisation's long-term viability. According to

Herrera and de las Heras-Rosas (2020:9), the economic variables that would affect sustainability are tied to performance and have to do with adapting organisational culture to organisational orientation, intergenerational knowledge transfer and innovation or internationalisation efforts. Innovativeness is an organisation's willingness and ability to quickly incorporate change in its operations by developing and executing new ideas that are useful in terms of competitiveness and long-term sustainability. Yadav, Pant and Seth (2020:1561) state that knowledge is "a critical source of sustainable competitive advantage for organisations". The ability of an organisation to continuously create, develop and ensure that the sharing or transferring of knowledge throughout remains a continuous process is referred to as sustainable organisational development.

Strong technical and innovative capabilities are required for oil or gas extraction, renewable energy generation and storage (Rosiello & Maleki, 2021:3). Furthermore, offshore innovation entails the creation of novel deep-water support and installation structures, as well as installation vessels that can operate in a variety of environments. This complex POG environment requires a high level of KT in the industry.

Scientists and engineers have skills that are in high demand in the knowledge economy (Williams, 2019:201). Deloitte Insights (2020:1) acknowledge that the POG industry has to employ skilled and professional staff to operate successfully. However, employees leave the organisation for many reasons, such as new employment opportunities, retrenchment and retirement. According to Gaghman (2019:35), an awareness of the importance of tacit knowledge retention as part of KM is becoming increasingly crucial for organisations to achieve their strategic goals. Relying on explicit information and old-style training courses is simply no longer successful for transferring or retaining knowledge. Gaghman (2019:35) suggests that "intensive-knowledge, high-technology organisations, oil and gas organisations rely heavily on their employees' collected expertise". Simultaneously, POG is a volatile business with a large risk in respect of organisational learning and knowledge retention. Retaining professional knowledge is regarded as one of the most difficult issues facing any industry, particularly the POG industry. Information may leave a business along with an individual, posing a major threat to the organisation's learning and memory capacity.

The transfer of knowledge is frequently assessed on an implicit hypothesis, as explicit theories are absent (Adler, Hadorn, Breu, Wiesmann & Pohl, 2018:182). Bules, Curkovic, Eckert and Stamper (2019:823) state that "Understanding where the gap lies is the first step to addressing the disconnect …" Sinha and Kapur (2019:1)

suggest that the lack of design fidelity as an important element in the KT failure process, failing to surpass instructional approaches on conceptual knowledge and/or transfer.

Identifying the hurdles that prevent tacit knowledge from being retained and how to overcome them is the first step in developing tacit knowledge retention techniques (Dolphin, 2021:6). Human capital management is a problem in the POG industry because of the difficulty of retaining experienced individuals and the training required to achieve target competency levels, (Seydi, 2020:33). The transfer of tacit knowledge, which can be aided by using mixed teams of experienced and inexperienced engineers, should be given special consideration (Tavčar, Benedičič & Žavbi, 2019:18).

1.3   Problem statement

KT is difficult to implement in complex organisations (Crupi, Del Sarto, Di Minin, Phaal & Piccaluga, 2020:1265; Seydi, 2020:35). Crupi et al. (2020:1266) suggest that organisations usually fail to implement KT practices when attempting to change the organisational culture to meet KM or KT goals and strategies, rather than integrating them into the culture. Retention of experienced individuals and the training required to achieve the target competency level is a challenge and, as a result, human capital management remains a problem in the POG industry (Seydi, 2020). The performance of individuals is measured as productivity and profitability and the impact of the KT on both can be as high as 70% (Fredriksson & Jonsson, 2019:201).

According to Smuttrasen (2020:6), if the KT process fails, intangible resources such as knowledge would lose their capabilities. Sheng and Saide (2021:928) add that "KT is crucial to the organisation's success since, when done correctly, it boosts the organisation's efficiency and productivity". Employees can work faster and with fewer errors when they have the proper information at their fingertips. As stated, a lack of information results in errors, causing financial losses to the organisation. These financial losses have a direct negative impact on the organisation's sustainability. Sustainability also comes under pressure as a result of low retention rates, when employees leave the company due to the lack of KT and the accompanying frustrations that build up.

There is still a need to understand the impact of KT implementation on organisations (Dolphin, 2021; Wang, Nimmolrat & Khamaksorn, 2021a:103). It is unclear how a lack of KT affects the sustainability in organisations such as the POG industry in South Africa.

1.4   Research questions

To address the research problem, two primary research questions (RQs) are asked. Firstly, "What are the factors affecting KT in a selected petroleum organisation in South Africa?", and secondly, "How can the KT be sustainable in a selected petroleum organisation?" From these primary research questions, research sub-questions are created. Tables 1.1 and 1.2 indicate the research questions, research sub-questions, the methodology used to answer the research questions and the objective of each research question.

Table 1.1: Research question 1 and research sub-questions 1.1, 1.2 and 1.3

Research Questions	Methodology	Objective
RQ1: What are the factors affecting KT in a selected petroleum organisation in South Africa?		
RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?	Case study, interviews, semi-structured interviews.	To determine the challenges that hinder the transfer of knowledge in the selected petroleum organisation
RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?	Case study, interviews, semi-structured interviews.	To determine the impact (success or failure) based on the organisation's ability to leverage their knowledge-based assets
RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?	Case study, interviews, semi-structured interviews.	To examine the employees' perceptions of tacit knowledge and the manner in which KT takes place

Table 1.2: Research question 2 and research sub-questions 2.1 and 2.2

Research Questions	Methodology	Objective
RQ2: How can KT be sustainable in a selected petroleum organisation?		
RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?	Case study using semi-structured questions/ interviews	To establish a knowledge management (KM) and knowledge transfer (KT) infrastructure (culture, strategy and technology) contributing to manage knowledge effectively
RSQ 2.2: How does the organisation plan succession with regards to KT?	Case study using semi-structured questions/ interviews	To determine whether the succession plan delivers a return on investment

1.5   Research aim

The aim of the study was to explore the role of KT in the sustainability of a POG organisation in South Africa.

1.6   Objectives of the study

The objectives of the study are:

i)   To determine the challenges obstructing KT in the selected petroleum organisation

ii)   To examine how the organisation leverages knowledge

iii)   To determine the employees' role in KT

1.7   Research methodology

1.7.1   Introduction

Research methodology is the procedure or method used to identify, select, process and analyse information about a research topic. The methodology of a study grants the reader the ability to evaluate the study's overall rationality and trustworthiness (Kumar, 2020:4).

According to Majeed, Jawad and AlRikabi (2021:254), the advantage of research methodology is that it aids the researcher in the development of problem-solving skills and logical thinking to investigate the necessary parts of the phenomenon or circumstance in order to arrive at the most optimal and logical answer. Ioka (2018:50) adds that research methodology improves the understanding of individuals, groups, organisations, society, and community so that they can be involved in the study and the findings can be expanded.

According to Melnikovas (2018:3), research methodology is a broad research plan that specifies how research should be conducted. The research methodology section of a dissertation or thesis helps to ensure that the tools, procedures and underlying philosophy are all consistent. The response to the question indicates whether the knowledge gained via the research method is acceptable (Easterby-Smith, Thorpe & Lowe, 2002:27).

1.7.2   Research philosophy

The different ways of viewing research philosophy are referred to as ontology and epistemology (Han, Xue, Wang, Zhang Y Gao, 2021:635; Melnikovas, 2018:4; Saunders, Lewis & Thornhill, 2007:130).

1.7.2.1   Ontology

Salama (2019:9) advises that ontology (a branch of metaphysics) deals with the nature of reality. Alharahsheh and Pius (2020:40) state that ontology is "primarily interested in the nature of a phenomenon's existence". Ontology is the process of

determining the truth or solution to a research issue by pointing to existing types of knowledge.

i) Objectivism

This research did not follow the objectivist world view. According to Hasni, Karim, Arshad, Abdullah and Khairatun (2020:63), the objectivist approach, "should be evidence of familiarity with what is authentic in terms of things, artefacts, culture, practices, or activities taken in order to pre-determine authenticity". Bell (2021:2) states that knowledge is imparted and comprehended; it can be applied and transferred to new circumstances.

ii) Subjectivism

As this study is about the understanding of human behaviour during KT in a POG organisation, a subjectivist approach was followed. According to Martin (2020:480), subjectivity is defined as "the way a researcher's perspectives, values and social experiences influence the research". According to Saunders, et al. (2019:159), the objective attributes of management are less significant than how managers attach their own personal meanings to their tasks and how they believe those duties should be executed. This view is seen as subjectivism.

1.7.2.2 Epistemology

Cuthbertson, Robb and Blair (2020:96) suggest that epistemology is "a means of thinking about knowledge and understanding the world?" Epistemology is concerned with the nature of knowledge, including its validity, range and legality (Thomas, Lubarsky, Varpio, Durning & Young, 2020:990). Epistemology mainly consists of positivism and interpretivism (Saunders et al., 2007:159). In the next section these two stances are briefly discussed.

i) Positivism

The positivist approach to research is founded in the quantitative methodologies of research. The positivist perspective, according to Walsham (1995:76), is that "scientific knowledge is made up of facts and takes reality to be independent of social construction". One of the main goals of positivist research is to find explanatory linkages or causal relationships that may be used to anticipate and regulate the events at issue.

ii) Interpretivism

The ontological stance of subjectivism was followed in this study. The epistemological stance was that of interpretivism. The research was driven by the interpretivist position, as the method followed relates to a qualitative study that is dependent on

thoughts and opinions of individuals in the fulfilment of the problem construction. The primary goal of qualitative research is to learn how people create constructs to help them make sense of their surroundings. Easterby-Smith et al. (2002:28) state that "experience reality through the interpreted reality of their participants". Interpretivism is also known as social constructivism, according to Creswell (2009a:96), since it emphasises the human capability to create meaning and is used in qualitative research. According to Win and Kofinas (2019:342), the interpretivist admits the existence of multiple realities, which are observed through people; consequently subjective implementation of the interpretivism perspective is based on a subjective interpretation of the participants' views through the researcher's own subjective views.

1.7.3   Research approach

The research approach provides a narrative framework for better understanding of a phenomena (Doan, Kim, Mooney and Vo, 2021:46; Bryman, 2004:756). Jones and Masika (2021:2) suggest that the research approach is a strategy used in a study that is based on experiences, idealising, articulating plans and a subsequent development phase. The research approach is based on the nature of the research problem addressed. According to Saunders et al. (2019:153), the research approach can be "deductive, abductive or inductive".

1.7.3.1   Deductive approach

Okoli (2021:2) suggests that deductive reasoning takes a general rule and infers the situation of a specific case from it. According to Bergdahl, Ternestedt, Berterö and Andershed (2019:177), there is a probability of uncovering flaws in a theoretical construction and, by doing so, improving knowledge by using a deductive approach to test the interpretation of the development of ideas. A deductive approach entails formulating a hypothesis (or hypotheses) based on a current theory and then devising a research strategy to test it. Deductive reasoning is defined as reasoning from the specific to the universal (Upmeier zu Belzen, Engelschalt & Krüger, 2021:2).

1.7.3.2   Abductive approach

Larco, Montenegro, Yanez and Luján-Mora (2020:3) suggest that the abductive approach technique is used when the findings do not match the theory's predicted outcome, which directs the research. As a result, the abductive approach may be reasoned to develop stages of the knowledge-production process.

1.7.3.3   Inductive approach

This research follows an inductive approach. This approach was chosen because exploratory data were gathered using semi-structured interviews and then simplified

through a process of analysing and categorising to find meaning in the data and to identify various factors that an organisation should consider when implementing knowledge transfer.

Inductive reasoning takes a broad rule and infers from it the situation of a specific case (Okoli, 2021:4; Saunders et al., 2012:117). According to Upright and Forsythe (2021:65), researchers use data triangulation and an inductive approach to qualitative data analysis to uncover in-depth knowledge that quantitative analysis may not be able to provide. The inductive approach, also known as inductive reasoning, begins with observations and theories are presented as a result of observations towards the end of the research process (Saunders et al., 2012:117).

1.7.4   Research strategy

The research strategy is a general plan for answering the research questions, which involves defining research objectives, specifying data collection sources and considering research restrictions (Al-Ababneh, 2021:176). Experiment, survey, case study, grounded theory, ethnography and action research are examples of research strategies (Saunders et al., 2007:36).

1.7.4.1 The strategy

The research strategy used in this study was a case study undertaken at a POG organisation in Cape Town, South Africa. The case was chosen because of the researcher's familiarity with (as a former employee) and knowledge of the processes of the organisation. The case was, therefore, non-randomly and conveniently selected.

Yin (2018:11) states that "a case study can be thought of as a current phenomenon in its real-world setting, especially when the lines between phenomena and context are blurry and the researcher has limited influence over the phenomenon and environment". This approach assists with answering "why" and "how" questions. Yin (2018:12) continues to explain how relevant the approach is when there is a lack of theory, or the theory has been under-explored. While each part of case design and the type of case study is chosen depending on the research aims, the focus on data triangulation, academic rigor and the researcher's objectivity is consistent throughout.

McBride, Misnikov and Draheim (2021:12) motivate that a case study is defined as "an in-depth description of a phenomenon or social unit, such as an individual, group, institution, or community, and when it comes to case study research, the unit of analysis itself, rather than the issue itself, defines the case". A case must have a clear focus and a specific unit of analysis, as well as a detailed description of the

phenomena and the ability to develop knowledge about the subject of the research. This case study differs from previous case studies in that it emphasises the need for a rich and complete account of the case; yet, this emphasis on description and comprehension makes the study more interesting for interpretation. This case is described in detail in section 4.2.

1.7.4.2 Sampling

The research aim and objectives of the study, as well as the features of the study population (such as size and variety), are used to decide who and how many persons should be chosen to participate in the study. Purposive, quota, snowball and convenient sampling are frequent sampling procedures used in qualitative research (Saunders et al., 2007:36). Non-probability purposive and convenient sampling was used to choose the sample of 20 participants for this study, based on the employees' availability. The researcher considered using the engineers in a department of the organisation as a sample frame to identify cases of knowledge transfer. Provided that the sample may only depict a fraction of the target group, the researcher carefully examined whether the chosen sample frame fit the study objectives and, more importantly, whether there were techniques to overcome the sample frame limitations.

1.7.4.3 Unit of analysis

The subject of investigation is determined by the unit of analysis, which is a critical component of any methodology (Damşa & Jornet, 2020:2). The unit of analysis is made explicit, how it may be researched, by providing an overview of frameworks and numerous analytical methods accessible in research. For this study the unit of analysis was the transfer of knowledge in the POG organisation.

1.7.4.4 Unit of observation

The unit of observation for this case study on KT was the staff interviewed, namely the 20 participants, consisting of engineers in different capacities (section 4.1). Morin, Olddon & Artikcan (2021:303) suggest that an object or person from which data is collected is referred to as a unit of observation. Researchers base their conclusions on data collected and analysed, therefore, defining units of observation in a survey or other study can help to clarify the legitimate conclusions that can be derived from the data.

1.7.5   Data collection

In this research, a qualitative approach (interviewing experts from the case company and literature analysis) was followed. Data were collected (section 3) by means of semi-structured questionnaires (Appendix E) and from interviews with the aid of an

interview guide (Appendix A). Interviews were recorded with the permission of the participants. Morin et al. (2021:286) state that data collection is "the methodical approach to collecting and assessing information from a selection of sources, of the area interest". Data collection empowers the organisation to answer pertinent questions, evaluate outcomes and predict future probabilities and trends (Creswell, 2007:56). This study addresses how factors influence the relationship between knowledge transfer and sustainability in the petroleum oil and gas sector by highlighting a qualitative rather than quantitative approach. The quantitative approach restricts access to skilled respondents to a closed-end questionnaire. Qualitative interviews help to broaden explanations and delve deeper into the factors involved in knowledge transfer. As a result, the qualitative approach was chosen to develop a better understanding of the phenomena.

1.7.6   Data analysis

Using qualitative methods, key informant interviews are used to evaluate the profession's views. Those who completed a questionnaire included production, process, drilling, and petroleum engineers. An explanatory approach was used to generate key themes from informant responses. Interviews were recorded and transcribed. Keywords and key phrases were identified and summarised. Findings were then summarised and categorised, after which themes were determined. The research questions were linked to the themes and discussed in Chapter 5 of the thesis.

1.8   Ethics

Before interviews were conducted, the research ethics committee at the Cape Peninsula University of Technology (CPUT) (Appendix F) approved this study to ensure ethical principles, such as honesty, objectivity, carefulness, integrity, transparency, intellectual property and confidentiality, were satisfied (section 3.8). For this study, participant confidentiality and the information provided by the participants were handled correctly and the CPUT policies and procedures were followed.

1.9   Delineation

Although every attempt was made to include as much variability as conceivable in the research participants, a smaller, larger, or different group of interview participants would have generated a varying dataset. The researcher, in particular, would have favoured to include more study participants, but recruiting participants from this cluster proved challenging. Ideas were reinforced through a content analysis of studies published and strategy proposals by these groups to improve the reliability of the data even further. Discussions, focus groups, scholarly journals, and guidelines were used

to ensure data triangulation, which increased reliability and trustworthiness. By carefully pretesting the interview questions and manually coding and evaluating the interview transcriptions, the researcher was able to reduce interviewer and affirmation biases. Finally, initial findings were disseminated, allowing for broad informant feedback and member-checking.

The three key considerations for the research have been identified as:

1.9.1 Limiting the scope

Given the size of the POG industry across South Africa, there were multiple compelling reasons, such as time and budget constraints, to limit the scope of the study to just one organisation.

1.9.2 Choosing a general location

The choice was made to keep the study in Cape Town because of time and budget constraints.

1.9.3 Determining particular limits

The research focused on exploring the role KT plays within the engineering department of a POG organisation. All other departments of the organisation were excluded from the study.

1.10 Conclusion

The results of the study indicate that KT to support sustainability is a major challenge for the POG. This challenge places the sustainability of the organisation at risk. Employees are demotivated and are leaving the organisation, creating a serious brain drain. KT is not part of the organisational strategy and this leaves the organisation vulnerable. KT can play an important role in supporting the sustainability of the organisation by retaining expert knowledge, transferring that knowledge and creating a KT culture within the organisation.

1.11 Contribution

Guidelines are proposed to assist the organisation to manage KT by implementing and identifying the challenges, whilst adding knowledge to the research area. The research contributes towards body of knowledge of KM and KT.

1.12 Summary

The implementation of KT remains a challenge to organisations. The aim of the study was to explore the role of KT in the sustainability of a POG organisation in South Africa. In Chapter 1, the problem statement was presented, indicating that it is unclear

how the lack of KT affects the sustainability in organisations in South Africa. The problem statement was followed by the research questions posed, namely: 1) What are the factors affecting KT in a selected petroleum organisation in South Africa?, and 2) How can KT be sustainable in a selected petroleum organisation? These research questions were developed by framing research sub-questions, leading to the methodology used to answer each question. The objective of each question was presented.

A subjectivist stance with an interpretivist approach has been adopted for the research methodology. A case study strategy was used with a POG organisation in South Africa as the case. The data were collected using semi-structured questionnaires, followed by the data analysis; methods of summarising and categorising the data; and a thematic analysis of the categories. An explanation of the ethics that were applied throughout the research process followed.

The chapter concludes with the delineation and contribution of the research to the existing body of knowledge. The research focused on exploring the role KT plays within the engineering department of a POG organisation. The research contributes to the body of knowledge in terms of KM and KT. To implement KT and development, organisations must have the necessary infrastructure and support systems in place.

Chapter 1: The background to the study is presented in this chapter, with the problems statement, research questions, aim of study, objectives, research methodology, main findings, conclusions, contributions and ethics.

Chapter 2: This chapter presents the literature review, which was done by identifying keywords from the title, problem statement, research questions, and aim of the study. The keywords were then used to explore the literature.

Chapter 3: This chapter provides details of the research methodology used in the research, which includes the research philosophy, research approach, research strategy, data collection techniques and how the data were analysed.

Chapter 4: Information about the case used in the research is discussed in this chapter. The interviews conducted during the research process are analysed and findings are formulated based on the analysis of the interview answers provided by the 20 participants.

Chapter 5: This chapter provides the reader with a discussion of the findings and guidelines to solve the phenomenon under investigation are proposed.

Chapter 6: Chapter 6 concludes the research with recommendations, a reflection, and contributions of the research to the existing body of knowledge.

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK
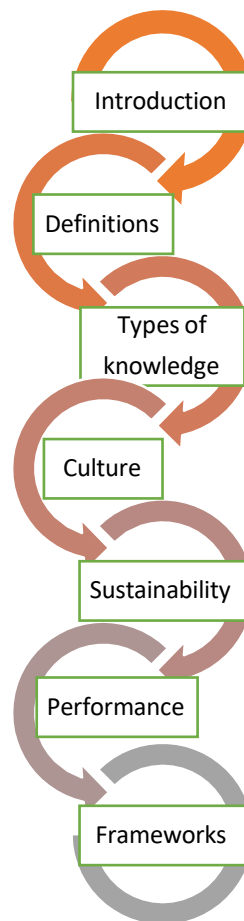
Figure 2.1: Layout of Chapter 2

2.1 History of knowledge management

KM can be traced back to Michael Polanyi's key work, *The Tacit Dimension*, published in the mid-1960s (Williams, 2011:1). Figure 2.2 is a graph indicating how the concept of KM started in 1960 and gained traction in the mid-1990s. Over the next few decades, interest in the concept declined. However, two important works, namely Nonaka and Takeuchi's (1995) *The Knowledge Creating Company* and Davenport and Prusak's (1998:2) *Working Knowledge*, were essential in influencing the discussion. There were conflicting views about KM, especially with regard to the development of knowledge and knowledge in the workplace.
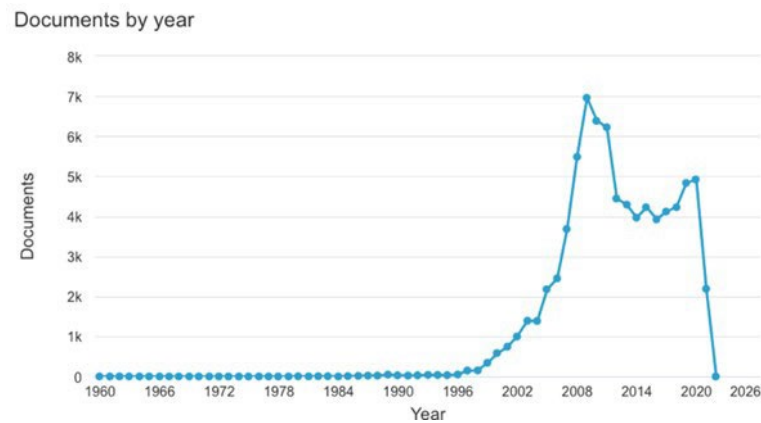
Figure 2.2: History of knowledge management (Source: Towe et al., 1997)

According to Takpuie (2014:18), KT research dates back to the 1960s, when product knowledge in the United States of America (USA) was captured in card books and delivered to Japanese resellers. Pea (1987:38) suggests that KT is "a cultural issue that encompasses the study of history as well as an individual achievement". The process to transfer knowledge from the culture to the individual is known as education. Love (1985:344) defines KT as "the process of distributing or disseminating information from a researcher's creator, organiser, or interpreter to a potential user".

Bartkus (1968:2) suggests that education equals KT and that knowledge production equals information transfer. According to Aparicio and Renn (2021:27) it is worth noting that the word "knowledge transfer" has had a variety of meanings since the 17th century. The concept first appeared during the early Enlightenment Era, when it was combined with the concept of development. Between 1628 and 1688, development was viewed as a linear, cumulative and infinite process at the time (Descartes & De Spinoza, 1961:2). This idea remained unchallenged until the end of the 18th century. The prevailing assumption of endless progress and linear process persisted until the 20th century, with studies dealing with the impact on diverse civilisations that were subjected to "knowledge transfer" projects.

