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Strategies to Improve Knowledge Management Initiatives in Oil and Gas Companies

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Walden University

College of Management and Technology

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Aissatou Seydi

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Walden University
2020

Abstract

Strategies to Improve Knowledge Management Initiatives in Oil and Gas Companies

by

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MS, Centre Africain d'études Supérieures en Gestion, 2004

BS, University of Buea, 2002

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

December 2020

Abstract

According to a study by the Society of Petroleum Engineers, oil and gas industry experts estimated a loss of 231,000 years of cumulative experience and knowledge due to retirements. Strategies to improve knowledge management initiatives are important for oil and gas industry business leaders seeking to maintain, sustain, and develop knowledge in their organizations. Grounded in knowledge creation theory, the purpose of this qualitative single case study was to explore strategies that business leaders use to improve knowledge management initiatives with their employees in an oil and gas company located in Lagos, Nigeria. Data were collected from semistructured interviews completed by telephone with 10 business leaders and from company procedures, policies, and guidelines. Data were analyzed using Yin's 5-step process. Three key themes emerged from this study: organizational knowledge documentation, implementation of employee knowledge acquisition strategies, and the transfer of knowledge to enhance personnel capabilities. A key recommendation is for oil and gas industry business leaders to focus on employee development and use knowledge acquisition, knowledge transfer, and knowledge documentation as key knowledge management processes. The implications for positive social change could include the potential to enhance employees' intellectual capital and leaders' competencies, which could improve employee job satisfaction and employee performance, improving business profitability. This profitability could increase employment, employee incomes, and tax revenues, which could improve the standard of living in the local community.

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Dedication

I dedicate this doctoral study to my mother, Mrs. Seydi Mballa Rebecca, who is also my prayer warrior. She motivates me to keep learning all the time, tracks my work progress through time, and continually prays for her family to be successful. I am also thankful to my family, including my husband, my three children, my sister and nephews, and my brothers, all of whom have been supportive during the last 6 years and encouraged me to do my best.

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Section 1: Foundation of the Study

Knowledge management (KM) is critical for employees, for whom an understanding of their contributions to their organizations is needed so that they can perform their jobs effectively (Ahuja, Singh, & Kumar, 2018). In the oil and gas industry, implementing KM initiatives enables managers to develop and retain employees while improving competitiveness (Sumbal, Tsui, Cheong, & See-to, 2018). This research study focused on strategies that can be used to enhance KM initiatives in the oil and gas industry. Section 1 includes the background of the problem, the problem statement, the purpose statement, the nature of the study, the study's research question, and the interview questions. In this section, I also present the conceptual framework, operational definitions, significance of the research, and the study assumptions, limitations, and delimitations. The section ends with a review of the academic literature and a transition to Section 2.

Background of the Problem

KM perception by organizational leaders has evolved from knowledge sharing (KS) concepts to employee work optimization and company cost control (Dalkir & Beaulieu, 2017). In the business environment, knowledge is a critical organizational resource from a strategic perspective, because of the potential loss of business opportunities to recover employees' expertise in an organization (McEvoy, Ragab, & Arisha, 2017). Managers cannot avoid some loss of employee knowledge in an organization because of resignations, layoffs, retirement, restructuring, or outsourcing (McEvoy et al., 2017).

In the oil and gas industry, researchers have identified a decrease in performance due to knowledge loss (Ranjbarfard, Aghdasi, López-Sáez, & Emilio Navas López, 2014). To counteract this, some key KM initiatives have been implemented in the oil and gas industry, including virtual seminars, communities of practice, and KM systems (Ranjbarfard et al., 2014). Despite the implementation of initiatives to maintain the knowledge of employees within organizations, KM nonetheless constitutes a permanent challenge in the oil and gas industry (Ranjbarfard et al., 2014). Key challenges are personal KS challenges, organizational KS barriers, and potential technological KS barriers (Chong & Besharati, 2014). The review of KM initiatives in the oil and gas industry is a challenge for business leaders to maintain knowledge within their organizations.

Problem Statement

Assessing the KM capability of a company constitutes an essential part of building a competitive advantage and improving profits (Inkinen, 2016). Although 50% of oil and gas workers will retire between 2020 and 2025, leading to knowledge loss, only 40% of oil and gas companies are implementing measures designed to manage knowledge (Sumbal, Tsui, & Lee, 2015). The general business problem that I addressed in this study involved some business leaders in oil and gas companies who are negatively affected by the lack of KM initiatives, which resulted in a loss of profitability. The specific business problem that I addressed in this study was that some business leaders lack strategies to improve KM initiatives with their employees.

Purpose Statement

The purpose of this qualitative single case study was to explore strategies that business leaders use to improve KM initiatives with their employees. The targeted population of the study comprised of 10 business leaders from an oil and gas company located in Lagos, Nigeria, who had implemented strategies to improve KM initiatives. The implications for the positive social changes included potential increases in employees' intellectual capital and maximized organizational profitability. The potential to develop high KM standards, enhance a business reputation, and improve competitiveness might promote company growth. This growth could expand into the business community by creating employment opportunities for competent potential employees and improving growth and prosperity in the local economy.

Nature of the Study

Three research methods are available to researchers: qualitative, quantitative, and mixed methods research (Yin, 2015). In qualitative research, researchers collect data using open-ended questions to explore a phenomenon within a context (Kharchenko, 2016). In quantitative analysis, researchers use closed-ended questions to conduct hypothesis testing (Black, 2014). Mixed methods research is the sequential or concurrent use of both qualitative and quantitative research methods in the same inquiry (Venkatesh, Brown, & Sullivan, 2016). I selected a qualitative method so that I could ask open-ended questions about the phenomenon I wanted to explore. I did not test a hypothesis, which would be within the scope of quantitative research or the quantitative aspect of mixed methods.

I considered five research designs for this study: narrative design, phenomenology design, ethnography design, grounded theory, and case study design. A narrative design consists of telling a story (Merriam & Tisdell, 2015). This approach did not apply to the research study because I did not tell a story. A phenomenological design involves analyzing a phenomenon that is part of participants' lived experiences (Jenkins, 2016). A phenomenological design did not apply to this study, because it did not concern the lived experiences of the study participants. An ethnographic design consists of portraying and explaining social groups and chosen situations in their real lives (Stevenson, 2016). An ethnographic design was not the optimal choice for this study because I was not seeking to describe a real-life situation of a social group. Grounded theory is a design used to analyze data collected in a specific research area to generate an inductive theory about the area under research. Researchers use a systematic approach, including defined methods, to generate the theory (Ragsdell, Probets, Ahmed, & Murray, 2014). A grounded theory design did not apply to this research because I did not intend to generate theory within a specific research area. The case study design enables researchers to explore phenomena within time boundaries and locations and allows for an in-depth understanding of a specific problem (Yin, 2014). I chose a case study design for this study because I wanted to explore a real phenomenon in an oil and gas company, including the implementation of KM initiatives and understanding how business leaders dealt with issues related to implementing these initiatives.

Research Question

The central research question for this study was: What strategies do business leaders use to improve KM initiatives with their employees?

Interview Questions

1. What strategies are you using to improve KM initiatives with your employees?
2. What best practices or methods are you using for the successful implementation of KM initiatives in your organization?
3. What are the issues faced during the implementation of KM initiatives with your employees?
4. What methods do you find work best to solve issues faced with your employees?
5. What are the less effective methods used to improve KM initiatives with your employees?
6. What are the documents used in your organization to support KM initiatives?
7. What are the methods used for the transfer of knowledge from employees to groups or vice versa?
8. How do employees respond to the KM initiatives implemented?
9. What additional information would you like to share about KM initiatives?

Conceptual Framework

Nonaka and Takeuchi (1995) developed a knowledge creation (KC) framework embedded in KC theory. Company success relates to workers' ability to generate knowledge and produce successful products and technology. The focus of KC theory is to provide an organizational KC method, and Nonaka and Takeuchi distinguish two types of knowledge: explicit knowledge, contained in manuals and procedures, and tacit knowledge, which is learned from experience and transferred through metaphor and analogy. The purpose of the KC theory is to describe the transformation of tacit knowledge into explicit knowledge in organizations (Nonaka & Takeuchi, 1995).

Nonaka and Ryoko (2003) explained how companies might build sustainable competitive advantage by using knowledge and enhancing KC capabilities. KC is the key to creating sustainable competitive advantage, because knowledge diminishes quickly with competition and changes in customers' preferences over time (Nonaka & Takeuchi, 1995). Nonaka (1994) identified four vital constructs as modes of KC: socialization, externalization, internalization, and combination (SECI). These essential constructs relate to tacit knowledge conversion to explicit knowledge and vice versa. The KC theory applied to this research because it provided a practical framework for organizations to manage knowledge and create KM initiatives.

Operational Definitions

This subsection defines terms employed within the context of this research.

Explicit knowledge: Explicit knowledge is the knowledge that can be shared, documented, easy to handle, and storable (Birasnav, 2014).

KM: KM is the capture, distribution, and effective use of knowledge within an organization (Ponelis & Fairer-Wessels, 2014).

KM initiatives: KM initiatives are actions executed to enable companies to develop organizational learning, resulting in corporate knowledge and expertise application and enhancement of organizational resources (Akhavan & Pezeshkan, 2014). The objective is an efficient use of firms' resources and a successful implementation of companies' resources in organizations (Akhavan & Pezeshkan).

KS: KS is the process of a mutual exchange of knowledge and the creation of new knowledge by two parties: the knowledge owner and the knowledge receiver (Mittal & Dhar, 2015).

Knowledge transfer (KT): KT is a process developed in organizations for the systematic exchange of information and skills between entities and the ability to convey data from one place to another or from one person to another within the organization (Jiménez-Jiménez, Martínez-Costa, & Sanz-Valle, 2014).

Organizational knowledge: Organizational knowledge is data created from the transformation of tacit and explicit knowledge in a company. This transformed data is valuable and unique to each organization (Birasnav, 2014).

Tacit knowledge: Tacit knowledge is the knowledge that resides in employees' brains and consists of unique, valuable, and underutilized data. This type of knowledge may be unarticulated (Birasnav, 2014).

Assumptions, Limitations, and Delimitations

In this section, I described the assumptions considered, the limitations of the research, and its delimitations. I considered the research setting, an oil and gas company, and the study participants, about whom I established research assumptions. The limitations relate to weaknesses in a research study (C. Marshall & Rossman, 2014), and delimitations constitute research boundaries (Harmon, 2018).

Assumptions

Vogt and Johnson (2015) defined an assumption as a presumed true statement used temporarily for a specific goal. In this research study, I considered four assumptions. The first assumption was that all or most chosen participants would volunteer to take part in the research study. The second assumption was that individuals who signed the letter of cooperation would provide a list of fully knowledgeable participants who had used successful strategies to improve KM initiatives. The third assumption was that the information I gathered was representative of practices in the oil and gas industry. The last assumption was that I would receive truthful and honest answers from participants.

Limitations

Limitations are weaknesses identified in a study (C. Marshall & Rossman, 2014). Some limitations include potential biases when conducting the research and access to information (C. Marshall & Rossman, 2014). The first limitation was the existence of potential bias when I worked in the oil and gas industry as human resources personnel. My duties required the implementation of KM initiatives and corresponding strategies.

The second limitation was related to access to information. I conducted the research using phone interviews because the organization whose employees I targeted for participation was located in a neighboring country, and I lacked the opportunity to travel to conduct this research. This lack of face-to-face interaction might have reduced participants' eagerness to share data. The last limitation was the lack of experience in conducting qualitative case studies research. According to Yin (2014), one of the key success factors in qualitative case study research is the researcher's training and ability to apply the research method. This research was my first qualitative case study research making the lack of competency a limitation.

Delimitations

Delimitations are researchers' self-imposed restrictions to reduce the scope of a study or the research boundaries (Harmon, 2018). The choice of one oil and gas company in Nigeria delimited the research to one country, and the results obtained described practices in Nigeria only. Choosing the oil and gas industry as the sole industry was also a delimitation as KM initiatives may apply in other sectors. Another delimitation of the study was the number of case studies reviewed as part of this research. Employing only a single case study delimits the research to only one organization in contrast to possibly researching multiple organizations or increasing the representation within the oil and gas industry, both of which could occur if multiple case studies constituted the research.

Significance of the Study

The significance of the study covered the research added value to business practice and social change implications. The contribution to business practice included potential improvements of KM practices in the oil and gas industry and the effect of these practices on business profitability. The positive social change implications were related to employees and local communities.

Contribution to Business Practice

This study is of value to the practice of business because business leaders may increase intellectual capital within their organizations as a result of improved KM practices. As stated by Shahveisi, Khairollahi, and Alipour (2017), intellectual capital is one of the principal factors of firms' profitability. Fifty percent to 90% of the value created within companies is estimated to come from intellectual capital rather than production (Alipour, 2012). The use of improved KM initiatives in oil and gas companies might lead to value creation and improved profitability for businesses. The contribution to professional or practitioner application included strategies to transfer knowledge from experienced, knowledgeable employees to less experienced ones, plans to build and document organizational learning, approaches to assess KS barriers, and strategies to create communities of practices to maintain proficiency in business units. The use of improved initiatives might have an effect on business performance and might contribute to increased financial returns. The resulting increases in competitiveness and growth of the company within the local business environment could also be factors of development for the local economy.

Implications for Social Change

The implications for positive social change covered two dimensions: internal and external of companies. In organizations, there was a potential to enhance employees' capabilities by improving their knowledge through KS, leading to an overall human capital development for the organization, and to the empowerment of workers with higher competency levels (Sumbal, Tsui, See-to, & Barendrecht, 2017). The increase in competency levels and job responsibilities might create job satisfaction, employee engagement, and contribute to positive social change culture in organizations.

External to organizations, improved KM initiatives could enable technical knowledge and business practice sharing with contractors, partners, or competitors. Business leaders might define a mechanism to share documented organizational knowledge with colleagues of the same industry as a contribution to build their capabilities and develop an exchange relationship (Sumbal, Tsui, See-to, & Barendrecht, 2017). Oil and gas industry workers using efficient KM initiatives might also transfer acquired knowledge to their customers or individuals within their communities, contributing to improved working methods of the members of these communities. From a social responsibility standpoint, good interactions with external parties could contribute to building a positive business reputation for the organization seen as a role model in the industry.

A Review of the Professional and Academic Literature

The purpose of a literature review is to provide an overview of the conceptual aspects of the research topic using scholarly sources. I conducted searches from within

online sources, including Google Scholar and databases of available online libraries. I used Business Sources Complete, ABI Inform, and ProQuest databases to find most of the research content. In Google Scholar, I conducted research linked to Walden University's library. To find research related to the topic, I searched with the following keywords: *KC theory*, *KM*, *oil and gas*, *petroleum*, *industry*, *profitability*, *KM theory*, *KT*, *KS*, *knowledge acquisition (KA)*, *SECI*, *Ba*, *tacit*, and *explicit knowledge*. The research results included 116 sources, of which 89 (77%) were peer reviewed, and 78 (67%) were published between 2016 and 2020.

The strategy used to organize the literature comprised of three areas of research. The first area was to review theories applicable to the research study and compare the chosen theory to a contrasting theory. In the second area, I reviewed KM principles and strategies to improve KM initiatives in organizations. The last area was an overview of studies, including strategies used to improve KM initiatives in oil and gas companies, the effect of KM on oil and gas business profitability and the application of the KC theory in oil and gas businesses as part of their KM strategies.

Review of Theories Applicable to KM

I reviewed two theories to identify the most appropriate one to use in the conceptual framework for this research study. The theories were the KC theory and the knowledge-based view (KBV) theory of the firm. To determine the most useful theory for the conceptual framework, I examined the alignment with the research question.

The KBV theory of the firm. I reviewed the KBV theory of the firm to assess its application as an alternative theory to this research as compared with the KC theory.

From the KBV theory, organizations are places where knowledge production and integration occur (Grant, 1996). One of the main assertions of the KBV theory is the consideration of assets and people as strategic resources (Donate & de Pablo, 2015). In this theory, organizational performance results directly from the repository of employees' knowledge and competencies (Grant, 1996). Considering that organizational knowledge is unique to each firm (Birasnav, 2014), managers' use of organizational systems should enable employees' knowledge conversion into organizational knowledge. As a consequence, the leading strategic resource in the KBV theory is knowledge and success resides in the proper management of knowledge for value creation within firms.