KT as a concept was introduced in 1970 (Figure 2.3) (Cortada, 2014:77). It was only from around 2000 that the concept became of real interest to researchers.
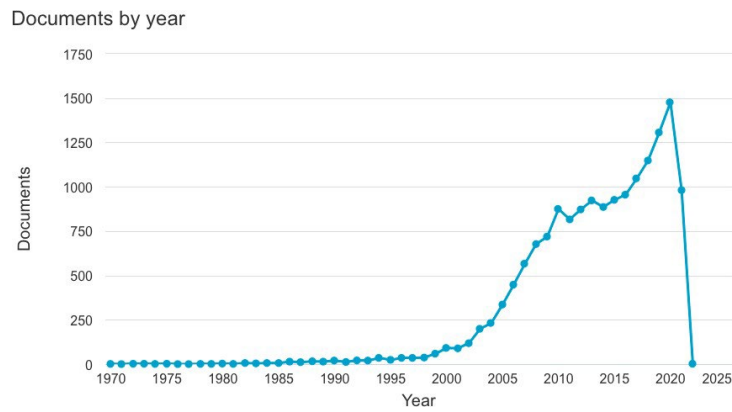
Figure 2.3: History of knowledge transfer (Source: Cortada, 2014)

KM has changed (Figure 2.4) from inception to 1995. From this point on, the history of KM can be divided into three periods, namely leveraging explicit knowledge (1995–2000), leveraging implicit and tacit knowledge (2000–2010) and leveraging collective knowledge (2010–2017) (Dixon, 1999).
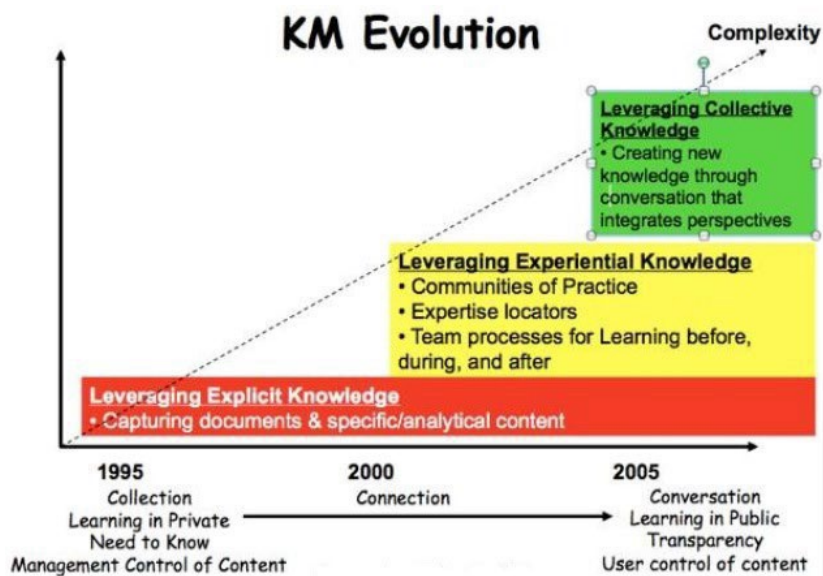
Figure 2.4: The three eras of knowledge management (Source: Dixon, 1999:1)

Original knowledge starts with the individual; sharing personal knowledge with others is at the core of knowledge creation (Nonaka & Takeuchi, 1995,57). Sharing tacit (section 2.3.2) and explicit (section 2.3.3) knowledge between individuals is based on the uninterrupted cycle of externalisation, internalisation, combination and socialisation of knowledge transformation (Nonaka & Takeuchi, 1995,57). These authors proposed the socialisation, externalisation, combination and internalisation (SECI) knowledge conversion spiral model, as illustrated in Figure 2.5. The SECI model presents four modes of knowledge conversion: i) socialisation; ii) externalisation; iii) internalisation; and iv) combination. According to Șandor and Tonț

(2021:238), creating new tacit knowledge from the same tacit dimension through face-to-face communication or shared experience is called socialisation. Transforming tacit knowledge into explicit knowledge by developing concepts and embedding the combined tacit knowledge is called externalisation. Transforming explicit knowledge into tacit knowledge is called internalisation, while combination is the process of transforming explicit knowledge into a more complicated systematic set of explicit knowledge in order to develop new knowledge, is called combination. These conversion processes interrelate in the spiral of knowledge creation.
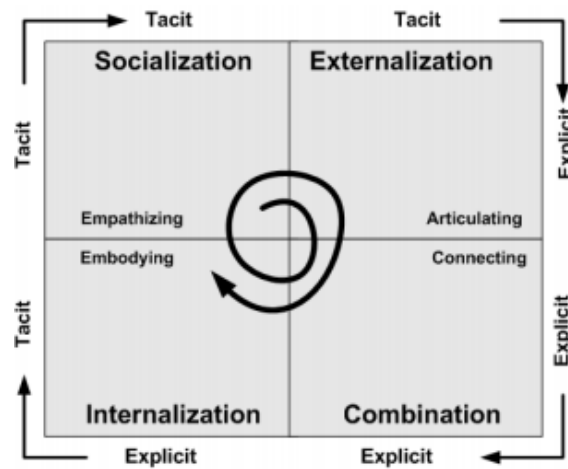
Figure 2.5: SECI model for knowledge conversion (Source: Nonaka & Takeuchi, 1995:57)

KM is divided into five stages: i) developing knowledge; ii) taking the knowledge; iii) maintaining knowledge; iv) sharing or transferring knowledge with others; and v) applying knowledge (Sydanmaanlakka, 2002:12). The oil and gas industry has been at the forefront of both the development and use of knowledge management strategies (Gaghman, 2019:36). Since the early 1990s, oil and gas organisations have acknowledged that they are in a knowledge-based business, where greater performance is obtained by early identification, evaluation and exploitation of opportunities. These considerations were especially important for international, publicly traded oil and gas organisations. Ganson (2013:2) suggests that organisations in complex environments rely heavily on their employees' acquired knowledge as intensive-knowledge and high-technology. Simultaneously, the oil and gas industry is a volatile industry, with a large risk of organisational learning and knowledge retention. Retaining professional knowledge is regarded as one of the most difficult issues, particularly in the oil and gas industry. Tacit knowledge may leave with the individual, posing a major threat to the organisation's learning and memory capacity (Gaghman, 2019:36). According to Sumbal (2017:905), oil and gas organisations are under increased pressure to retain and protect departing employees

and their knowledge as a result of the dwindling workforce. Tacit knowledge cannot be formalised, it must be passed down from person to person. Ribiere, Gong and Yang (2021:3) suggest that people were at the centre of the second KM era. During this time, the emphasis switched to activities such as communities of practice, tutoring or mentorship programmes, knowledge cafés and storytelling as a means of KS or KT.

According to Aldehayyat (2021:16), the development of KM systems emphasises the importance of paying attention to knowledge work and the people who do it. In 1959, Drucker coined the term "knowledge worker". In 1986, Karl Wiig is said to have originated the term "knowledge management" during a 1986 International Labour Organisation (ILO) meeting in Switzerland (Beckman, 1999:5). Forsman and Solitander (2003:2) stated that Nonaka and Takeuchi published a paper in 1995 that popularised the notions of tacit and explicit knowledge.

2.2   Definitions

The following definitions are given: i) knowledge; ii) tacit knowledge; iii) explicit knowledge; iv) experiential knowledge; creation; v) skills; vi) knowledge asset; vii) knowledge transfer; viii) KT pipeline; ix) knowledge creation; x) knowledge gap; and xi) communities of practise.

2.3   Introduction

Sustainable competitive advantages should be realised through good cooperation between the operations of an organisation (Zeng, Lee & Lo., 2020:2). According to Kurniawan, Wardati, Noviana, and Ardiani (2021:57) information systems also have a substantial and positive impact on sustainable competitive advantage. Instead of viewing information systems (IS) as tangible assets or leadership experience, competitive resources may generate an alignment between information systems and other financial opportunities (Zeng et al., 2020:2). IS also assists organisations in encouraging human resources by information, records, and knowledge available. IS must be commonly understood to include both the knowledge that organisations create and use and a wide range of progressively coordinated and related technologies that interpret the information.

The process of translating information and intellectual assets into long-term value is known as knowledge management (KM) (Suryawanshi & Khaparde, 2021:80). Organisations have focused on knowledge management (KM) as a creative technique for strategic management changes, connected to environmental and market growth. A structural role for KM is to ensure the accessibility of knowledge

within the organisation. The view of knowledge-based organisations is to derive a competitive advantage from the creation, coordination, transfer and integration of knowledge. The phrases knowledge transfer (KT) and KS are sometimes used interchangeably or have overlapping meaning, as this research study illustrates. KT (the transfer of knowledge from one part of the organisation to another) and KS (where explicit or tacit knowledge is communicated to other individuals) are referred to interchangeably because the similarities between them. Transferring or sharing knowledge also has its challenges, which include systems and processes that cause obstructions, known as knowledge barriers. For this study, a single department, the engineering department, was used to research the phenomenon of exploring the role of KT in the sustainability of a petroleum, oil and gas (POG) organisation in South Africa.

The implementation of KT is an important strategy; a tactic and action plan to enhance competitive advantage and, ultimately, organisational sustainability. The implementation of KT provides improved communication, collaboration and error prevention and encourages employee engagement. Acceptance, adoption, suitability, practicality and sustainability play a key part in the knowledge that demonstrates the results of KT activity implementation (Kalbarczyk, 2020:9). It is unclear how a lack of KT affects the sustainability of organisations in South Africa. As a result, the aim of the study was to explore the role of KT in the sustainability of a petroleum, oil and gas (POG) organisation in South Africa.

The title, problem statement, research questions and study goal were used to identify keywords for the literature review. After that, the keywords were utilised to search the literature. The research questions were derived from the literature and linked to the study's problem description and objectives. The keywords and phrases were then used in the CPUT library's portal of electronic databases. The literature review was conducted using electronic databases from the CPUT library, including Google Scholar, Research Gate, Emerald Insight, Elsevier, Science Direct, Scopus, and Springer Link. To give a comprehensive picture of literature, the literature search encompassed published research from the last two decades, with a focus on studies released as recently as was practically feasible.

This chapter is structured as follows (Figure 2.1): firstly, the chapter provides a history of KM (section 2.2), followed by definitions of key concepts (section 2.3), and the literature on organisational culture (section 2.9.2), organisational sustainability (section 2.10.2) and organisational performance (section 2.11). Secondly, the researcher links the frameworks found in literature to the topics highlighted in an

organisation related to KT, organisational culture, organisational sustainability and organisational performance. The chapter ends with a summary.

2.3.1 Knowledge

Hartlieb, Bordehore, González-Barros, Correia and Vidovic (2020:1) state that "knowledge is the facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject". Knowledge can be defined in terms of tacit, explicit, experimental, skills knowledge". According to Latilla, Frattini, Petruzzelli and Berner (2019:1336), "knowledge is critical for organisational performance and knowledge transfer, between personnel".

2.3.2 Tacit knowledge

Tacit knowledge is "a type of knowledge that each human possesses in the form of their thoughts, cognitive, and intuitive impressions. It's more difficult to provide this kind of information" (Novitasari, Haque, Supriatna, Asbari & Purwanto, 2020:2). According to Fuller (2021:1249), "the willingness to share tacit knowledge is influenced by trust". Cheng, Chelliah and Teoh (2021:232) argue that organisational trust can be utilised as a factor that influences KT and used as a variable for other factors involved. Because of the knowledge source's complete trust in the knowledge recipient, the knowledge source will lower the perception of a predicted risk. Schaefer and Makatsaria (2021:157) suggest that knowledge is a very personal, human asset that symbolises networks, combined knowledge and efforts. In the workplace, tacit knowledge is frequently undervalued and misused. Face-to-face interactions, such as informal discussions, storytelling, mentoring, internships and apprenticeships, provide the majority of work-related information that is progressively transformed into tacit knowledge. When people communicate ideas and solutions in a fair and open environment, and frequently have one-of-a-kind, spontaneous and creative talks, tacit knowledge would be the preferred choice as it provides expertise and competitive advantage.

2.3.3 Explicit knowledge

According to Abeysekera (2021:238), explicit knowledge is knowledge "that has been codified and can be formally communicated and transmitted in a systematic manner". Explicit knowledge is available in the form of shared expertise or public knowledge. Knowledge becomes more easily distributable when it is formalised and embodied in raw materials, products and services, machinery and mechanisms, organisational practices and processes, or cultural or organisational values.

2.3.4 Experiential knowledge

Woods, Rothwell, Rudd, Robertson and Davids (2021:2) state that "expert practitioners' and performers' experiential knowledge, gathered through many years of practice, might be considered a complementary source of information". In this study, experts are the senior engineers. Waters, Panchuk, Phillips and Dawson (2020:1) argue that the importance of existing knowledge in the decision-making process can still demonstrate KT by informing the visual perception with experiential knowledge.

2.3.5 Skills

Rodrigues, Fernández-Macías and Sostero (2021:1) define skills as "the ability to perform tasks". Ligarski, Rozałowska and Kalinowski (2021:2) suggest the organisation defines skills as "acquired capacities that assist learning or performance". Creating a set of critical talents that are in demand in the profession should be emphasised because these skills are essential for project planning and goal-setting, as well as ensuring project completion on schedule (Ballesteros, Sánchez, Ratkovich, Cruz & Reyes, 2021:9). Mtshali (2019:8) motivates that older employees' willingness to transfer skills and to use talents sharing to achieve goals are all linked to a culture that encourages older employees to transfer skills.

2.3.6 Knowledge assets

Fernandes (2018:1090) defines "knowledge assets as intellectual capital or knowledge resources". Using knowledge assets (KA) efficiently would assist the organisation to gain a long-term competitive advantage. KA has the ability to boost organisational performance. Intangible assets and intellectual capital have been alternately referred to as KA. Ferreira, Curado and Oliveira (2021:2) identify the pivotal role of KM as the development and management of knowledge-based intangible assets. Intangible assets include skills and intellectual property. KM has become a strong and interdisciplinary research field (Suknunan & Maharaj, 2019:20). The KA construct and its components serve as inputs to an organisation's value- creation procedure, allowing the organisation to develop and exploit its essential capabilities and competences in order to improve performance. KA are one of the most important tools for fostering ongoing innovation and performance in businesses (Asiaei, Bontis & Zakaria, 2020:134). According to Asiaei et al. (2020:135), KA help to improve knowledge process capabilities, such as the creation, KT, integration and application processes.

2.3.7   Knowledge transfer

Gu, Meng and Farrukh (2021: 34647) suggest that the process of passing information from a source to a recipient is known as KT. According to Dahiyat, Khasawneh, Bontis and Al-Dahiyat (2020:9), it may be inferred that KT lies at the heart of these knowledge-laden, intra-organisational contacts and exchanges, which promote the required information flows that let people mobilise and use static knowledge assets.

Singley and Anderson (1989:1) define KT at the individual level as "how knowledge acquired in one situation applies (or fails to apply) to another". According to Argote and Ingram (2000:151), KT is defined as "the process through which one unit (e.g., group, department, or division) is affected by the experience of another". Darr and Kurtzberg (2000:29) add that KT can be defined as "an event in which one organisation gains knowledge from another's experience". Paulin and Suneson (2012:82) suggest that KT "includes a variety of interactions between individuals and groups; within, between, and across groups; and from groups to the Organisation". Kuciapski and Weichbroth (2021:1) define KT as "the transmission of knowledge (experience, knowhow, lessons learned) and the use of transmitted knowledge, namely transmission and absorption between the knowledge owner (who possesses knowledge) and the knowledge perceiver (who acquires knowledge)".

2.4   Knowledge transfer pipeline

Goldstein, Kachuee, Shiell and Sarrafzadeh (2020:3) suggest that the classic pipeline approach to KT involves scientists setting the research topic, doing the study and then transferring the findings to potential users. Iterating at the source and the target model levels and trying to match a model to each pair of levels is required to create the KT pipeline.

According to Zhang and Etemad (2021:2), knowledge distillation has been presented as a way to establish an effective KT pipeline suitable for deep learning. Knowledge distillation transfers soft target distributions learned by a large model (teacher) to a smaller model (student), allowing the models' architecture and parameters to be customised.

2.5   Knowledge creation

Bag, Gupta, Kumar and Sivarajah. (2020:179) suggest that knowledge creation is critical to achieving a competitive advantage and staying ahead of the competition. Converting tacit information to explicit knowledge is possible with knowledge creation. Knowledge creation is defined as "the act of making independent knowledge available to others" (Lane, Ganguli, Gaule, Guinan & Lakhani, 2021:1218). Knowledge is not

just an essential asset for an organisation but also an essential competitive asset for KM skills; for example, the creation and transfer of knowledge that develops and uses knowledge within an organisation (Alraggad & Onizat, 2020:11).

2.6 Knowledge gap

Alijan and Al-Rabeawi (2021:4387) describes the knowledge gap as stemming from the strategic gap, which is the difference between what the organisation needs to implement its plan and what it really has. Organisational rivalry and innovation are hampered by knowledge gaps. Liu, Yu, Sun and Yan (2021:683) suggest that the knowledge gap may benefit organisations by allowing for knowledge transfers to aid in project completion. As a result, a wider knowledge gap can boost an organisation's openness to acquire information. By adopting more knowledge, an organisation's knowledge stockpile grows, and the knowledge gap shrinks.

2.7 Communities of practise (CoPs)

Wenger (1999:149) defines communities of practice as "groups of people who are concerned about or enthusiastic about a topic, a craft, or a vocation". Farley (2020:20) refers to groups of people with diverse skills, and possibly separate divisions within an organisation, as a community of practise (CoP). CoPs work towards a goal created to cope with a complex problem or generate new information. The group can be considered as those who share comparable skills or passion. According to Jayathilake and Huxham (2021:4), peer learning works best "when there is a large variety of knowledge, as it involves less experienced members migrating from the peripheral to the center as they understand and adopt the techniques of more experienced members". The primary objective of CoPs is to create a structure that shares and transfers knowledge among different members in a given field (Dei & Van der Walt, 2020). CoPs are imperative in the management of tacit and explicit knowledge.

2.8 Types of knowledge

Collins (1993:99) identified the following five (5) knowledge types:
i) Embrained knowledge is based on conceptual skills and cognitive capacities, referred to as ingrained knowledge. Mishra and Das Mohapatra (2019:2250) suggest that this form of knowledge comes from personal experience and might reflect one's perceptions, ideas, values and morals.
ii) Embodied knowledge: is action-oriented and may only be partially explicit. Kasamali (2021:104) describes embodied knowledge as mental, emotional, spiritual and physical learnings that are all intertwined.
iii) Encultured knowledge: the process of gaining a shared understanding is referred to as enculturated knowledge. Baláž, Williams, Moravčíková and

Chrančoková (2021:1759) state that individuals share collective tacit knowledge that arises from a shared understanding through socialisation and acculturation. Language, cultural habits, social norms, storytelling and cultural norms are all examples of enculturated knowledge.

iv) Embedded knowledge: knowledge that is embedded into systems routines. According to Baláž et al. (2021:1759), embedded knowledge reflects individual experiences or practices and is able to create and understand shared cultural significance, which is conducive to the transfer of knowledge and the creation of knowledge in different intercultural situations and environments.

v) Encoded knowledge: is information given by signs and symbols; examples include books and manuals (Bhatia & Pinto, 2021:2). The ability to efficiently encode knowledge is not only dependent on the framework used to encode knowledge facts, but also on the accessibility of processors that can check for flaws in the encoded knowledge pieces.

2.9 Culture

2.9.1 Culture background

Goodenough (1970:99) defines culture as "a system of standards for perceiving, believing, evaluating, speaking, and behaving; people who share a set of cultural principles of social behaviour are said to have a culture". Goodenough (1970:99) highlights the notion that certain norms are clear, while others are not, but that failing to follow them is considered a breach of appropriate behaviour in either instance. Gill (1989:302) adds that, "learning emerged which was based on the transfer of knowledge between cultures". According to Lucas (2006:258), cultural differences may generate bottlenecks that obstruct or destroy the ability to transfer knowledge successfully.

Vinson (2021:2) defines culture as the "norms, beliefs, worldviews, values, openness, diversity, rituals and ceremonies, practices, material artefacts, role structures, space and place, taboos, and a common sense of the sacred and profane are all examples of cultural phenomena". According to Timmermans and Ostergaard's (2021:2) openness to diversity is an important aspect of corporate culture that influences knowledge sharing and collaboration. The facilitation of professional learning, flow of information, knowledge sharing, creative thinking and knowledge recombination is facilitated by workplace diversity. According to Su and Li (2021:3), in order to improve KT, knowledge partnerships must establish strategies for openness in culture and relationship management.

2.9.2   Organisational culture

The concept of culture in the workplace was the first mentioned in Elliott Jacques'
1951 book, *The Changing Culture of a Factory.* Elliot and Tavistock Institute of Human
Relations (1951:251) suggest that a factory's culture is "traditional and customary way
of thinking and acting, which all of its employees share to some extent and which new
employees must learn". According to Hofstede, Hofstede and Minkov (2010:2), the
set of morals, objectives and procedures that shape the activities of all members of
the team is referred to as organisational culture. Organisations do not acquire a
culture in a single day, according to Schein (1986:2); rather, organisations develop
culture over time, as personnel go through numerous changes, adjust to the external
conditions and resolve issues as a result of lessons learnt and put it into practice on
a daily basis, thereby building the organisational culture.

Leadership styles, the nature of the job and, most significantly, the way things are
done in the organisation determine the organisational culture (Mashile, Munyeka &
Ndlovu , 2021:386). Organisational culture is also strongly linked to staff retention and
staff turnover. According to Nguyen and Zeadally (2021:2), an ethical culture creates
employee loyalty, creates a sense of responsibility and achieves goals by ethical
means; all of which help to maintain the organisation's image and reputation. Viskari
(2020:3) states that reducing the effects of cultural difficulties by allowing employees
to focus on the process and their core skills, and by focusing on activities within lines
of expertise, contributes to a culture that supports KT.

2.10 Sustainability

Hans Carl von Carlowitz authored *Silvicultura Oeconomica* in 1713, more than 300
years ago, advocating for the continued, steady and sustained conservation, growth
and use of the word *nachhaltigkeit*, the German term for sustainability, was first used
in this context (Huss & Von Gadow, 2013:5; Schmithüsen, 2013:3). Sustainability is
defined as "a system's ability to maintain production at a level that is roughly equal to
or greater than its historical average, the approach established by the system's
historical level of unpredictability" (Lynam & Herdt, 1989:384).

Sustainability, has three pillars: i) economic; ii) social; and iii) environmental, and all
three pillars must be examined at the same time in order for managers to make more
informed   decisions   (Hasheminasab,   Gholipour,   Kharrazi   &   Streimikiene,
2020:15306). Wall and Lippel (2020:2) motivate that effective KT between
departments within an organisation contributes to sustainability in a variety of ways.
When KM is enhanced, it boosts competitiveness and has a positive impact on the

organisation's long-term sustainability (Kavalić, Nikolić., Radosav, Stanisavljev & Pecujlija, 2021:2).

2.10.1 Sustainable development

In 1987, Nikola Tesla, the father of sustainable development (SD), defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Hummels & Argyrou, 2021:2). Incorporating cross-cutting paradigms into teaching, research, operations and KT will promote sustainable development (Zimpel-Leal & Lettice, 2021:3).

2.10.2 Organisational sustainability

Organisational sustainability is a "multifaceted phenomenon that focuses on retaining results, developing knowledge, building capacity, forming partnerships, and delivering services and goods based on efficiency and effectiveness" (Rodríguez-Olalla & Avilés-Palacios, 2017:2). Genty (2021:2) defines organisational sustainability as "having the leadership, talent, global knowledge and change strategies required to meet the specific problems that organisations face".

Demir, Budur, Omer and Heshmati (2020:2) suggest that KM has been shown to have a substantial impact on organisational sustainability. For different types of businesses, organisational sustainability is a critical issue in avoiding risks, dealing with unpredictable conditions and finding stability in quickly changing markets. KM and, specifically, KT are critical aspects of business that must be effectively addressed in order to achieve long-term organisational success. Effective KM boosts an organisation's competitive advantage.

2.11 Organisational performance

According to Putri, Riswandi, Ridwan, Oktavinesa and Putri (2020:6253), performance is described as the amount and accuracy of data, the timing with which activities and objectives are done in order to meet the organisation's goals, objectives, mission, and vision. Performance management determines whether the activity completed by the employee or organisation is acceptable or not and whether it is measurable (Andrianina & Okle, 2021:44). KT, as a crucial component of an organisation's human capital and intangible assets, can improve work performance when effectively processed. Employees' contextual and task performance improves as a result of knowledge acquisition and provision.

Hamann, Schiemann, Bellora and Guenther (2013:384) define organisational performance as "an organisation's actual output or results as compared to its expected outputs (or goals and objectives)". Successful organisations are defined by their ability to improve organisational performance factors, which is typically the outcome of knowledge processes that represent the nature of leadership and the ideals of diversity and continual improvement. In order to improve organisational performance in a multicultural workplace, it is critical and beneficial for the organisation to promote the transfer of data, information and knowledge between organisational units (Izadi, Ziyadin, Palazzo & Sidhu, 2020:699).

According to Suwarsi, Harahap and Amanah (2021:5673), KM cannot directly influence organisational performance without improvements in the organisation's personnel. KM can aid in organisational growth by increasing the sort of organisational growth that necessitates creativity and innovation, which are strongly dependent on the competencies of the organisation's employees. There must be a culture of continued KT to have an impact on organisational performance.

2.12 Frameworks

Tafahomi (2021:177) defines a framework as a method for systematically obtaining facts, ideas, or beliefs through a selection process to address a problem in a certain field of research. The term "framework" is frequently used to describe a variety of techniques used to assess the quality of a debate (Breivik, 2020:10). According to Yasuoka and Hirata (2020:4882), a KM system offers enormous potential for preserving and transmitting information to future generations. To increase the depth of the knowledge accessible and to improve organisational performance and decision-making, insights and new knowledge gained from data analysis should be integrated into a typical KM system (KMS) (Shujahat, Sousa, Hussain, Nawaz, Wang & Umer, 2019:443). This system is a component of KM and its primary functions include collecting, accessing and upgrading data, information and knowledge. Implementing a KMS allows the organisation to make better decisions. The movement of information between and within an organisation is addressed by knowledge transfer, which is part of the KMS (Asad, Rind & Abdulmuhsin, 2021:2).

Concrete models or frameworks could serve as the foundation for more detailed descriptions of KT processes and more thorough evaluations of interventions. Moullin, Dickson, Stadnick, Rabin and Aarons (2019:2) suggest that framework users invest in service knowledge, including knowing or pursuing input from stakeholders who comprehend the external context, such as society norms and culture, policy and

government processes, as well as the internal context, such as organisational culture and climate, personnel policies and attitudes toward innovations.

For decades, socio-technical system theory have recognised Knowledge Management Systems (KMS) (Malhotra, Majchrzak, & Lyytinen, 2021:1382) KM, according to research and practice, is successfully carried out by optimising both technological and social aspects. Lack of understanding development and implementation of KMS, could lead to knowledge losses. There is a need for guidelines on how to implement KMS, such as knowledge transfer in organisations, turning to socio-technical systems theory and incorporate it with the POG's concept of knowledge transfer challenges. The proposed framework (Basic KT model) requires guidance to develop and implement Knowledge Management Systems as Socio-Technical Systems, for petroleum oil and gas.

Table 2.1: Frameworks explained

Description	Framework 1: Agricultural KM for Innovation (AKM4I)	Framework 2: Knowledge-pull	Framework 3: Knowledge of sustainable development	Model 1: Basic KT model
The framework in terms of KT	To promote equity and diversification of knowledge processes, systems require KT between all stakeholders, rather than the top-down linear interchange between stakeholders	To inspire and guide KT by using a methodology that specifies where, when and how KT should occur and be used	To improve the practice of sustainable development knowledge transfer. To encourage employees, to contribute to the gathering of fresh information on social, environmental and economic sustainability as required by planning approval standards	To focus on the employee's attitude as a disposition that determines their liking or disliking of certain behaviour. The notion connects KT to certain consequences, such as social, economic and strategic results, that are either approved or rejected.
	This framework was not chosen	This framework was not chosen	This framework was not chosen	This framework was chosen as it focuses on the factors that affect the knowledge provider's willingness to participate KT. The framework reviews conditions that may prevent a knowledge recipient from digesting new information. The framework explores interdependencies and inequalities between knowledge provider and knowledge recipient behavioural drivers.

2.12.1 Conceptual framework

According to Hellebrandt, Heine and Schmitt (2018:175), the conceptual process model for long-term KT is built on KM activities. The conceptual framework, on the other hand, encapsulates the exact direction in which the research must proceed. The conceptual framework describes the link between the study's specific variables and details the investigation's input, process and outcome.

The conceptual framework depicted the role of knowledge transfer as well as the factors influencing POG's sustainability. The conceptual framework and underlying

socio-technical theory is developed to comprehend how employees perceive knowledge transfer and the factors influencing implementation in POG. With high price volatility and limited mineral resources, the POG faces significant economic challenges. These challenges are exacerbated by knowledge losses and brain drain, which occur when experienced engineers leave the organisation with tacit knowledge that has not been recorded (Malhotra et al, 2021:1379). The theoretical perspective was discussed in order to comprehend the various approaches to knowledge transfer implementation.

2.12.2 Theoretical framework

The theoretical framework is based on tried and tested theories that incorporate the results of countless studies into how phenomena occur (Maniatis, 2021:2). The theoretical framework depicts the links between things in a given phenomenon in broad terms (Varpio, Paradis, Uijtdehaage. & Young, 2020:990). Furthermore, the framework acknowledges active participation between the knowledge source and the knowledge receiver, even if the transfer of knowledge is not able to occur due to the inherent difficulty of the task (Worum, Lillekroken, Ahlsen, Roaldsen & Bergland 2020:3). In the following section the Agricultural KM for Innovation (AKM4I) framework; the Knowledge-pull framework; Knowledge of Sustainable Development framework; and the Basic KT model, are discussed. These frameworks have been chosen because they address the following: through formalising flows; management of information and knowledge between varied groups of stakeholders; and societal interactions that favour innovative results.

i) Agricultural KM for Innovation (AKM4I) enables the organisation to inspire and guide KT through the use of a methodology that specifies where, when and how KT and utilisation should occur (Gardeazabala, Lunt, Jahn, Verhulst, Hellin & Govaerts, 2021:4)

ii) The Knowledge-pull framework assists knowledge networks, made up of numerous stakeholders, as a facilitator of accountability thanks to the help of KT and organisational learning (OL). (Bell, Van Waveren and Steyn, 2016:18).

iii) Knowledge of sustainable development focuses on the crucial role of knowledge and that the transfer of knowledge between the various participants in an innovation system is emphasised by innovation (Mohamed, Wee, Chen & Masrom , 2014:4).

iv) Basic KT model examines the behaviour of individual key participants in the KT process, particularly the dynamics created by the interaction between the multiple elements of their behaviour, goals and the environment (Wehn & Montalvo, 2016:s58).

2.12.3 The Agricultural KM for Innovation (AKM4I) framework

The AKM4I framework (Figure 2.6) can help to close the loop of constantly re-creating knowledge by evaluating and iterating innovations, forming coalitions to democratise knowledge access and use, and facilitating course correction at all levels of KM (Gardeazabala et al., 2021:4) Gardeazabala et al. (2021:4) motivate that frameworks have primarily focused on KM processes within specified targets, which does not always include reciprocal interactions between multiple stakeholders, nor does it explain what consequences or innovative processes occur as a result of knowledge development and transfer. AKM4I prioritises the formation of solid partnerships in which operations and activities are characterised by mutually beneficial alliances created around common goals. The flow of information is based on strong relationships between the key actors, with crucial knowledge interactions occurring either naturally or through a deliberate, organised process. For example, socialisation and externalisation occur when traditional and expert tacit information is verbally passed from senior engineers to graduate engineers and then validated through a collaborative effort.

Figure 2.6 outlines the fundamental processes in the AKM4I framework, connecting the eight AKM4I principles with important ideas needed to support agri-food system innovation. The framework's process aspects are as described below:

i)   Creating, acquiring and storing knowledge;
ii)   Integrating knowledge;
iii) Analysing knowledge;
iv)   Sharing knowledge.

Knowledge is the sum of one's experiences, attitudes, values, skills, contextual information and expert opinion that allows one to function in a consistent, structured and efficient manner. Knowledge can be explicit when formal; tacit when internalised through trial and error, introspection or review; or implicit when intangible (Davenport & Prusak, 1998:2). The knowledge classifications function on a continuum, with multiple relationships identified: i) socialisation (tacit knowledge is shared through experiences); ii) externalisation (tacit knowledge is converted to explicit knowledge using metaphors and analogies); iii) combination (explicit knowledge is systemised and refined); and iv) internalisation (explicit knowledge is incorporated into explicit knowledge) (Gardeazabala et al., 2021:4).
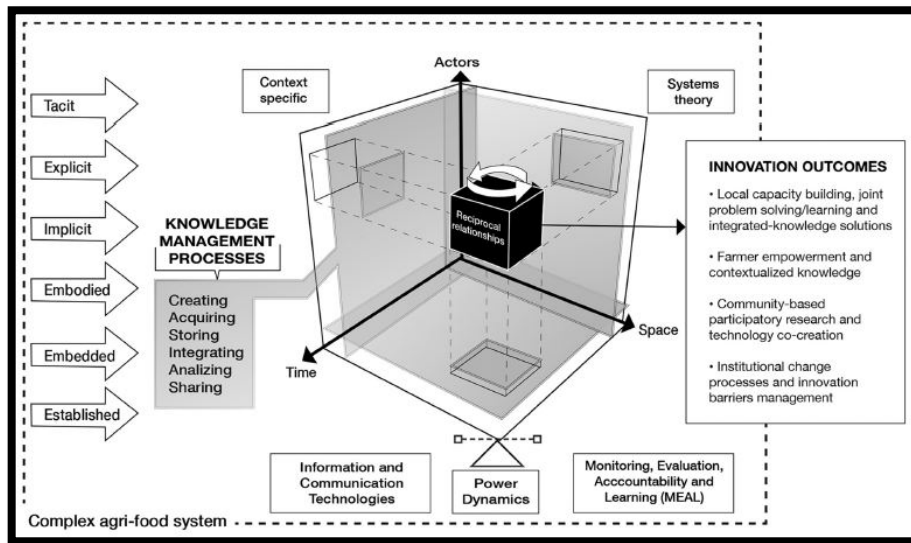
Figure 2.6: AKM Framework for Innovation (AKM4I) in agri-food systems
(Source: Gardeazabala et al., 2021:4)

2.12.4 Knowledge-pull framework

Bell et al. (2016:18) advise developing a framework to examine the organisation's knowledge-pull process and knowledge dissemination, which allows for the transfer of relevant and important knowledge from one project to another. When contemplating a knowledge-pull structure (Figure 2.7), it is equally important to examine the flow of knowledge back to the project. This criterion has a big impact on how the knowledge-gathering framework is set up. KT in an organisation does not always result in its application; yet, its use is required if KT is to be beneficial to the organisation. Within the organisational knowledge environment, the KT mechanism impacts on how knowledge should be communicated within the organisation.

In order for an organisation to pull in information, the organisation should declare what knowledge is necessary at each step of the project. To provide the necessary context for the organisation's codified knowledge, the organisation should construct a database of specialists. The knowledge that is drawn into the organisation is then shared throughout the organisation.
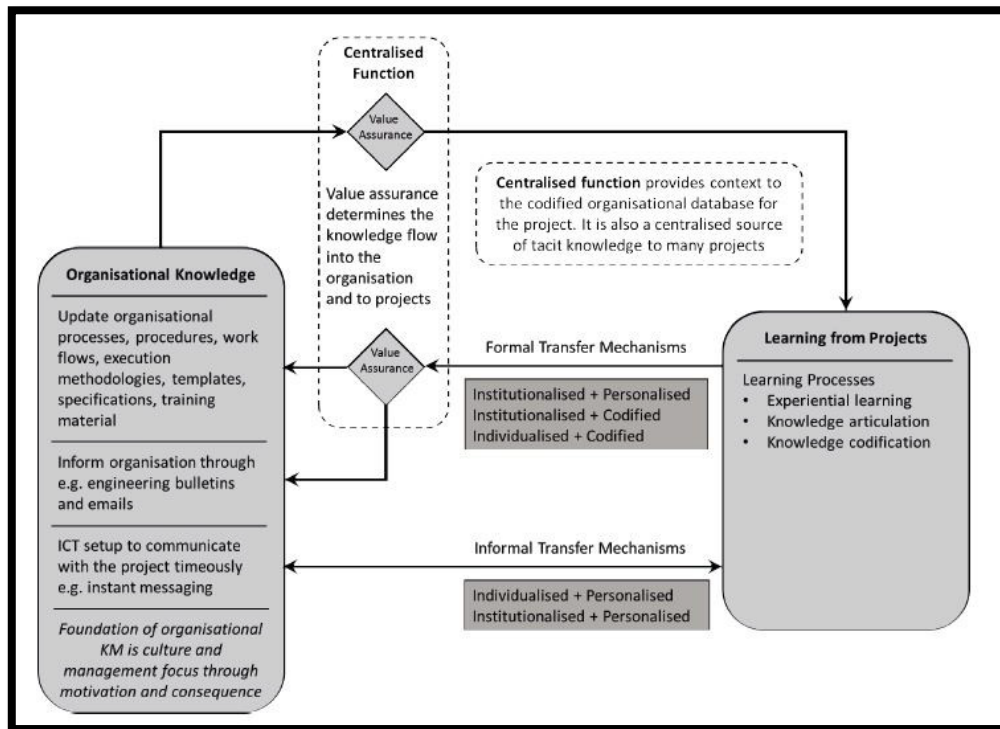
Figure 2.7: Updated and refined knowledge-pull framework (Source: Bell et al., 2016:29)

2.12.5 Knowledge of sustainable development framework

Mohamed et al. (2020:2) posit that in order to manage knowledge of sustainable development, local governments and their stakeholders must work together. To achieve its goal, a sustainable development framework must be incorporated into all stages of development planning in the organisation. A knowledge-pull framework will enable the organisation to discover, organise, and transfer knowledge gathered from the project's lifecycle phases in support of the organisation's KM strategy, which will increase project success.

During exploration, the organisation draws on the project's expertise to determine the value of the knowledge, where it will be transferred and how it will be distributed. Knowledge utilisation allows for the motivation and support of the organisation's capabilities in the KT process. The suggested framework has been revised to provide more information regarding the organisation's knowledge dissemination process. As shown in Figure 2.8, the KT method has an impact on how knowledge should be transmitted throughout the organisation and within the organisational knowledge environment.
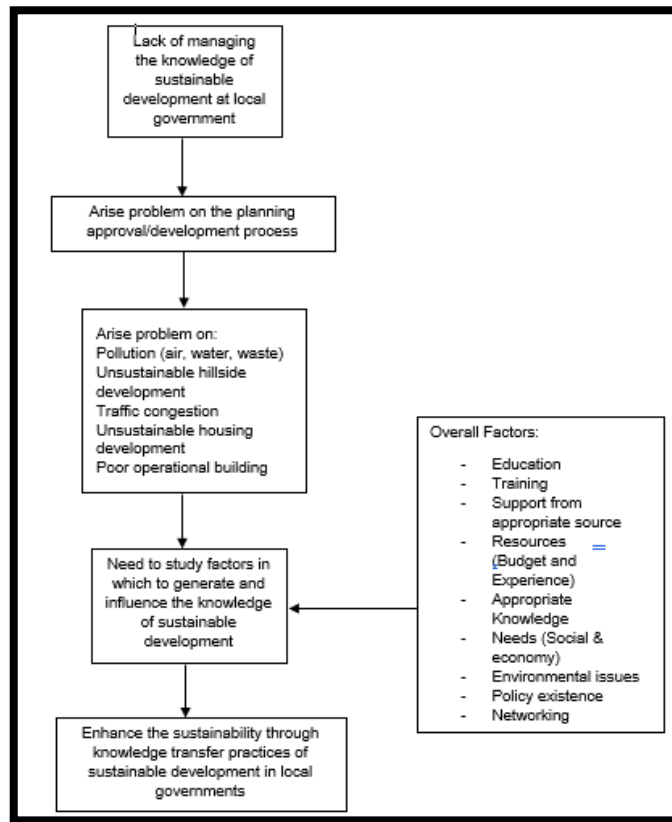
Figure 2.8: Theoretical framework (Source: Mohamed et al., 2014:2)

2.12.6 Basic knowledge transfer model

The basic KT model provides insights into the behavioural drivers of KT (Wehn & Montalvo, 2016:S58). The dynamics of KT between providers and recipients of knowledge are all influenced by the knowledge recipient. The "willingness" or "intent" of an employee to engage in KT might be considered the first indicator of such behaviour. Main stakeholders can provide accurate knowledge of their organisation's position on a given strategic or planned behaviour because they are willing to accept responsibility and seek evidence to support them.

As shown in Figure 2.9, it is suggested that the behaviour of both knowledge providers and knowledge recipients in specific settings and events can be discussed in terms of attitudes (A) and social norms (SN), which can be regulated over the KT process (C), mediated by intentions or willingness (W) and built on the premise that motives predicted behaviour. The basic model for explaining behaviour (i.e., $B \sim W = W (A, SN, C)$) is strongly predicated on the fact and it has been shown to explain up to 91% of the variance in behaviour.
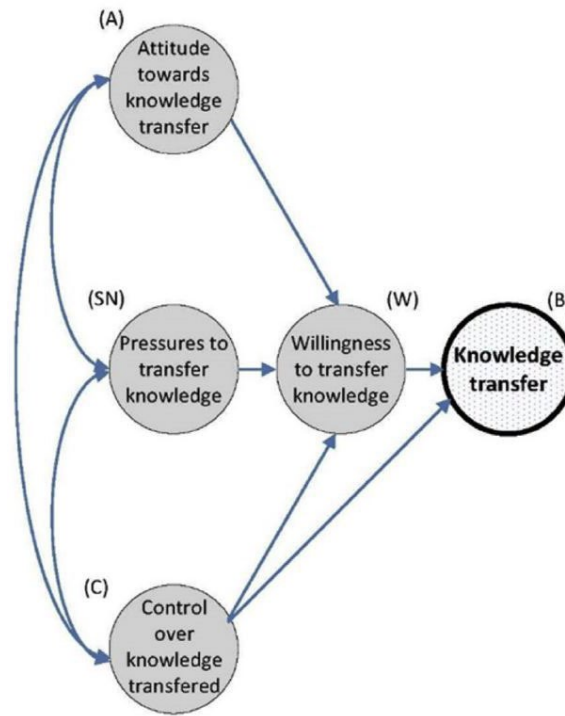
Figure 2.9: The basic KT Model (Source: Wehn & Montalvo, 2016:S58)

2.13 Conclusion

In conclusion, Chapter 2 served as the foundation for the implementation of knowledge transfer. The chapter traces the evolution of the knowledge management, which served as the foundation for this study's conceptual framework, the Basic KT model. Factors influencing participation and employee behaviour were discussed. As a result, the chapter began by outlining the integration of KT as a set specific goal; a tactic and activity plan to improve competitive advantage and, inevitably, organisational sustainability. Transferring or sharing knowledge has its own range of difficulties, including systems and processes that create impediments, known as knowledge barriers.

2.14 Summary

In this chapter, the researcher presented a review of the research literature pertinent to this study. There is a paucity of literature on the subject in South Africa because the majority of the research is from other countries. The backdrop of the Basic KT model, which served as the conceptual basis for this study, was explained in this chapter. Within the conceptual framework, factors influencing KT involvement were also examined.

According to the reviewed literature, implementing KT based on organisational factors is a major phenomenon and there is a paucity of pertinent and indigenous literature

on the subject. Organisational factors include culture, sustainability and performance. Concentrating on tasks within areas of competence contributes to a culture that supports KT by limiting the effects of cultural barriers; allowing employees to focus on the process and their core competencies. KT is a crucial part of business that must be well managed in order for an organisation to achieve sustainable success. KM can aid in organisational growth by promoting innovation in order io have an influence on organisational performance. In addition, there must be a culture of continuous KT within an organisation to have an influence on organisational performance.

The majority of studies looked at were undertaken in developed nations and, as a result, their conclusions may or may not be applicable to emerging countries, such as South Africa. Therefore, there is a knowledge gap that has to be filled in this study. The following frameworks and model were discussed (Rodríguez-Olalla & Avilés-Palacios, 2017:2):

i) **Framework 1:** Agricultural KM for Innovation (AKM4I) – in order to promote equity and diversification of knowledge processes, systems require KT between all stakeholders, rather than a top-down, linear interchange between stakeholders.

ii) **Framework 2:** Knowledge-pull – a framework to inspire and guide KT through the use of a methodology that specifies where, when and how KT and utilisation should occur.

iii) **Framework 3:** Knowledge of sustainable development – implemented to improve the practice of sustainable development knowledge transfer; to encourage employees to contribute to the gathering of fresh information on social, environmental and economic sustainability as required by planning approval standards.

iv) **Model 1:** Basic KT model – focuses on the employees' attitudes as a disposition that determines their liking or hate of certain behaviour. The notion that goals and intentions predict behaviour connects knowledge transfers to certain consequences, such as social, economic and strategic results, that are either approved or rejected.

The methodology of this research, as supported by this literature review, is discussed in the next chapter.

CHAPTER 3: RESEARCH METHODOLOGY
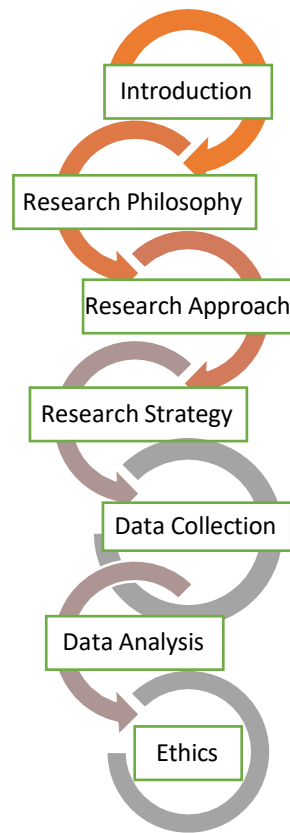
Figure 3.1: Layout of Chapter 3

3.1 Introduction

The role that knowledge transfer (KT) plays in organisational sustainability for the future wellbeing of the organisation within the petroleum, oil and gas (POG) industry in South Africa needs to be explored. In this chapter the methodology used to explore this role is presented.

Research methodology is the means whereby systematic approaches are formed, applied and warranted (Willmott, 2020:3). Methodology provides a philosophical foundation for assertions about the methodical generation of knowledge and the use of specific procedures. The goal of research methodology is to facilitate theory and practice by questioning the prevailing consensus underpinning assumptions and, by doing so, persuade people involved of the questionable status of the generally accepted way of doing things (Palitta & Simoncini, 2020:2).

For the comfort of the reader, the research questions (RQs) and aim of the study are stated once again. The following are the research questions posed in this study:

RQ1: What are the factors affecting KT in a selected petroleum organisation in South Africa?

RQ2: How can KT be sustainable in a selected petroleum organisation?

The study aimed to explore the role of KT in the sustainability of a POG organisation in South Africa.

The following topics are explored below: i) research philosophy; ii) research approach; iii) research strategy; iv) data collection; and v) data analysis. The chapter concludes with a discussion on the ethics that were considered throughout the research process and, finally, a summary of the chapter.

3.2 Research philosophy

The research philosophy influences the research design, technique and methods used to collect and analyse study data. Muhaise, Ejiri, Muwanga-Zake and Kareyo (2020:203) state that "a postgraduate researcher must have a research philosophy in order to match the study with an appropriate research philosophy that regulates the entire study". This chapter deals with the research philosophy chosen. Positivism, interpretivism, critical realism, postmodernism and pragmatism are the main research philosophies with which one aligns a research study, each with its own notations. Saunders et al's (2019:130) research onion model illustrates this further (Figure 3.2).
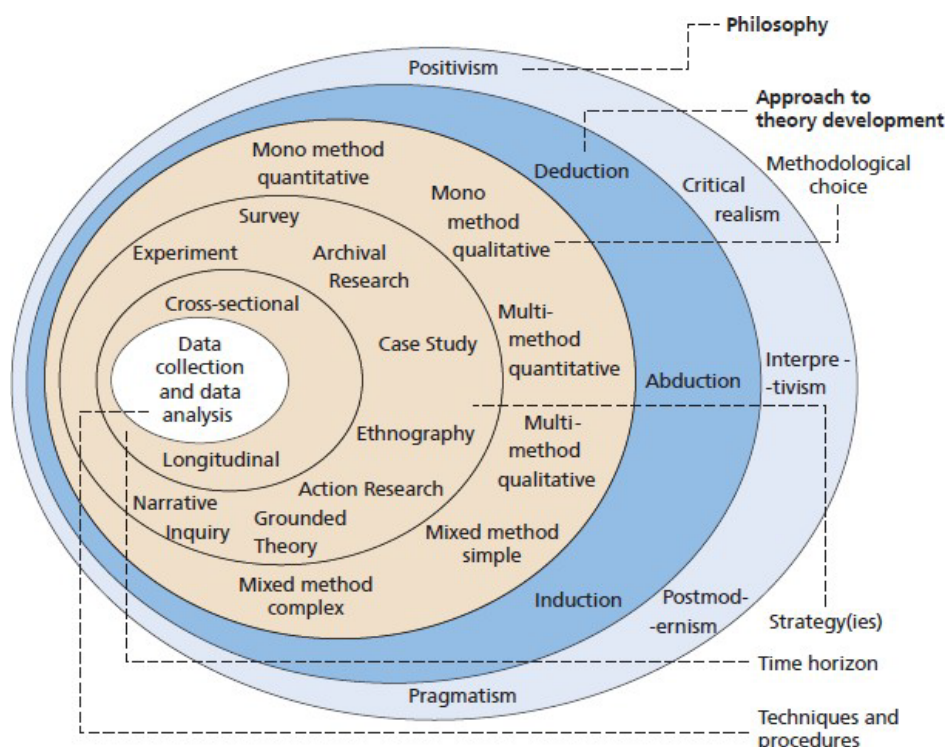
Figure 3.2: The Research Onion model (Source: Saunders et al., 2019:130)

The philosophical approach and the selection of theory development are the first two layers of the onion to be examined. These decisions are influenced by the researcher's personal ideas and assumptions, which are important factors determining how the research is carried out. The middle layers of the onion, i.e., methodological choice, strategies and temporal horizon, encompass the choice of a case study and the approach to implementing this choice.

3.2.1 Ontology

Ekeh (2020:1) defines ontology as "the study of being". The two main pillars describing ontology are that of subjectivism and objectivism (Saunders et al., 2019:133). Epistemology enhances or explicitly develops ontology, while ontology drives epistemology (Walach & Hockertz, 2020:2). Both of these parts of one's worldview are intertwined. Gruber (1995:1) states that "an ontology is an explicit specification of a conceptualization". Gruber (1995:1) explains that ontology is a statement of a logical notion and a method used to address the queries and assertions of research. According to Walsham (1995:2), ontology takes reality to be independent of social construction.

3.2.1.1 Objectivism

According to Knuppová (2020:29), objectivism considers social phenomena to be apart from the intellect and the agent. If the research study is based on a reliable and unquestionable reality, the researcher can take an "objectivist" approach to the study. Realist ontology is founded on the belief in an objective and real world. Objectivism is a disengaged epistemological stance founded on the belief that people's opinions and declarations are either true or untrue, correct or incorrect. A researcher whose belief system is based on a view of the world that is hard, real and acquirable can use a methodology that relies purely on control and manipulation (Walsham, 1995:2).

3.2.1.2 Subjectivism

Subjectivism emphasises "agentic components, arguing that the substance of social activity is encoded in agent-dependent features such as an agent's conscious reasoning, beliefs, or emotions" (Knuppová, 2020:29). Unlike objectivism, which ignores agents' consideration of the world, subjectivism ignores any external forces that may constrain agents, such as socialisation. This research is based on the subjective research philosophy, which views "reality as socially created" (Hromuško, 2021:15) and assumes that knowledge can be acquired as a result of interaction between employees of the POG organisation. Furthermore, subjectivism is linked to constructionism since this philosophical approach emphasises the social dimension of reality and is based on the premise that "social actors generate social reality

through social relationships" (Hromuško, 2021:14). The ontological stance of subjectivism was followed in this study. The epistemological position of the researcher in this study was interpretivist.

3.2.2 Epistemology

According to Creswell (2009a:103), epistemology is one's world view of observations, presumption, facts, interactions, qualities and method of understanding or discovering things. Paul and Criado (2020:1) define epistemology as "a way of understanding and explaining how we know what we know". Table 3.1 shows the different epistemological stances. For this research only positivism and interpretivism are discussed.

Table 3.1: Some distinguishing features of the main epistemological positions (Source: Bleiker et al., 2019:5)

Overall approach to research	Quantitative		Qualitative	
Philosophical position	Positivism	Critical Realism	Constructionism	Interpretivism
Truth	Exists as an external reality independent of the researcher	There is a reality 'out there', but one that is filtered through the mind of the researcher	Truth is socially constructed through interactions between people; reality is subjective	The truth depends on the sense and meaning-making of a person or groups of people
Typical or commonly used methodology	Experimental, manipulative, hypothesis testing and deduction	Can be experimental but include qualitative	Grounded theory	Ethnography, Phenomenology
Data	Empirical, numerical	Any mixture of numerical and linguistic	In depth; 'what' and 'how' questions, although some numbers can be counted	Rich ('thick') descriptions of a person's world
Typical analysis	Quantitative; eg SPSS	Quantitative and qualitative	Thematic, coding and categorising	Thematic, narrative or discourse analysis

3.2.2.1 Positivism

According to Alharahsheh and Pius (2020:41), positivism is "a philosophical position taken by natural scientists who work with observable reality in society to make generalisations". Positivism is more dependent on the status quo, with more descriptive research findings.

3.2.2.2 Interpretivism

Social reality, according to interpretive researchers, is impossible to isolate from social circumstances instead of testing hypotheses; reality is interpreted through a sense-making process (Aspers & Corte, 2019:148). As a result, social science research needs to be differentiated from natural scientific research (Walsham, 1995:2). Interpretivism is more focused with context-specific variables and characteristics, based on the theory that human beings cannot be explored in the same way that physical phenomena can (Alharahsheh & Pius, 2020:2). Interpretivism considers the cultural, environmental and temporal variations that lead to the creation of distinct social realities. Interpretivism differs from positivism in that it aims to integrate variety into the knowledge gained, rather than providing a single, universal law (Hudson &

Ozanne, 1988:509). The case study is an interpretivist research strategy for using actual evidence from real individuals to produce an original contribution to a theory, without any biases (Ahangama & Prasanna, 2021:3).

3.3 Research approach

There are mainly three research approaches identified, namely: i) inductive; ii) deductive; and iii) abductive approach (Saunders et al., 2019:153). According to Saunders et al. (2019:153) inductive research begins with data collection to investigate a phenomenon and ends with the generation or construction of a theory (Table 3.3). Utilising an abductive technique when collecting data to investigate a phenomenon uncovers themes and patterns to build a hypothesis that can be tested with further data (Table 3.2).