The KBV theory of the firm is appropriate for addressing KM issues, as its focus is the efficient use of employees' knowledge. Company managers can gather knowledge in the form of information or expertise for efficient processing and differentiation when competing with other firms (Blome, Schoenherr, & Eckstein, 2014). In organizations, the combination of employees' dynamic capabilities may improve KM (Donate & de Pablo, 2015). Business leaders should build knowledge and define appropriate processes to facilitate KC from employee knowledge. Company managers may apply the KBV theory for organizational changes based on employee capabilities, to review hierarchy and decision-making process, and to redefine the boundaries of their organization (Grant, 1996). It can be inferred that the knowledge-based approach may lead to innovations and changes in management practice. Despite the principles considering knowledge generation by individuals, the focus of the KBV theory is on organizational

management rather than people.

The KBV theory contains no reference to the organizational KC process, leading to practical difficulties in applying the theory to businesses (Nonaka & Toyama, 2015). One issue relates to managing employee relationships and interactions. The KBV theory of the firm does not provide a guide to managing interactions between individuals, their environment, and organization processes (Nonaka & Toyama, 2015). The focus of the KBV theory is about identifying knowledge as the key organizational asset rather than providing guidance on knowledge development, retention, and KT (Donate & de Pablo, 2015). The KBV theory is limited in its application to business as there is no clear guide on how to manage knowledge from individuals to teams or to conceptualize the knowledge created for further use in organizations. I considered employing the KBV theory of the firm to find strategies to improve KM initiatives in the oil and gas industry. However, I did not select this theory because of its limited application to solve a business problem in an organization.

KC theory. I reviewed the foundation principles of the KC theory, together with its associated theoretical concepts. The purpose of Nonaka and Takeuchi's KC theory (Nonaka & Takeuchi, 1995) is to enhance organizational knowledge using a spiral process beginning at the individual level and moving upwards to the organizational level. The theory includes a focus on tacit knowledge conversion to explicit knowledge, further operationalized by employees within organizations (Khodakarami & Chan, 2014). The driver of the KC theory is the application of explicit and tacit knowledge concepts to organizational knowledge (Nonaka, Von Krogh, & Voelpel, 2006). Explicit

knowledge includes language and documents, whereas tacit knowledge consists of skills and employees' expertise (Nonaka et al., 2006). The knowledge differentiation process in the KC theory enables business leaders to develop and implement actionable KM strategies in their organizations.

I reviewed the rationale and principles of Nonaka and Takeuchi's KC theory. The purpose of the KC theory is to make knowledge available and to improve organizational learning through knowledge connection and crystallization in organizations (Nonaka et al., 2006). Nonaka and Takeuchi (1995) developed the KC theory in response to the lack of KC approaches in some firms where KM issues were identified. The theory includes a provision to overcome knowledge transmission issues among individuals in organizations. Human beings are at the center of the KC theory as people hold and justify knowledge within organizations. In the organizational KC theory, the differences in human subjectivities help to develop new knowledge (Nonaka et al., 2006). During the organizational knowledge-creating process, there is an interaction between individuals, resulting in a change in people, organization, and environment. The KC theory is a guide for developing a vision of knowledge, which is the direction of KC in a firm. This vision of knowledge relates to why a company exists and what the employees should do beyond profits based on the company-defined mission.

Researchers can use the KC theory to categorize knowledge in organizations. Different stages and knowledge types are considered within the scope of this framework. One of the fundamental assumptions of the KC theory is that all knowledge is either

tacit or explicit (Nonaka & Nishihara, 2018). Tacit knowledge represents subjective knowledge that is not expressible as figures, language, or numbers. This knowledge includes technical skills, beliefs, opinions, and expertise; however, explicit knowledge is rational knowledge presented as formulas or numbers (Nonaka & Nishihara, 2018). The KC theory of the firm includes a knowledge conversion cycle involving tacit and explicit knowledge. The KC process consists of four sequential modes of knowledge conversion: socialization, externalization, combination, and internalization (Kaur, 2015). The two types of knowledge generated in organizations are tacit knowledge or explicit knowledge. Managers can establish a KC process based on different types of knowledge. For effective organizational KC, all knowledge generated should follow the four steps process of the KC theory.

I reviewed the mechanism of the four steps process of the KC theory and the theory contents. The two fundamental factors of the KC theory are the process and the content (Huang, 2013). The process is the SECI process, also called the knowledge conversion process; and the content is the KC context called Ba (Huang, 2013). At the beginning of the SECI process, individuals create knowledge, and this knowledge resides within these individuals (J. Wang, 2016). The “Ba” is a shared space used as a setting for KC and organizational learning progress (Bartolacci, Cristalli, Isidori, & Niccolini, 2016). The KC theory led to two critical success factors to corporate KC: the existence of KC processes and a defined organizational setting. These factors are the basic requirements to apply the KC theory in an organization. The KC theory was the most suitable theory for this research study because of the potential to adapt this

conceptual framework to solve organization KM issues and determine strategies to improve KM initiatives in businesses.

Knowledge categorization in the KC theory. I reviewed knowledge categorization within the scope of the KC theory. In the organizational KC theory, knowledge is classified into two types: tacit knowledge and explicit knowledge. Understanding the differences between these two types of knowledge is valuable for KC in organizations. Explicit knowledge is the knowledge that may be shared using formal or systematic language, whereas tacit knowledge is specific to individuals. Tacit knowledge, which is challenging to communicate and formalize, is rooted in individual actions and involves technical and cognitive elements such as expertise, skills, and crafts (Nonaka & Takeuchi, 1995). In contrast to tacit knowledge, explicit knowledge is digital, discreet, and captured over time in records, including libraries, databases, and archives.

The efficient and effective management of tacit knowledge is a key success factor to KM in organizations (Zaim, Gürcan, Tarım, Zaim, & Alpkan, 2015). The uniqueness of tacit knowledge also makes it difficult to imitate and replicate (Zaim et al., 2015). Because of the abstract nature of tacit knowledge, it is more difficult to manage tacit knowledge than explicit knowledge. In summary, identifying tacit knowledge requires close interactions with knowledge owners, because knowledge is within individuals and not documented. Managing explicit knowledge can be a straightforward process because of its tangible nature. For effectiveness, the focus of KM strategies in organizations should be oriented towards a transformation of tacit to

explicit knowledge. This transformation may help business leaders to require knowledge documentation from employees to build companies' knowledge databases to minimize knowledge loss.

The SECI model. The SECI model, including the SECI process and the Ba, are the key constructs of the KC theory. The SECI process is a knowledge conversion cycle used for social validation of combined personal knowledge with other organizational expertise for organizational growth (Nonaka & Toyama, 2015). The second key construct is the Ba. The Ba is a shared context of KC, including the knowledge assets as part of the KC cycle (Kaur, 2015).

In the KC theory, knowledge is assumed to be created within a specific organizational context called *Ba*; the Ba is a KC enabling factor. The Ba is a Japanese word, which means space (Berry, 2016). The notion of Ba originates from the KC theory (Berry, 2016). Nonaka and Konno (1998) positioned the Ba as the catalyst of KC within organizations. In the KC theory, people create knowledge because of the Ba. To summarize, the Ba is a shared context in motion where users can utilize, share, and create new knowledge rather than a physical space such as a meeting room (Brătianu, 2016). Considering the Ba as a KC setting, it is the site of continuous transfer and creation of knowledge. To enable KS and KC, business leaders should develop a contextual environment known as the Ba within their organization.

The SECI process consists of four KS phases in organizations: socialization, externalization, combination, and internalization. For effective implementation of the KC theory, business leaders should link their KM initiatives to the corresponding phase

of the SECI process and define appropriate KC settings. Socialization is the first phase of the SECI process, which enables knowledge exchange between individuals in an organization. Socialization is a tacit to tacit KT process (Kaur, 2015). Social interaction is the crucial enabler for the tacit to tacit knowledge conversion (Ragab & Arisha, 2013). Socialization is the conversion of an individual's tacit knowledge to a tacit group knowledge using social interactions that include the sharing of feelings, emotions, and expertise with peers (Kaur, 2015). The focus of socialization is to gain understanding through individuals (Lin, Chang, Peng, & Li, 2016). During this SECI phase, the knowledge passes from the status of individual to group with face-to-face discussions (Lin et al., 2016). Socialization can occur between individuals who may not be workers of the same department or organization. Optimal KS requires the interaction of employees with all third parties, including customers and suppliers. The success of socialization requires stimulation of deeper layers of experiences and knowledge that are different from everyday dialogues. The socialization phase requires managers to build a work environment where employees can communicate together and share their thoughts, as good interpersonal relationships between employees are the condition needed for the socialization stage to be a success.

Externalization is the next phase of the SECI process, during which individuals formalize their knowledge for further use in the organization. Externalization is a tacit to explicit KT process (Kaur, 2015). The conversion of tacit knowledge to explicit knowledge occurs through narration and analogies to convey personal perceptions to others (Ragab & Arisha, 2013). During the externalization phase, the status of

knowledge changes from hidden to formal using group sharing techniques (Lin et al., 2016). Formalization also occurs from individual to group sharing or from a unique group to several groups sharing (Lin et al., 2016). Externalization involves individuals and requires the transformation of the tacit knowledge obtained from socialization into explicit knowledge for sharing, dissemination, and transfer to others in the organization. From the above description, externalization can occur by using ideas, images, concepts, and visual language. The level of education and employee motivations are critical to the success of this phase of the SECI process. The challenge is to formalize tacit knowledge. The existence of computerized systems facilitates knowledge formalization and is an enabler to externalization.

The combination phase of the SECI process enables users to join existing pieces of knowledge in organizations to build consistent knowledge databases. The combination is an explicit to explicit KT method (Kaur, 2015). The combination consists of joining new and existing fragments of formal knowledge collected from various people to obtain precise, systematic knowledge for use by peers in their organization (Lin et al., 2016). During combination, the conversion of personal or group explicit knowledge into a piece of standard explicit knowledge usable in the organization, occurs through manipulations in KM systems (Ragab & Arisha, 2013). The combination phase is a social process enabling the creation of new explicit knowledge with documents and databases to make the knowledge reusable. Communication, the effectiveness of diffusion processes, and the level of computerization in organizations are critical to the success of the combination phase. The combination of existing knowledge with new

knowledge requires expertise and data understanding to avoid duplicating or losing existing organizational knowledge.

The purpose of the internalization phase of the SECI process is to enable individuals within the organization to acquire standardized organizational knowledge. Internalization is an explicit to tacit knowledge conversion phase (Kaur, 2015). The critical criterion for the internalization phase is knowledge ownership during the transformation of formal knowledge to personal knowledge (Lin et al., 2016). Internalization occurs through continuous collective and personal interactions (Kaur, 2015). Users may build their expertise during the internalization process by transforming the explicit knowledge available. This expertise is a knowledge asset for the organization. The purpose of internalization is to match knowledge to unique learning styles and organizational roles. The internalization phase is an update, expansion, extension, and transformation of data generated in the combination phase for sharing among people. To be successful, managers should provide conditions and settings to encourage employees to learn. Employees can acquire explicit knowledge only if they are willing to learn and internalize knowledge available in organizations. Figure 1 is a summary of the SECI process, including the level of interaction required for each phase of the process.

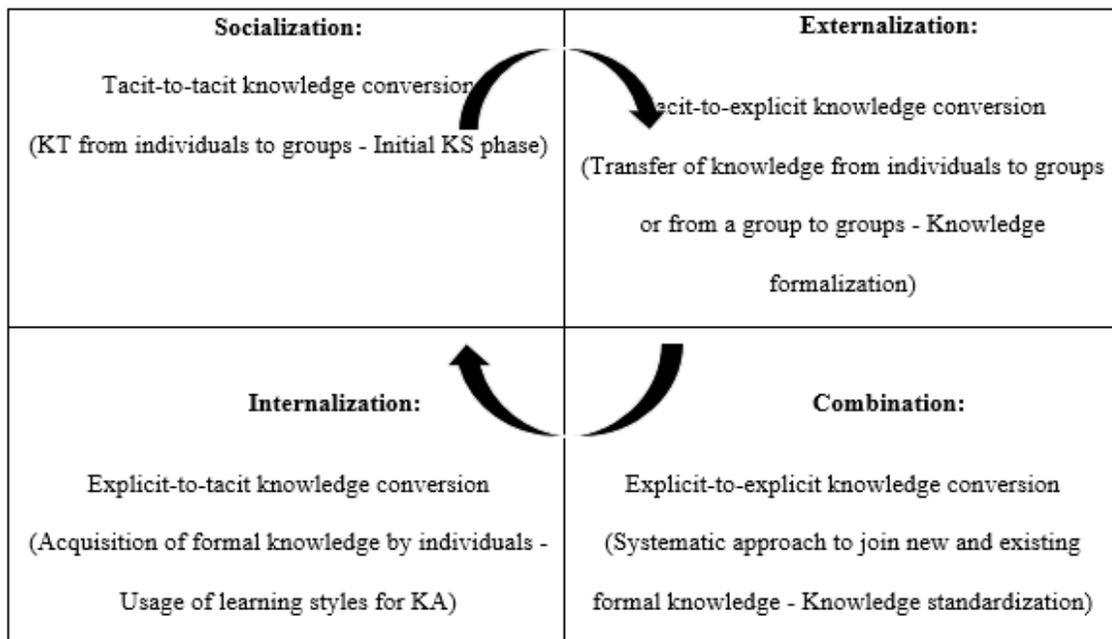


Figure 1. Summary of the KC process.

From the description of the SECI process I could conclude that business leaders can use the SECI process to enhance KC, and to disseminate and share knowledge within their organizations. The continuous dissemination of knowledge through the SECI process should lead to a dynamic KC cycle. Socialization and combination are transformation phases in a social context, whereas externalization and internalization are conversion phases at the individual level within the organization. The use of the SECI process in organizations creates a knowledge dynamic over time as users follow the knowledge conversion cycle. The detailed description of each of the process phases is a guide for identifying the types of knowledge and defining appropriate knowledge conversion phases in organizations.

Knowledge Management

In this subsection of the literature review, I introduce the basic concepts leading to KC in organizations, including knowledge, information, and data. From these concepts, I define KM in organizations and I explain the mechanisms of KC, KS, and KA, which are three main processes required to implement KM strategies. I finalize my analysis by reviewing the importance of KM initiatives for companies and KM challenges identified in businesses.

Organizational concepts leading to KC: Data, information, and knowledge.

The relationship between knowledge, information, and data is a pivotal step to a better understanding of KM in organizations. Data includes raw facts and numbers in a specific organizational context (Sen, 2019), whereas information is a meaningful and valuable interpretation of data in organizations (J. Chen, Sohal, & Prajogo, 2016; Secundo, Magnier-Watanabe, & Heisig, 2015). Knowledge is the meaningful organization of accumulated information acquired through experience, inference, and communication (Khodakarami & Chan, 2014). The link between knowledge and data is information as information results from the processing of data in organizations. Knowledge is associated with individuals and can change based on personal abilities, interests, and the level of engagement in organizations. As a result, when creating knowledge in an organization, users should request information and data in a specific organizational context. Therefore, information processing and the existence of a data management system are leading factors in the KC process.

KM in organizations. Managing knowledge in organizations enables business leaders to build knowledge databases and to define opportunities to acquire, share, and create knowledge based on business strategies and goals. KM is the organization, update, reorganization, and sharing of information (Grover & Froese, 2016). The purpose of KM is to grow and maintain individuals' knowledge for further sharing within organizations (Uddin et al., 2015). The focus of KM is thus the management of tacit knowledge. Senior managers in organizations are responsible for defining KM strategies to achieve desired objectives (Uddin et al., 2015). In organizations, KM needs arise from the requirement to convert tacit to explicit knowledge and vice versa (Hislop, Bosua, & Helms, 2018). The key KM processes enabling the implementation of KM strategies in organizations are KC, KS, and KA (Donate & de Pablo, 2015; Hislop et al., 2018). In summary, business leaders should make use of these key KM processes to define KM initiatives following existing KM strategies. The KM initiatives should meet the business needs and lead to KC and dissemination within organizations.

KM processes. KM processes are the different steps of a KM program; these steps are required to implement KM initiatives in organizations based on existing KM strategies. Three major KM processes arise from the literature related to KM: KC, KS, and KA (Bolisani & Bratianu, 2018; Intezari, Taskin, & Pauleen, 2017; Kao & Wu, 2016). From the review of the three KM processes, I could identify how to apply KM strategies in organizations including principles of the KC theory.