Table 3.2: Deduction, induction and abduction: From reason to research (Source: Saunders et al., 2019:153)

	Deduction	Induction	Abduction
Logic	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive inference, known premises are used to generate untested conclusions	In an abductive inference, known premises are used to generate testable conclusions
Generalisability	Generalising from the general to the specific	Generalising from the specific to the general	Generalising from the interactions between the specific and the general
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory

3.3.1 Inductive approach

Kalogiannidis and Chatzitheodoridis (2021:58) state that with "an inductive approach, the researcher begins with a list of considerations that are made on the basis of several facts". According to Saunders et al. (2019:153), the inductive approach begins with data collection to investigate a phenomenon, followed by the generation or construction of theory (typically in the form of a conceptual framework). The strength of an inductive approach to research is that it allows a cause–effect link to be established between specific variables, without requiring knowledge of how humans view their social surroundings (Saunders et al., 2019:153). According to AlGhamdi (2020:54), an inductive approach must be used to acquire an in-depth understanding

of the organisation, including how aspects of both organisational culture and KT are regarded.

The inductive approach method is in line with the research questions of this study. For this reason, an inductive approach was followed.

3.3.2   Deductive approach

Kalogiannidis and Chatzitheodoridis (2021:58) suggest that in a deductive approach, the researcher begins with a specific theory, then produces numerous hypotheses based on that theory and, lastly, surveys the data to test the hypotheses. This research did not follow a deductive approach.

3.3.3   Abductive approach

Larco et al. (2020:3) state that the abductive reasoning approach "is used when the findings do not match the theory's predicted outcome, which directs the research endeavour". As a result, the abductive approach may be reasoned to develop stages of the knowledge-production process.

3.4   Research strategy

The aim of this study was to explore the role of KT in the sustainability of a POG organisation in South Africa, using a qualitative exploratory research approach. This strategy focused on gathering information from the participants about their experiences with a least defined phenomenon of knowledge transfer in POG (Alarcon, 2018:143). Abdirad and Krishnan (2020:2) suggest that a research strategy relates to the responses to the research questions and to implementing the approach into practice. The research strategy for this study was that of a case study, which followed an inductive approach. The research focused on exploring the role that KT plays within the engineering department of a POG organisation. All other departments of the organisation were excluded. The reasoning behind this strategy was to improve KT among engineering professionals in a complex environment as part of the POG's long-term sustainability. In the following sections of this chapter, the i) case study; ii) sampling; iii) data collection; and iv) data analysis are discussed.

3.4.1   Case study

A case study is an empirical investigation into a current occurrence in its real-life environment, particularly when the boundary between the phenomenon and the context are blurred (Yin, 2003:199). Halkias and Neubert (2020:49) argue that a case study is "an in-depth examination of a single case (for example, one organisation) or a small group of cases". In general, case study research seeks information from a

variety of sources and employs a variety of data formats, including observations, surveys, interviews and document analysis. When "how" and "why" questions are asked and the focus is on a current event in a real-life environment, case studies are the chosen technique. Case study research allows for a comprehensive and multifaceted examination of a problem or issue.

A POG organisation in Cape Town, South Africa was chosen for this study. This was done because the researcher worked at the organisation and became aware of the challenges the organisation faces with respect to KT.

3.4.2 Sampling

Manna and Mete (2021:42) state that sampling is "the process of selecting a specific number of observations from a larger population". Depending on the sort of analysis being performed, the methods utilised to obtain a sample from a broader population may include simple random sampling or systematic sampling. People were chosen to participate in case study research because they met specific requirements, namely having had experience of both knowledge management (KM) and KT and based on the employees' availability. The researcher considered using the engineers in a department of the organisation as a sample frame to identify cases of knowledge transfer. Provided that the sample may only depict a fraction of the target group, the researcher carefully examined whether the chosen sample frame fit the study objectives and, more importantly, whether there were techniques to overcome the sample frame limitations. In exploratory and qualitative research, non-random and convenient sampling approaches are frequently used. The goal of this form of sampling is to gain an early understanding of a tiny or under-researched community, rather than to test a theory about a large population (Khalefa & Selian, 2021:37). As a result, the sampling of this study was done on a non-random, purposively and conveniently selected basis. This study selected the national petroleum oil and gas corporation (state-owned organisation) from the petroleum oil and gas sector because of the major impact the sector has in many nations around the globe, their contribution to gross domestic product, generating employment, and providing essential services to the communities.

3.4.3 Unit of analysis

A unit of analysis is the entity or phenomenon about which the researcher intends to make a conclusion. The level at which treatment or intervention takes place determines the unit of analysis (Lund & Vestøl, 2020:2). The unit of analysis in this study relates to the phenomenon being researched. In this case the unit of analysis is KT process of the selected POG organisation.

3.4.4 The unit of observation

A unit of observation is the unit(s) from where the data originates (Morin et al., 2021:303). Twenty participants were selected for this research. The 20 participants included 7 senior managers, 8 middle managers and 5 junior employees. Demographically speaking, 95% of the participants were male and 5% were female, with an age span of 25 to 55 years, indicating that males outnumbered female participants. The selection criteria for the participants was their experience and position with respect to KM in the organisation, and because they work in the area of interest. The participants were selected on a non-random and conveniently selected basis. In Chapter 4 (Table 4.1), a detailed description of the participants is presented.

3.5 Data collection

The data for this study was acquired via one-on-one, face-to-face interviews with the 20 participants in the form of a qualitative semi-structured questionnaire, guided by an interview guide (Appendix A). This method enabled the researcher to construct a study questionnaire that could be completed by the participants as either a physical copy or in an online format. This allowed the researcher to offer the participants a set of questions, but also to give the participants an opportunity to elaborate on some subjects, giving the researcher a greater understanding of how the participants perceived KT (Grobbelaar, 2021:5). Although face-to-face interviews were conducted, the 20 participants chose to complete written replies instead of being recorded. This was done in a way where the interviewer posed the questions, and the participant then wrote down their response (Appendix B1-B12).

Permission to conduct research was requested from the POG organisation's top management. Once approval was received, participants were contacted by email to inform them of the research and requested to indicate whether they would be willing to take part in the research. Each of the 20 participants was required to complete an individual consent form (Appendix C). The participants were briefed on the ethics that would be followed throughout the course of the data collection procedure (sections 3.7.1 to 3.7.15).

Although the above-mentioned questions served as a foundation for the interviews, participants were given an opportunity to expand on their responses, allowing the researcher to acquire a more complete picture of the participants' experiences and perceptions. To enable the researcher to define the demographic group, the qualitative questionnaire required biographical information, such as age, ethnicity, gender and language, to be provided.

3.6   Data analysis

The process of collecting, modelling and analysing data in order to derive insights that aid decision-making is known as data analysis (Gökalp, Gökalp, Kayabay, Koçyiğit and Eren, 2021:538). Depending on the organisation and the goal of the analysis, there are a variety of methodologies and strategies for analysing data. All of these different data analysis approaches are centred on two main areas, namely quantitative and qualitative research methodologies (Yang, Anderson & Zhang, 2018:2339). For this study, the data analysis approach was centred on qualitative research. The purpose of the data analysis was to deconstruct the collected data into smaller pieces in order to gain useful information for the study (Baxter & Jack, 2008:545). Data from questionnaires where cleaned up and any uncertainties clarified with the specific participant. After the cleaning of the data, data were coded and keywords were identified, summarised and categorised, after which a thematic analysis performed using a Microsoft Excel spreadsheet (figures 4.2 to 4.6). The thematic analysis approach was followed because it assists in answering broad or specific research questions concerning people's experiences, perspectives and representations of a phenomenon (Clarke & Braun, 2017:298).

3.7   Delineation

Although every attempt was made to include as much variability as conceivable in the research participants, a smaller, larger, or different group of interview participants would have generated a varying dataset. The researcher, in particular, would have favoured to include more study participants, but recruiting participants from this cluster proved challenging. Ideas were reinforced through a content analysis of studies published and strategy proposals by these groups to improve the reliability of the data even further. Discussions, focus groups, scholarly journals, and guidelines were used to ensure data triangulation, which increased reliability and trustworthiness. By carefully pretesting the interview questions and manually coding and evaluating the interview transcriptions, the researcher was able to reduce interviewer and affirmation biases. Finally, initial findings were disseminated, allowing for broad informant feedback and member-checking.

Three key delineation categories for the research were identified:

3.7.1   Limiting the size

Given the enormous POG organisational footprint across South Africa, there were multiple compelling reasons to limit the size of the study to just one organisation. In order to produce recommendations that are viable for the POG organisation, it was

essential to limit the research study area at the onset. The amount of time it took to acquire and analyse the data were solely determined by the study's size.

3.7.2 Choosing a general location

A decision was made to keep the study area small, and Cape Town was chosen. This study selected the national petroleum oil and gas corporation (state-owned organisation) from the petroleum oil and gas sector because of the major impact the sector has in many nations around the globe, their contribution to gross domestic product, generating employment, and providing essential services to the communities.

3.7.3 Determining particular limits

The research focused on exploring the role KT had within the engineering department of an POG organisation. All other departments of the organisation were excluded in order to focus on improving KT among engineering professionals as part of the POG's long-term sustainability.

3.8 Ethics

Ščepanović, Labib, Buljan, Tijdink, and Marušić (2020:3) indicate that the rules of behaviour for researchers are governed by research ethics. In order to protect the dignity, rights and wellbeing of study participants, it is critical to follow ethical guidelines. As a result, all human-centred research should be assessed by an ethics committee to guarantee that the highest ethical standards are followed. An ethical review revolves around the ethical principles of beneficence, fairness and autonomy.

The principles of research ethics are as follows, according to Žukauskas, Vveinhardt, and Andriukaitienė (2018:143):

3.8.1 Honesty

Data, results, methods and processes, and publication status should all be reported honestly. Do not fabricate, falsify or misrepresent information. Fabrication (e.g., deliberately producing data to remove incomplete results), falsification (e.g., modifying research outcomes to support claims) and manipulation of the instrument or of data procedures were all avoided by the researcher.

3.8.2 Objectivity

Experimentation, data analysis, data interpretation, peer review, personnel decisions, grant writing, expert testimony and other aspects of research should all be free of prejudice. In this study, the researcher's pre-existing beliefs or perceptions had no bearing on the study's outcome.

3.8.3 Integrity

Experiments, data analysis, data interpretation, peer review, personnel decisions, grant writing, expert testimony and other aspects of research should all be free of bias. In this study, the researcher practiced research integrity with objectivity when reviewing the data and when following the outcomes, rather than allowing predetermined preconceptions to influence interpretation.

3.8.4 Carefulness

Researchers must avoid careless errors and negligence; carefully and critically examining their own work and the work of their peers. Researchers should keep good records of research activities. To avoid blunders and faults, the researcher did the research in a meticulous manner.

3.8.5 Openness

Data, outcomes, ideas, tools and resources should all be shared. Researchers must be receptive to fresh ideas and criticism. In this study, the researcher made a commitment to the participants that their information would not be shared.

3.8.6 Respect for intellectual property

Patents, copyrights and other types of intellectual property should be respected. No unpublished data, techniques or results were used by the researcher without permission. The researcher provided references for research used.

3.8.7 Confidentiality

Researchers must protect sensitive information, such as papers or grants that have been submitted for publication, personnel records, commercial or military secrets and patient records. In this study, aspects of the research investigation were shielded by the researcher (e.g., research plan, papers, personal records and proprietary information).

3.8.8 Responsible publication

Researchers must protect sensitive information, such as papers or grants that have been submitted for publication, personnel records, commercial or military secrets and patient records. In this study, written questionnaires sent via email were saved to a password protected folder.

3.8.9 Respect for colleagues

The researcher has not discriminated against colleagues or students on the basis of their gender, race, ethnicity, religion or other factors, such as educational attainment.

3.8.10 Social responsibility

Through study, public education and advocacy, researchers should strive to promote social good and prevent or reduce social evils. The researcher bears a responsibility, not only towards the participants in the study, but also for those who may be harmed by the study's findings.

3.8.11 Non-discrimination

Discrimination against colleagues or students based on sex, colour, ethnicity or other criteria unrelated to their scientific ability and integrity should be avoided by researchers. In this study, the researcher worked in a way that respected and celebrated the ideas, rights and behaviours of persons from minority groups.

3.8.12 Competence

Researchers must maintain and increase their own professional competence and expertise through lifelong learning and education and take initiatives to promote science-wide competency. The researcher showed the aptitude to possess the information, skills and behaviours required to complete the study.

Several ethical principles were explored for this investigation. For data gathering purposes, top management (Appendix C) as well as each participant gave their consent to participate in the study. Despite the fact that the POG and participants gave their consent, no data gathered was or will be disseminated without the organisation's permission and anonymity is guaranteed to all participants by using alias when referring to the participants. The final version of the questionnaire along with the consent form were reviewed and approved by the institutional review board at the author's institution. The cover page of the questionnaire included the consent form, indicating the purpose of this study, the expected time to complete the questionnaire, the provisions for maintaining confidentiality, no threat of mental or physical harm to participants, no direct benefits from participating in this survey, and respondents' willingness to voluntarily participate in this survey. In all communications with the POG and in the representation of data obtained, the researcher was truthful. In the data analysis and in all other aspects of this study where this is essential, the researcher was unbiased. In order to avoid errors and neglect in the research, the researcher was cautious. The researcher continued to be truthful during the data collection procedures by constantly focusing on truthfulness. If the organisation requested it, the researcher shared all results with them and ensured the transparency of the study. The researcher maintained honour and was mindful of the implications of intellectual property, giving acknowledgment to anybody who contributed to this study and by not using any data without permission. Both the organisation and the

participants gave their consent voluntarily (Appendix C). The information gathered was not and will not be used to harm the organisation's reputation. To ensure the security of the material, the name of the organisation was and will be kept confidential throughout the research and beyond. All the participants in the research process were respected by the researcher and everyone who participated had the option of participating or not, as they chose.

3.8 Conclusion

This Chapter described how the research was carried out, including the method used to select participants, the method used to collect data, and the approach used to analyse the data. The goal of this study was to understand how participants constructed their reality, demonstrating one way wherein the concepts under inquiry are constructed by a group of engineers in the same context. The following Chapter describes the research findings as well as the analysis process.

3.9 Summary

Methodology is concerned with how research is carried out, how phenomena are discovered and how knowledge is acquired, as well as dealing with the many methods of data collection. The research methodology used throughout the research process was covered in Chapter 3. This included the research philosophy, research approach, research strategy, data gathering tools and data analysis.

The chapter began with a discussion on research philosophy, then moved on to dealing with ontology and epistemology. A subjective ontological position was used in this study since all the participants had their own perspective on the phenomenon under inquiry. An interpretivist epistemology was used because there were various ways to look at the phenomenon under examination.

An inductive strategy was used in this study, with the researcher observing the phenomenon under examination in order to build towards a theory. An exploratory case study was utilised for this study since it could be used to answer "how" and "why" research questions.

A non-random, purposive sample was used for the case study. The sample consisted of 20 engineers from the engineering department of the POG organisation, and the participants were chosen based on their availability and their willingness to participate in the study. The transfer of knowledge in the POG organisation was designated as the unit of analysis. The data analysis approach was centred on qualitative research, which included interviews with the 20 participants in the form of a semi-structured

questionnaire, guided by an interview guide. The data analysis consisted of coding, summarising, recoding and categorising the data, followed by a thematic analysis. The chapter ended with a detailed description of the ethics of the research.

Chapter 4 addresses the data analysis and findings of the study.

CHAPTER 4: ANALYSIS AND FINDINGS
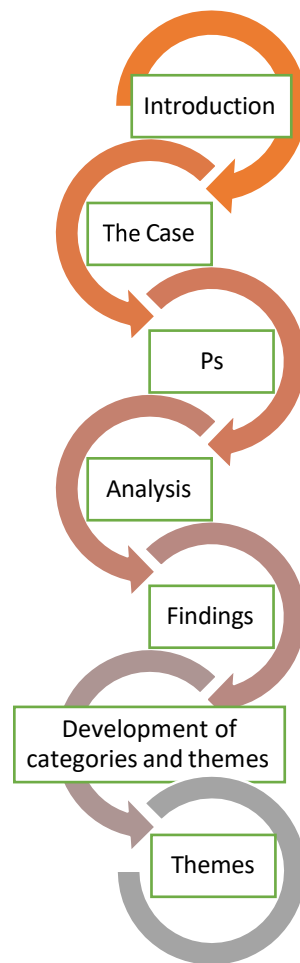
Figure 4.1: Layout of Chapter 4

4.1   Introduction

In this chapter, the researcher presents the analysis and results of the analysis of the qualitative data collected for research and used in the study. The study focused on an organisation in the petroleum, oil and gas (POG) sector. In Chapter 4, the researcher expands on the interviews conducted during the research process and the findings are formulated based on the analysis of the responses received from the 20 participants. For the reader's convenience the problem statement, research questions and the aim of the study are again listed.

Problem statement: It is unclear how the lack of knowledge transfer (KT) affects the sustainability in organisations in South Africa.

The research questions:

RQ1: What are the factors affecting KT in a selected petroleum organisation in South Africa?

RQ2: How can KT be sustainable in a selected petroleum organisation?

Aim of the study: The aim of the study was to explore the role of KT in the sustainability of a POG organisation in South Africa.

The chapter is presented as follows: i) introduction; ii) the case; iii) participants; iv) analysis; v) findings; vi) categories and themes development; vii) themes; and viii) a summary.

4.2 The case

The research was based on a case study and focused on how KT can be sustainable in an organisation. The business chosen for this study was a POG organisation that operates in Cape Town, South Africa. The POG is a state-owned company that was formed in January 2002 and registered as a commercial entity under South African law. The POG is a subsidiary of the Central Energy Fund (CEF), which is wholly owned by the state and reports to the Department of Energy. The company holds a portfolio of assets that spans the petroleum value chain, with all operations in accordance with world-class safety and environmental standards.

The POG continues to play an instrumental role in the country´s transformation by implementing a range of activities that span the petroleum chain. The petroleum chain starts with the exploration and production of oil and natural gas, selling petrochemical products to South Africa´s major oil companies and exporting petrochemical products to the international market.

The POG build the world's first gas-to-liquid (GTL) refinery at Mossel Bay. It remains the third largest GTL refinery of the five such refineries now operating worldwide. Specialist teams produce some of the cleanest fuels on the market, using some of the most environmentally friendly processes ever developed.

4.3 The participants

Twenty participants were interviewed. The job title, years of experience and job descriptions of the participants is presented in Table 4.1.

Table 4.1: Job title, years of experience and job descriptions of participants

Code	Job title	Years of experience	Work specifications
P1	Junior Project Engineer	5 years	Utilise engineering knowledge for project management; estimate timelines and schedules; anticipate risks and costs related to the technical aspects of the project. Coordinate and communicate between various areas; supervise and train project staff as needed. Plan and organise technical projects from conception to completion.
P2	Reservoir Engineer	11 years	Business Development: Independent Reservoir Characterization Studies, Reservoir Performance, Field developments studies, IOR, etc. Provide inputs to Commercial evaluation necessary. Maintain an up-to-date knowledge of petroleum/reservoir engineering and petroleum property evaluation.
P3	Production Engineer	9 years	Assist in process hazard analysis and drive resulting action items to completion. Perform training to operators on new processes. Modify and update all Safety Information and procedures. Identify opportunities for process improvement.
P4	Petroleum Engineer	9 years	Devise methods to improve oil and gas well production and determine the need for new or modified tool designs. Oversee drilling and offer technical advice to achieve economical and satisfactory progress.
P5	Infrastructure Project Technologist	6 years	Provide construction observation and technical support services from design to construction of projects. Interpret construction plans to better communicate with management and respond to client inquiries. Coordinate with the project manager, clients, and contractors. Assist in drafting designs, plans, specifications, and estimates.
P6	Project Controls Manager	18 years	Area of expertise, Oil and Gas Management of Cost, Estimating and Scheduling for both on and offshore engineering projects including Drilling, Sub- Sea infrastructure and Topsides construction activities. Co-ordination of Project Controls function and deliverables during Project Life cycle development from FEL 1 through to Final Handover and Close Out.
P7	Engineer	4 years	Monitoring production condition and making improvements, track engineering changes.
P8	Cost Engineer	4 years	Project Controls using Primavera and SAP systems, Managing Project Budgets, Project Change Management, Contract management, Investment management, Managerial accounting, Marketing, Meeting facilitation, Procurement, Reports, Sales.
P9	Drilling Engineer	7 years	Develop strategies to achieve well construction and data gathering objectives. Document results, problems and causes and improvement suggestions throughout the implementation. Support field supervisors throughout the implementation and assist on-site as needed. Develop cost estimates and risks versus rewards analysis.
P10	Graduate In Training Chemical Engineering	2 years	Assisting a production team, ensuring quality product at the best price. experience with benchmarking and ensure compliance with statutory regulations, quality, environmental and other applicable laws, and regulations.
P11	Production Area Manager	10 years	Coordinate the activities of the various production functions to ensure the operation run efficiently and effectively. Organise resource allocation to ensure petroleum best practise is implemented on time and on standard. Measure and monitor productivity and quality and propose solutions to facilitate continuous improvement
P12	Production Process Engineer	7 years	Monthly production accounting for producing gas fields, data collection and analysis. Identification of technical improvements to be made to allocation process. Identification and execution of well impairment and well intervention opportunities. Commissioning and implementation of automated allocation system
P13	Production Engineer	4 years	Monthly production accounting for producing gas fields, data collection and analysis. Identification of technical improvements to be made to allocation process. Identification and execution of well impairment and well intervention opportunities. Commissioning and implementation of automated allocation system
P14	Process Engineer	6 years	Assist in process hazard analysis and drive resulting action items to completion. Perform training to operators on new processes. Modify and update all Safety Information and procedures. Identify opportunities for process improvement.

Code	Job title	Years of experience	Work specifications
P15	Production Engineer	7 years	Monthly production accounting for producing gas fields, data collection and analysis. Identification of technical improvements to be made to allocation process. Identification and execution of well impairment and well intervention opportunities. Commissioning and implementation of automated allocation system
P16	Process Engineer	10 years	Assist in process hazard analysis and drive resulting action items to completion. Perform training to operators on new processes. Modify and update all Safety Information and procedures. Identify opportunities for process improvement.
P17	Production Engineer	12 years	Monthly production accounting for producing gas fields, data collection and analysis. Identification of technical improvements to be made to allocation process. Identification and execution of well impairment and well intervention opportunities. Commissioning and implementation of automated allocation system
P18	Process Engineer	8 years	Assist in process hazard analysis and drive resulting action items to completion. Perform training to operators on new processes. Modify and update all Safety Information and procedures. Identify opportunities for process improvement.
P19	Production Engineer	15 years	Monthly production accounting for producing gas fields, data collection and analysis. Identification of technical improvements to be made to allocation process. Identification and execution of well impairment and well intervention opportunities. Commissioning and implementation of automated allocation system
P20	Process Engineer	11 years	Analyse how process changes will affect overall production and the product. Perform troubleshooting on plant equipment and systems. Lead project planning and project management of small capital upgrades to the plant. Implement process improvements to reduce cost and increase efficiency.

The participants comprised of 20 employees working in exploration and production within the upstream sector of the oil and gas field.

Table 4.2: Job titles of participants

Code	No of employees	Job title
P1	1	Junior Project Engineer
P2	1	Reservoir Engineer
P3, P13, P15, P17 & P19	5	Production Engineer
P4	1	Petroleum Engineer
P5	1	Infrastructure Project Technologist
P6	1	Project Controls Manager
P7	1	Engineer
P8	1	Cost Engineer
P9	1	Drilling Engineer
P10	1	Graduate In Training Chemical Engineering
P11	1	Production Area Manager
P12	1	Production Process Engineer
P14, P16, P18 & P20	4	Process Engineer

*P = participant

The years of experience in the industry ranged from 5 to 15 years, with an average of 8 years and 4 months.

To protect the identity of the interviewers, the findings are represented anonymously and not in the order listed in Table 4.1. All the participants gave written consent to participate in the interviews that were conducted in this study.

4.4 Analysis

In this section the responses of the participants to the questionnaires are presented. Table 4.3 presents an extract of the responses received from the participants (Appendix D).

Table 4.3: Extract of collated written questionnaires

RQ *	SRQ	IQ	P1	P2
1. What are the factors affecting knowledge transfer in a selected petroleum organisation in South Africa?	1.1 What are the challenges faced when transferring knowledge by a selected petroleum organisation?	1.1.1 Are there skill gaps in the petroleum organisation?	There are few players locally within the petroleum industry, which makes the skills rare.	Very limited resources, few drilling activities, ony one company has got offshore assets in SA.
		1.1.2 How is knowledge transferred from experienced too inexperienced employees?	Experts are not good at sharing information, so in addition to the above, learning method becomes on the job with limited formal / direct education.	Because head office does not have training programs like Mosselbay plant, it is more challenging at the head office.
		1.1.3 Is there a willingness and motivation to share or transfer knowledge, in the organisation?	Experts are not good at sharing information	… does not have training programs like Mosselbay plant, it is more challenging at the head office.

*The red fonts show the key concept from the response of the participants for the specific question. RQ = research question, RSQ = research sub-question, IQ = interview question

After thoroughly reading the written questionnaire responses, codes were identified (Table 4.4; Appendix D). This was an iterative process undertaken to ensure that all possible codes were identified.

Table 4.4: Extract of written questionnaire responses, with codes and concepts

Participant	RQ *	SRQ	IQ	Initial Codes A	Revised Codes	Category	Sub-Themes	Themes
P1	1	1.1	1.1.1	**few players locally, skills rare**	Skills shortage	scarce resources	Training needs analysis & Work skills planning	Human Resources
P10	1	1.1	1.1.1	**graduate learn only basics**	Limited resources - human resources	inexperienced /untrained Staff	Training needs analysis & Work skills planning	Education
P11	1	1.1	1.1.1	**knowledge is experience based** built up over years	Knowledge based experience	professionals	Historical /Legacy challenges	Knowledge management

*The red fonts show the key concept from the response of the participants for the specific question. *RQ = research question, RSQ = research sub-question, IQ = interview question

Following this, the codes were summarised into key concepts (Table 4.5). This was done by identifying and combining synonyms, similar meaning words and concepts. Table 4.5 shows how codes and concepts were identified and linked. The key concepts are highlighted in red.

Table 4.5: Extract of codes and concepts identified and linked

RQ *	SRQ	IQ	P1	Codes
1. What are the factors affecting knowledge transfer in a selected petroleum organisation in South Africa?	1.1 What are the challenges faced when transferring knowledge by a selected petroleum organisation?	1.1.1 Are there skill gaps in the petroleum organisation?	There are **few players locally** within the petroleum industry, which makes the **skills rare**.	Few players locally; Makes the skills rare
		1.1.2 How is knowledge transferred from experienced too inexperienced employees?	**Experts are not good at sharing information,** so in addition to the above, learning method becomes on the job with **limited formal / direct education**.	Experts are not good at sharing; Learning method becomes on the job; Limited formal / direct education
		1.1.3 Is there a willingness and motivation to share or transfer knowledge, in the organisation?	**Experts are not good at sharing** information	Experts; not good at sharing information

*The red fonts show the key concept from the response of the Ps for the specific question. RQ = research question, RSQ = research sub-question, IQ = interview question

Table 4.6 shows the initial codes that were developed from the written questionnaire responses (Appendix D).

Table 4.6: Extract of Initial codes developed from the written questionnaire linked to the RQs, RSQs and IQs

Participant	RQ	SRQ	IQ	Initial Codes A
P1	1	1.1	1.1.1	**few players locally, skills rare**
P10	1	1.1	1.1.1	**graduate learn only basics**
P11	1	1.1	1.1.1	**knowledge is experience based** built up over years

*RQ = research question, RSQ = research sub-question, IQ = interview question

Table 4.7 below shows an example of the second round of code development, where similar initial codes were combined before categorisation of the revised codes.

Table 4.7: Extract of second round of code development, from initial codes to revised codes

Participant	RQ	SRQ	IQ	Initial Codes A	Revised Codes
P1	1	1.1	1.1.1	**few players locally, skills rare**	Skills shortage
P10	1	1.1	1.1.1	**graduate learn only basics**	Limited resources - human resources
P11	1	1.1	1.1.1	**knowledge is experience based** built up over years	Knowledge based experience

*RQ = research question, RSQ = research sub-question, IQ = interview question

Twenty=seven categories were developed from the re-coded key concepts (Table 4.8; Appendix E).

From the categories developed, 7 themes were developed by combining categories with the same or similar meanings (Table 4.9; Appendix E). The themes are:

i) Education

ii) Human resources

iii) Financial management

iv) Information technology

v) Knowledge management

vi) Management

vii) Risk management

Table 4.8: Categories (27) developed

Categories	
Business strategy	Management
Challenges	Operations / Finance
Collaboration	Perception
Culture	Professionals
Education	Quality
Factors influencing KT	Risk management
Financial Management	Risks
Human Resources	Scarce resources
Implementation	Strategic management
Inexperienced / untrained Staff	Succession planning
Information technology / Information systems	Systems
Knowledge management	Talent management
Knowledge transfer	Training
Knowledge transfer process / procedure	

Table 4.9: Themes developed from the data collected

Themes
Education
Financial Management
Human Resources
Information technology
Knowledge management
Management
Risk management

In the next section, the responses to the interview questions are presented. Examples of interviews are given and each interview question is summarised in one or more findings. The findings are then summarised, categorised and, once again, themes are developed.

4.5 Findings

4.5.1 Introduction

This section elaborates on the findings derived from the interviews conducted during the study. In this chapter, the information from the interviews is explained according to the RQs, RSQs and the specific IQ linked to the RSQ. The format holds for all RQs, RSQs and IQs.

The section is structured as follows: i) findings; ii) categories; iii) theme development; and v) summary.

4.5.2 Research question 1

RQ1: What are the factors affecting KT in a selected petroleum organisation in South Africa?

4.5.2.1 Research sub-question 1.1

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skills gaps in the petroleum organisation?

The justification for asking this question was to establish whether there were skills gaps and to identify the skills required to meet the organisational goals. Two participants (P1 & P2) used the term "*rare* or *limited skills"*, including "resources and few drilling activities". According to P1, "learning method becomes on the job with limited formal / direct education. There are few players locally within the petroleum industry, which makes the skills rare" (Appendix B1). Two participants (P8 & P10) referred to learning basics. P10 stated that "normally as a graduate you learn only the basics and that affects very bad when you they are not renewing the contract and makes it difficult to get another job to other organisation" (Appendix B10).

Participants P9, P11 and P12 referred to the possession of "knowledge as power" and, as a consequence, they did not want to share their knowledge, which contributed to the skills gap in organisation. P11 indicated that "some of this knowledge is experience based that is built up over years and this is not always transferable within a short space of time as is often required" (Appendix B11).

As far as the sharing of knowledge goes, P12 indicated that it is "more valuable if you are the only person with that specific knowledge" (Appendix B12).

Finding 1: There are limited human and mineral resources within the organisation.

Finding 2: Graduates are exposed to limited knowledge.

Finding 3: There are no formal skills training or development opportunities for graduate engineers.

Finding 4: There is a reluctance to share knowledge and skills freely.

Finding 5: There is a lack of a skills transfer strategy in the organisation.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

The rationale for this question was to determine how an inexperienced individual, group or department could learn from the tacit knowledge of other more experienced employees. The assumption is that some knowledge was transferred.

Seven participants (P2, P3, P6, P9, P10, P11 & P12) indicated that there were challenges with KT, which included understaffing and the complexity of information to be shared. Two participants (P5 & P7) indicated that there was "no central facility in which to store the accumulated knowledge". Two participants (P1 & P2) mentioned the absence of training programmes. Two participants (P1 & P6) stated that there was an unwillingness to share information or experiences. P6 indicated that "There is reluctance by the senior employees who occupy strategic roles within the organisation to share experience either through lessons learnt or information transfer" (Appendix B6). P11 stated that "the complexity and sheer volume of detail that needs to be transferred is always a challenge" (Appendix B11). According to P12, "Understaffing … results in employees not having time to transfer knowledge and rather do it themselves. No present, formalised structure to do so" (Appendix B12). In addition, P1 said that "Experts are not good at sharing information … learning method becomes on the job with limited formal/direct education. The majority of the training and academic qualifications in the petroleum industry are offered abroad/overseas" (Appendix B1).

Finding 6:   There is a lack of mentorship by experienced employees to transfer their tacit knowledge to inexperienced employees.

Finding 7:   There is a deficiency of guided experiences or hands-on guidance for certain job functions and activities.

Finding 8:   There is a lack of work shadowing for inexperienced employees that affords them an opportunity to acquire knowledge from experienced employees.

Finding 9:   There is a demand for paired work, by putting the experienced employee with an inexperienced employee, in order to create opportunities for learning a new function or activity.

Finding 10: There is a fundamental requirement for knowledge fairs to showcase topics and functions, facilitating KT from experienced employees to inexperienced employees.

Finding 11: There is a lack of storytelling by experienced employees to inexperienced employees to efficiently impart knowledge and to show a point.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

The reason for posing this question was to find out whether the organisation motivates KT amongst its employees. Sharing knowledge and inspiration is crucial because it helps others develop their perspectives and strengthen professional ties. Sharing one's knowledge with others helps to enlarge and solidify one's own understanding. According to P1, "Experts are not good at sharing information" (Appendix B1). P3 indicated that "The secrecy or confidentiality of information in this industry. Most of the information you deal with in this industry is highly confidential so it is a challenge to give out details in order to get views from your peers in the industry" (Appendix B3).

P9 added,

> Confidentiality of information also contributes as a factor. If knowledge is shared in this regard exposes the organisation wealth of data and leaves it vulnerable to its competitors. I think trust is another contributing factor since it allows no faith in it, as it fears the risk of losing its value (Appendix B9).

P9 provided reasons why there was an unwillingness to share knowledge. P6 stated that "there is still a racial gap, perceived or otherwise which contributes to knowledge not being shared both up and down the company structures" (Appendix B6).

Finding 12: There are few activities offered by the organisation geared to improving relationships between peers and building networks based on knowledge transfer.

Finding 13: There is a lack of formal opportunities (seminars or conferences) to share knowledge.

Finding 14: The lack of trust creates reluctance to share information

Finding 15: There is a lack of cohesion amongst employees, which does not motivate KS or collaboration

Finding 16: There is no space in which KT can happen.

4.5.2.2 Research sub-question 1.2

RSQ 1.2: What is the organisation doing to leverage the knowledge transfer, to their advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

This question was posed in order to determine whether the organisation has methods to transfer knowledge and how the knowledge is managed. Individuals should be able to promote innovation and the necessary cultural changes for the organisation to evolve and meet the changing business needs. Knowledge employees should be able to act more swiftly with faster access to information and resources across the organisation.

Three participants (P3, P9 & P11) indicated that KT was happening in the organisation and that knowledge is transferred via communities of practise. According to P3, "there are peer review sessions or consultants that facilitate the sharing of information amongst the industry peers & organisations" (Appendix B3). P9 substantiated that "The selected organisation is starting to align themselves with South African Petroleum Policies in all regards and are utilising this by means of establishing mentorship program through Skills Development Matrixes by empowering its workforce to meet the international petroleum standards" (Appendix B9). P11 stated that, "Furthermore there are various experts that within the organisation build communities of practise in certain areas of specialities" (Appendix B11). There was no mention of how the knowledge from the experts is documented or distributed throughout the organisation.

P4, P5 and P6 indicated that there was no KT happening in the organisation. P4 stated that "Nothing is being done". P5 corroborated P4's assertion by saying that "I have not noticed any undertaking by business to transfer skills". P6 added, "It is not doing this. Specialist remains specialist until they leave the organisation without transferring knowledge to incoming employees. Consultants are used to complete specialist activities and these consultants then leave with all the organisational information" (Appendix B6).

P8 and P10 indicated that, because of macroeconomic factors, the organisation's focus had shifted from KT to organisational survival. P8 stated that, "At the moment, due to the low oil price environment, business is limited i.t.o. spending time and money on knowledge transfer" (Appendix B8). P10 added:

> The organisation used to provide graduate programme almost every year for a period of 2 years, due to financial problems that the organisation is facing at the moment they provide Graduate programme to students that they were sponsoring during their studies and the programme is for a period of 1 year (Appendix B10).

P11 stated that "there are numerous software knowledge-based systems that are built to facilitate the storage of documents and decision registers and fault trees with regards to knowledge transfer" (Appendix B11). It was not evident that the software being used by the organisation was done so effectively.

Finding 17: There are peer review and consultation sessions, however, mapping the existent or new knowledge gained is excluded.

Finding 18: There is a lack of cross-training to mitigate the knowledge risk.

Finding 19: There is a lack of efficiency when using software knowledge-based systems to store knowledge.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from knowledge transfer?

The rational for asking the question was to identify the differentiation and influence the organisation has gained from KT. Organisations can use knowledge management (KM) to get the correct information to the right people at the right time. Employing the correct strategy ensures that organisational goals are met as technology advances, keeping businesses at the cutting edge of industry trends and always keeping them one step ahead of the competition.

Four participants (P2, P4, P5 & P6) indicated that no KT was happening in the organisation and, therefore, the organisation was not leveraging any competitive advantage. P2 stated that "Currently I don't see anything in place to leverage knowledge transfer" (Appendix B2). P4 stated that "Nothing is being done" (Appendix B4). P5 corroborated P4's statement by saying that "I have not noticed any undertaking by business to change" (Appendix B5). P6 mentioned that "succession planning which should include upskilling and transfer of skills and knowledge is not enforced" (Appendix B6). The organisation does not clearly differentiate how KT is done.

Three participants (P3, P9 & P11) suggested different means by which the competitive advantage, to strengthen the organisation is gained. According to P3:

> There are peer review sessions or consultants that facilitate the sharing of information amongst the industry peers and organisations. This assist organisations to benchmark and compare notes on how they go about businesses or organisation must develop clear or practical talent management plans in order to assist with KT amongst its personnel (Appendix B3).

It is not clear whether management analyses competitor benchmark reports as comparative analytical tools used to compare internal business performance to that of other organisations. P9 added that "they have also taken advantage of the international contractors by enforcing them to empower local talent within the selected organisation" (Appendix B9). P9 indicated that management had employed international contractors to upskill the staff within the organisation, directing the organisation to achieve its strategic goals. The empowerment of employees allows the organisation to create a culture that aids in the development and maintenance of a distinct competitive advantage. P11 motivated that "there are various experts that within the organisation build communities of practise in certain areas of specialities" (Appendix B11). It is unclear whether these communities of practise document the meetings or distribute the findings throughout the organisation.

Finding 20: There is a lack of competitor analysis undertaken to differentiate the organisation from its competitors.

4.5.2.3   Research sub-question 1.3
RSQ 1.3:   What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate knowledge transfer, to develop employees?

This question was asked in order to understand whether the organisation enables the development of employees. Knowledge is constantly evolving; the generation and application of knowledge, as well as KS, are all reliant on interpersonal social connections. Employee perceptions of an organisation's information sharing culture are critical because they influence their KS behaviour.

Three participants (P6, P11 & P12) were of the opinion that the organisation does not facilitate or motivate KT. According to P6, "It is not a given that the organisation will facilitate it's transfer" (Appendix B6). P11 stated that, "Given the challenges, it is not executed very well" (Appendix B11). P12 added that "KT is not pushed from management as a key objective" (Appendix B12). Three participants (P2, P5 & P9) were of the opinion that the organisation does facilitate KT to develop employees. According to P2, "I believe there is more in Mossel Bay compared to head office. Company scale wise, 60% off the staff have KT in place" (Appendix B2). P5 corroborated P2's assertion that "The company does focus on developing employee's" (Appendix B5). P9 added that "there is a lot of engagement in terms of knowledge sharing amongst individuals from various department, especially when

trying to understand the complete over view of the organisation's operations" (Appendix B9).

It is clear that the KT process is not communicated to all employees. Some employees' perceptions were that there is no KT happening in the organisation, however, others were aware of KT initiatives. There is a lack of consistency regarding the facilitation of KT.

Three participants (P1, P3 & P7) indicated that there were other factors influencing the organisation's ability to develop employees. P1 argued that "the cost of formal training programmes and software impact on the effectiveness …" (Appendix B1). P3 also indicated that "experienced individuals fear … that they might lose their jobs or be made redundant … lose their market competitiveness in the industry" (Appendix B3). P7 mentioned that "experienced individuals fear … that they might lose their jobs or be made redundant … lose their market competitiveness in the industry" (Appendix B7). There was a perceived view among the participants that KT leads to job loss or redundancy.

Finding 21: Indications are that employees are extremely perceptive of the importance of internal competition in the organisation.

Finding 22: There is a perception amongst employees that management does not support knowledge transfer.

Finding 23: There is a perception amongst employees that they could potentially reduce the power that they have over others as a result of knowledge transfer.

IQ 1.3.2: Does it benefit the employee to participate in knowledge transfer?

The question was posed to establish whether there are benefits or incentives provided to those employees who are involved in knowledge transfer. Employees gain access to valuable information and produce greater results when knowledge is managed appropriately. The organisation encourages innovation and, as a result, makes it much easier to achieve growth.

Three participants (P2, P3 & P5) mentioned that no benefits were derived from participating in knowledge transfer. According to P2, "Some find it to have additional responsibilities without necessarily getting compensation" (Appendix B2). P3 indicated that "KT might hinder or they might lose their market competitiveness"

(Appendix B3). P5 stated that "There is no motivation for employee's to acquire more knowledge in skills" (Appendix B5). Participants P6, P8 and P9 argued that the benefits derived from KT are associated with a personal development plan. P6 added that, "If one has to gain knowledge one has to go out and find it" (Appendix B6). P8 suggested that "KT in the petroleum engineering industry can easily be done by online courses and self-reading" (Appendix B8). P9 added that "there is a lot of engagement in terms of knowledge sharing amongst individuals from various department…" (Appendix B9). P12 indicated that culture affects KT negatively. P12 stated that "Not good at knowledge transfer. The culture is not in place in the organisation to share knowledge" (Appendix B12).

Finding 24: There are no incentives that encourage employees to become involved in KT initiatives.

Finding 25: Knowledge losses as a result of workforce mobility, which include technical expertise and organisational memory.

Finding 26: The POG organisation does not foster opportunities to reuse competencies or technology.

Finding 27: There is no culture of KS between employees in the organisation.

4.5.3   Research question 2
RQ2: How can KT be sustainable in a selected petroleum organisation?

4.5.3.1   Research sub-question 2.1
RSQ 2.1: How does the selected petroleum organisation manage knowledge transfer?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

The purpose of this question was to find out whether the organisation advanced its economic sustainability through knowledge transfer amongst its employees.

Based on the responses from three participants (P3, P5 & P6), it does not seem as though KT is being managed in the organisation. P3 indicated that "There is a lack of clear plans practical ways in this organisation when it comes to knowledge transfer" (Appendix B3). P5 suggested that "It must be well documented with programs in place. There must be a clear growth path" (Appendix B5). P6 added that "Mentoring programs that have a genuine and honest approach to sharing knowledge skills and experiences should be implemented" (Appendix B6). Economic growth plans are

knowledge-driven, allowing the decision-makers to harvest, store, produce and exploit both current and new knowledge sources.

Some participants (P1, P9, P10, P11 & P12) provided suggestions about how the economic sustainability could be achieved. P9 stated:

> I think it would be to motivate an awareness amongst the work force of the significance knowledge sharing has towards organisation success. Also is for the organisation to clearly state the results that thus would achieve in not only empowering the work force but also create a good and strong organisational culture. I am aware organisation provide the space for KT to take place and pay for its workforce to be part of professional bodies. So this in turn allows individuals within the organisation to invite guess speakers to talk on certain subjects that can benefit organisation work force, they mandated by these professional bodies (Appendix B9).

P10 said that, "by selecting employees that will be responsible for KT to graduates with all the materials that are being used in the organisation" (Appendix B10). P11 added that "more time needs to be given to allow entrants into positions to understand the business and allow for meaningful transfer of knowledge, in order to derive the maximum benefit of transferred knowledge" (Appendix B11). P12 suggested that "formalised training programs for graduates with presentations and tests. Formalised training modules with a competency assessment after completion of module (engineering)" (Appendix B12). In order to attain economic sustainability, it is essential harness existing underutilised resources to be more efficient in the use of available resources.

Finding 28: There is a lack of funding for business development.

Finding 29: Employee career paths within the organisation are not developed.

Finding 30: There is no platform from which to engage with employees about the strategies related to organisational success.

Finding 31: There is no alignment of organisational learning and development with business performance.

Finding 32: There are no competency-based training programmes available to assess graduates after completion of modules.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

This question was posed in order to determine whether KT increased sustainable development within their organisation.

Four participants (P2, P9, P10 & P12) stated that social sustainability (human development) was taking place in the organisation via online training. The participants continued to indicate that libraries had been established and performance reviews had been implemented to enable the monitoring of key performance areas. According to P2, "In the absence of training programs. The company is using a software programs that are more like online training" (Appendix B2). P9 said that "The organisation provides the knowledge sharing through establishment of libraries within the organisation and record keeping for future reference" (Appendix B9). P10 indicated that "Every three months they review the performance on the tasks given within the organisation" (Appendix B10). P12 added that "some managers add KT to employee performance contracts" (Appendix B12).

Five participants (P3, P4, P5, P6 & P11) suggested that no human development was being implemented in the organisation. The participants motivated that there were no talent management or development plans in place in the organisation. The participants also alluded to a lack of succession planning, including shadowing and mentoring, within the organisation. P3 stated that "No talent management plans in place and no succession plans in place" (Appendix B3). P4 suggested that "development plans that are monitored that they are achieved" (Appendix B4). P5 added that "Managers must be scored in their KPI against skill transfer" (Appendix B5). P6 stated that "Generation barriers are real and these should be addressed before knowledge can flow freely. Structured progression planning that incorporates shadowing, mentoring and fostering of incoming employees should be adopted" (Appendix B6). P11 substantiated this position by saying that "more time needs to be given to allow entrants into positions to understand the business and allow for meaningful transfer of knowledge" (Appendix B11). It is clear that the human development within the organisation is not communicated throughout the organisation.

Finding 33: There is a lack of uniform key performance contracts that include knowledge transfer.

Finding 34: There is a lack of consistent record management and the preserving of knowledge.

4.5.3.2 Research sub-question 2.2

RSQ 2.2: How does the organisation plan succession with regards to knowledge transfer?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

The justification for asking this question was to establish whether there is succession planning to meet organisational goals.

Seven participants (P2, P3, P4, P5, P6 P7 & P8) indicated that there is no succession planning in the organisation. According to P2, "honestly most of the succession plans are unknown and not clear to the staff as to what is the plan. Especially at the head office. Plant operation is different because everyone is working on a more practical environment than theoretical applications" (Appendix B2). P3 responded "N/A" (Appendix B3), while P4 said, "None in place" (Appendix B4). P5 said, "None at all" (Appendix B5); P6 mentioned that "There is none unfortunately!" (Appendix B6); P7 mentioned that "no succession planning in place to transfer knowledge"; while P8 concurred with P7 and added that there is "Currently no plan" (Appendix B8).

Contrary to the above statements, three participants (P9, P10 & P12) indicated that there is succession planning and the development of graduates in the organisation.

P9 argued that:

> I think the organisation has provided all the tools and space necessary for this significant activity to take place but this would be incomplete it is not encourage and motivated amongst individual for implementation and better utilisation of it. Education around this is of crucial importance for it to succeed (Appendix B9).

P10 said that "the organisation provides graduate programmes for a period of 1 year, then they extend the contract if there is a need to keep you in the organisation" (Appendix B10). P11 added, "however, for new entrants down below closer to the floor where the impact is greater there is not much room for succession planning" (Appendix B11). P12 indicated that "normally, a graduate is expected to be 'competent' within a 2-year period. There used to be a minimum graduate hire per year, but not anymore due to a no-new-hire policy. Vacancies are usually filled" (Appendix B12). There is no clear message about succession planning from the organisation. Succession planning is a method of transferring leadership duties, such as organisational ownership, to an individual or a group of employees. Succession

planning helps an organisation to keep running efficiently after key employees leave for new opportunities, retire or pass away.

Finding 35: There is a lack of succession planning in the organisation.

Finding 36: There is a decrease in employment associated with the downturn in economic growth.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

The purpose of this question was to determine whether a promoted or exiting employee follows a KT process before leaving their current position.

Participants P3, P4, P5, P6 and P8 were of the opinion that there are no KT process in place. P4 clearly stated that there are "none in place" (Appendix B4). Participants P5, P6 and P8 also indicated that there are no KT process in place. Two participants (P7 & P12) indicated that there is a handover process, however, this process is not compulsory. According to P7, "A handover process occurs when the employee leaves the job. He may choose to share the knowledge or not" (Appendix B7). P12 added that, "when an employee leaves, they are expected to do a formal handover" (Appendix B12).

Finding 37: There is no compulsory handover process in the organisation.

4.5.4 Participant responses – a cross analysis between junior, middle and senior employees

Lower-ranking engineers' understandings of skill gaps, knowledge transfer effectiveness, and willingness to share knowledge amongst the team all played an important role in the variations in their responses. Given the belief that the workforce is more knowledgeable and equipped with useful experience, junior employees would favour managers who would listen to them and facilitate opportunities for advancement (Table 4.11).

Middle-ranking engineers' understanding indicates that the experts are not available, and this may impact the limited succession planning. Succession planning affects the organisational sustainability, which in the POG is imperative. HR and Executive Management needs to enforce a succession planning strategy. A concern raised

identifies the risk of knowledge sharing sensitive information with peers, which would require a risk policy or implementation to avoid the knowledge losses (Table 4.11).

Senior engineers' understanding is based on behavioural characteristics, which will impact the organisational sustainability and culture. These factors require immediate intervention from the Human Resource and Executive Management. In the capital-intensive industry such as POG requires policies and strategies for knowledge transfer implementation, and avoidance of knowledge losses (Table 4.11).

Table 4.1 provides a view on the cross analysis between junior, middle and senior engineers that were derived from the findings related to the research question (RQ). The interview questions (IQs) were linked to the research sub-questions (RSQ) using thematic analysis

Table 4.101: Cross Analysis between junior, middle and senior engineers

Code	No of employees	Job title	Level of employment	IQ 1.1.1 Are there skill gaps in the petroleum organisation?	IQ 1.1.2 How is knowledge transferred from experienced too inexperienced employees?	IQ 1.1.3 Is there a willingness and motivation to share or transfer knowledge, in the organisation?
P1	1	Junior Project Engineer	Junior	There are few players locally within the petroleum industry, which makes the skills rare.	learning method becomes on the job with limited formal / direct education.	Experts are not good at sharing information
P3	1	Production Engineer	Middle	The lack of succession planning / talent management plans in the organisation is a challenge	is a challenge where the more experienced personnel are not easily available to transfer skills to inexperienced personnel.	The secrecy or confidentiality of information in this industry. Most of the information you deal with in this industry is highly confidential so it is a challenge to give out details in order to get views from your peers in the industry.
P6	1	Project Controls Manager	Senior	Generational issues also play a very large role in creating barriers to communication and thus the transferring of knowledge and institutional memory.	There is reluctance by the senior employees who occupy strategic roles with the organisation to share experience either through lessons learnt or information transfer.	There is still a racial gap, perceived or otherwise which contributes to knowledge not being shared both up and down the company structures

4.6 Categories and themes

Table 4.12 summarises categories and themes that were derived from the findings related to the research question (RQ). The interview questions (IQs) were linked to the research sub-questions (RSQ) using thematic analysis.