KC. The KC process generates value for the organization. KC relates to sharing people's mental or emotional knowledge with groups, communities, or organizations

(Kao & Wu, 2016; Kaschig, Maier, & Sandow, 2016). KC increases the competitiveness of organizations in real and virtual world perspectives (Kao & Wu, 2016). Defining organizational roles and responsibilities for collaboration and communication within the organization is crucial to a successful implementation of KC initiatives (Saide, Indrajit, Trialih, Ramadhani, & Najamuddin, 2019). Employees are at the center of the KC process in organizations, as KC highly depends on employees' acceptance of KM initiatives, and implementing new KC initiatives to solve complex business problems requires combining nonobvious knowledge and information (Bartolacci et al., 2016). Managers should define incentives enabling KC in their organizations (Friedrich, Becker, Kramer, Wirth, & Schneider, 2020). In summary, existing KM strategies, together with people interaction (managers and employees), are essential to creating knowledge within an organization. The effectiveness of the KC process will depend on business leaders' knowledge, vision, employee engagement, and company goals. The driver for a successful KC process includes a clear definition of employees' roles and responsibilities in accordance with organizational goals.

KS. The KS process requires people to share their expertise using clear communication channels with one or more individuals; and to document their knowledge for further use in organizations. KS is the transfer of knowledge among individuals, groups, or departments in an organization (Tong, Tak, & Wong, 2015; Zhang & Jiang, 2015). The KS process consists of exchanging both explicit and tacit knowledge at all organizational levels to build a collective corporate knowledge

(Serenko & Bontis, 2016; Tong et al., 2015). KS is a complex area in KM because it requires a personal motivation from employees to share their knowledge with peers.

Considering KS within the context of the SECI process of the KC theory, the sharing of knowledge can occur at all phases of the KC process. During the externalization and combination phases of the SECI process, individuals and group can document their knowledge to share their expertise; the documented knowledge is combined into organizational knowledge (Z. Wang, Wang, & Liang, 2014). At the internalization phase, employees share the documented organizational knowledge with peers (Z. Wang et al., 2014). The same KS process occurs during the socialization phase with a transfer of informal or formal knowledge from individuals to groups or vice versa (Z. Wang et al., 2014). Therefore, KS initiatives are critical steps in the SECI process, because they occur at every stage of the KC process. Successful KS processes require a flawless knowledge translation from individuals to groups and vice versa and available technologies for knowledge documentation.

KS processes are critical for business productivity. KS initiatives have a positive effect on competitiveness and economic performance of organizations (Serenko & Bontis, 2016; Vargas, 2015). Drivers to implement KS initiatives in organizations include the search for efficiency and effectiveness (Serenko & Bontis, 2016; S. Wang, Noe, & Wang, 2014). There is thus a need for business leaders to implement basic requirements for a successful KS process in their organizations to improve business results.

Some significant factors influencing KS among individuals in organizations include motivation and sharing opportunities, the nature of knowledge (tacit or explicit), and KS culture (Llopis & Foss, 2016). Promoting social interaction and structured reward systems are also vital to the success of KS initiatives in organizations (Eid & Al-Jabri, 2016; Z. Wang et al., 2014). In addition, leadership plays a crucial role in defining KS incentives and creating a sense of ownership towards organizational goals (Tong et al., 2015). Considering the notion of Ba in the SECI process, managers should define appropriate contexts for social interaction and knowledge exchange. To conclude, the key KS success factors in organizations are employee engagement, positive social climate, leadership support, and employees' ownership of company objectives. KS remains a complicated process because successful human interactions are the basis of KS initiatives, and managers cannot dictate social interactions.

KA. During the implementation of KA initiatives, there is a collection of knowledge from various sources and a generation of new knowledge. KA is the process enabling employees to obtain knowledge through transformation, collaboration, and transfer of expertise from a knowledge source (Costa & Monteiro, 2016; Dalkir & Beaulieu, 2017). Knowledge originates from both inside and outside organizations. Employees should use their expertise and experiences to convert external knowledge acquired into useful explicit knowledge (Cegarra-Navarro, Soto-Acosta, & Wensley, 2016). Organizational KA occurs at a macro level, this process requires an identification and coding of valuable tacit knowledge at the group and individual levels (Dalkir &

Beaulieu, 2017). The relationship between organizational KA and individual KA is the formalization of individual knowledge into companies' knowledge databases.

Considering the application of the KC theory to organizations, KA is a key step in the SECI process, as it requires acquiring new knowledge from individuals or groups as part of the socialization and internalization processes; and consolidating this knowledge in organizations during the combination phase. KA enables employees to transform their tacit knowledge into explicit knowledge, which could be considered as the basis of a new spiral KC process in organizations (Battistutti & Bork, 2017). It can be inferred that KA occurs at all stages of the SECI process.

From a business standing point, acquiring new knowledge has a positive effect on innovation, competitiveness, and performance in organizations (Papa, Dezi, Gregori, Mueller, & Miglietta, 2018; White & Cicmil, 2016). A flawless KA process may improve the competitiveness in organizations and increase employees' capabilities. External KA including market KA has a positive influence on business profitability, as this knowledge enable business leaders to improve their business strategies to respond to market trends (Guo, Wang, Wang, & Zhang, 2019; Marco-Lajara, Claver-Cortés, Úbeda-García, García-Lillo, & Zaragoza-Sáez, 2019). Managers should thus encourage trustful relationships and networking in their organizations for an effective KA process and a potential boost of their business results.

KA initiatives require some critical success factors to be effective. Trust is one critical success factor in the KA process. A climate of trust in organizations enables employees to implement a flawless data exchange process based on personal

relationships (Ho, Ghauri, & Larimo, 2018). Technology is also a KA enabler as new technologies facilitate KA within organizations (Lichtenthaler, 2016). Networking is essential to KA activities; Networking leads to improved learning methods and smooth communication mechanisms in organizations (Ortiz, Donate, & Guadamillas, 2017; Song, Min, Lee, & Seo, 2017). In summary, there is a potential increase in the knowledge acquired in companies with trust and technological improvements.

From the reviews performed, KC, KS, and KA processes are interrelated. The application of the KC theory principles to organizations involves the three KM processes at socialization, externalization, combination, and internalization phases. Sharing knowledge in some specific contexts may require the acquisition and application of new concepts, leading to KC within companies (Dalkir & Beaulieu, 2017). Critical factors to consider in implementing KM initiatives include existing organizational goals and processes, employee engagement and effective communication channels (White & Cicmil, 2016). In addition to these factors, KS culture, structured reward systems, and a climate of trust in organizations can affect the implementation of KM processes in companies. Strategies should exist to define the roles and responsibilities of employees and management in the implementation and definition of KM processes within an organization.

Importance of KM initiatives in organizations. KM initiatives include measures implemented to standardize organizational knowledge and defined procedures to share and generate new knowledge within organizations (Akbari & Ghaffari, 2017). The implementation of KM initiatives in organizations provides a range of benefits to

organizations. These initiatives may lead to growth in organizations, improvement in regulatory processes, and cohesion within working teams. KA over time and through several individuals is a driver to implement KM initiatives (Khodakarami & Chan, 2014). The merits of KM initiatives include work processes improvement, access to updated data, an increase in proficiency, and improvement in the decision-making process (Martínez-Martínez, Suárez, Montero, & del Arco, 2018). KM initiatives also serve to share knowledge among personnel, to increase profit in organizations, and to build personal relationships (Shahmoradi, Ahmadi, Sadoughi, Piri, & Gohari, 2015; Zhang & Jiang, 2015). These initiatives also enable managers to enhance their strategic planning as part of key success factors in their organizations (Akbari & Ghaffari, 2017; Pour, Zadeh, & Zadeh, 2018). Researchers agree that implementing KM initiatives is an enabling factor for personal growth and knowledge enhancement for both firms and individuals. The practical use of KM initiatives may improve company profitability, interpersonal relationships, and strategic planning in organizations. Employees play a vital role in the success of KM initiatives in organizations. Business leaders should communicate KM objectives to their personnel, check if the goals are well understood, and monitor staff commitment to the desired objectives.

KM in the Oil and Gas Industry

The purpose of this subsection is to assess the status of KM in oil and gas businesses and to review strategies applied in petroleum companies to solve KM issues. I reviewed the literature with a focus on documents published since 2015 to align the research results to current business practices. However, when the research results led to

few articles I considered documents published prior to 2015. To assess the status of KM in the oil and gas industry, I reviewed the industry KM practices and challenges. I also analyzed specific KM best practices in relation to the KC theory in oil and gas businesses.

Status of KM in the oil and gas industry. From the research question, there is a need to assess the status of KM in oil and gas companies to identify strategies to improve KM initiatives in these organizations. Companies of the oil and gas sector are among the leaders and pioneers in the implementation of good KM practices in the energy sector (Grant, 2013; Sumbal, Tsui, See-to, & Barendrecht, 2017). Some awards, such as the global MAKE (Most Admired Knowledge Enterprise) award are evidence of the contribution of the oil and gas industry to KM practice (McIntyre, Dalkir, Paul, & Kitimbo, 2015). The main drivers to the implementation of KM initiatives in the oil and gas industry include complex operational challenges, people integration to organizations, and information availability (De Castro, de Campos Lima, & Gutierrez, 2015). KM initiatives exist in the industry, however, there is a need to assess how effective are these practices for business leaders and employees.

Despite existing KM practices in the industry, Ali, Paris, and Gunasekaran (2019) considered the research on KM in oil and gas companies to be limited because of a small number of studies conducted in this research area. According to Bento and Garotti (2019) it is difficult to implement standard KM strategies in the oil and gas industry because of the complexity of operations. Moreover, KM issues in the oil and gas sector are different per location; they depend on the level of development in the

country, the workforce age structure, and the size of operations (Sumbal, Tsui, See-to, & Barendrecht, 2017). There is thus a difficulty to adopt a standard KM approach in the industry. Given that the oil industry operates in a global market where all elements are the same irrespective of locations and tasks performed, there are common KM challenges around the globe (McIntyre et al., 2015). Issues are therefore similar across the industry because of operating standards. The improvement of KM practices requires an analysis of KM issues faced by the oil and gas business leaders.

From the articles reviewed, I identified some KM challenges in the industry. The three main challenges to implementing KM initiatives included people, organizational, and technological challenges (Ranjbarfard et al., 2014). People challenges included human capital management, job characteristics, and employee engagement in the industry. Human capital management is an issue in the oil and gas sector, because of the attrition of experienced personnel and training requirements needed to attain the expected competency level. The lack of knowledge dissemination in the industry led to a knowledge gap after the attrition of experienced workers caused by retirements and resignations (Agrawal & Aggrawal, 2015; Ali et al., 2019; Bento & Garotti, 2019; Ewers, 2016; Rony, Suki, & Chowdhury, 2017; Sumbal, Tsui, Cheong, & See-to, 2018). The scarcity of resources created a gap between the offer and supply of qualified staff in the oil and gas industry (Agrawal & Aggrawal, 2015). Moreover, there is no standard education package defining KT requirements in the industry to avoid the effect of the departure of qualified workers on the competency level of organizations (Karytsas, 2018). An analysis of people challenges to the implementation of KM in the oil and gas

industry revealed issues related to workforce competencies because of historical attrition during the oil crisis with no KT. Therefore, managing the loss of knowledge from experienced workers is the main issue related to human capital management in the oil and gas sector.

The second people related challenge to KM initiatives in petroleum companies is job rotations. A characteristic of oil and gas businesses is job rotations and a variety of work locations without existing KT schedules between experienced, nonexperienced workers and contractors (Shortland, 2020; Sumbal, Tsui, Cheong, & See-to, 2018). Consequently, the transfer of knowledge in organizations does not always occur, because of jobs technical requirements and the limited KT opportunities between employees.

The third challenge involving people is low employee engagement. The oil and gas crisis led to a decrease in confidence in management and organizational processes, because of staff reductions, the absence of a clear hierarchy, and ineffective compensation and recognition systems (Agrawal & Aggrawal, 2015; Ali et al., 2019; Chong & Besharati, 2014). Employee attrition resulted in a loss of knowledge in some organizations coupled with a drop in competency. A consequence of employees' disengagement is the lack of motivation to share or acquire knowledge in organizations.

The review of people's barriers to the implementation of KM initiatives led to the conclusion that there is a current need for petroleum professionals in the industry, because of the shortage of experienced workers due to attrition and a lack of adequate KT methods. People barriers to KM processes implementation include the lack of trust

in organizations, personnel attrition, and the technical requirements of jobs in the industry. The solutions to personnel challenges faced will require to consider a psychological dimension, because human beings are at the center of the process. Employees' voluntary participation in KM processes initiatives will require a positive social climate and trustful relationships in organizations.

Besides people's challenges to the implementation of KM initiatives, I could also identify some organizational challenges in the literature. These challenges included the company structure (private or public), geographical location, culture and potential environmental issues which may affect knowledge retention and transfer activities, because of staff movements or employees' preferences to maintain their jobs in specific location (Fernando & Yovany, 2014; Hustad, 2017). Different work settings implied differences in languages, work environment, culture, and diverse business approaches. All these factors contributed to setting boundaries in the KT process.

The principal challenge affecting KT and KS processes in organizations was culture. Organizational culture enables employees to identify themselves with their organization. Researchers' considered the lack of KS culture as a challenge in oil and gas companies (Ali et al., 2019; De Castro et al., 2015). There was an erosion of KS culture in the petroleum industry because the financial crisis created a focus on short-term KA processes, rather than building long-term oriented programs and motivating employee retention (De Castro et al., 2015; Sumbal, Tsui, See-to, & Barendrecht, 2017). Therefore, employees were not willing to share or transfer their knowledge, as they

consider it as a comparative advantage to maintain their jobs, because of uncertainties with their employment status.

Technological issues related to the implementation of KM strategies in the oil and gas industry included innovation and employees' capabilities. Petroleum companies are high tech businesses requiring a permanent renewal of technologies and knowledge to build employee capabilities and maintain a competitive advantage (Gaghman, 2020; Garcia, Lessard, & Singh, 2014; Kimiagari, Keivanpour, Al-Azad, & Mohiuddin, 2015). There is a low response from employees to new systems because of a reluctance to change their working habits (Garcia et al., 2014; Hadjar, Handayani, Satria, & Pinem, 2018). In addition, the complexity of technological systems in the petroleum industry is a barrier to KT as employees avoid using technologies with which they are uncomfortable (Chong & Besharati, 2014). Employees considered new techniques as time-consuming, cumbersome, and more challenging to use than asking or sharing the information from one individual to the other or using a system workaround. Managers face issues in implementing new technologies, because of the lack of employee training before implementing the technologies (Grant, 2013). In summary, the complexity of oil and gas operations requires a technological shift in petroleum companies coupled with advanced KS practices. The challenge in the petroleum industry is the implementation of effective technologies for both users and organizations to optimize organizational knowledge.

KM Strategies applied to oil and gas businesses. I could identify 28 journal articles, published between 2015 and 2020, mentioning KM practices in the oil and gas

industry. The researchers considered four areas in their KM strategies: people, technology, culture, and organization processes. The research was limited, as all authors did not discuss each of the four dimensions. Only Spek and Kelleher (2017) recommended implementing KM strategies with a consideration of people, technological and cultural factors in organizations.

People. The first factor identified in the literature to enhance KM strategies was an effective use of people in organizations. Twelve authors considered people to be at the center of the KM process in oil and gas businesses. Researchers referred to human resources as a key KM success factor with a positive relationship between employee development and KM process implementation (Agrawal & Aggrawal, 2015; Badpa, Salim, & Yahaya, 2018). In the articles reviewed, I could identify three factors to optimize the use of people in petroleum companies: leadership effectiveness to cascade company goals, increasing the level of trust and engagement in organizations and, personnel training to build competencies.

Leadership. The role of leaders in oil and gas companies is to define and cascade KM strategies. Some successful strategies were listed in the literature to improve the leadership in oil and gas companies as part of KM initiatives implementation. The first strategy was to recommend the use of a goal setting mechanism to communicate the company strategy, with a clear definition of employees' roles and responsibilities in KM processes (De Castro et al., 2015; Iyamah & Ohioyenoya, 2015; Ochieng et al., 2018). The second strategy was to use innovative methods when defining strategies and facilitating the implementation of KM processes to maintain a competitive advantage

(Darwish, Zeng, Rezaei Zadeh, & Haak-Saheem, 2018; Weightman & Curson, 2018).