Table 4.12: Summary of categories and themes linked to findings, RQs, RSQs and IQs

Findings	Description of findings	Categories	Themes	RQ: RSQ
Finding 1	There are limited human and mineral resources within the organisation	Scarce resources	Human resources	RQ1: RSQ 1.1
Finding 2	Graduates exposed to limited knowledge	Education	Education	RQ1: RSQ 1.1
Finding 3	There are no formal skills training or development of graduate engineers	Knowledge management	Human resources	RQ1: RSQ 1.1
Finding 4	Reluctance to share knowledge and skills freely	Factors influencing KT	Management	RQ1: RSQ 1.1
Finding 5	Lack of skill transfer strategy, not scheduling enough time for transfer of skills to occur	Challenges	Human resources	RQ1: RSQ 1.1
Finding 6	There is a lack of mentorship by experienced employees, in transferring tacit knowledge to inexperienced employees	Professionals	Management	RQ1: RSQ 1.1
Finding 7	There is a deficiency in guided experiences, hands-on guidance, for certain job functions and activities	Implementation	Human resources	RQ1: RSQ 1.1
Finding 8	There is a need for work shadowing for inexperienced employees to acquire the knowledge from experienced employees	Management	Human resources	RQ1: RSQ 1.1
Finding 9	There is a demand for paired work, by putting the experienced employee with an inexperienced employee, to create learning a new function or activity	Information technology/ Information systems	Information technology	RQ1: RSQ 1.1
Finding 10	There is a fundamental requirement for knowledge fairs, to showcase topics and functions, from experienced employees to inexperienced employees	Human Resources	Education	RQ1: RSQ 1.1
Finding 11	There is a need for storytelling by experienced employees to inexperienced employees, to efficiently impart knowledge and show a point	Training	Education	RQ1: RSQ 1.1
Finding 12	Knowledge is not transferred due to the fear of corporate espionage	Risks	Risk management	RQ1: RSQ 1.1
Finding 13	KT processes are not in place at the Head Office	KT process/ procedure	Knowledge management	RQ1: RSQ 1.1
Finding 14	The lack of trust creates reluctance to share information	Risk management	Management	RQ1: RSQ 1.1
Finding 15	There is a lack of cohesion amongst employees, which does not motivate KS or collaboration	Knowledge transfer	Knowledge management	RQ1: RSQ 1.1

Findings	Description of findings	Categories	Themes	RQ: RSQ
Finding 16	There is an unwillingness to share information as the receiver is not competent	Factors influencing KT	Human resources	RQ1: RSQ 1.1
Finding 17	There is no standardised methods of managing the existent or new knowledge gained by peer reviews and consultation sessions	Systems	Information technology	RQ1: RSQ 1.2
Finding 18	Due to macroeconomic factors the organisation is unable to provide employee empowerment initiatives	Financial management	Financial management	RQ1: RSQ 1.2
Finding 19	The software knowledge based systems are effectively utilised	Systems	Information technology	RQ1: RSQ 1.2
Finding 20	There is a lack of monitoring competitor benchmark reports, used for competitive advantage	Business strategy	Financial management	RQ1: RSQ 1.2
Finding 21	Indications are that employees are extremely perceptive of the importance of internal competition in the organisation.	Challenges	Management	RQ1: RSQ 1.3
Finding 22	There is a perception amongst employees that management does not support knowledge transfer.	Challenges	Management	RQ1: RSQ 1.3
Finding 23	There is a perception amongst employees that they could potentially reduce the power that they have over others as a result of knowledge transfer.	Perception	Knowledge management	RQ1: RSQ 1.3
Finding 24	There are no incentives to employees for knowledge transfer initiatives	Challenges	Knowledge management	RQ1: RSQ 1.3
Finding 25	Knowledge losses as a result of workforce mobility, which include technical expertise and organisational memory	Management	Management	RQ1: RSQ 1.3
Finding 26	The POG organisation does not foster opportunities to reuse competencies or technology	Collaboration	Education	RQ1: RSQ 1.3
Finding 27	There is no culture of KS between employees in the organisation	Culture	Management	RQ1: RSQ 1.3
Finding 28	There is a lack of funding for business development	Operations/ Finance	Financial management	RQ2: RSQ 2.1
Finding 29	There is a lack of developing the employee career path	Talent management	Human resources	RQ2: RSQ 2.1
Finding 30	There is no platform to engage with employees on the strategies related to organisational success	Collaboration	Knowledge management	RQ2: RSQ 2.1
Finding 31	There is no alignment of organisational learning and development with business performance	Talent management	Human resources	RQ2: RSQ 2.1
Finding 32	There are no competency-based training programmes to assess graduates, after completion of modules	Inexperienced staff/untrained	Education	RQ2: RSQ 2.1

Findings	Description of findings	Categories	Themes	RQ: RSQ
Finding 33	There is a lack of uniform key performance contracts, which include knowledge transfer	Talent management	Management	RQ2: RSQ 2.1
Finding 34	There is a lack of consistent records management and the preserving of knowledge	Quality	Information technology	RQ2: RSQ 2.2
Finding 35	There is a lack of succession planning	Succession planning	Management	RQ2: RSQ 2.2
Finding 36	There is a decrease in employment associated with the downturn in economic growth	Business strategy	Management	RQ2: RSQ 2.2
Finding 37	There is no compulsory handover process	Business strategy	Management	RQ2: RSQ 2.2

*RQ = research question, RSQ = research sub-question, IQ = interview question

In Table 4.13, the themes are aligned to the RQs and the RSQ using thematic analysis. Themes are also related to important theories that apply to the organisation.

Table 4.13: Themes aligned with RQs

Themes	RQs and RSQs
Education	RQ1: RSQ 1.1; RSQ 1.3; RQ2: RSQ 2.1
Financial management	RQ1: RSQ 1.2; RQ2; RSQ 2.1
Human Resources	RQ1: RSQ 1.1; RSQ 1.3; RQ2: RSQ 2.1
Information technology	RQ1: RSQ 1.1; RSQ 1.2; RQ2: RSQ 2.2
Knowledge management	RQ1: RSQ 1.1; RSQ 1.3; RQ2: RSQ 2.1
Management	RQ1: RSQ 1.1; RSQ 1.3; RQ2: RSQ 2.1; RSQ 2.2
Risk management	RQ1: RSQ 1.1

*RQ = research question, RSQ = research sub-question, IQ = interview question

4.7 Conclusion

This chapter discussed data analysis and findings, which were presented in table and graphic form. Similar findings were found in the literature. The results of 20 questionnaires collected revealed the perception and exposure to KT.

4.8 Summary

The findings highlight the factors affecting KT in the POG organisation. The risks identified stem from trust, fear and a reluctance by senior employees to share or transfer knowledge. Inexperienced employees were found to lack knowledge and skills and, as a result, a manual should be produced, and internal training is required in order for these employees to gain the relevant understanding.

For the purpose of the research, 20 participants situated in the engineering operating divisions of a POG organisation were interviewed. The participants included process and production engineers, as well as specialists in the engineering field. All of the participants had many years of experience in oil and gas industry.

Based on the responses and an analysis of the responses, findings were developed for each interview question by summarising and categorising the data, as discussed in Chapter 3. From the 37 findings, 5 headline findings were identified.

Headline finding 1: KT is not adequately taking place in the POG organisation.

Headline finding 2: The lack of KT results in employees leaving the POG organisation.

Headline finding 3: The lack of KT puts the POG organisation's sustainability at risk.

Headline finding 4: There are no structured processes in place to support KT within the POG organisation.

Headline finding 5: Communities of practise are not in place to support the KT strategy of POG organisation.

The themes developed from the findings include: i) education; ii) financial management; iii) human resources; iv) information technology; v) knowledge management; vi) management; and vii) risk management.

In the next chapter, Chapter 5, the researcher will deal with the themes of the research. Chapter 5 also includes a discussion of themes, headline findings, the proposed framework and conclusions.

CHAPTER 5: DISCUSSION
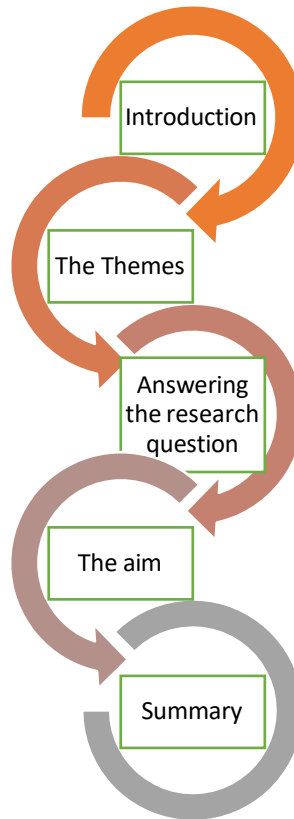
Figure 5.1: Layout of Chapter 5

5.1 Introduction

Employers are aware that successful employee management practices require knowledge transfer (KT) that empowers and engages prospective improvements and growth. Unfortunately, not everyone is willing to share their knowledge. People are fearful to share tacit knowledge, driven by the belief that they will be replaced. As an individual engages in the organisation, knowledge and insights are gained. This knowledge becomes part of the individual's tacit knowledge and, therefore, sharing information becomes selective. Individuals feel empowered by withholding information from others. Corporate South Africa is facing a skills shortage crisis and it is important to grow a KT and KS environment within organisations. When a culture of KT and KS is created within organisations, succession planning follows. The cost of providing individuals with tacit knowledge by training them is substantial and debilitates KT. When individuals leave an organisation without KT or KS, the organisation is exposed to risks. Seven themes were identified from the findings described in Chapter 4. These themes are education, financial management, human resources, information technology, knowledge management, management and risk management.

In Chapter 5, the view of the researcher is concentrated on the themes that were identified in Chapter 4, which dealt with the findings of the analysed data that was collected from the participants. In Chapter 5, the researcher also discusses a proposed integrated framework and summarises the research findings. The themes are discussed and linked to the research questions and aim of the study. The lack of KT has identified many risks and challenges when KT is not implemented. These risks are interrelated and include corporate espionage, along with the brain drain that affects the organisation negatively. Tables 4.1 to 4.6 in Chapter 4 provide details of each finding and the themes developed based on the 27 findings.

For ease of reading, the problem statement, research questions and aim of the study are listed below:

Problem Statement: It is unclear how the lack of KT affects the sustainability in organisations in South Africa.

RQ1: What are the factors affecting KT in a selected petroleum organisation in South Africa?

RQ2: How can KT be sustainable in a selected petroleum organisation?

Aim of the study: The aim of the study was to explore the role of KT in the sustainability of a POG organisation in South Africa.

5.2   Themes

5.2.1   Theme 1: Education

This theme links to the following research and research sub-questions:

RQ1: RSQ 1.1; RSQ 1.3; RQ2: RSQ 2.1 (section 1.4)

From the results analysed, education came out as a theme of importance. Participants mentioned the need for development and training. P1 stated: "Learning method becomes on the job with limited formal/direct education". P2 added, "Because head office does not have training programs like Mossel Bay plant" (Table 4.9; Finding 3).

According to Schaefer et al. (2021:156) education is intended to foster learning; however, it does not specify how learning occurs. The most basic aspect of using knowledge management in education is learning, which is intended to apprehend knowledge itself. In the organisation in which the study was conducted, all participants were formally educated in the engineering field. Formal education is a method of learning that is structured and systematic and is managed by organisations. This is to

ensure that formal learning is standardised and that all learning institutions (e.g. schools, colleges, universities, etc.) follow these standards. Formal education can play a larger role in the development of expertise (Hartlieb et al., 2021:82).

According to Schaefer et al. (2021:159) to adapt developing knowledge, a partnership of both organisational and technical experts must engage in a process, thereby applying knowledge in the approach to problem - solving. Formal education is considered vital, but merely as a foundation for capacity building and expertise development, since graduates are seen as future decision-makers.

5.2.2 Theme 2: Financial management

This theme links to the following research and research sub-questions:

RQ1: RSQ 1.2; RQ2: RSQ 2.1 (Chapter 1; section 1.4)

Financial management entails the planning, arranging, directing and managing of an organisation's financial activities, such as procurement and the use of funds. Financial management means applying general management ideas to the organisation's financial resources. Intellectual c a p i t a l i s an important aspect of an organisation's financial resources. Intellectual capital accounts for a larger share of total capital in a knowledge-based organisation. To generate organisational value, total accessible capital is managed and leveraged. (Abeysekera, 2021:12).

In the organisation where the study was conducted, the participants were aware of the financial concerns the organisation was facing. According to Latilla et al. (2019:1347) knowledge acquisition and retention become critical for the long-term survival and profitability of organisations. Financial risk tolerance is described as the rate of profitability, which is heavily influenced by financial risk assessment and how variations in the rate of profitability are affected.

Knowledge management is a managerial action that can be conducted to gain a competitive advantage and provide the necessary market share. As a result, employees can be financially and economically rewarded (Mishra et al.; 2021:49). Financial management supports the need to manage expenditures and to keep the deficit within sustainable levels, while fostering economic growth, which are all factors that must be considered. Financial management mitigates the impact of oil price volatility and the oil producers' reliance on quantity changes, as well as stabilising the revenue stream (Table 4.10; Finding 28).

5.2.3 Theme 3: Human resources

This theme links to the following research and research sub-questions:

RQ1: RSQ 1.1; RSQ 1.3; RQ2: RSQ 2.1

Ferreira et al. (2021:1) stated that knowledge management (KM) and human resource management (HRM) are inextricably linked because they both monitor knowledge-based intellectual capital that generate and sustain competitive advantage. Public service quality can improve in tandem with employee's ability or competence in their jobs (Table 4.10; Finding 7). Human resources (HR) are the division of an organisation responsible for locating, screening, hiring and training job candidates, as well as administering employee benefit programmes (Table 4.10; Finding 29).

The participants identified that a greater HR presence is required (Table 4.10, Finding 8). Fernandes (2018:1091) state that an internal compensation structure becomes essential to foster motivation to share knowledge; intrinsic motivation such as enjoyment and self-assurance in sharing knowledge; responsibilities and managers' support; accessibility to share knowledge; and software issues such as systems, training, process automation, and intraorganisational culture.

Ligarski et al. (2021:4) motivate those human resources play such an important role in the production process, employee training and willingness to adapt to changes in career opportunities are critical. Individual employee development is critical to the success of HR, which is becoming increasingly vital (Table 4.10, Finding 3).

5.2.4 Theme 4: Information technology

This theme links to the following research and research sub-questions:

RQ1: RSQ 1.1; RSQ 1.2; RQ2: RSQ 2.2

According to Fernades (2018:1089), organisations utilise information systems to achieve specific goals by combining human and information technology techniques. Dei et al. (2020) posits that once tacit knowledge is transcribed; analysed by information systems, codified, recorded, and archived, it becomes explicit knowledge. Organisations use knowledge to gain and maintain competitive advantages through the use of information technology to harness and leverage knowledge assets (Table 4.10; Finding 19).

The participants were aware of knowledge-based systems (KBS), however, implementation of these systems in the organisation was not proved. According to Latilla et al. (2019:1339), knowledge-based initiatives, as a result, have a significant impact on the formation of competitive advantage through the development of specific

and exclusive objects. Mtshali (2019:3) motivates that the significance of skill loss will be highlighted, and therefore how such skills can be managed to retain, transferred to new staff, and recorded as organisational property. (Table 4.10; Finding 34).

Artificial intelligence (AI) technologies have been widely used to improve the performance of KMS in the majority of modern organisations. Schaefer et al. (2021:157) motivate that business intelligences are focused on Information Technology (IT) elements that are introduced to set basic elements and used as a major influencer for Decision Support Systems (DSS) in designing successful analytics for top management and decision makers (Table 4.10; Finding 19).

5.2.5   Theme 5: Knowledge management

This theme links to the following research and research sub-questions:

RQ1: RSQ 1.1; RSQ 1.3; RQ2: RSQ 2.1

According to Schaefer et al. (2021:157), KM empowers a dynamic decision-making task, wherein it is essentially based on scenarios, involvement of individuals from diverse management levels in unlocking the decision-making process. KM is likely one of the most important tools and methods for improving employee performance. KM will immediately improve the organisation's outcomes. KM techniques should be employed to add value and to develop the organisation's knowledge resource. KM allows clear comprehension of people management and processes in order to accomplish growth and competitive processes, as well as to organise new goods and services (Table 4.10; Finding 6).

The participants in this study were aware of KT and KS, although not all participants agree that the implementation is happening. KT, unlike KS, frequently has a clear prior goal. KT compensates for the lack of use of obtained knowledge in KS. KT is classified as one of the knowledge management (KM) operational processes. According to Asiaei et al. (2020:4) improving a capacity of an organisation to cultivate sharing of knowledge is an important part of the knowledge transfer strategy (Table 4.10; Finding 24).

According to Lane et al. (2021:1221), mismatched employees will lack adequate interests to benefit from knowledge transfer, therefore there is a need for intellectual overlap to gain ideas from the knowledge transfer process. Employee attitudes or behaviour are seen to be influenced when creative approaches are introduced because they experience fear and a perception of threat (Ligarski et al., 2021:5). Employees' behaviour is driven by views or a collection of attributes. The behaviour is negative, influences an organisation's competitiveness. Behaviour and perception

provide understanding and measuring on various KM challenges. Employees perceive that the organisation will take unfair advantage of their specific investments in comparison to competitors may be reduced by organisation incentives (Table 4.10; Finding 15).

5.2.6 Theme 6: Management

This theme links to the following research and research sub-questions:

RQ1: RSQ 1.1; RSQ 1.3; RQ2: RSQ 2.1; RSQ 2.2.

Bhatia et al. (2021:3) suggest that autonomy in the management of various systems and their processes necessitates the development of knowledge-bases which can be used for rationalisation and decision-making. Management, especially leadership is important in the formation of motivation for employees of the organisation. A leader's role is to motivate his or her subordinates. Leaders must not only have valuable opinions and suggestions for the organisation, but they must also create an enabling environment for employees to share knowledge. Setting the organisation's strategy and organising employee efforts to achieve these objectives through the application of available resources are examples of administrative activities (Table 4.10; Finding 25).

Participants view KT as not fully supported by management (Table 4.10, Finding 22). According to Abeysekera (2021:10) to promote engagement and communication and to share positive explicit knowledge, an organisational management must intertwine its knowledge, economic entities, and managerial responsibilities. The willingness of employees to use and share knowledge is determined by their degree of participation and trust in those who provided it. Management should therefore support KT, employees' lack of trust in management would aggravate the willingness to knowledge share. Participants indicated that there is a reluctance to share information freely. Reluctance by employees to cooperate creates a lack of collaborative culture (Table 4.10; Finding 4).

Fernandes (2018:1089) suggests that a learning culture can be founded through leadership' views, value systems, and behaviours, resulting in personal growth that can advantage employees, motivate the creation of advancement, and result in organisational performance. KS to improve productivity is frequently framed by the organisation's procedures, social standards, and learning culture. KS mediates the relationship between organisational culture and employee performance success. KS is inextricably linked to human capital and good human capital management gives businesses a significant competitive advantage. The participants indicated that KS is

not motivated by organisational culture. Bag et al. suggest that KM capabilities are factors (such as organisational culture and technology) that can improve KM related activities. Organisational culture is a system of distributing politics and principles that succeed in an organisation and guide employee behaviour. This culture impacts on KS, both directly and through formal knowledge governance mechanisms, job autonomy, job satisfaction, KS opportunity, organisational commitment, a sense of wellbeing, subjective norms and trust (Table 4.10; Finding 27).

5.2.7   Theme 7: Risk management

This theme links to the following research and research sub-questions:

RQ1: RSQ 1.1

Andrianina et al. (2021:48) strategically support employees on methods to knowledge sharing with others and retain control over the knowledge contributed, therefore reducing the risk and uncertainty. Financial uncertainties, legal liabilities, strategic management failures, accidents and natural disasters are some of the hazards or risks that could arise in this industry.

In the organisation where the study was conducted, the participants identified that the risks surrounding KT include fear and trust (Table 4.10; Finding 12). Ligarski et al. (2021:6) suggest that feared loss of employment, lack of expertise with new technology, fear of becoming redundant due to age, fear of potential unidentified advancements, feared loss of competence, a secluded viewpoint rather than informed opinion among peers, employees who do not recognize the significance of data, and fears that are not discussed by management. Risk management is dependent on trust. Some types of trust are barriers to appropriate behaviour. Risk management is effective by striking the correct balance between risk perception and social trust.

The goal of risk management is to reduce the danger of unfavourable consequences. Unfavourable consequences may include knowledge losses suffered by the organisation. Knowledge protection (KP) is a fundamental KM strategy that must be coordinates and balanced with KS, KP is particularly challenging. Ferreira et al. (2021:5) suggest that knowledge protection (KP) refers to the various strategies, processes, and tools that can be used to safeguard not only intangible assets from knowledge use, but also knowledge itself. A knowledge protection strategy requires an integrated risk management framework that focuses on organisational risk management strategies.

5.3 Answering the research questions and aim of study

5.3.1 Research question 1

RQ1: What are the factors affecting KT in a selected petroleum organisation in South Africa?

KT is viewed as crucial by all participants. From the research, numerous factors were discovered that the management would need to address. These factors include understaffing, fear, trust, the lack of time required and reluctance to share knowledge. Individuals who are overburdened with responsibilities generally do not have enough time to share or seek new knowledge. There is a fear that, because of a lack of expertise with safeguarding sensitive information, employees will mistakenly communicate sensitive information to other organisations. There is a lack of trust, which creates the belief that senior management does not trust the way tasks are performed. Members of the team were reluctant to share their information. Results of the research proves that multiple factors make it difficult for organisations to achieve the anticipated results, despite the fact that KT has been recognised as critical for organisation and market performance.

5.3.2 Research question 2

RQ2: How can KT be sustainable in a selected petroleum organisation?

From the research it is clear that knowledge is critical for long-term sustainability and knowledge transfer, as well as acquiring and retaining a competitive advantage in the industry. It is critical to explore the factors that may affect KT. The factors identified in this research question need to be managed in order for the organisation to implement a sustainable KT strategy. By introducing new structures and developing succession planning processes, the organisation will be able to quickly adjust to changes within its workforce (Chapter 4), assisting in developing a sustainable KT strategy and environment.

5.3.2 Aim

The aim of the study was to explore the role of KT on the sustainability of a POG organisation in South Africa. The research successfully achieved this aim. From the interviews with the participants, factors influencing KT in the POG were identified. These factors indicated that KT plays an important role in an organisation. In this case, a lack of KT was identified by the participants. This causes an unhappy workforce, resulting in employees leaving the organisation. Unfortunately, because of employees

leaving the organisation and the lack of KT, knowledge is also leaving the organisation.

5.4   Concept mapping

The visual presentation of the socio-technical systems theory is intended to demonstrate how the system scenario tool (SST) was used to address more acute, localised organisational issues. The application occurred in a POG organisation, where the key stakeholders were members of an inter-disciplinary 'working group' made up of engineers. Members of the group were imposed with improving the knowledge transfer process across the engineering department, to reduce inefficiency and employee turnover costs. SST was used to assist the researcher in conducting a holistic analysis of the socio-technical systems theory to improve understanding.

5.5.1 *Adapted a visual representation of the socio-technical approach based on Davis, M.C., Challenger, R., Jayewardene, D.N. & Clegg, C.N., 2014:173*
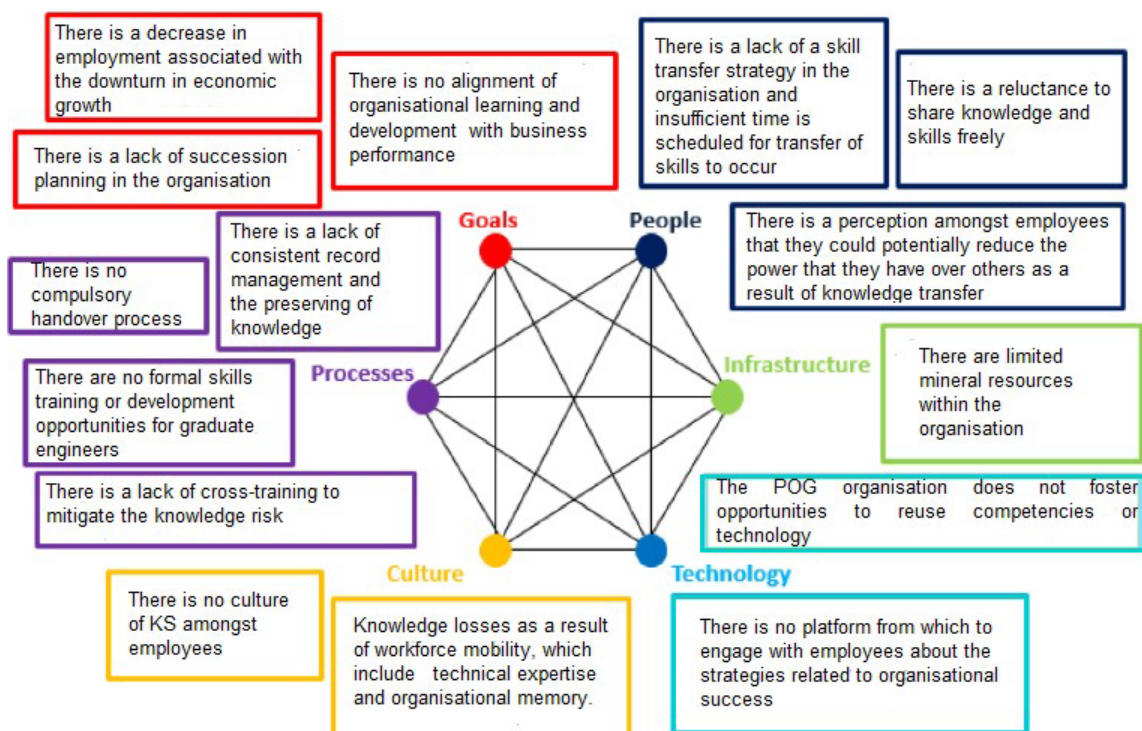
Figure 5.2: Socio-technical system, illustrating the interrelated nature of an organisational system, embedded within an external environment (Davis, M.C., Challenger, R., Jayewardene, D.N. & Clegg, C.N., 2014:173).

5.5   Conclusion

Discovering themes in interview data facilitates an emerging framework for understanding organisational knowledge transfer. Allowing socio-technical theory to

emerge from qualitative methods results in a new understanding of knowledge transfer and aligns the findings with an existing theory (Basic KT model) that can be evaluated in the analysis. As a result of the data, a revised theory of organisational knowledge transfer based on employee attitudes or willingness may emerge, allowing the researcher to distinguish, develop, and review a new theoretical approach to knowledge transfer.

5.6 Summary

In Chapter 5, the researcher expanded on the themes identified in Chapter 4 and explained how each theme relates to the study's research questions and objectives. The author suggested several guidelines to help the industry with the phenomenon in question.

In Chapter 5, the researcher focused on each theme separately in order to present a clearer overview of education, financial management, human resources, information technology, knowledge management, management and risk management. Two key research questions were proposed to address the research problem: Firstly, what are the factors affecting KT in a selected petroleum organisation in South Africa? And, How can KT be sustainable in a selected petroleum organisation? Both research questions were answered and the research goal was addressed towards the end of the chapter. By appropriately adopting and executing the recommended standards, businesses will be able to address the phenomenon under investigation.

The research's conclusions, recommendations, reflections and contributions to the discipline are discussed in Chapter 6.

CHAPTER 6: CONCLUSIONS, RECOMMENDATIONS AND CONTRIBUTION
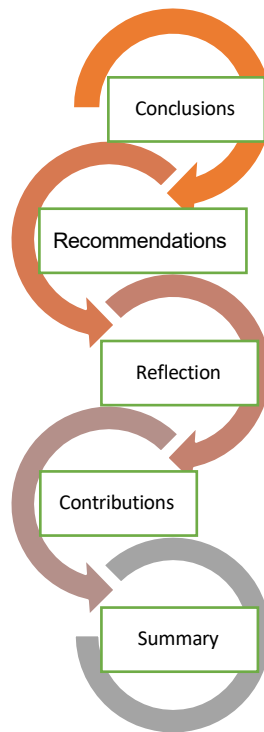
Figure 6.1: Layout of Chapter 6

6.1 Introduction

In Chapter 6, the researcher discusses the conclusions and proposes recommendations, followed by a reflection on the research conducted. The chapter deals with the contributions towards research and ends with the limitations experienced during the research.