Business leaders should therefore use effective communication channels, employee-coaching methods, and revise their business strategies according to market challenges. Managers should define goals aligned with their company KM strategies and confirm a clear understanding from employees.

Trust and engagement. Business leaders should assess employees' levels of confidence and trust in their organizations when defining their KT processes. Researchers considered the lack of trust as a limitation factor to knowledge formalization in oil and gas companies (De Castro et al., 2015; Ojo, Raman, & Chong, 2017; Omotayo, 2015). Managers should enhance employee engagement and boost their involvement in activities to meet challenges and increase business profitability (Ali & Dominic, 2018; Iyamah & Ohioyenoye, 2015; Ojo et al., 2017). The consequence of a high level of employees' trust in organizations is the motivation to share and formalize knowledge with peers. From the literature reviewed, some proposals to increase employee engagement included: defining career opportunities with cross-functional moves for data exchange (Ragsdell et al., 2014), the implementation of reward systems to motivate employees at work (Iyamah & Ohioyenoye, 2015) and the clarifications of employees' roles and responsibilities (Ojo et al., 2017). By choosing one of these options or all of them, business leaders may improve employee engagement. The goal is to recognize employees' efforts and their contribution to business objectives to increase trust in organizations.

Personnel training. Considering the job specialties in the petroleum industry, personnel's training is important in the KA and KT processes. Oil and gas business leaders may increase employees' efficiency in the KT process through training and mentoring (Bento & Garotti, 2019; Ejakpomewhe, 2017; Iyama & Ohiorenoya, 2015; Weightman & Curson, 2018). In the literature, I could identify three effective training methods as part of KM strategies: on the job training (Al Shatti, Bischoff, & Willy, 2018; Spek & Kelleher, 2017), mentoring involving the transfer of knowledge from peers or retiring workers to less experienced colleagues (Agrawal & Aggrawal, 2015; Bento & Garotti, 2019; Gaghman, 2020; Sumbal, Tsui, Cheong, & See-to, 2018) and face to face or classroom training (Ahuja et al., 2018; Gaghman, 2020; Sumbal, Tsui, & See-to, 2017; Valk & Hannon, 2016). On the job training consists of learning from peers during teamwork with no specific defined KT targets as compared to mentoring which is time-bounded and requires some KT targets. Business leaders may use both strategies to capture knowledge from leavers while maintaining the competency level in their organizations. Face to face or classroom training are formal training processes enabling employees to learn from external providers and increase companies knowledge databases (Ahuja et al., 2018; Sumbal, Tsui, & See-to, 2017). This training method is a motivational factor for employees as they acquire knowledge for themselves and for the company. External training also increases collaboration opportunities, and adequate support to employee creativity in their jobs for a consolidation of knowledge in organizations (Valk & Hannon, 2016). Among the three methods reviewed, there was no recommended training method in the literature. A mechanism to assess training

efficiency and its effect on company knowledge databases should exist to choose the most appropriate method for employees and organizations. Training plans and methods should evolve to consider the changes in the oil and gas industry, companies' operating environments, and employees' career evolution.

Technological enhancements. Among the articles reviewed, 15 articles included technological enhancements in oil and gas companies as a requirement to implement successful KM strategies. Researchers considered the use of KM systems as compulsory in companies' business strategies (Almalky, Ikeda, & Umemoto, 2019; Badpa et al., 2018; Kimiagari et al., 2015; Ochieng et al., 2018; Shpakova, Dörfler, & MacBryde, 2018; Sumbal, Tsui, & See-to, 2017). Business leaders should thus need to align technological infrastructure to their business strategy and consequently to the KM strategies deriving from the business strategy. Researchers listed a couple of technological developments applicable to the oil and gas industry and contributing to successful KM initiatives implementation. The first proposal was the use of databases to document organizational knowledge and enable employees to document explicit knowledge for an effective KT in the organization (Hawash, Mokhtar, & Yusof, 2019; Shpakova et al., 2018). These databases may also serve for knowledge mapping across organizational units, knowledge codification, and retirees' knowledge documentation (Bento & Garotti, 2019). Other examples include the implementation of enhanced technologies such as Web 2.0 applications (Ali & Dominic, 2018; Ali et al., 2019), big data technologies (Sumbal, Tsui, & See-to, 2017), cloud technologies (D. Li, 2016), and virtual communities of practices (Frank, Sander, Gastaldi, Madini, & Corso, 2017). The

technological developments which were specific to oil and gas operations in the literature included safety management systems (Wold & Laumann, 2015), artificial intelligence (Kaznacheev, Samoilova, & Kjurchiski, 2016), and systems to track operational efficiencies (Al-Qubaisi, Ajmal, & Khan, 2018; Badpa et al., 2018; Hawash et al., 2019). Technologies were also recommended to enhance employees KA and learning platforms (Spek & Kelleher, 2017). In summary, technologies played a key role in the implementation of KM strategies by enhancing KS and documentation processes.

In summary, technologies are critical enablers to knowledge standardization in the petroleum industry. The effective use of technologies enables business leaders to implement automated KS practices within their organizations, to reduce the effect of staff turnovers and increase operational efficiencies. Managers should however implement a frequency of review of market innovations to update their systems as needed.

Organization culture. I identified eight articles referring to organization culture as a KM enabler in oil and gas companies. Four of these articles were published before 2015. Researchers considered the definition of a clear organization culture statement as an enabler to employee engagement and a motivational factor for employees to share their knowledge with peers (Joia & Silva, 2020; Ochieng et al., 2018; Syed, Murray, Hislop, & Mouzughhi, 2018; Weightman & Curson, 2018). The proposals to develop or enhance organizational cultures as part of KM strategies in petroleum companies included two measures. The first one was the development and communication of a culture statement by leaders (Bertini & Boonsongpaisan, 2016; Ragsdell et al., 2014)

and the second one was the consideration of learning culture, innovation and sustainability in company culture statements (Al-Qubaisi, 2019; Weightman & Curson, 2018). Both options enabled managers to create a motivation for KS and KT in organizations. In the articles reviewed published as from 2015, organization culture enhancement was not a focus of KM research in oil and gas companies; however, business leaders may consider implementing an organization culture statement including KM focus areas to develop a sense of commitment and ownership from employees.

KM processes enhancement. I identified 13 articles referring to KM processes enhancement in oil and gas companies while conducting my literature review. The focus of the articles was the implementation of processes to share knowledge, transfer or acquire knowledge in organizations. The researchers considered the need to develop KM processes for an effective dissemination of the knowledge created, to develop knowledge repositories, and implement KA mechanisms (Ali et al., 2019; Almalky et al., 2019; Kimiagari et al., 2015; Sumbal, Tsui, Cheong, & See-to, 2018; Syed et al., 2018; Zaim, 2016). Supervisors and employees should rely on oil and gas KS best practices, and assess the effectiveness of existing processes to develop their KM processes and procedures (Ali et al., 2019; Kimiagari et al., 2015; Ruvania, Sofianti, & Tertiana, 2015; Syed et al., 2018; Zaim, 2016). Managers should create an enabling organizational structure for a flawless KM process implementation in their businesses (Ochieng et al., 2018; Rony et al., 2017; Syed et al., 2018). The researchers also considered the knowledge of business processes as one of the critical areas of knowledge loss when employees leave companies in the oil and gas industry because of

business complexities (Gaghman, 2020; Sumbal, Tsui, Cheong, & See-to, 2018).

Considering the potential knowledge loss, KM processes implementation is a requirement in oil and gas companies. Managers should leverage on existing market practices to build these processes. Business leaders play a crucial role in KM processes reviews; they should define a stewardship mechanism and assess the effectiveness of existing methods.

KM and profitability in the oil and gas industry. I reviewed the relationship between profitability and KM while conducting my literature review. The rationale of this analysis was to assess the effect of KM strategies implementation on oil and gas companies' business performance as mentioned in the problem statement. In the year 2000, the loss of knowledge in petroleum companies was linked to employees' resignation, transfers, terminations, and retirements and was costly and damaging for organizations (Egeland, 2017; Farahat, 2018). I found seven articles related to KM and profitability in oil and gas businesses. Researchers focused on knowledge loss mitigation and the implementation of KM practices to improve organizations performances. From a general standing point, the implementation of KM practices leads to an improvement of business performances (Agrawal & Aggrawal, 2015; Ali et al., 2019; Khor, 2017). Some solutions to mitigate knowledge losses in oil and gas companies and thus avoid a loss of profitability included the implementation of talent management systems (Agrawal & Aggrawal, 2015; Khor, 2017), KM processes standardization (Omotayo, 2015), and formal KT and KS from experienced workers to younger generations (Agrawal & Aggrawal, 2015; Ali et al., 2019; Bairi, Manohar, & Kundu, 2013). It can be inferred

that the formalization of KM processes is the response to avoid potential knowledge losses in oil and gas companies. In none of the articles reviewed, the implementation of KM strategies or practices led to an increase in business profitability in the literature. Considering the limited number of articles found, I could conclude that there is a gap between the offer and supply of qualified staff in the petroleum industry which may jeopardize the level of competency in organizations with potential knowledge and profit losses. This level of competency does not have a direct effect on the profitability of organizations.

KC Theory applied to Oil and Gas Businesses

Among the 28 articles related to KM in oil and gas businesses, only seven articles had the KC theory as their theoretical framework. In addition to these seven articles, some researchers used the KC theory associated with other theories such as the organizational learning theory (Moh'd Al-adaileh, Dahou, & Hacini, 2012), the KBV theory of the firm (Ojo et al., 2017), the resource-based theory, and the transformational leadership theory to support their research. Other researchers used the KC theory to elaborate specific frameworks applicable to oil and gas industry KM issues. The frameworks identified were Penspen's 8-point KM strategy and model for KC (Weightman & Curson, 2018), the hypothesized KS practice framework (Ali et al., 2019) and company maturity model (Retegi Albisua & Igartua, 2018). The focus of the three frameworks was on employees' skills development and implementation of specific KM processes.

For the specific case of articles using the KC theory as theoretical framework, researchers worked towards an identification of the different phases of the SECI process in oil and gas companies. According to authors, it is possible to identify the key components of the SECI process including the ba, in oil and gas companies (Al-Toubi & Malik, 2018; Ngatia, 2016; Prabhakar & Savinkina, 2018). The use of the KC theory as theoretical framework to improve KM strategies in oil and gas companies requires managers to consider employee willingness to participate to the KC or KT processes and the effective use of technologies (Gaghman, 2020; Retegi Albisua & Igartua, 2018; Siddik, Kurniawati, & Hedyanto, 2016). Before applying KC principles in their organization's managers should assess the status of KC processes in their companies by identifying existing gaps (Al-Toubi & Malik, 2018; Ngatia, 2016; Siddik et al., 2016). The standard training approaches and explicit KS techniques are no more effective in oil and gas businesses (Gaghman, 2020). Managers should thus focus their strategies on the implementation of effective technologies such as KM systems, to establish online KM processes (Retegi Albisua & Igartua, 2018; Siddik et al., 2016; Weightman & Curson, 2018). The combined use of KM systems and the SECI process of the KC theory in petroleum companies increased workers productivity through: best practices sharing, implementation of communities of practice, staff on boarding, and tacit and explicit knowledge capturing (Al-Toubi & Malik, 2018; Gaghman, 2020). From my reviews, I identified two factors leading to a successful implementation of the SECI framework in oil and gas businesses: people and technologies. The researchers did not refer to processes' enhancement and KS culture in the articles reviewed. In summary, managers

may consider the KC framework as a process to formalize KM strategies in their organizations, while using effective technologies and staffing their organizations with qualified employees. A strict adherence to the KC theory principles will enable them to define standard KC and KT methods in their organizations. The use of standard methods should create a clarity in workers understanding of company KM strategies and may increase their productivity and effectiveness at work.

Conclusions

The purpose of this literature review was to identify and discuss applicable theories to improve KM initiatives in the oil and gas businesses. The two theories assessed for use were the KBV theory of the firm and the KC theory. I did not consider using the KBV theory because there was no clear guide related to the management of individuals and teams in its statement. I found the KC theory to be the most appropriate as the SECI process was a standard framework applicable to organizations.

I reviewed KM principles in organizations to understand the mechanisms to manage knowledge. In companies, knowledge originates from information and data processed in a specific organizational context. KM enable users to create, share, and transfer their knowledge within an organization. To implement KM strategies managers should rely on three main KM processes: KC, KS, and KA. All the three processes are interrelated. From the review of the relationship between the KM processes and the application of the KC theory in organization, all KM processes applied to the different steps of the SECI process of the KC theory.

The research related to KM in the oil and gas industry was limited. The documents reviewed presented some KM challenges. The barriers identified were inherent to people, organizations, and technologies. The challenges listed included employee engagement issues, aging population, inefficient technologies, ineffective organizational structures, and employee attrition after the oil crisis. The main challenge was the loss of knowledge from retirements and personnel attrition in the industry. To solve these issues, researchers suggested some KM strategies having an effect on people, technology, culture, and organization processes. The support of leadership and a stewardship of the strategies were the key success factors for these strategies. The application of the KC theory to the oil and gas industry required effective people and leadership development and technological improvements. The SECI process applied to oil and gas business with qualified personnel and adequate KM technological systems. The global analysis of KM initiatives implementation in businesses revealed that most failures relate to the lack of acceptance and buy-in from employees. Business leaders were key KM initiatives enablers, but employees' acceptance was a critical success factor.

Transition

In this qualitative single case study, I explored strategies to improve KM initiatives in oil and gas companies. I researched KM initiatives and reviewed several theories related to KM initiatives in the oil and gas industry. In Section 1 I introduced the background of the problem and the problem statement. I also presented the purpose statement, the nature of the study, the research question, and interview questions. I

reviewed the conceptual framework, operational definitions, assumptions, limitations, and delimitations. The next subsections included the significance of the study and a review of the professional and academic literature related to the topic under research. In Section 2, I provide detailed information regarding the research design and methodology for approaching the problem statement. In Section 3, I present the findings of this study and the significance of the study, as it relates to KM in business practices.

Section 2: The Project

For this research study, I chose a qualitative case study design to explore business leaders' strategies to improve KM initiatives in the oil and gas industry. This section includes the role of the researcher, a description of the study participants, and a description of the research methods and design that I employed. I review the population and sampling methods, ethical research requirements, data collection instruments, data collection techniques, and data organization techniques. The last subsections include data analysis methods, reliability, and validity checks and a summary and transition to Section 3.

Purpose Statement

The purpose of this qualitative single case study was to explore strategies that business leaders use to improve KM initiatives with their employees. The targeted population of the study comprised 10 business leaders from an oil and gas company located in Lagos, Nigeria, who had implemented strategies to improve KM initiatives. The implications for the positive social changes included potential increases in employees' intellectual capital and maximized organizational profitability. The potential to develop high KM standards, enhance a business reputation, and improve competitiveness might promote company growth. This growth could expand into the business community by creating employment opportunities for competent potential employees and improving growth and prosperity in the local economy.

Role of the Researcher

The researcher's role includes interviewing, taking notes, and gathering relevant documents during the data collection process (Fusch & Ness, 2015). The researcher's role involves data collection, data organization, and analysis of data (Collins & Cooper, 2014). My role as researcher in the data collection process included collecting data from participants through semistructured interviews and collecting documents. I reviewed documents including strategies used in KM processes and initiatives. The word strategies refers to KM processes and procedures, job handover procedures, KT procedures, job profiles, job descriptions, virtual work procedures, training manuals, training roadmaps, employee engagement programs, recognition programs, and any other relevant document used to implement KM initiatives.

I have not performed any research related to the topic of KM initiatives in the oil and gas industry. Even though I worked in the oil and gas industry, I did not have a prior relationship with any of the research participants. I was familiar with some KM practices in the industry, business trends, and workers' needs. As a human resources employee in the oil and gas sector, I have access to potential organizations and participants meeting the study criteria. The study did not take place in the company at which I worked to avoid research bias. Having 15 years of experience as human resources practitioner in the oil and gas sector helped me inquire about and better understand the data collected during the research process.

In The Belmont Report protocol, respect for persons, beneficence, and justice are the three ethical principles used to guide research, and that involve human subjects

(Mikesell, Bromley, & Khodyakov, 2013). The respect of person principle relates to individual autonomy and, participants' information regarding their independent participation in the research (Ybarra et al., 2016). The beneficence and nonmaleficence principle require researchers to maximize research benefits and minimize harm (Mikesell et al., 2013). The justice principle is a fairness requirement to treat each participant equitably and equally (Kwan & Walsh, 2018). Moreover, there should be a fair distribution of research risk and burden among research participants (Kwan & Walsh, 2018). In my role as researcher, I adhered to The Belmont Report protocol and the ethics relevant to this protocol. I also explained confidentiality to participants in conformance with The Belmont Report protocols.

Research bias includes culture, experience, values, and ideas that can affect the data saturation process (Fusch & Ness, 2015). Liedtka (2015) presented overoptimism, the inability to see contradictory data, and early strategies in the research as bias factors. I assessed my personal views related to the topic to mitigate bias in the data collection process. I also considered the influence of culture and personal ideas in the data collection process and compared participants' data over time to search for contradictions.

Researchers should provide an objective description of the data collected and be detached and impartial during the research process to reduce bias when receiving data (McKee, Guimaraes, & Pinto-Correia, 2015). Castillo-Montoya (2016) recommends focusing interview protocols on the research question, avoiding closed-ended questions,

and conducting discussions with participants to obtain the optimal amount of information during the data collection process.

I mitigated bias and avoided viewing data through my perspective by using the interview protocol located in Appendix A, which included checking the interpretation of all data collected with participants. I used the same data collection process and interview questions with each participant to prevent bias. I used the interview protocol consistently throughout the interview process. Using the interview protocol throughout the process helped to ensure consistency during data collection.

Participants

Research participants should consist of people with rich and in-depth information to answer the research question (Knibbe, Biddiss, Gladstone, & McPherson, 2016).

Moreover, participants' selection criteria should include their ability to respond to the research questions and relevant subquestions (C. Marshall & Rossman, 2014).

Researchers should also consider the goals of the research questions when choosing participants (Nicholls et al., 2015). Eligible participants for this study included business leaders who could best answer the research question. I considered business leaders who have used successful strategies to improve KM initiatives in oil and gas companies.

In qualitative research, gaining access to participants is an ongoing process as the sample size depends on the identified concepts and themes as the research evolves (Collison & Marchesseault, 2018). Management support during the research process may help to gain access to participants as managers can solve issues faced during the recruitment process and build participants' trust in the researcher (Hernandez et al.,

2018). Gaining access to participants might be difficult in populations having gatekeepers who protect participants from any potential ethical issues, during the data collection process (Weil, Mendoza, & McGavin, 2017). I used a database of oil and gas companies obtained from trade associations containing company names, phone numbers, and email addresses to choose the business for this qualitative single case study.

The study included a two-step approach to access participants. The first step consisted of sending an email to some companies in the available database of oil and gas companies, located in Nigeria to present this research project. I sent an email to the human resources department to inquire about opportunities to conduct research in their organization and presented the research project. The second step occurred after receiving acceptance from an organization to conduct the research study. Once a company displayed an interest in taking part in the study, I obtained a signed letter of cooperation from the approving authority of the company. I requested and obtained a list of participants and contact information from the approver, as well as requested approval for access to supporting documents required to complete the research study. I contacted each potential participant by e-mail and by telephone, if potential participants did not respond to my email. The purpose of the phone call was to have direct access to participants and start building a relationship.

I established a working relationship with participants once I received access to them. Eriksson and Kovalainen (2015) considered three possible relationships between researchers and participants: a neutral and detached relationship, where the researcher is only an observer, a limited interaction with members, and a collaboration between

researchers and participants. For an efficient data collection process, researchers should establish a relationship of trust with participants (Lewis, Jones, & Hunter, 2017).

The researcher–participant relationship may affect data collection and analysis, and researchers should therefore, perform a review of differences in opinion when building the relationship, to understand the interactions between both parties (Gentles, Jack, Nicholas, & McKibbin, 2014). I collaborated with participants, and I listened to participants carefully to understand their concerns before I started data collection. I communicated with all participants and verified that the data collected and transcribed reflected their responses. In accordance with the research question, all participants were business leaders from an oil and gas company who have used successful strategies to improve KM initiatives.

Research Method and Design

In this component, I present the research method and design. The research method relates to the choice of a methodology to conduct the research: qualitative or quantitative methodology. On the other hand, the research design is the most appropriate research approach using the chosen methodology. The selection of the research method and design depends on the research area, and researcher’s ability to conduct a specific research method and use a research design

Research Method

To conduct this research, I chose a qualitative methodology. Qualitative research is a recommended approach in strategic management, as it presents effective practice in the area (Cunningham, Menter, & Young, 2017). Researchers use qualitative research

for scientific exploration of realities by following a research protocol, limiting bias, and obtaining clarifications about a research topic (Zitomer & Goodwin, 2014). Qualitative research is the best research option in business and management, because of its rigor and relevance, as well as its requirement to explore real situations instead of artificial ones (Myers, 2015). Alvesson and Sköldbberg (2017) presented qualitative research as firmly situated in discovery rather than in the justification context; moreover, in contrast to quantitative research, qualitative research is inductive rather than deductive. The qualitative method fitted this research study requirements because I explored a phenomenon or real-life situation through inductive means, by using open-ended questions.

Appelbaum et al. (2018) defined as empirical research related to testing a theory of a phenomenon based on variables *quantitative research* measured with numbers and analyzed using statistics, whereas qualitative research involves using nonstatistical data or quantifications. Quantitative research requires the analysis of data collected using closed-ended questions (Sandelowski, 2014). The quantitative method did not apply to the study, because data collection consisted of using interviews with open-ended questions using nonstatistical data. Choo, Garro, Ranney, Meisel, and Morrow Guthrie (2015) presented one of the main differences between qualitative and quantitative research methods as selecting issues or cases in qualitative research, versus searching for generalizable results in a population and comparing them across populations in quantitative analysis. Qualitative research was the most appropriate method for conducting the study, because of the limited sample size and research period. The

purpose of qualitative research is contextualization and understanding, whereas quantitative research includes explanations, predictions, and generalizations (Plakoyiannaki, Wei, Hsu, Cassell, & Prashantham, 2017). Qualitative method best applied to this research, because the aim of the study was not to generalize or hypothetically predict a phenomenon. I rather explored a phenomenon or a real problem and presented findings based on a bounded qualitative case study.

Mixed methods research is the sequential or concurrent use of both qualitative and quantitative research methods in the same research inquiry (Venkatesh et al., 2016). Venkatesh et al. (2016) considered the primary purposes of mixed methods to be complementary, completeness, developmental, corroboration, confirmation, and diversity. Hussein (2015) defined mixed methods as a social research technique in which researchers combine quantitative research (analysis, collection, and interpretation of numerical data) and qualitative research (a narrative form of data). Johnson (2015) recommended conducting mixed methods research, if one data source is insufficient. The mixed method also applies if a study needs enhancing using another method, or a need exists to explain initial results or exploratory findings (Johnson, 2015). Mixed method research did not apply to the research study. I did not perform a complementary study or use the quantitative method, involving collecting data from closed-ended questions, and using statistical data analysis. The research did not require the collection of numerical data and its interpretation using quantitative research; therefore, mixed methods research did not apply.

Research Design

In this study, I used a case study design. Researchers use case studies to facilitate the understanding of a research topic (Tsui-Auch & Yoshikawa, 2015). Researchers also use case studies to perform in-depth investigations of specific issues (Roegman, Knight, Taylor, & Watson, 2016). In a case study research design, researchers provide an accurate description of a problem and analyze data to answer the research question (Won, Yoon, & Treagust, 2014). The most appropriate research design for this study was a case study as compared to other designs such as narrative research, phenomenology, grounded theory, and ethnography. The case study design applied, because the purpose of this research was to explore a phenomenon, which included exploring successful strategies business leaders used to improve KM initiatives in the oil and gas industry.

The focus of narrative research is to reflect critically on and portray a situation; the nature of thinking during the data collection process is imaginative, critical, and reflexive (Van Burg & Romme, 2014). Benson (2014) also considered narrative inquiry as a form of research where narratives and stories play an essential role; researchers may use the stories as data with defined procedures in qualitative research. Researchers may also base narration on one or several data sources, including historical facts (Benson, 2014). The research did not require any historical data collection including a narrative inquiry. Narrative research includes written, nonverbal communications, and spoken communication data; it also involves the consolidation of contradictory stories collected from different narrators to obtain a general research outcome (Sunderland, Chenoweth,

Matthews, & Ellem, 2015). McMullen and Braithwaite (2013) presented narrative inquiry as suitable to social works, as narration involves personal relationships and a focus on portraying social facts depicted by individuals. As a form of business research, this inquiry consisted of exploring a phenomenon or problem at work and not social realities; hence, narrative research was not suitable for the study.

Researchers use phenomenology to analyze the way phenomena, or experiences appear to individuals, and to assess what makes a phenomenon unique or special (Pietkiewicz & Smith, 2014). The purpose of phenomenological research is to obtain diverse opinions about a phenomenon (Pietkiewicz & Smith, 2014). Willis, Sullivan-Bolyai, Knafl, and Cohen (2016) noted the focus of phenomenology on lived experiences that include human beings' experiences instead of professional or practical experiences, which leaves room for personal interpretations of lived facts. The phenomenological design did not fit this research, because I did not study lived experiences or human beings' experiences related to a situation or a phenomenon.

Ethnography is a qualitative research design used to explore a phenomenon within a group of people and aimed at understanding knowledge and systems specific to the said group (Queirós, Faria, & Almeida, 2017). Ethnography involves gathering data related to human societies and culture, and mostly applies to sociology and communication studies (Queirós et al., 2017). An ethnography research design originates in cultural anthropology to study people's natural living world; in business research, ethnography applies most to research related to customer experiences analyses (Hammersley, 2018). In this research, I did not refer to individual behavior; therefore,

ethnography was not an appropriate design to use. In ethnography, the researcher participates in setting the process under review and gaining insight from participants' knowledge about the process studied (Manfreda, Kovacic, Štemberger, & Trkman, 2014). This approach requires the researcher to take residence at the research site, in support of understanding the people, their context, and their organization (Manfreda et al., 2014). Ethnography was not suitable for this study, because I was not researching cultures.

Grounded theory is a qualitative research design used to generate a theory related to a process based on views of a large number of participants (Johnson, 2015). Applying grounded theory requires the inquirer to analyze the issue from the perspective of research participants using an inductive approach and accepting the influence of the participants on the research results (Corley, 2015). The data analysis in grounded theory consists of highlighting a research concern, looking for a general solution from people experience, and solving the issue by establishing a theory (Walsh et al., 2015).

Although conducting grounded theory, investigators are required to avoid literature related to the research topic to prevent contamination with established theories; inquirers use a systematic approach to conduct social research with the purpose of building social theories (Ingham-Broomfield, 2015). This research was not a social research. The grounded theory design did not apply to this research because the purpose of the research was not about generating a theory. I based the research on existing theoretical frameworks with the inputs of a small number of participants.

Data saturation is the point at which researchers identify no new themes, collect no new data, and have no new coding opportunities, and the possibility exists to replicate research under similar conditions (Fusch & Ness, 2015). Several terms are necessary to reach data saturation, including the use of a minimum of six participants in the case study research process, and the consideration of data richness and thickness in content (Fusch & Ness, 2015). Other conditions include focusing on the quality of data collected and choosing the appropriate data collection methods based on similar research conducted (Fusch & Ness, 2015). Another principle of data saturation is the consideration of the depth of data based on the inquiry quality, rather than the number of participants (Halawi, Kappers, & Glassman, 2016). To consider this principle during the data collection process, I sought data through interview responses and company procedures, associated with KM until no new information emerged. Yin (2014) recommended using documents as a data collection technique. I used internal company procedure documents and manuals that included KM processes, job handover procedures, KT procedures, job profiles, job descriptions, training manuals, training roadmaps, employee engagement programs, and recognition programs, as secondary data collection sources. I gathered data until no new themes emerged.

Population and Sampling

The targeted population was business leaders in an oil and gas company located in Lagos, Nigeria, who have implemented successful strategies to improve KM initiatives in their organizations. Considering the small population of less than 50 business leaders, the selection of the sampling method followed qualitative research

sampling rules applicable to small populations. Sampling is the selection of data sources providing the information needed to reach the defined research objectives (Gentles, Charles, Ploeg, & McKibbin, 2015). Some sampling methods applicable to qualitative research include convenience sampling, random sampling, stratified sampling, theoretical sampling, and focused or purposive sampling (Gentles et al., 2015). Yin (2014) described purposeful sampling as the selection of participants, based on the assumption of the relevance and richness of the data that will provide the answer to the research question. Palinkas et al. (2015) recommended using purposive sampling as the preferred qualitative sampling method to select and identify information rich cases during the research process. The seven types of purposive sampling methods are homogeneous, maximum variation, typical case, extreme case, total population, critical case, and expert (Etikan, Musa, & Alkassim, 2016). Expert sampling is a type of purposive sampling used when there is a need to obtain better information related to a topic under study (Etikan et al., 2016). Considering the time constraints during the research, I used expert sampling because the target participants were business leaders who have used successful strategies to improve KM initiatives.

In qualitative case study research, there is no specific guidance on the size of the sample selected for analysis (B. Marshall, Cardon, Poddar, & Fontenot, 2013). The sample considered should have an ideal and practical size suitable for the research study (Robinson, 2014). The sample size depends on what the researcher wants to know, the purpose of the research, the credibility of results, and research timing (Marshall et al., 2013). I had a sample size of 10 business leaders, who met the eligibility criteria:

participants with successful strategies to improve KM initiatives with their employees.

The business leaders were individuals who could best answer the research question.

Data saturation occurs when there is no new data emerging; researchers collected almost all information related to the study, and the possibility exists to replicate the study (Fusch & Ness, 2015). The primary criteria for choosing a sample should be data saturation, with a focus on the quality of information collected, rather than the number of research participants (Malterud, Siersma, & Guassora, 2016). Data saturation is essential in qualitative research, as this criterion signifies the end of the interviews and data collection processes (Squires & Dorsen, 2018). The member checking process enables to ensure data trustworthiness at the end of the data collection process (Goetschius, Hertel, Saliba, Brockmeier, & Hart, 2017). I focused on the quality of the interviews and member checking, because of the small number of participants I interviewed. Also, I concentrated on the review of documents that included strategies used in KM processes and KM initiatives to enhance the quality of data collected in the pursuit of data saturation. The absence of new data helped me to ensure data saturation.

Researchers should choose a setting with minimal distractions for an optimal concentration of participants during the interview process (Thakkar, Jaffe, & Vander Linden, 2015). The choice of the interview setting can affect the relationships between the participants and the researcher; elements such as race difference, language barriers, and age differences may influence participants' collaboration during the research process (Tarrant, 2014). During an interview, the researcher should express detachment and impartiality, as any reaction can have an adverse effect on the response received

from participants (Mellor, Ingram, Abrahams, & Beedell, 2014). The research participants were remotely located, so I conducted phone interviews. I scheduled appointments with participants during break times or after office hours to avoid interruptions. I conducted a 30 to 45-minute telephone interview with each participant. There were no language or communication barriers, such as the tone in a participant's voice during the calls. I checked with participants to ensure they understood the interview questions by repeating the questions and confirming they understood them. I did not interrupt participants during the interviews. I performed member checking after collecting the data to ensure my interpretation of interview responses was accurate.

Ethical Research

Informed consent forms provide information disclosure and prospective data descriptions for study participants; there is a reference to the purpose of the study to allow the participants to accept participation through written consent without coercion (Ssali, Poland, & Seeley, 2016). The informed consent process involves giving participants the opportunity to assess the ethical standards of the research (Lentz, Kennett, Perlmutter, & Forrest, 2016). Participants received the informed consent form by e-mail and acknowledged their participation by replying via e-mail. I allowed participants to ask for clarification before indicating their consent. The informed consent form included the purpose of the research, sample interview questions, and provisions for voluntary participation. No incentives were offered to participants. In all ethical inquiry, the right to withdraw is among the fundamental principles (Hadidi, Lindquist, Treat-Jacobson, & Swanson, 2013). Participants could withdraw from the research study

at any time without penalty. Researchers should not exercise any form of pressure on participants to maintain their participation (Hadidi et al., 2013). The informed consent process provided participants with the steps to withdraw from the research, as well as measures of ethical protection and data storage considerations. In accordance with the consent form, I advised participants about their ability to withdraw from the study at any time.

For all research involving human participants, there should be an ethical review and approval by an appropriate ethics committee before beginning the study (Harriss & Atkinson, 2015). The role of the institutional review board (IRB) is to protect human subjects involved in research (Hébert et al., 2015). The study was subject to Walden university IRB approval with approval number 06-28-19-0421216. Moreover, the National Institutes of Health (NIH) website included training to ensure that researchers understand the importance of protecting the rights and privacy of human research participants.