6.2 Conclusions

The long-tern development that has shaped KT within the past, present and beyond has evolved. Lack of meaningful knowledge demands thinking in long-term patterns of continuity, change, and generalisation in order to bridge the gap between the past, present, and future. The perspectives of the employees interviewed contribute to the implementation of a clear and sustainable solution, adapted to the organisation's needs. Employees' brains are full of tacit knowledge. Tacit knowledge is typically acquired through a trial-and-error approach during actual work experience, while formal knowledge is referred to as explicit knowledge. Explicit information is acquired via formal study and educational practices.

An organisation faces a number of concerns in respect of the KT process. The primary aim of KT is to gather and articulate tacit knowledge into a form that can be

communicated and distributed throughout the organisation. The next concern is to provide accessibility to tacit knowledge, throughout the organisation. Another concern is to create an organisational culture that encourages employees to pursue and use their tacit knowledge. Additional problems for the employer include retaining this knowledge and avoiding knowledge losses throughout the KT process.

6.3 Proposed guidelines

The proposed guidelines are made up of elements that could help the POG organisation manage the problem at hand, namely: i) remuneration model; ii) learning culture; iii) organisational stability' iv) talent management strategy; and v) management, are the components of the guidelines.

6.3.1 Remuneration model

Rewarding top achievers has a strong link to improved overall organisational performance. Incentive compensation systems are based on the idea that rewards motivate people to behave in certain ways. It is recommended that experts and those who encourage employee development should receive an incentive.

6.3.2 Foster a learning culture

A rapid movement in KS and KT is characterised as a learning culture. In knowledge-based societies, current research has repeatedly emphasised the importance of building a learning culture in organisations with robust KS and KT mechanisms. It is recommended that putting an emphasis on employee development at all levels by fostering their quest for knowledge.

6.3.3 Organisational stability

During times of disruptive change in the workplace, a foundation of organisational stability gives employees with a sense of confidence, security and optimism, allowing employees to remain calm, act sensibly and adapt efficiently as the situation changes. Organisational stability encourages employees to invest personally in a KT process.

6.3.4 Talent management strategy

A talent management strategy creatively manages an organisation's present and potential talent. Investing in a talent management strategy with KT (e.g. competency models, succession planning) increases knowledge and employee retention.

6.3.5   Management

Management should create a culture that encourages knowledgeable employees to create, organise and share organisational information. Management involvement can remove barriers to KT by holding executive positions accountable.

6.4   Recommendations

Globally, organisations have large amounts of information, data, knowledge and talent, which is expanding by the day. A framework that can gather information, retain it, convey it and achieve the desired result by transferring tacit knowledge from experienced to inexperienced is essential to make the greatest use of this knowledge. KM is a practice that concerns an organisation's preservation and management of knowledge or data. The petroleum, oil and gas (POG) organisation's primary knowledge must be communicated, shared and utilised throughout for this knowledge to become an advantage that improves the performance of the organisation. The term KT refers to the process of communicating and disseminating information between organisations or inside a single organisation. Knowledge can be passed on through weekly meetings, training and human interactions. The methods for disseminating knowledge vary, based on the type of knowledge to be communicated.

It is critical to consider who knows what, who needs to know what and how to communicate knowledge. Investing in developing an effective system of KT could save the organisation, by retaining employees and creating a financial competitive advantage. Without knowledge transfer, the organisation will continue to waste capital resources and knowledge. Thanks to technological advancements, the POG organisation has a wonderful opportunity to collect, store, share and apply knowledge. Knowledge implementation can be aided by a variety of software systems, methodologies and procedures.

6.4.1   Knowledge fairs

According to Dostal and Skrbek (2020:197), knowledge fairs are events where employees from various departments are brought together and encouraged to share their knowledge through informal conversation. A knowledge fair is recommended when there is a great deal of information to present to a large group in order to communicate one-on-one on specific themes.

It is recommended that the POG organisation arranges quarterly knowledge fairs designed to showcase information about the various departments or on a specific topic.

6.4.2 Establish storytelling sessions

Zhang (2020:757) suggests that in order to facilitate knowledge transfer, convey tacit knowledge, produce new knowledge and shape company culture, a mix of storytelling and KM is effective. When someone tells a story, there is usually an underlying message or lesson that the speaker is attempting to impart to the listeners. The art of storytelling is a powerful instrument. It aids in the explanation of expectations, the strengthening of character and the teaching of desired workplace behaviour.

It is recommended that the POG organisation has a compulsory approach to storytelling in the various departments, bringing in creativity, engagement and change.

6.4.3 Apply competency-based training and assessments

Umuago, Obiebi, Eze and Moeteke (2020:1638) state that competency-based training is an approach used to ensure that trainees obtain appropriate knowledge, accurately perform all phases of a task and are assessed using standardised instruments to guarantee they have achieved the target degree of proficiency. Training and development that focuses on specific competencies or skills is known as competency-based training. These modules concentrate on a single skill at a time, guiding learners through a course based on their understanding of each of the programme's particular competencies.

It is recommended that the POG employees are registered to complete competency-based training and assessments that emphasise the intended outcomes as the most important aspect of the learning process.

6.4.4 Implement cross-training of employees

Hernaus, Cerne and Skerlavaj (2020:626) advocate for increased discretionary workplace performance through job relational architecture and system-wide cross-training techniques. Cross-training entails learning how to perform multiple tasks so as to broaden professional horizons. Cross-training allows a visiting employee (the "visiting employee") to learn certain tasks by collaborating with another employee (the "receiving employee") for a predetermined period of time.

Cross-training of employees is recommended as the type of training is crucial for development related to improving the POG organisation and the client experience.

6.4.5 Implement a competitive analysis report

A competitive analysis is an approach used for identifying and researching significant competitors' products, sales and marketing tactics. A competitive analysis enables

the organisation to keep on top of market changes and to ensure that their product meets and exceeds industry requirements on a continual basis (Wang, Richard & McDonald, 2020b:11).

It is recommended that the POG organisation engages in a competitive analysis study to benchmark itself against competitors in the POG market, thereby strengthening weaknesses.

6.4.6 Impose a skill transfer strategy

The procedure through which an employee is taught how to do a new task or learn a new skill is known as a skills transfer. The key to successful skills transfer is for the person who is transferring the skill to comprehend and be able to explain the skill to their peer. Thuketana (2020:50) posits that experiential learning can be employed as a skill-transfer approach in situations where skills shortages and training challenges are constantly being investigated.

The POG organisation is advised to enforce a skills transfer strategy so that person who is transferring the skill to their peer is successful.

6.4.7 Supply guided experiences, for job functions and activities

Guided experiences are workflow-based widgets that guide an employee through a multistep process that may span many systems to complete certain tasks. Niman and Chagnon (2020:2) suggest that these process-based guided experiences aim to tap into the wisdom of an industry professional or practitioner who has honed their skills over years of experience. A comprehensive learning experience can be built when well-designed activities are linked.

The organisation needs to apply guided practices, in which an employee empowers a graduate-in-training to practice skills independently for the first time, while providing real performance insights.

6.4.8 Initiate work shadowing

Dimma (2020:70) explains that job or work shadowing is a practice in which an employee from one department works alongside an employee from another department to gain experience in their role and obtain insights into their work area. Magdalena and Mocanu (2020:1373) add that this strategy is particularly effective for novices who have a certain degree of theoretical, explicit information and who need to put this into context (implicit knowledge). In addition, unexpected scenarios may arise during shadowing and the novice can watch, first-hand, how such situations are dealt with (tacit knowledge).

It is recommended that a job shadowing programme be implemented.

6.4.9   Institute a knowledge-based system

A knowledge-based system (KBS) is a type of artificial intelligence (AI) that tries to collect human specialist knowledge to aid decision-making. Expert systems, which are named for their reliance on human expertise, are examples of knowledge-based systems (Jin, Qin, Huang, Zhao & Liu, 2020:1).

Knowledge-based systems are recommended for implementation since they can help with decision-making in complex POG environments.

6.4.10   Invest in a reward and recognition system

According to Nuaimi and Jabeen (2020:176), employees are more likely to transfer and support the KT process if they trust their own knowledge and organisational elements such as culture, structure, management support and a reward system. Employee incentive systems are organisation programmes that reward and inspire employees on an individual and/or group level. They are usually considered independent from salary, but they may be monetary or incur other costs to the organisation.

It is recommended that the POG organisation establishes a reward and recognition system to incentivise employees to optimise their performance.

6.4.11   Circumvent internal competition

For some employees, internal competition is beneficial. The idea of being superior to someone else leads to a variety of outcomes. Internal competition is contentious to practice and is encouraged because it has a long-term impact on employee behaviour (Balogun & Ogbeide, 2020:2).

It is suggested that negative employees who are the source of internal competition, and who are more concerned with personal gain than the larger welfare of the organisation, be isolated and managed.

6.4.12   Foster strategies to promote organisational success

Organisations must execute strategies and measure the level of employee engagement, commitment to the organisation and its success. The success of an organisation is determined by examining where it is in relation to its goals and mission. According to Bencsik and Juhasz (2020:250), the preliminary premise is that everyday practice of high-quality information sharing improves the influence of trust on

organisational success, but workplace gossip, which is a common kind of informal KS, undermines this effect.

The POG organisation's performance needs to improve through infrastructure, expertise and behaviour.

6.4.13 Commence an internal mentorship programme

According to Wiratmadja and Tahir (2021:13465) individuals, as senders and recipients of knowledge, engage directly in mentorship processes concerned with knowledge sharing (KS). Individuals with greater knowledge and skills verbally and in practice share their information and skills with those who have little knowledge and less ability. Jefford, Nolan, Munn and Ebert (2020:2) added that both the mentor and the mentee's experiences are fundamentally shaped through mentorship.

It is recommended that a mentorship programme be established to help mentees develop their capacity, increase their abilities and develop their capabilities in order to attain desired results.

6.4.14 Endorse a positive attitude toward KT and KS

Moreno, Cavazotte and Dutra (2020:284) suggest that individuals' perceptions of shared understanding within their workgroup are a key factor in the development of pro-KS attitudes.

The POG organisation needs to encourage employees to create an atmosphere that is welcoming of both learning and knowledge transfer.

6.4.15 Demonstrate management support towards knowledge transfer

Allowing workers to grow and apply their skills and abilities is a requirement of management support. If managers fail to do so, they inadvertently communicate a lack of support to their employees. According to Rohman, Eliyana, Purwana and Hamidah et al. (2020:40), KS in corporate environments include managerial support, incentives or rewards, leadership and business culture.

It is recommended that top management of the POG organisation demonstrates commitment KS.

6.4.16 Prevent knowledge losses

According to Arham, Norizan, Norizan, Arham and Ibrahim (2020:86), retirement, death or better work prospects can all result in knowledge losses in any organisation. When a person with valuable information leaves an organisation, knowledge loss

occurs. Because of workforce mobility and our aging society, the situation is getting worse. The impact is felt at the organisational level in terms of skill and talent shortages.

Strategies need to be put in place to prevent knowledge losses when employees retire, or leave the POG organisation.

6.4.17 Nurture a culture of knowledge sharing

According to Kokt and Makumbe (2020:4), mistakes are accepted, creativity is fostered, knowledge is widely shared and risks are taken in the atmosphere within a favourable organisational culture. Tennakoon, Kulatunga and Jayasena (2020:4) add that knowledge generation and sensing; knowledge organisation and capture; and KS and dissemination behaviours have all been highlighted as being linked to organisational culture.

The organisation needs to establish a knowledge-sharing culture, as well as a vision of how the POG organisation should operate on a daily basis.

6.4.18 Train employees on data security and best practices to prevent corporate espionage

According to Ahmad, Maynard, Desouza, Kotsias, Whitty and Baskerville (2021:5), by targeting confidential data and information or by stealing intellectual property from competing organisations, large-scale multinational companies are vulnerable to industrial and corporate espionage assaults.

It is recommended that the POG ensures that learning and understanding are applied on a daily basis to maintain a high degree of security awareness.

Table 6.1 summarises recommendations that were derived from the findings.

Table 6.1 Recommendations linked to findings

Recommendations	Description of recommendations	Findings	Description of findings
Recommendation 1	Knowledge fairs	Finding 10	There is a fundamental requirement for knowledge fairs in order to showcase topics and functions between experienced employees and inexperienced employees
Recommendation 2	Establish storytelling sessions	Finding 11	There is a need for storytelling by experienced employees to inexperienced employees to efficiently impart knowledge and show a point
Recommendation 3	Apply competency-based training and assessment	Finding 32	There are no competency-based training programmes available to

Recommendations	Description of recommendations	Findings	Description of findings
			assess graduates after completion of modules
Recommendation 4	Implement cross-training of employees	Finding 18	There is a lack of cross-training to mitigate the knowledge risk
Recommendation 5	Implement a competitive analysis report	Finding 20	There is a lack of competitor analysis to differentiate the organisation from its competitors
Recommendation 6	Impose a skill transfer strategy	Finding 5	There is a lack of a skill transfer strategy in the organisation and insufficient time is scheduled for transfer of skills to occur
		Finding 17	There are peer review and consultation sessions, however, mapping the existent or new knowledge gained is excluded
		Finding 29	Employee career paths are not developed within the organisation
		Finding 33	There is a lack of uniform key performance contracts, which include knowledge transfer
		Finding 35	There is a lack of succession planning in the organisation
Recommendation 7	Supply guided experiences, for job functions and activities	Finding 7	There is a deficiency in guided experiences and hands-on guidance for certain job functions and activities
Recommendation 8	Initiate work shadowing	Finding 8	There is a need for work shadowing opportunities to afford inexperienced employees an opportunity to acquire the knowledge from experienced employees
Recommendation 9	Institute a knowledge-based system	Finding 19	There is a lack of efficiently when using software knowledge-based systems to store knowledge
		Finding 34	There is a lack of consistent record management and the preserving of knowledge
Recommendation 10	Invest in a reward and recognition system	Finding 24	There are no incentives that encourage employees to become involved in knowledge transfer initiatives
Recommendation 11	Circumvent internal competition	Finding 21	Indications are that employees are extremely perceptive of the

Recommendations	Description of recommendations	Findings	Description of findings
			importance of internal competition in the organisation
		Finding 23	There is a perception amongst employees that they could potentially reduce the power that they have over others as a result of knowledge transfer
Recommendation 12	Foster strategies to promote organisational success	Finding 1	There are limited human and mineral resources within the organisation
		Finding 16	The absence of a space for KT to happen within the organisation is evident
		Finding 28	There is a lack of funding for business development
		Finding 30	There is no platform from which to engage with employees about the strategies related to organisational success
		Finding 31	There is no alignment of organisational learning and development with business performance
		Finding 35	There is a lack of succession planning in the organisation
		Finding 37	There is no compulsory handover process in the organisation
Recommendation 13	Commence an internal mentorship programme	Finding 2	Graduates exposed to limited knowledge
		Finding 3	There are no formal skills training or development opportunities for graduate engineers
		Finding 6	There is a lack of mentorship by experienced employees for the transfer of tacit knowledge to inexperienced employees
		Finding 9	There is a demand for paired work, which is met by putting an experienced employee with an inexperienced employee, in order to create opportunities to learn a new function or activity

Recommendations	Description of recommendations	Findings	Description of findings
Recommendation 14	Endorse a positive attitude towards KT and KS	Finding 4	There is a reluctance to share knowledge and skills freely
		Finding 14	The lack of trust creates reluctance to share information
		Finding 15	There is a lack of cohesion amongst employees, which does not motivate KS or collaboration
Recommendation 15	Demonstrate management support towards knowledge transfer	Finding 22	There is a perception among participants that management does not support knowledge transfer
Recommendation 16	Prevent knowledge losses	Finding 25	Knowledge losses as a result of workforce mobility, which include technical expertise and organisational memory.
		Finding 26	The POG organisation does not foster opportunities to reuse competencies or technology
		Finding 36	There is a decrease in employment associated with the downturn in economic growth
Recommendation 17	Nurture a culture of knowledge sharing	Finding 27	There is no culture of KS amongst employees
		Finding 12	There are few activities related to improving relationships with the peers and building networks based on knowledge transfer
		Finding 13	There is a lack of formal requests for opportunities to share knowledge (seminars or conferences)
Recommendation 18	Train employees on data security and best practices to prevent corporate espionage	Finding 17	There are peer review and consultation sessions, however, mapping the existent or new knowledge gained is excluded

Table 6.2 summarises recommendations that were derived from the findings linked to

related to the research question (RQ) and the research sub-questions (RSQ) using thematic analysis.

Table 6.2 Recommendations linked to findings, RQ. and SRQ.

Recommendations	Description of Recommendations	Findings	Description of findings	Categories	Themes	RQ: RSQ
Recommendation 12	Foster strategies to promote organisational success	Finding 1	There are limited human and mineral resources within the organisation	Scarce resources	Human resources	RQ1: RSQ 1.1
Recommendation 13	Commence an internal mentorship programme	Finding 2	Graduates exposed to limited knowledge	Education	Education	RQ1: RSQ 1.1
Recommendation 13	Commence an internal mentorship programme	Finding 3	There are no formal skills training or development of graduate engineers	Knowledge management	Human resources	RQ1: RSQ 1.1
Recommendation 14	Endorse a positive attitude towards KT and KS	Finding 4	Reluctance to share knowledge and skills freely	Factors influencing KT	Management	RQ1: RSQ 1.1
Recommendation 6	Impose a skill transfer strategy	Finding 5	Lack of skill transfer strategy, not scheduling enough time for transfer of skills to occur	Challenges	Human resources	RQ1: RSQ 1.1
Recommendation 13	Commence an internal mentorship programme	Finding 6	There is a lack of mentorship by experienced employees, in transferring tacit knowledge to inexperienced employees	Professionals	Management	RQ1: RSQ 1.1
Recommendation 7	Supply guided experiences, for job functions and activities	Finding 7	There is a deficiency in guided experiences, hands-on guidance, for certain job functions and activities	Implementation	Human resources	RQ1: RSQ 1.1
Recommendation 8	Initiate work shadowing	Finding 8	There is a need for work shadowing for inexperienced employees to acquire the knowledge from experienced employees	Management	Human resources	RQ1: RSQ 1.1

Recommendations	Description of Recommendations	Findings	Description of findings	Categories	Themes	RQ: RSQ
Recommendation 13	Commence an internal mentorship programme	Finding 9	There is a demand for paired work, by putting the experienced employee with an inexperienced employee, to create learning a new function or activity	Information technology/ Information systems	Information technology	RQ1: RSQ 1.1
Recommendation 1	Knowledge fairs	Finding 10	There is a fundamental requirement for knowledge fairs, to showcase topics and functions, from experienced employees to inexperienced employees	Human Resources	Education	RQ1: RSQ 1.1
Recommendation 2	Establish storytelling sessions	Finding 11	There is a need for storytelling by experienced employees to inexperienced employees, to efficiently impart knowledge and show a point	Training	Education	RQ1: RSQ 1.1
Recommendation 17	Nurture a culture of knowledge sharing	Finding 12	Knowledge is not transferred due to the fear of corporate espionage	Risks	Risk management	RQ1: RSQ 1.1
Recommendation 17	Nurture a culture of knowledge sharing	Finding 13	KT processes are not in place at the Head Office	KT process/ procedure	Knowledge management	RQ1: RSQ 1.1
Recommendation 14	Endorse a positive attitude towards KT and KS	Finding 14	The lack of trust creates reluctance to share information	Risk management	Management	RQ1: RSQ 1.1
Recommendation 14	Endorse a positive attitude towards KT and KS	Finding 15	There is a lack of cohesion amongst employees, which does not motivate KS or collaboration	Knowledge transfer	Knowledge management	RQ1: RSQ 1.1
Recommendation 12	Foster strategies to promote organisational success	Finding 16	There is an unwillingness to share information as the receiver is not competent	Factors influencing KT	Human resources	RQ1: RSQ 1.1
Recommendation 18	Train employees on data security and best practices to prevent corporate espionage	Finding 17	There are peer review and consultation sessions, however, mapping the existent or new knowledge gained is excluded	Systems	Information technology	RQ1: RSQ 1.2

Recommendations	Description of Recommendations	Findings	Description of findings	Categories	Themes	RQ: RSQ
Recommendation 4	Implement cross-training of employees	Finding 18	Due to macroeconomic factors the organisation is unable to provide employee empowerment initiatives	Financial management	Financial management	RQ1: RSQ 1.2
Recommendation 9	Institute a knowledge-based system	Finding 19	The software knowledge based systems are effectively utilised	Systems	Information technology	RQ1: RSQ 1.2
Recommendation 5	Implement a competitive analysis report	Finding 20	There is a lack of monitoring competitor benchmark reports, used for competitive advantage	Business strategy	Financial management	RQ1: RSQ 1.2
Recommendation 11	Circumvent internal competition	Finding 21	Indications are that employees are extremely perceptive of the importance of internal competition in the organisation.	Challenges	Management	RQ1: RSQ 1.3
Recommendation 15	Demonstrate management support towards knowledge transfer	Finding 22	There is a perception amongst employees that management does not support knowledge transfer.	Talent management	Management	RQ1: RSQ 1.3
Recommendation 11	Circumvent internal competition	Finding 23	There is a perception amongst employees that they could potentially reduce the power that they have over others as a result of knowledge transfer.	Perception	Knowledge management	RQ1: RSQ 1.3
Recommendation 10	Invest in a reward and recognition system	Finding 24	There are no incentives to employees for knowledge transfer initiatives	Challenges	Knowledge management	RQ1: RSQ 1.3
Recommendation 16	Prevent knowledge losses	Finding 25	Knowledge losses as a result of workforce mobility, which include technical expertise and organisational memory	Management	Management	RQ1: RSQ 1.3

Recommendations	Description of Recommendations	Findings	Description of findings	Categories	Themes	RQ: RSQ
Recommendation 16	Prevent knowledge losses	Finding 26	The POG organisation does not foster opportunities to reuse competencies or technology	Collaboration	Education	RQ1: RSQ 1.3
Recommendation 17	Nurture a culture of knowledge sharing	Finding 27	There is no culture of KS between employees in the organisation	Culture	Management	RQ1: RSQ 1.3
Recommendation 12	Foster strategies to promote organisational success	Finding 28	There is a lack of funding for business development	Operations/ Finance	Financial management	RQ2: RSQ 2.1
Recommendation 6	Impose a skill transfer strategy	Finding 29	There is a lack of developing the employee career path	Talent management	Human resources	RQ2: RSQ 2.1
Recommendation 12	Foster strategies to promote organisational success	Finding 30	There is no platform to engage with employees on the strategies related to organisational success	Collaboration	Knowledge management	RQ2: RSQ 2.1
Recommendation 12	Foster strategies to promote organisational success	Finding 31	There is no alignment of organisational learning and development with business performance	Talent management	Human resources	RQ2: RSQ 2.1
Recommendation 3	Apply competency-based training and assessment	Finding 32	There are no competency-based training programmes to assess graduates, after completion of modules	Inexperienced staff/untrained	Education	RQ2: RSQ 2.1
Recommendation 6	Impose a skill transfer strategy	Finding 33	There is a lack of uniform key performance contracts, which include knowledge transfer	Talent management	Management	RQ2: RSQ 2.1
Recommendation 9	Institute a knowledge-based system	Finding 34	There is a lack of consistent records management and the preserving of knowledge	Quality	Information technology	RQ2: RSQ 2.2
Recommendation 12	Foster strategies to promote organisational success	Finding 35	There is a lack of succession planning	Succession planning	Management	RQ2: RSQ 2.2

Recommendations	Description of Recommendations	Findings	Description of findings	Categories	Themes	RQ: RSQ
Recommendation 16	Prevent knowledge losses	Finding 36	There is a decrease in employment associated with the downturn in economic growth	Business strategy	Management	RQ2: RSQ 2.2
Recommendation 12	Foster strategies to promote organisational success	Finding 37	There is no compulsory handover process	Business strategy	Management	RQ2: RSQ 2.2

6.5 Reflection

The study took a case study approach, focusing on a single POG company in South Africa. The research findings are as exact as feasible and are based on the interview responses of 20 participants. It is important to note that the results are not generalisable since they are specific to the organisation.

Various problems were encountered prior to and during the interviews; for example, respondents were uncomfortable being voice recorded and asked to write down their comments. Secondly, interviewees were not always available for interviews, necessitating other arrangements to be made, such as after-hours sessions. Despite the authority offered to the employees by the company to respond to the interview questions, several interviewees declined to answer specific questions because they considered that personal or sensitive information should be maintained within the organisation.

The study's findings raise issues such as "how can an organisation create a knowledge sharing culture to safeguard internal competition?" and "does KT and sharing receive sufficient attention?" To ensure that organisations are protected against knowledge losses, further research on human behaviour towards KT is required.

6.6 Contribution to research

Although there are numerous frameworks linked to KM in the literature (Chapter 2), such as AKM4I, Knowledge-pull and Knowledge in Sustainable Development, these three best represented KT. The organisation may be better able to manage and reduce knowledge losses if the frameworks indicated are adequately enforced.

6.7 Limitations of research

A number of research limitations have been discovered. Since the research findings are based on a single POG organisation in South Africa, they cannot be applied to all

POG organisations. Despite the fact that the findings came from a single organisation, the topic under inquiry can be researched further in different organisations.

Twenty participants, ranging from production and process engineers to engineering specialists, were interviewed. Although the outcome could have been different if a different unit of analysis had been used, all of the participants answered the questions to the best of their knowledge.

Finally, due to the sensitivity of the questions or participants who did not want to submit the answers because they considered the information should be kept confidential, certain questions were not correctly addressed by interviewees.

The study discovered a number of limitations in knowledge transfer, one of which is a reluctance to share knowledge, which can be viewed as a key contributor to internal competitiveness. Although further research on human behaviour in relation to KT and KS is needed to ensure that organisations are safeguarded from knowledge losses, the proposed framework could help to correct the majority of the research findings.

6.8 Summary

The chapter's content includes the current use of KT by engineers and highlights various perspectives from professionals involved in POG in South Africa. The discussion revealed that engineers in POG do not frequently use KT and that training is required. The research problem was developed using engineers' perspectives on the use of KT.

The purpose of this study was to develop and implement KT for the sustainability of the POG organisation. According to the framework that guided this research, the Basic KT model, assessed the dynamics of KT between knowledge providers and knowledge recipients. The commitment of an employee to participate in KT could be regarded as measure of such behaviour. Employees will be able to engage in the multi-professional team with awareness into knowledge transfer and its advantages, which will support the engineering profession.