Using a coding process helps to maintain confidentiality in research (Sussner et al., 2015). I used a coding process to assign a unique identifier to each participant (i.e., P1, P2, and P3 for participant 1, 2, and 3 respectively). Participants' names and the name of the chosen company remained confidential. There was no reference to a specific company, or participant personal data in the research. I will store all interview data, and raw data reviewed in a locked office cabinet for 5 years. I will delete the files and shred all raw data 5 year after completing the study.

Data Collection Instruments

The primary data collection instrument in qualitative research is the researcher (Rimando et al., 2015). Researchers are the principal data collection instruments because they are part of the data collection and data analysis processes (Fusch & Ness, 2015). The qualitative research process enables an adequate collection and analysis of data by researchers (Anney, 2014). I was the primary data collection instrument in this study. As the primary data collection instrument, I was responsible for collecting and analyzing data. I used two data collection methods: semistructured interviews and review of documents including strategies used in KM processes and KM initiatives.

I sent an e-mail invitation (see Appendix B) to participants to determine their interest in the research and scheduled their interviews accordingly. I planned and scheduled the interviews with participants by defining: the interview setting, the call details, and the interview time based on participants' preferences. I conducted interviews within 4 weeks based on participants' availability. Some of the participants were not available during the defined weeks, so I had to extend the interview timeframe by one week. I conducted semistructured interviews using the telephone because this was the most appropriate and logistical means of conducting interviews with participants based on their time constraints.

Open-ended questions are a useful data collection technique for researchers in qualitative research (Tran, Porcher, Falissard, & Ravaud, 2016). Among qualitative research principles, open-ended questions enable the recognition of emerging patterns and the identification of key themes (Campbell, 2014). The formulation of open-ended

questions does not dictate which data to collect; participants are free to provide their answers in their own words (Brubacher, Powell, Skouteris, & Guadagno, 2015). Using open-ended questions encourages participants to give responses relevant to the study and not provide generic answers (Sato, 2014). The interviews consisted of a set of nine open-ended questions, as shown in the interview protocol in Appendix A.

In qualitative research, company documents serve as a secondary source of data (Merriam & Tisdell, 2015). Researchers use documents to understand better the strategy making process in organizations (Canales, 2015). The use of company documents also provides a rationale to analyze research gaps at the end of the research process (Hafeez, Khalid, & Mir, 2017). I used company documentation, as a second data collection method, to conduct the research study. The specific documents reviewed were KM processes, job handover procedures, KT procedures, job profiles, job descriptions, training manuals, training roadmaps, employee engagement programs, and recognition programs.

Researchers can use member checking to verify validity by inquiring about respondents' satisfaction with the interpretation of interview records (Birt, Scott, Cavers, Campbell, & Walter, 2016). Member checking ensures data reliability, as researchers can verify the accuracy of data collected during interviews (Schlomer & Campbell, 2018). To enhance the reliability and validity of the data collection instruments, I used member checking. Researchers use the member checking process, so that it allows the interviewees an opportunity to verify the accuracy of data collected. In addition to member checking, I used a consistent data collection process for all participants to

enhance the reliability and validity of data collection. The validity of data collection processes depends on interviewers' ability to obtain and summarize data using the same process with all participants (Hurst et al., 2015). Using a consistent and repetitive approach helps to maintain reliability in case study research (Yin, 2014). The interview protocol located in Appendix A served as a guide for all participant interviews.

Data Collection Techniques

Methodological triangulation is the use of two or more data sources to confirm an emerging pattern (Hussein, 2015). Researchers may triangulate multiple collected data sources such as interviews and documents (N. Li & Jackson, 2015). For effectiveness, researchers should combine the use of semistructured interviews with other data collected, such as documentation reviews in qualitative case study research (Matusiak, 2017). I used methodological triangulation in this research study. The two data collection methods that I used were semistructured interviews and archived records displaying strategies used in KM processes and KM initiatives.

The use of semistructured interviews enables data generation (Bräutigam-Ewe, Lydell, Månsson, Johansson, & Hildingh, 2017). Yin (2014) defined semistructured interviews as guided conversations with participants. I conducted semistructured telephone interviews with participants. The semistructured telephone interviews I conducted with participants were a maximum duration of 1-hour. This allotted time enabled me to ask questions and allowed participants to answer all interview questions. An interview protocol (see Appendix A) served as a guide during the interview process. The interview protocol included nine open-ended questions related to successful KM

initiatives in the oil and gas industry. Researchers can probe to obtain more data from respondents during interviews (Bräutigam-Ewe et al., 2017). Probing is an efficient technique for getting detailed information from participants (C. Marshall & Rossman, 2014). I used probing questions to encourage participants to provide accurate information related to the implementation of KM initiatives in their organizations.

There are several methods to record interviews, including written notes, audio recording, and video recording; the recommended approach in the literature is audio recording (Twining, Heller, Nussbaum, & Tsai, 2017). I used a digital voice recorder software on a phone to record each interview and a word processing program to replace participants' names with codes. A reflexive journal is a diary used to record useful information related to the method or data collected during the research process (Gill, Gill, & Roulet, 2018). I used a reflexive journal to note relevant information from discussions with participants.

Company documents provide complementary data to interviews (Cho & Lee, 2014; Tsai et al., 2016). In addition to conducting the interviews and as a second data collection method, I collected documents during this research. I asked for documents referring to strategies used in KM processes and KM initiatives. I requested these documents from participants during the interview process.

There are some advantages and disadvantages of using multiple data collection techniques. The benefits of telephone interviews include less time required, lower travel costs, and the ability to interview anyone around the world (Ward, Gott, & Hoare, 2015). One limitation was telephone interviews. The limitation was the physical distance

between the respondent and the interviewer, which may create a psychological gap between the researcher and the respondents (Ward et al., 2015). Researchers who collect documents can reduce the subjectivity of data collected during the interview process (Tsai et al., 2016). Other advantages of collecting documents include a better understanding of the research context and answers received from respondents (Yin, 2015). Some disadvantages of document collection include the possibility of gathering irrelevant data for the research process; therefore, researchers must take care to select documents that are useful for the research (Yin, 2015). The document collection process may be time consuming if the data received is not well organized (Yin, 2015).

Semistructured interviews were cost effective and time efficient for the research study. I conducted all interviews by telephone within a defined period because the chosen organization was in another country and traveling required additional research costs. I only requested, collected, and reviewed documents that included content that helped answer the research question.

Researchers reduce data misinterpretation when using member checking, because they can develop a better understanding of participants' responses (Varpio, Ajjawi, Monrouxe, O'Brien, & Rees, 2017). The member checking process enables participants to review the data collected during interviews and researchers' understanding of the data (Varpio et al., 2017). At the end of each interview, I scheduled another 1-hour appointment with participants, to allow time for member checking. Participants listened to the interpretation of the interview responses and provided clarification, if applicable. Member checking also allowed me to collect supplemental

information as appropriate. The purpose of the member checking process was to validate data collected from participants.

Data Organization Techniques

The data organization techniques allowed me to facilitate the analysis and interpretation of data. Organizing data is essential to understanding and representing the data collected during the research process (Garcia-Mila, Marti, Gilabert, & Castells, 2014). Researchers may improve data exploration by organizing the data collected (M. Chen, Mao, & Liu, 2014). The data collected and transcribed should remain in a password-protected file for the duration of the interview process (C. Marshall & Rossman, 2014). The transcribed summaries of interview responses from my own interpretation and audio-recorded interviews were encrypted on a password-protected thumb drive for storage.

Both audio and interview summaries should remain stored for 5 years after completion of the study and should be destroyed immediately afterwards (Doody & Noonan, 2013). I am the only person having access to the files. Each participant should be assigned an alphanumeric code to protect his or her identity during the research (Yin, 2014). For this study, I used codes consisting of a capital P for Participants and a number indicating the order of the participants' interview (i.e., P1, P2).

Data Analysis

Triangulation refers to using multiple sources of data to support research findings (Suporn & Prammanee, 2014). The four types of triangulation are data triangulation, investigator triangulation, theory triangulation, and methodological

triangulation (Denzin, 2012). Methodological triangulation is the analysis of data collected using various methods (Agyemang & Carver, 2014). It is a useful technique to explore multiple viewpoints within data (Denzin, 2012). Researchers use methodological triangulation to corroborate findings by using two or more sources of data (Ngulube & Ngulube, 2015). I used methodological triangulation to triangulate data from multiple resources during this study. The two data collection techniques used for the research included telephone interviews followed by member checking and a review of documents that included strategies used in KM processes and KM initiatives.

Suporn and Prammanee (2014) noted that data analysis involves reading, searching through documents, coding data, and summarizing findings. Yin (2011) described data analysis as a five-step process including compiling the data, disassembling the data collected, reassembling the data, interpreting the meaning of the data, and concluding the data. I analyzed data using Yin's five-step process. Compiling the data consisted of reviewing documents that include strategies used in KM processes and KM initiatives. I also reviewed interview responses and interview notes from the journal used during the data collection process. I identified and compiled data rich in content, related to strategies used to improve KM initiatives with employees.

Yin (2011) second data analysis phase consists of disassembling the data into smaller pieces and assigning codes. During this phase, I separated the data based on relevance and content similarity, and attached each piece of information to the predefined codes loaded in the data analysis software. Reassembling the data is the third phase of Yin's data analysis process. The process involves reassembling the data into

themes, as identified by coded clusters (Yin, 2011). I classified coded clusters into themes.

The fourth phase of the data analysis process is interpreting the meaning of the data. Data interpretation is the process of checking the data collected against the research question with a focus on findings answers to the research question (Yin, 2011). I reviewed each of the data clusters built from identified themes and interpreted the data to obtain answers to the research question. Concluding the data is the last phase of Yin's data analysis process. Completing the information involves finalizing and summarizing research findings (Yin, 2011). I summarized the data collected and analyzed to answer the research question. This summary included emerging themes and a final analysis of the research findings.

NVivo software features include storage capacity for a predefined start list of codes, based on the research question to manage the data collected effectively (Houghton, Murphy, Shaw, & Casey, 2015). Researchers can use predefined loaded codes as nodes in NVivo to conduct the coding process; the process is dynamic, as there is a flexibility to drag and drop data from one node to the other (Woods, Paulus, Atkins, & Macklin, 2016). I used NVivo software for data coding and as an aid to analyze the data during the disassembling and reassembling phases of the data analysis process. Researchers can also use NVivo to identify key themes from the data loaded in the software interface (Davis, 2014). I used NVivo software to identify key themes and patterns, and I reclassified data based on these key themes during the reassembling phase of the data analysis process. The use of a qualitative data analysis software

enabled me to identify themes. I considered published studies and research on the research topic, and the KC theory, as a basis to review the themes from data analyzed and the research findings.

Reliability and Validity

In qualitative research, reliability refers to the use of consistent protocols and processes in research (Yin, 2014). Validity is the strength of conclusions and the ability to generate specific and single findings from the initial case study (Yin, 2014). Validity and reliability are separate concepts yet interrelated; reliability is a necessary criterion for validity, and all valid data are reliable (Bruehl et al., 2016). Criteria used to confirm reliability in research include evidence of consistency in data collection over time, settings, and conditions to establish trust in research findings (Morse, 2015). Validity is a criterion related to research quality (Yin, 2014). The three aspects to consider while checking for validity are construct validity, internal validity, and external validity (Shekhar Singh, 2014). In qualitative research, credibility is a criterion for internal validity, and confirmability is a criterion for the neutrality of findings (Guba & Lincoln, 1994). The four principles of trustworthiness to discuss in qualitative research are credibility, transferability, confirmability, and dependability.

Dependability

Dependability consists of showing the consistency of the research findings (Guba & Lincoln, 1994). Dependability is a criterion for trustworthiness (Guba & Lincoln, 1994). The member checking process involves researchers verifying the accuracy of their interpretation of the data collected (Guba & Lincoln, 1994). Member checking is a

criterion for reliability, as a researcher can ask participants to confirm that the researcher understands participants' responses (Gunawan, 2015). I used member checking to ensure dependability and called participants to discuss the interpretation of their answers. The discussions with participants using the member checking process ensured dependability.

Credibility

Credibility refers to researchers' confidence in the truthfulness of the findings (Guba & Lincoln, 1994). The integration of validity in the data collection and data analysis phases enables credibility (Yin, 2014). Member checking serves as evidence of qualitative research credibility (Ogilvie & McCrudden, 2017). Researchers use member checking to assess research trustworthiness, and the credibility of results based on participants' validation of the research results (Birt et al., 2016). Checking participants' preliminary results during the member checking process lead to an increase in credibility (Varpio et al., 2017). I used member checking and triangulation to preserve the credibility of this research. Participants' validation through member checking of the data collected from interview responses, allowed them to assess the data interpretation and the trustworthiness of the results. Researchers use methodological triangulation to enhance the credibility of their research based on the checks performed when using two or more sources of data (Abdalla, Oliveira, Azevedo, & Gonzalez, 2018). The two data collection methods: telephone interviews followed by member checking and the review of documents that included strategies used in KM processes and KM initiatives enabled me to enhance the credibility of this research.

Confirmability

Confirmability is the neutrality of findings in qualitative research (Guba & Lincoln, 1994). Researchers can assess confirmability by providing evidence of factual research findings (Baran, 2016). Researchers achieve confirmability by linking data to their sources (Guba & Lincoln, 1994). The existence of a chain of evidence connecting conclusions, data, and literature enables researchers to check confirmability (Yin, 2014). Reflexive journals serve as tools for learning and mitigating research bias (Al-Rawahi & Al-Balushi, 2015). I used a reflexive journal throughout the study to write all my thoughts and differentiate them from the data collected. I also used some pieces of evidence to connect the findings to the data collected.

Transferability

Transferability is the ability to replicate a study (Yin, 2014). Researchers can help readers to check transferability by providing rich data and examples (Bahrami, Namnabati, Mokarian, Oujian, & Arbon, 2017). In qualitative research, the transferability of results is up to the reader to identify (C. Marshall & Rossman, 2014). I wrote a detailed description of the findings, with information for readers to interpret the results. The transferability of the findings is left up to the reader to decide.

Data Saturation

Data saturation is a criterion for research quality (Yin, 2014). Researchers can reach data saturation if new data or information leads to little or no change in the research results (Tran et al., 2016). Data saturation can occur faster in smaller studies, than in larger ones (Fusch & Ness, 2015). To achieve data saturation, I applied

methodological triangulation and used multiple sources of data. In addition, I conducted interviews, which included member checking with participants, and reviewed documents that included strategies used in KM processes and KM initiatives until no new themes or new data could be garnered.

Transition and Summary

The purpose of Section 2 was to present the details of this research study. The section started with a reminder of the purpose of the study. It included a description of the role of the researcher, participants' selection process, the research method and research design, and population and sampling criteria. In this section, I discussed ethical research conditions, data collection instruments, and data collection techniques. I also explained how I organized and analyzed the data collected. Section 2 ended with requirements for reliability and validity.

Section 3 includes the presentation of the findings of the research study, applications to professional practice, implications for social change, and recommendations for action and further research. I will finalize the section with some reflections and the summary of the research study and study conclusions.

Section 3: Application to Professional Practice and Implications for Change

I used a qualitative case study to conduct this research. In Section 3 of this study, I discuss the research findings, how the research applies to professional practice in the oil and gas industry and the implications for positive social change. I also make recommendations for action and future research, reflect on my research experience, and conclude the research study.

Introduction

The purpose of this qualitative single case study was to explore the strategies that oil and gas business leaders used to improve KM initiatives with their employees. I collected data from semistructured telephone interviews with 10 business leaders and from company documents that included procedures and forms belonging to an oil and gas company located in Lagos, Nigeria. The findings included strategies used by business leaders to improve KM initiatives among their employees.

Presentation of the Findings

The research question was as follows: What strategies do business leaders use to improve KM initiatives with their employees? I conducted interviews with 10 business leaders of an oil and gas company, and I reviewed the documents provided concerning KM initiatives. After coding the participants' responses and documents, I identified 13 recurring elements concerning KM initiatives improvement. Three themes, representing strategies to improve KM initiatives, emerged from the data analysis. These themes were (a) strategies to document organizational knowledge, (b) strategies to acquire knowledge, and (c) strategies to transfer knowledge. Participants argued there was a

need for knowledge documentation; they explained strategies to acquire existing knowledge in their organization and presented their KT methods. These strategies were also identified in the documents reviewed.