The researcher addressed ethical concerns such as preventing exposure, obtaining informed consent, ensuring collaboration with contributors, avoiding any deception of the respondents, ensuring competence on the researcher's part, and focusing on the respondents' privacy, personal privacy, and anonymity.

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APPENDIX A: INTERVIEW GUIDE TEMPLATE

Cape Peninsula University of Technology

Semi-structured questionnaires

Interview schedule:

<u>**Introductory remarks**</u>: Knowledge transfer (KT) is an important issue for most organisations and when implemented leads to a competitive advantage. This study will explore looking at the impact of Knowledge Transfer in a selected petroleum organisation in the Western Cape.

<u>**The aim**</u>: The aim of the study is to explore the role of Knowledge Transfer or the lack of Knowledge Transfer plays within an organisation within the petroleum industry in South Africa. A further aim is to explore the factors which may affect the success and sustainability, thereof.

We are kindly requesting answers to the questions listed below in your good faith. Your answers will be used specifically for this study purposes only and they will be treated with the highest degree of confidentiality and privacy. Also, participation in this interview is voluntary and allows anonymity as well as autonomy.

<u>**Section A: participant's details**</u>

Name: _____ surname: _____ Position: _____	Date: _____ Contact No: _____

RQ1: What are the factors affecting knowledge transfer in a selected petroleum organisation in South Africa?
SQ1.1 What are the challenges faced when transferring knowledge by a selected petroleum organisation?
IQ 1.1.1 Are there engineering skill gaps in the petroleum organisation?
IQ 1.1.2 How is knowledge transferred from experienced too inexperienced employees?
IQ 1.1.3 Is there a willingness and motivation to share or transfer knowledge, in the organisation?

SRQ1.2 What is the organisation doing to leverage the knowledge transfer, to their advantage?
IQ 1.2.1 How does the organisation manage existing knowledge and transferring the knowledge?
IQ 1.2.2 How does the organisation leverage competitive advantage, gained from knowledge transfer?

SRQ1.3 What is the perception of the employees on knowledge transfer within the selected petroleum organisation?
IQ 1.3.1 Does the organisation facilitate knowledge transfer, to develop employees.
IQ 1.3.2 Does it benefit the employee to participate in knowledge transfer?

RQ 2: How can the knowledge transfer be sustainable in a selected petroleum organisation?
SRQ2.1 How does the selected petroleum organisation manage knowledge transfer?
IQ 2.1.1 How does knowledge transfer contribute towards the organisation's economic sustainability?
IQ 2.1.2 How does knowledge transfer contribute towards the organisation's social sustainability (human development)?

SRQ 2.2 How does the organisation plan their succession with regards to knowledge transfer?
IQ 2.2.1 Is there an awareness of succession planning with regards to knowledge transfer?
IQ 2.2.2 Does a promoted or exiting employee have a knowledge transfer process to complete before leaving the unit or organisation?

Thank you for your time and patience in answering the questions. Your contribution is highly appreciated.

APPENDIX B1: INTERVIEW ANSWERS OF PARTICIPANT 1

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

…learning method becomes on the job with limited formal / direct education. There are few players locally within the petroleum industry, which makes the skills rare.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

Experts are not good at sharing information, so in addition to the above, learning method becomes on the job with limited formal / direct education. The majority of the training and academic qualifications in the petroleum industry are offered abroad / overseas.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

Experts are not good at sharing information.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

Training when executing projects / training programmes.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

Students offered bursaries to study abroad.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

The cost of formal training programmes & software impact on the effectiveness, oil price fluctuations affect availability of resources & projects + company size, strategy etc.

IQ 1.3.2: Does it benefit the employee to participate in KT?

Some find it to have additional responsibilities without necessarily getting compensation.

RQ2: HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

Government funding / assistance on the training programme and secondments to leading countries.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

Assistance with the training programme and secondments to leading countries

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

No answer submitted.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

No answer submitted.

APPENDIX B2: INTERVIEW ANSWERS OF PARTICIPANT 2

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

Very limited resources, few drilling activities only one company has got offshore assets in SA.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

Because head office does not have training programs like Mossel Bay plant, it is more challenging at the head office.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

…it is more challenging at the head office.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

They used to bring GITs, graduates in training but due to the low oil price that has not being going as well like before.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

Currently I don't see anything in place to leverage knowledge transfer.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

I believe there is more in Mossel Bay compared to head office. Company scale wise, 60% off the staff have KT in place.

IQ 1.3.2: Does it benefit the employee to participate in KT?

60% of the staff have KT in place.

RQ2: **HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?**

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

Bring more training and have more drilling campaigns.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

In the absence of training programs, the company is using a software programs that are more like online training.

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

Especially at the head office – Plant operation is different because everyone is working on a more practical environment than theoretical applications.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

Honestly most of the succession plans are unknown and not clear to the staff as to what is the plan.

APPENDIX B3: INTERVIEW ANSWERS OF PARTICIPANT 3

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

…not easily available to transfer skills to inexperienced personnel. The lack of succession planning / talent management plans in the organisation is a challenge…

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

…is a challenge where the more experienced personnel are not easily available to transfer skills to inexperienced personnel.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

The secrecy or confidentiality of information in this industry. Most of the information you deal with in this industry is highly confidential so it is a challenge to give out details in order to get views from your peers in the industry.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

There are peer review sessions or consultants that facilitate the sharing of information amongst the industry peers and organisations.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

There are peer review sessions or consultants that facilitate the sharing of information amongst the industry peers and organisations. This assists organisations to benchmark and compare notes on how they go about businesses or organisation must develop clear or practical talent management plans in order to assist with KT amongst its personnel.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

Experienced individuals' fear …that they might lose their jobs or be made redundant …lose their market competitiveness in the industry.

IQ 1.3.2: Does it benefit the employee to participate in KT?

Experienced individuals' fear that when they transfer their knowledge to inexperienced guys that they might lose their jobs or be made redundant. Some people fear that the KT might hinder or they might lose their market competitiveness in the industry.

RQ2: **HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?**

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

There is a lack of clear plans / practical ways in this organisation when it comes to knowledge transfer.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

No talent management plans in place and no succession plans in place.

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

N/A

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

N/A

APPENDIX B4: INTERVIEW ANSWERS OF PARTICIPANT 4

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

Development plans and career succession plans not being approved.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

Managers not implementing knowledge transfer.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

Not implementing knowledge transfer.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

Nothing is being done.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

Nothing is being done.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

No answer submitted.

IQ 1.3.2: Does it benefit the employee to participate in KT?

No answer submitted.

RQ2: HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

It should be done through having talent management in place.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

Development plans that are monitored that they are achieved.

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

None in place.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

None in place.

APPENDIX B5: INTERVIEW ANSWERS OF PARTICIPANT 5

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

No formal skill transfer mechanisms. There is no clear growth path.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

There are no formal skill transfer mechanisms.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

Department execution model is more output orientated.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

I have not noticed any undertaking by business to transfer skills.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

Nothing is being done.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

The company does focus on developing employees.

IQ 1.3.2: Does it benefit the employee to participate in KT?

There is no motivation for employee's to acquire more knowledge in skills.

RQ2: **HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?**

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

It must be well documented with programs in place. There must be a clear growth path.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

Managers must be scored in their KPI against skill transfer.

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

None at all.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

None at all.

APPENDIX B6: INTERVIEW ANSWERS OF PARTICIPANT 6

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

Knowledge not being shared both up and down the company structures. Generational issues also play a very large role in creating barriers to communication and thus the transferring of knowledge and institutional memory.no formal skill transfer mechanisms. There is no clear growth path.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

There is reluctance by the senior employees who occupy strategic roles with the organisation to share experience either through lessons learnt or information transfer.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

There is still a racial gap, perceived or otherwise which contributes to knowledge not being shared both up and down the company structures.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

It is not doing this. Specialist remains specialist until they leave the organisation without transferring knowledge to incoming employees. Consultants are used to complete specialist activities and these consultants then leave with all the organisational information.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

Succession planning which should include upskilling and transfer of skills and knowledge is not enforced.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

It is not a given that the organisation will facilitate its transfer.

IQ 1.3.2: Does it benefit the employee to participate in KT?

If one has to gain knowledge one has to go out and find it.

RQ2: **HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?**

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

Mentoring programs that have a genuine and honest approach to sharing knowledge skills and experiences should be implemented.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

Generation barriers are real and these should be addressed before knowledge can flow freely. Structured progression planning that incorporates shadowing, mentoring and fostering of incoming employees should be adopted.

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

There is none unfortunately!

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

There is none unfortunately!

APPENDIX B7: INTERVIEW ANSWERS OF PARTICIPANT 7

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

Lack of quality control/ Management of this system / deposit

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

Lack of a central facility to accumulate all the knowledge within an organisation

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

Lack of quality control … to accumulate all the knowledge…

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

Regular audits of the quality system.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

Regular audits of the quality system.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

Transfer is limited or minimal and knowledge is not easily accessible.

IQ 1.3.2: Does it benefit the employee to participate in KT?

…knowledge is not easily accessible.

RQ2: **HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?**

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

Various systems are available but not centralised.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

Information is available on a need to know basis.

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

No succession planning in place to transfer knowledge.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

A handover process occurs when the employee leaves the job. He may choose to share the knowledge or not.

APPENDIX B8: INTERVIEW ANSWERS OF PARTICIPANT 8

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

Finding graduates with the basic understanding / fundamentals of reservoir / petroleum engineering …

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

No petroleum engineering courses offered in South-Africa.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

Finding graduates with the basic understanding.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

At the moment, due to the low oil price environment, business is limited.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

In terms of spending time and money on knowledge transfer.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

KT in the petroleum engineering industry can easily be done by online courses and self-reading but you require skill and experience transfer which is lacking and expensive.

IQ 1.3.2: Does it benefit the employee to participate in KT?

KT in the petroleum engineering industry can easily be done by online courses and self-reading but you require skill and experience transfer which is lacking and expensive.

RQ2: HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

More senior members needs to train juniors doubling workload for juniors.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

More senior members needs to train juniors

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

Currently no plan; waiting for industry recover.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

Currently no plan.

APPENDIX B9: INTERVIEW ANSWERS OF PARTICIPANT 9

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

I think multicultural is still the major contributing factor regarding KT within the Petroleum Organisation in South Africa. …possession of knowledge is treating as power therefor is not easy transferred.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

There are various factors affecting KT in any organisation, but I can only share these ones that come to fore regarding Petroleum Organisation.
• Also since the Petroleum Industry is a very competitive industry and generates high revenue it possession of knowledge is treating as power therefor is not easy transferred.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

• Confidentiality of information also contributes as a factor. I knowledge is shared in this regard exposes the organisation wealth of data and leaves it vulnerable to its competitors.
• Due to the reason listed in bullet 3 here, it is evident that knowledge comes at a costly price.
• I think trust is another contributing factor since it allows no faith in it, as it fears the risk of losing its value. I think some of the challenges I have mentioned in IQ1 such as risk in exposing organisations data and the cost that this knowledge comes at. Thus, sets a lack of collaboration through these organisations to empower each other in this regard.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

Thus, I have seen it achieved through Petroleum Professional Society platform, where guest speakers are invited to share certain knowledge regarding various challenging topics. The selected organisation are starting to align them with South African Petroleum Policies in all regards and are utilising this by means of establishing mentorship program through Skills Development Matrixes by empowering its workforce to meet the international petroleum standards.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

They have also taken advantage of the international contractors by enforcing them to empower local talent within the selected organisation.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

There is a lot of engagement in terms of knowledge sharing amongst individuals from various departments, especially when trying to understand the complete over view of the organisation's operations.

IQ 1.3.2: Does it benefit the employee to participate in KT?

I think and this as experience amongst professional within my space of expertise is that there is a lot of engagement in terms of knowledge sharing amongst individuals from various department.

RQ2: HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

I think it would be to motivate an awareness amongst the work force of the significance knowledge sharing has towards organisation success. Also is for the organisation to clearly state the results that thus would achieve in not only empowering the work force but also create a good and strong organisational culture. I am aware organisations provide the space for KT to take place and pay for its workforce to be part of professional bodies. So thus in turn allows individuals within the organisation to invite guess speakers to talk on certain subjects that can benefit organisation work force, they mandated by these professional bodies.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

The organisation provides the knowledge sharing through establishment of Libraries within the organisation and record keeping for future reference.

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

I think the organisation has provided all the tools and space necessary for this significant activity to take place but this would be incomplete it is not encourage and motivated amongst individual for implementation and better utilisation of it. So education around this is of crucial importance for it to succeed.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

It is not encourage and motivated amongst individual for implementation and better utilisation of it.

APPENDIX B10: INTERVIEW ANSWERS OF PARTICIPANT 10

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

Normally as a graduate you learn only the basics and that affects very bad when you they are not renewing the contract and makes it difficult to get another job to other organisation.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

Facts are that the organisation is thinking of the future of the company by transferring the knowledge to Graduates who have no experience in the industry. Through my experience the challenge is that they do not have a specific employee responsible for KT and the organisation have restrictions e.g. when you are still a Graduate you are not granted for engineering licences within the organisation and on my side not allowed to go to offshore.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

And I believe that the organisation's aim and objective is to keep the business going to achieve the vision and mission of the company; and also to be competent with other petroleum organisations.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

Due to financial problems that the organisation is facing at the moment they provide Graduate programme to students that they were sponsoring during their studies and the programme is for a period of 1 year.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

The organisation used to provide graduate programme almost every year for a period of 2 years.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

As for senior employees they appreciate that they have Graduates that will assist them on their dead lines of their projects.

> *IQ 1.3.2: Does it benefit the employee to participate in KT?*

Graduates that will assist them with the deadlines of their projects

RQ2: HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?

> **RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?**

> *IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?*

By selecting employees that will be responsible for KT to Graduates with all the materials that are being used in the organisation.

> *IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?*

Every three months they review the performance on the tasks given within the organisation.

> **RSQ 2.2: How does the organisation plan succession with regards to KT?**

> *IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?*

The organisation provides Graduate programmes for a period of 1 year, then they extend the contract if there is a need to keep you in the organisation.

> *IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?*

Given responsibilities on the projects.

APPENDIX B11: INTERVIEW ANSWERS OF PARTICIPANT 11

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

Furthermore, some of this knowledge is experience based that is built up over years and this is not always transferable within a short space of time as is often required

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

The complexity and sheer volume of detail that needs to be transferred is always a challenge.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

Knowledge is experience based that is built up over years and this is not always transferable within a short space of time as is often required.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

There are numerous software knowledge based systems that are built to facilitate the storage of documents and decision registers and fault trees with regards to knowledge transfer.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

Furthermore there are various experts that within the organisation build communities of practise in certain areas of specialities.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

Given the challenges, it is not executed very well.

IQ 1.3.2: Does it benefit the employee to participate in KT?

It is not executed very well.

RQ2: **HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?**

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

More time needs to be given to allow entrants into positions to understand the business and allow for meaningful transfer of knowledge, in order to derive the maximum benefit of transferred knowledge.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

More time needs to be given to allow entrants into positions to understand the business and allow for meaningful transfer of knowledge.

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

However, for new entrants down below closer to the floor where the impact is greater there is not much room for succession planning.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

In higher up positions this is often achieved given that promotion within areas are made upwards.

APPENDIX B12: INTERVIEW ANSWERS OF PARTICIPANTS 12–20

GROUP: 8 ENGINEERS

RQ1: WHAT ARE THE FACTORS AFFECTING KT IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?

RSQ 1.1: What are the challenges faced by a selected petroleum organisation when transferring knowledge?

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

Understaffing leads to employees being overworked …more valuable if you are the only person with that specific knowledge.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

Understaffing … This results in employees not having time to transfer knowledge and rather do it themselves. No present, formalised structure to do so.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

If a company's future is uncertain, the perception is that you are more valuable if you are the only person with that specific knowledge.

RSQ 1.2: What is the business doing to leverage KT to the selected petroleum organisation's advantage?

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

No answer submitted.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from KT?

No answer submitted.

RSQ 1.3: What is the perception of the employees about KT within the selected petroleum organisation?

IQ 1.3.1: Does the organisation facilitate KT to develop employees?

KT is not pushed from management as a key objective.

IQ 1.3.2: Does it benefit the employee to participate in KT?

Not good at knowledge transfer. The culture is not in place in the organisation to share knowledge.

RQ2: **HOW CAN KT BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?**

RSQ 2.1: How does the selected petroleum organisation manage KT within the organisation?

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

Formalised training programs for graduates with presentations and tests; formalised training modules with a competency assessment after completion of module (engineering).

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

Some managers add KT to employee performance contracts.

RSQ 2.2: How does the organisation plan succession with regards to KT?

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

Normally, a graduate is expected to be "competent" within a 2 year period. There used to be a minimum graduate hire per year, but not anymore due to a no-new-hire policy. Vacancies are usually filled.

IQ 2.2.2: Does a promoted or exiting employee have a KT process to complete before leaving the unit or organisation?

When an employee leaves, they are expected to do a formal handover.

APPENDIX C: CONSENT LETTER OF COMPANY TO CONDUCT RESEARCH

Date:

I, *LINDA NENE*, in my capacity as *GROUP COMPLIANCE MANAGER* at *PETROSA* give consent in principle to allow Ursula Riddles, a student at the Cape Peninsula University of Technology, to collect data in this company as part of her M Tech (IT) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

This consent in no way commits any individual staff member to participate in the research, and it is expected that the student will get explicit consent from any participants. I reserve the right to withdraw this permission at some future time.

In addition, the company's name may—or may not be used as indicated below. (Tick as appropriate).

	Thesis	Conference paper	Journal article	Research poster
Yes				
No	✓	✓	✓	✓

LINDA NENE

Name:

Date: 23.02.2017

APPENDIX D: EXAMPLE OF ANALYSIS OF INTERVIEW DATA

RQ 1:	WHAT ARE THE FACTORS AFFECTING KNOWLEDGE TRANSFER IN A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA?	Response: Participant 1	Response: Participant 2	Response: Participant 3
SRQ 1.1	What are the challenges faced when transferring knowledge by a selected petroleum organisation?	The majority of the training and academic qualifications in the petroleum industry are offered abroad / overseas. Experts are not good at sharing information, so in addition to the above, learning method becomes on the job with limited formal / direct education. There are few players locally within the petroleum industry, which makes the skills more.	Very limited resources, few drilling activities, ony one company has got offshore assets in SA. Because head office does not have training programs like Mosselbay plant, it is more challenging at the head office.	The secrecy or confidentiality of information in this industry. Most of the information you deal with in this industry is highly confidential so it is a challenge to give out details in order to get views from your peers in the industry. The lack of succession plan / talent management plan in an organisation. The lack of succession planning / talent management plans in the organisation is a challenge where the more experienced personnel are not easily available to transfer skills to inexperienced personnel.
SRQ 1.2:	What is the business doing to leverage the knowledge transfer to the selected petroleum organisation's advantage?	Training when executing projects, / training programmes. Students offered bursaries to study aboard.	They used to bring GIT's, graduates in training but due to the low oil price that has not being going as well like before. Currently I don't see anything in place to leverage knowledge transfer.	There are peer review sessions or consultants that facilitate the sharing of information amongst the industry peers & organisations. This assist organisations to benchmark and compare notes on how they go about businesses or organisation must develop clear or practical talent management plans in order to assist with knowledge transfer amongst its personnel.
SRQ 1.3:	What is the perception of the employees on knowledge transfer within the selected petroleum industry?	Some find it to have additional responsibilities without necessarily getting compensation. The cost of formal training programmes & software impact on the effectiveness, oil price fluctuations affect availability of resources & projects + company size, strategy etc.	I believe there is more in Mosselbay compared to head office. Company scale wise, 60% off the staff have knowledge transfer in place.	Experienced individuals fear that when they transfer their knowledge to inexperienced guys that they might loose their jobs or be made redundant. Some people fear that the knowledge transfer might hinder or they might loose their market market competitiveness in the industry.

RQ 2:	HOW CAN KNOWLEDGE TRANSFER BE SUSTAINABLE IN A SELECTED PETROLEUM ORGANISATION?	Response: Participant 1	Response: Participant 2	Response: Participant 3
SRQ 2.1:	How does the selected petroleum organisation manage knowledge transfer	Government funding / assistance on the training programme & secondments to leading countries.	Bring more training and have more drilling campaigns.In the absence of training programs. The company is using a software programs that are more like online training.	There is a lack of clear plans / practical ways in this organisation when it comes to knowledge transfer. No talent management plans in place & no succession plans in place.
SRQ 2.2:	How does the organisation plan their succession with regards to knowledge transfer?	No answer submitted	Honestly most of the succession plans are unknown and not clear to the staff as to what is the plan. Especially at the head office. Plant operation is different because everyone is working on a more practical environment than theoretical applications.	N / A

APPENDIX E: SUMMARY OF INTERVIEW RESPONSES

IQ 1.1.1: Are there engineering skill gaps in the petroleum organisation?

P1 & P2: Limited resources, including drilling activities.

P3, P5, P6, P9 & P11: Knowledge and skills not easily transferred or shared.

P3, P4 & P5: There is a lack of succession planning / talent management plans and no clear growth plan.

P5 & P7: There are no formal skill transfer mechanisms or management of a KT system.

P8: Finding graduates with the basic understanding and the training of graduates is not satisfactory.

P12: Understaffing leads to employees being overworked.

IQ 1.1.2: How is knowledge transferred from experienced too inexperienced employees?

P1, P2 & P8: Limited formal / direct education. The training and academic qualifications in the petroleum industry are offered abroad / overseas.

P1, P3, P4, P5 & P6: Reluctance from managers to transfer knowledge and skills to inexperienced personnel, through lessons learnt or information transfer.

P5, P7 & P12: There are no formal skill transfer mechanisms.

P9: Factors affecting KT includes no specific employee responsible for KT and knowledge is treated as power and not easily shared.

P10 & P11: The complexity and sheer volume of detail that needs to be transferred to graduates along with the absence of approval, related to the engineering licences.

IQ 1.1.3: Is there a willingness and motivation to share or transfer knowledge, in the organisation?

P1 & P2, P3 & P9: The reluctance to share stems from the following: Secrecy or confidentiality – organisation wealth of data and leaves it vulnerable to its competitors. Trust and fear are also some of the factors associated with the lack of collaboration and knowledge transfer.

IQ 1.2.1: How does the organisation manage existing knowledge and transferring the knowledge?

P1 & P2: Training associated with executing projects.

P2 & P8: The low oil price contributes to the lack of knowledge transfer.

P3 & P6: There are peer review sessions or consultants that facilitate the sharing of information amongst the industry peers and organisations.

P4, P5 & P6: No KT is being done.

P7: Regular audits of the quality system and software knowledge based systems that are built to facilitate the storage.

IQ 1.2.2: How does the organisation leverage competitive advantage, gained from knowledge transfer?

P1: Students offered bursaries to study aboard.

P2, P4 & P5: Currently I don't see anything in place to leverage knowledge transfer.

P3, P9 & P11: There are various experts that within the organisation build communities of practise in certain areas of specialities.

P6, P9 & P10: Succession planning by enforcing international contractors to empower local talent.

IQ 1.3.1: Does the organisation facilitate knowledge transfer, to develop employees?

P2, P5, P7 & P9: KT in place, company does focus on developing employees. Engagement in terms of knowledge sharing amongst individuals from various departments.

P6 & P12: It is not a given that the organisation will facilitate its transfer, KT is not pushed from management as a key objective.

IQ 1.3.2: Does it benefit the employee to participate in knowledge transfer?

P1: Some find it to have additional responsibilities without necessarily getting compensation.

P5: There is no motivation for employee's to acquire more knowledge in skills.

P6: If one has to gain knowledge one has to go out and find it.

P12: The culture is not in place in the organisation to share knowledge.

IQ 2.1.1: How does KT contribute towards the organisation's economic sustainability?

P1, P2, P5, P6, P9, P10, P11 & P12: Government funding / assistance on the mentoring training programme & secondments to leading countries, more drilling programmes.

IQ 2.1.2: How does KT contribute towards the organisation's social sustainability (human development)?

P1: assistance on the training programme and secondments to leading countries.

P2, P3 & P7: In the absence of training programs. The company is using a software programs that are more like online training.

P4, P5, P6, P8, P10, P11 & P12: Development plans and KPI's are monitored every three months the performance on the tasks given within the organisation. Structured progression planning that incorporates shadowing, mentoring and fostering of incoming employees.

IQ 2.2.1: Is there an awareness of succession planning with regards to knowledge transfer?

P2, P3, P4, P5, P6, P7, P8 & P11: Honestly most of the succession plans are unknown and not clear to the staff as to what is the plan, especially at the head office. Plant operation is different because everyone is working on a more practical environment than theoretical applications.

P9, P10 & P12: the organisation has provided all the tools and space necessary for succession planning and KT to take place.

APPENDIX F: ETHICAL CLEARANCE

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Office of the Chairperson Research Ethics Committee	Faculty:	BUSINESS AND MANAGEMENT SCIENCES

At a meeting of the Research Ethics Committee on 23 June 2017, Ethics Approval

was granted to Ursula Franelin Riddles (201095793) for research activities

Related to the MTech/DTech: Mtech Business Information Systems at the Cape Peninsula University

of Technology

Title of dissertation/thesis/project:	THE ROLE OF KNOWLEDGE TRANSFER IN THE SUSTAINABILITY OF A SELECTED PETROLEUM ORGANIZATION, IN SOUTH AFRICA Lead Researcher/Supervisor: Dr A. De La Harpe

Comments:

Decision: APPROVED

	23 June 2017
Signed: Chairperson: Research Ethics Committee	Date

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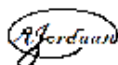
APPENDIX G: EDITING CERTIFICATE

21 February 2022

URSULA FRANELIN RIDDLES
Faculty of Business and Management Sciences
Cape Peninsula University of Technology
Cape Town

RE: EDITING CERTIFICATE - MASTER'S THESIS

I, the undersigned, herewith certify that the editing of the Master's thesis of Ursula Franelin Riddles, *"THE ROLE OF KNOWLEDGE TRANSFER IN THE SUSTAINABILITY OF A SELECTED PETROLEUM ORGANISATION IN SOUTH AFRICA"*, has been conducted and concluded.

The finalised thesis was submitted to Ms Riddles and cc'd to Prof. Andre de la Harpe on 21 February 2022.

Sincerely

A Jordaan

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DTech: Information Technology
Ph: 065 990 3713

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South African Translators' Institute (SATI)