Theme 1: Strategies to Document Organizational Knowledge

All 10 participants considered documentation as the foundation of KM processes implementation in oil and gas businesses. Twelve documents reviewed included strategies to document organization knowledge. Adequate documentation was also among the KT and KA strategies identified in the literature. Researchers considered the use of inefficient documents or the absence of documented critical processes as a barrier to KM initiatives implementation (Blagov, Pleshkova, Soldatkin, & Koritckiy, 2017). I will discuss the strategies to document knowledge in organizations in three subsections: the definition of work processes and procedures, the documentation of existing knowledge, and the use of online repositories. During interviews, participants referred to the three main topics listed in table 1 below when presenting strategies to document organizational knowledge in their company.

Table 1

Strategies To Document Organizational Knowledge

Theme 1 nodes	Sources	References
Definition of work processes and procedures	10	89
Documentation of existing knowledge	09	43
Use of online repositories	05	15
Total		147

Definition of work processes and procedures. All participants mentioned the word process in their responses related to KM strategies. Six participants listed the

definition of work processes and procedures as a KM requirement in their organization. Both processes and procedures were used as methods to document personal knowledge or business practices in use in the organization. The terms processes and procedures appeared 62 times and 43 times, respectively, in participants' responses. P2, P3, P4, P5, P6, and P9 agreed they worked for a process driven organization. P6 stated that "All company processes were documented, and all positions had defined competency levels and key expectations required." The same participant said there was an "existing outline of all processes within their specific organization units, including procedures, desk guides, forms, and policies." The purpose of these documents was to document KM best practices.

To develop their documentation, employees had to consider standard expectations included in the delegation of authority guides, controls requirements, and operations integrity systems in use. According to P9, "For job-specific strategies, we have ..., process documentation and checklists to fill with job requirements to make sure the knowledge is captured." P9 further added, "We should ensure processes are well documented, and applicable changes are documented when they occur." The review of documents included the following processes and procedures: a sample of desk manual (describing job-specific tasks to follow) and the change management procedure. Other documents reviewed were the competency assurance manual (describing the process to train operations technicians), policies and guideline manuals, sample operating and maintenance procedures, and controls integrity and operations management systems. These procedures defined the steps to conduct tasks and work requirements. The

procedures also included a required frequency of review by users based on the risk level of the activity undertaken.

The driver to the documentation of all processes was accountability and job criticality. P2 explained, “Success resides in a highlight of the benefits and dangers of not documenting how tasks are performed.” P2 added that employees would be accountable for all potential issues. P6 confirmed, “Employees accept to document and update procedures as they are aware of the effect of poor procedural updates on further controls.” At the job execution stage, procedures were vital documents to follow for job completion and improving employee knowledge.

Specific processes and procedures required for documentation were desk guides, written by employees to explain how they conducted each of their tasks on the job. These guides were systematic descriptions of processes that enabled different users to sit for the employee and conduct their tasks. P7 explained that for nontechnical jobs, the desk guides were critical, as they were considered the reference documents during audits or company internal assessments. The desk guides were updated as the task evolved. I reviewed a sample desk guide together with operations and maintenance procedures, including the last review dates. Based on participants’ inputs and the review of documents, it can be inferred that processes and procedures were basic KM requirements to conduct employee duties in the oil and gas business.

The participants’ responses were consistent with Donate and de Pablo’s (2015) findings requiring the need for business leaders to define appropriate processes for KC in organizations. Processes and procedure documentation in organizations could be

considered as part of the socialization phase of the SECI process in the KC theory. During socialization, employees share their expertise with peers, and there is a conversion of individual knowledge to group knowledge using social interactions (Donate & de Pablo, 2015; Kaur, 2015). From the participants' responses, documents reviewed, and literature, process, and procedures documentation were essential for employees to conduct their tasks and maintain an effective KM system in oil and gas organizations. These processes and procedures enabled employees to have a standard working approach in organizations.

Documentation of existing knowledge. Nine of the 10 participants (all participants except P4) listed employees' knowledge documentation among their KM strategies. The purpose of knowledge documentation was to summarize the acquired knowledge and experience for further use in the organization. P2 recommended a firm approach when requesting knowledge documentation from peers:

There should be no flexibility in documentation requests. When supervisors allow the choice of documenting knowledge or not, there is an erosion of standards. There is a need to check if proper documentation exists. We need to check the effectiveness and relevance of the documents prepared by employees.

According to P1, the "identification of experienced people in the organization who will retire short term, to record their knowledge and interview them as subject matter experts to keep their knowledge in the organization for future sharing" was required. For P2, knowledge or information should be documented in meeting minutes to transfer knowledge to a large number of employees during meetings, and

“Technology makes it a lot easier when it is to document knowledge.” P3 referred to “Bulletins to share information on processes changes,” and P5 explained that knowledge should be documented appropriately in procedures because “At the job executions stage, procedures are key documents to follow for job completion and improving employee knowledge.” It can be inferred that knowledge should be documented for further KS in organization and managers and supervisors should review these documents for effectiveness.

Some business leaders suggested some best practices in use in the organization to document work processes. As a best practice in use, P6 said: “All KM processes are documented, and all positions have defined competency levels and key expectations required.” For P7: “Another best practice is to develop a manual or guidelines explaining decision-making processes and rationale behind these decisions. That will be a documentation of experiences, discussions, and scenarios used as case studies later.” P8 considered that “The most effective methods include defining a list of future retirees for whom there is a KT target and document the knowledge progressively over time. Managers and supervisors should interview departing employees to build knowledge databases.” While reviewing documents, no document included a requirement for employees to document their knowledge. Knowledge documentation was among the best practices in use in the organization, and each business leader had a different approach to request knowledge documentation from their employees.

There was a consistency between participants’ responses and the externalization phase of the SECI process, which is a key construct of the KC theory. During the

externalization phase of the SECI process, individuals formalize their knowledge in the organization (Kaur, 2015). Individual knowledge documentation enables a change of knowledge status from hidden to formal (Lin et al., 2016). Sumbal, Tsui, See-to, and Barendrecht (2017) considered the need to document all knowledge from an employee leaving the oil and gas industry using guidelines and procedures because of the complex nature of businesses. Documenting employees' knowledge was essential in the oil and gas industry because of job-specific requirements (specific operations and maintenance procedures applicable and strict requirements to execute job procedures). There was a gap in the procedures in use as no formal requirement to document employee acquired knowledge was defined. The consideration of knowledge documentation as a business practice was a mitigating factor in the potential knowledge loss and was consistent with KM literature.

Use of online repositories. Five of the 10 participants interviewed leveraged on technologies for filing and knowledge documentation. P1, P2, P6, P7, and P10 considered the use of online databases as a KM best practice. The following documents reviewed were stored online for KS: desk manuals, job handover checklists, change management procedures, appraisal forms, competency assurance manual, company policies, operations and maintenance work procedures, and company management systems expectations and guidelines.

Participants referred to the use of local access network (LAN) and SharePoint as repositories enabling employees: to collaborate, to manage their knowledge, and save their data. According to P6, "Leveraging on the LAN as a single repository of data

versus individual network drives enabled employees to increase the sharing of information within their teams.” P1 explained that “Various SharePoint and websites are accessible to find documents and to increase employees’ knowledge on specific topics,” he added that there were “dedicated SharePoint to post resources so that people could rely on documents posted in the different folders.” For P2, “All documents should be stored and labeled in shared drives” and “Technology makes it a lot easier when it is to document knowledge or train employees.” P10 explained that all documents used for tracking learning progress were stored in computerized databases. The existence of reliable technology enables knowledge documentation in organizations. To ensure an effective collaboration and documentation of the knowledge acquired and developed in their organizations, managers should require employees to store their data in local access network drives available to all team members. The documents reviewed included reference to storage on company local access networks or SharePoints to be accessible to all users.

The research findings corroborated the literature related to knowledge documentation in organizations. Nimmagadda and Rudra (2017) recommended knowledge virtualization and building global knowledge databases within corporations. The purpose of virtual communities of practice was to improve employees’ knowledge and enable managers and supervisors to build standard knowledge databases in their organizations (Frank et al., 2017). Ali et al. (2019) suggested a focus on KS systems implementation to facilitate the transfer of both tacit and explicit knowledge within oil and gas companies from experts to less experienced workers. From data analysis and

literature, it can be inferred that the use of online repositories was critical to the success of KM initiatives in oil and gas companies. A recommended best practice for business leaders was to leverage on technology to implement their KS initiatives. Managers and supervisors might explain to their employees the benefits of using online repositories to spread and document knowledge within their organization.

Theme 2: Strategies to Acquire Knowledge

The second theme identified from the data analysis was KA strategies. All 10 participants mentioned strategies to acquire knowledge, and 13 documents reviewed included KA strategies. Participants used some keywords such as training, courses, mentoring, experience, learning, and communication to explain their KA strategies. Table 2 includes the KA strategies identified and the corresponding number of participants recommending the strategies.

Table 2

Strategies To Acquire Knowledge

Theme 2 nodes	Sources	References
Training plans development	10	106
Implementation of mentoring programs	6	25
Experience sharing	6	18
Communication enhancement	5	10
Total		159

Training plans development. All 10 participants considered employee training as an effective KA strategy. Participants mentioned the word training 106 times. This word had the highest number of occurrences in the data collection process. P1 stated, “Training methods. Seminars, training workshops prepared by experienced workers”

was among the best strategies to acquire knowledge. P5 also stated:

We rely on a global practice to categorize employees' training. To assign employees in positions, some key roles are identified and associated training activities defined. Managers are responsible for defining these training activities. Senior management approves these training plans to make sure they satisfy the job role requirements.

P9 considered, "Sharing data with employees in training courses" as the best KA strategy for oil and gas jobs. P4 explained the KA requirements to mitigate risks: "New training courses were also developed when there were changes in equipment or facility as part of the management of change process to mitigate exposure to existing risks."

Four business leaders (P1, P5, P6, and P8) of the 10 participants interviewed mentioned training plans and programs in their answers. The four leaders considered the development of training plans as a fundamental step in the KA process. According to Participant 1, "Company training programs are linked to competency gaps to build required skills and competencies" in the organization. P6 explained that training plans were part of the employee succession process: "For key positions in the organization, including leadership positions, there is a defined succession plan and a robust training plan for successors." The development of training plans enabled business leaders to implement their KA strategies.

Participants had different training classification methods. The first training differentiation was to classify training as formal or informal. Seven participants considered formal or informal training as the training differentiation mode. P3 stated,

“Training either formal or informal is the main KA approach.” P7 added, “The formal training programs include individual effectiveness training (soft skills knowledge enhancement), leadership training programs, technical training programs, and computer-based training.” According to P3, informal training included “On the job training done with the help of mentors to explain to mentees how they can improve their working methods.” P4 referred to classroom training followed by a testing process for formal training and “on the job training performed based on the location and task complexity” as informal training. From participants’ responses, formal training was part of the employee training plans. Employees could follow formal training by attending either instructor-led courses or taking online courses. On the other hand, informal training was part of the job routine and consisted of knowledge acquired from mentors or colleagues. Both training approaches were complementary as employees should apply knowledge from formal training on the job and improve this knowledge using informal training methods.

As part of formal training, participants referred to a second training differentiation method: technical training and nontechnical ones. Technical training enabled employees to meet their job competency requirements whereas nontechnical training included individual effectiveness and leadership development courses. The focus of participants’ responses was to provide some technical training best practices. P10 provided some ideas to improve the technical training effectiveness, such as “working on simulators in the training center to have a standardized training approach.” P10 also suggested creating a training center within the company or collaborating with

specific training centers to define adequate training contents based on company management systems. The purpose of such a strategy was to align training requirements with the company management systems, competency assessment programs, and training systems. The next best practice suggested by P10 was to implement a learning management system. This system could enable supervisors to deploy learning activities for their subordinates, serve to track employees' training completion status (face-to-face training or procedural training), and could be used to monitor employees' competencies concerning some work procedures. Another practice was to assess the effect of participants' culture on the training process. P4 argued, "We observed there is an influence of culture on the KA process so we may adapt the training and mentoring to employee culture as compared to organization culture." An additional best practice was to assign the monitoring of the training completion status to senior management. As explained by P5: "A high leadership support in the training and employee development processes is essential to improve the effectiveness of training initiatives." The participant added, "Supervisors should be more involved in defining required training and reviewing the training completion status and perform follow-up with their employees." One practice was to enforce the definition of training plans based on gaps and employee development objectives only. P8 suggested, "Training should be aligned to employees' knowledge gaps and development objectives." In summary, formal training should follow a clear stewardship process and business leaders should have the responsibility to define their employees training plans based on business needs.

According to P5, the best training approach was instructor-led classes. The same strategy was suggested by P8 explaining that classroom training was the most effective KA process, and employees could use computer-based training for basic KA. Despite the reference to available online training courses, the most effective formal training method is classroom training because of the benefit obtained from discussions with trainers and other participants.

From the participants' inputs, figure 2 is a summary of the training options used in the organization.

Training types			
Formal Training (Delivery: Instructor led, or Computer based)		Informal training	
Technical	Non-Technical	Technical	Non-Technical
Operations and maintenance positions training roadmaps	Individual effectiveness courses	On the job training Mentoring Work shadowing	
Other positions training plans	Leadership development classes		

Figure 2. Training classification.

Nine documents included a reference to training strategies: the job handover checklist, training plans, online training modules, mentoring procedures, contents of the corporate learning organization website, training reports, competency reports, competency roadmaps, and class attendance registers. Participants provided details related to specific training strategies such as the definition of training plans, training classification, and training best practices in their organization. I reviewed a sample of training plans and training roadmaps. The training plans included the job position,

training requirements for the upcoming five years, associated costs, delivery method, and training purpose (competency development or soft skills training). Training roadmaps included a list of required skills and knowledge in the near and long term (up to 5 years) for specific technical positions. Business leaders used training plans as a guide to assess the KA progress in their organizations. The success of training plans required close monitoring of their execution, from business leaders. For jobs with specific training requirements, supervisors might develop training programs, process documentation, checklists to fulfill job requirements, and monitor employees' training completion status regularly.

Participants' contributions were consistent with literature related to KA strategies. Research participants identified face-to-face training as a commonly used training method in their organization and the best KA strategy. This learning method enabled the transfer of knowledge from individuals to groups, as mentioned in the SECI process of the Nonaka and Takeuchi KC theory (Lin et al., 2016). Nesheim and Smith (2015) recommend a face-to-face training method as it enhances employees' willingness to share their knowledge and enables trainees to update training databases in organizations. The practice in the organization was to request qualified subject matter experts to conduct training and transfer their knowledge and experience. Supervisors and managers were responsible for checking the skill level of the trainers. There was a mechanism to enhance the skills level of trainers and equip them to transfer their knowledge to a group of people. Training remained the preferred KA approach as

supervisors could check their effectiveness as employees use acquired skills and knowledge.

Implementation of mentoring programs. Six participants referred to mentorship as part of strategies to acquire knowledge. P1, P3, P4, P6, P9, and P10 mentioned the use of mentorship when implementing KA strategies with their employees. Four documents reviewed included the mentorship process: mentoring procedures, the corporate learning organization webpage, competency reports, and competency roadmaps. During interviews, P1 explained that they use “mentorship programs including mentors and mentees working together to achieve required KT on the job with an expectation to improve the mentees knowledge base.” P3 added, “On the job training is performed with the help of mentors to explain to mentees how they can improve their working methods and provide them with insights related to job challenges” and, “On the job training is the first best practice by assigning a mentor to a trainee.” The mentors were not required to be employees’ supervisors; they might be chosen among experienced peers available to coach mentees and to assess acquired skills.

References to mentoring as a KA method were found in the literature, and researchers recommended mentoring to increase employee efficiency and to transfer knowledge from mentors to mentees (Ejakpomewhe, 2017; Iyama & Ohiorenoya, 2015; Weightman & Curson, 2018). The purpose of the mentoring process in an organization was to gather the knowledge of experts into databases for further KS (Ahuja et al., 2018). The review of documents and analysis of participants’ responses led

to the conclusion that mentors and supervisors play a crucial role in the early career stages of employees' KA. The mentoring process requires face-to-face interactions, observation, and employee participation in tasks under a mentor's supervision.

Management should seek mentors having the skills and knowledge to help their mentees in building the required competencies. Business leaders defined mentoring programs as processes enabling mentors and mentees to work together to achieve required on the job training programs to improve mentees' knowledge.

Experience sharing. Six participants used experience sharing as a KA method for their employees. The two documents, including a requirement to share experience during the KA process, were the job handover checklist and mentoring procedures. P1, P3, P4, P6, P7, and P9 provided details regarding the experience sharing process applied in their organization. P1 described the change in assignments as part of the KA process as follows:

Sending employees on an expatriate assignment or other local assignments as part of opportunities in our organization (deciding after knowledge gaps identification to assign an employee to a different location to take advantage of different cultures, different experiences, different roles, and opportunity to interact with different people to improve their knowledge and develop employee to occupy their future jobs).

P1 also referred to the identification of experienced people in the organization who will retire short term, to record their knowledge and interview them as subject matter experts. The target was to keep their knowledge in the organization for future

sharing. The participant also mentioned “business meetings experience sharing such as controls sharing and seminars and training workshops prepared by experienced workers.” P3 mentioned “emotional videos including personal stories for sharing and gaining experience” and “peer to peer review enabling employees to showcase best practice and share them, and to create an exchange of experience and knowledge demonstration” as part of the KA process. According to P4, supervisors should assess employees’ previous experiences and seniority in the organization to determine the best experience sharing approach. P6 considered that supervisors should implement an experience sharing process between senior and less experienced employees to avoid a knowledge loss and enhance the KA process. The best practices identified to share experience in the research organization included business meetings and peer to peer discussions. The experience sharing process may be formalized to avoid knowledge loss and establish a standard KA process from experienced workers.

As part of the literature review, experience sharing was associated with the socialization phase of the SECI process of the KC theory. During socialization, there is a conversion of individuals’ tacit knowledge into tacit group knowledge. The socialization process occurs through social interactions, people sharing their feelings, emotions, and transferring their expertise to peers (Kaur, 2015). The purpose of socialization is to understand company processes through individual interactions (Lin et al., 2016). From the review of documents and the analysis of the interview data, the experience sharing process was critical for KA process as there was a physical interaction between the employee transferring the knowledge and the receiver. This physical interaction was an

opportunity for clarifications and familiarization with people and processes, including all KM processes and procedures.

Communication enhancement. Five participants (P1, P3, P6, P7, and P9) listed communication as a KA strategy. Six documents included communication as part of strategies to acquire knowledge. The documents reviewed were desk manuals, online training modules, mentoring procedures, online reports, emotional videos, and bulletins. According to P1, effective communication was necessary for sharing data in business meetings, experience sharing (example includes controls sharing), Q&A sessions, discussions, and exchange. For P6, the communication between employees and their supervisors related to an improvement of their efficiency at work created employees' adherence to KA strategies. P9 also emphasized on "regular discussions between supervisor and employees to identify knowledge gaps" and email communications or stand-downs for general communications with the personnel. P9 considered that communication in a nonofficial manner was advantageous as it enabled parties to have open discussions and inquiries. In summary, business leaders should seek for the appropriate communication channel to cascade KM strategies in their organizations. Depending on the message, formal and informal communication methods apply.

In the literature, communication was an effective KA strategy. Khodakarami and Chan (2014) considered communication as part of the KA process. In the SECI process, communication is an enabler of the combination phase requiring the creation of explicit knowledge in organizations and effective diffusion of organizational processes. Effective collaboration and communication in organizations is a necessary condition for

the success of the KA process (Venkitachalam & Bosua, 2014). Communication was critical in the KA process, enabling clarification and diffusion of KM processes.

Business leaders should leverage available communication channels in organizations to enhance the level of knowledge of their employees.

Theme 3: Strategies to Transfer Knowledge

The third theme identified during the data analysis was the transfer of knowledge in oil and gas companies. Out of 10 participants, eight business leaders mentioned different KT strategies in use in their organization. Among the 13 documents referring to KT strategies, three included a description of KT strategies in use, and 10 were tools used in the KT process. The participants suggested six KT strategies: the implementation of job handover and change management processes, the use of management systems, developing competency assessment systems, the transfer of knowledge during meetings, defining career development plans, and building leadership capabilities. Table 3 represents the number of references to the different strategies during the interview process.

Table 3

KT Strategies

Theme 3 nodes	Sources	References
Implementation of job handover and change management processes	09	20
Use of management systems	07	25
Development of competency assessment processes	07	18
Use of meetings as a KT channel	06	17
Defining career development plans	06	13
Leadership capabilities development	06	12
Total		105

Implementation of job handover and change management processes. P2, P3, P4, P5, P6, P7, P8, P9, and P10 mentioned the job handover process, and four participants (P2, P3, P4, and P7) referred to the management of change process as KT strategies. Both strategies were interdependent as the handover of job duties required employees to manage changes in positions and job roles. According to P2, “The use of the job handover note enables managers to ensure an effective transfer of verbal knowledge between incoming and outgoing employees.” P4 stated, “For employees assigned to new positions, the job handover checklist and the pre-placement checklist enabled supervisors to assess the readiness of incoming employees.” The participant added, “For job handover between shift workers, there was a transfer of key information and knowledge related to shift duties.” P6 explained that “there was an initial onboarding session for newcomers in the organization including a review of the key expectations in the job handover checklist”. According to P9, “Supervisors can check the effectiveness of the handover process by making sure that the job pre-requisites are met, including specific training and regular discussions with their employees to identify knowledge gaps.” From participants’ responses, the job handover process enables employees and supervisors to standardize the transfer of knowledge, assess new employees’ readiness for their job duties and the potential knowledge gaps. There should be an interaction between incoming and outgoing employees and a close monitoring of the supervisors for a successful process.

In the research organization, the management of change process was driven by potential risks inherent to uncontrolled changes. These risks could lead to undesirable

business results and previous work invalidation. The different dimensions considered in the company management of change procedure were hydrocarbon producing and handling, procedural changes, organizational changes, chemical and hazardous materials changes, change in operating parameters and safety, security and environmental risks. The specific changes affecting KT were equipment, procedural, and organizational changes. P2 stated, "Management of change is key in all position changes and should be effectively documented." According to P3, stand down meetings served to explain changes in organizations to align all personnel on upcoming changes. For P4, "New training is developed in case of a change in equipment or facility as part of the management of change process to mitigate exposure to existing risks." P7 explained that there was a need to use change management requirements when training employees for the use of new technologies in the organization. The purpose of the management of change was to handle organizational changes, risk mitigation, and change in processes. Participants identified some key success factors such as the systematic use of the management of change process for all position changes, the documentation of all risk mitigating measures and the implementation of training to guarantee the effectiveness of the KT process.

Five documents reviewed listed the job handover and management of change processes as part of KT strategies. The documents were the job handover and position placement checklist, change management procedures, interim directives, competency assurance reports, and staffing and development procedures. Job handover and position placement checklists were forms used to document the transfer of activities from one

individual to the other. Items listed in the forms included controls responsibilities, safety, health, and environment job requirements, knowledge of procedures and manuals associated with the position, transfer of delegation of authority, knowledge of systems in use, and required training. The existence of desk manuals was a critical success factor in the job handover process. Change management procedures were used to assess and mitigate risks inherent to the change. Participants used the change management procedure as a guide for all organization and process changes. Interim directives and competency reports were part of regular KT between employees. The staffing and development procedures enabled to manage the position appointments and career plans. The participants were knowledgeable and recommended the different guidelines as part of the KT process. The development or use of change management procedures as part of KT is a best practice to implement in oil and gas business.

In the literature, change management and effective job handover were interrelated KT strategies. The KBV theory of the firm guided researchers on organization design and processes changes, and the transfer of capabilities in an organization (Grant, 1996). Leadership support remained a key aspect of the success of organizational changes (Valk & Hannon, 2016). The job handover was a critical factor in the KT process, as the transfer of knowledge from external workers to employees did not always occur, because of a large number of contractors and consultants in the oil and gas industry (Nesheim & Smith, 2015). Business leaders' strategies were consistent with the literature related to job handover and management of change processes in the oil and gas industry. The use of documents enabled business leaders to standardize the KT

requirements for their employees. All strategies used by participants in the event of changes were defined in company processes and guidelines. It can be inferred that for an effective KT in oil and gas companies' managers should assess the risks inherent to the transfer of knowledge and document them in change management procedures. Business leaders should consider using management of change and job handover processes when determining KT strategies in their organizations.

Use of management systems. Management systems are mechanisms implemented in oil and gas companies to mitigate management and controls risks related to petroleum operations (Yanting & Liyun, 2011). Seven of the 10 participants considered management systems as KT enablers. The seven participants were P1, P3, P4, P5, P6, P7, and P10. The operations and integrity management system in use in the organization comprised operations, maintenance, safety, health, and environment requirements for risk mitigation in the oil and gas industry. As part of this management system, P3, P5, and P10 referred to a learning management system used in the KT process. P5 stated, "Our business is driven by the operations integrity system and training is one of the expectations of the company operations system." P10 explained that all KT requirements were documented in the operations best practice manual, including competency assessments and training obligations. According to P7, the automation of the company operations management system enabled users to leverage on technology to transfer knowledge in the organization. Other management systems in use in the organization included compensation systems. P1 argued that employees were motivated to transfer their knowledge in a context where their "compensation was based

on a performance appraisal system.” In summary, using management systems enabled employees to apply established standards. Management systems permit an effective KT process, as employees are required to follow the KT guidance imbedded in the systems procedures. Oil and gas business leaders may consider implementing learning management systems, technologies and employee management systems such as compensation systems to enhance their KT processes.

Seven documents reviewed comprised references to management systems in the KT process. These documents were the position placement checklist, training plans, competency roadmaps, management of change procedures, interim directive guidelines, shift change over, and competency assurance reports. The documents covered all the KT expectations of the operations integrity system. The training documents defined basic controls, operations, and maintenance training requirements in the event of job roles transfers. Change management processes included a competency verification before the final approval of a change affecting processes or people. The documents reviewed enabled to formalize the KT processes by either filling forms or referring to documents as guidance in the KT process. Business leaders should document KT requirements as part of their management systems expectations. Such documentation should serve as a guidance in the KT process with specific reference to risk mitigating measures.

The research findings corroborate the literature related to KT in oil and gas companies. Burnett and Williams (2014) explained the need for oil and gas business leaders to implement KM systems to improve their KS processes. Wold and Laumann (2015) considered safety management systems as an operational requirement in the

industry. Business leaders used management systems to review their organizations' work processes and to enhance existing KT processes (Badpa et al., 2018). Supervisors and managers should invest the required time and efforts to explain the management system requirements to their personnel. These business leaders should implement a verification and measurement process to check employees' compliance with the system guidance. Business leaders should reinforce the application of the management system guidance for a standardized and successful KT process.

Development of competency assessment processes. The third KT strategy was the implementation of a process to assess employee competencies. In the research organization, the competency assurance standards (CAS) enabled business leaders to establish basic training and competency requirements for technical jobs. The CAS are specific to organizations in the oil and gas industry, and different companies define their standards based on job requirements within the organization (Garcia et al., 2014). Seven participants (P1, P3, P4, P5, P7, P9, and P10) considered competency assessments as part of their KT strategies. P10 explained that:

There is a competency assessment process for testing employees' skills. For the specific case of oil and gas technical jobs, all personnel must be competent in their area of specialization. We have a structured competency program where people must demonstrate their competencies by showing their ability to use the job procedures (skills and knowledge understanding).

P7 stated, “The CAS enabled supervisors to validate the skills, acquired competencies and the proficiency level of employees via regular assessments.” P4 described the competency assessment process as follows:

The first step is to separate safety related competencies and technical competencies. Because of the risk exposure in the oil and gas industry, the focus is on safety competencies. For groups, we need to make sure that the overall group collective competency is balanced. The group competency assessment is based on individual competency assessments.

In addition to the other participants’ inputs, P9 referred to the KT from experienced workers to less experienced ones as follows: “Specialists can provide support in their area of expertise. Since there exist different levels of competency, people at lower levels can seek help from experts for some tasks completion within the scope of the competency assessment process.” Answers from P1, P3, P5, and P9 were aligned with responses from P4, P7, and P10. The competency assessment process in the organization include a testing requirement to measure employees’ proficiency, job competency requirements and specific collective competencies needed within teams to mitigate operating risks. The benefit of implementing a competency assessment system includes a limited exposure to operating systems failures caused by the lack of employees’ capabilities. Another advantage of such system is the compulsory KS between workers, to meet the minimum competencies requirement to conduct their duties.

Seven documents incorporated a reference to competency assurance in the KT process: the job handover checklist, staffing and development procedures, training plans,

competency roadmap, interim directives, shift change over, and competency assessment reports. Employee competency assessment reports applied to technical jobs, with a formal requirement to undergo an on the job training process using procedures and task books. These reports enabled mentors and supervisors to identify technical gaps, collective competency in the organization, and define action plans required to reach the expected level of competency for a job and the operational unit at large. The CAS reports also included applicable work restrictions. The other documents enclosed references to competency requirements to fulfill prior to signing some forms or performing a job. There was a frequent reference to competency requirements in the different documents reviewed to remind users to consider this factor as a key operating requirement. In summary, it is advisable for business leaders to develop adequate documentation related to the minimum technical competencies required to run their businesses at large and for specific oil and gas jobs.

The research findings align with the literature. There was a need to define standard knowledge packages within oil and gas companies to enhance collective competencies within organizations (Frank et al., 2017). Defining standard educational packages enabled business leaders to maintain employee competency levels and to prevent knowledge loss (Karytsas, 2018). The business leaders who participated in the study commended the use of an existing competency assurance program, as it enabled them to validate employee skills and competencies through regular assessments. The organization's competency assessment structure required the testing of all employees on the skills needed to perform their jobs. The program applied to maintenance and

operations jobs with basic competency requirements. The competency program structure enabled employees to demonstrate their competencies by showing their ability to follow procedures applicable to their jobs and transfer their knowledge to their peers. From the data analysis, supervisors and managers should assess their employee competencies related to the entire operations or maintenance system and not on specific equipment. Such assessments could enable employees to gain a progressive understanding of the 'big picture' and meet their job requirements. Moreover, the implementation of competency assurance processes enables managers to mitigate operating risks by allowing only qualified personnel to conduct their duties; other employees remaining under mentorship until they acquire the minimum competency level required.

Use of meetings as a KT channel. Six study participants (P1, P2, P3; P4, P7, and P9) referred to meetings as a valuable medium for KT. P1 cited "Network meetings or face-to-face meetings enabling KT and business meetings experience sharing (example includes controls sharing and Q&A sessions with employees)." In reference to KT approaches, P2 said: "Training is one way, meetings another one. Both methods should be documented in meeting minutes to transfer knowledge to a large number of employees." According to P4, the KT methods included:

Safety meetings, toolbox meetings (prior to carrying out a task in a facility), tail board meetings (similar to toolbox but conducted with procedures, maps, and diagrams), and job handover meetings between shift workers. During these meetings, there is a transfer of key information and knowledge.

P3, P7, and P9 referred to similar meetings as part of their KT strategies. During meeting, employees can document their data exchange in meeting minutes; there is an active transfer of knowledge during discussions and some clarifications may be provided as needed. Oil and gas business leaders should encourage their employees to meet with their peers to clarify their understanding of business processes, acquire new knowledge, and transfer their knowledge to colleagues.

Four documents included a reference to meetings as part of the KT process: change management procedure, interim directives, meeting minutes required in the job handover process, and shift change over. There were specific requirements in the documents to record the minutes of business meetings, as they were a valuable means to share information. These minutes were useful in the KT process as they could be shared within the organization. There was a reference to questions and answers sessions, discussions, and information exchange in the documents reviewed. In the company documents, meetings were a KT best practice. Business leaders should recommend the use of meetings and meeting minute's documentation as part of their processes and procedures. The purpose of this documentation will be an implementation of a formal KT process during meetings and a monitoring of the knowledge transferred.

Research findings corroborate KT literature. Researchers consider meetings to be an essential means to transfer knowledge smoothly and effectively (Ortiz et al., 2017; Song et al., 2017). Leaders assessed the effectiveness of the KT process within their organizations based on meetings with their teams (Baldé, Ferreira, & Maynard, 2018). Meetings are part of the externalization phase of the SECI process, requiring a transfer

of knowledge from individuals and groups to the organization's knowledge base (S. Wang et al., 2014). Meetings enabled business leaders to implement effective work processes and KT in their organizations. Key points to consider by supervisors and managers for effective KT during and after meetings included proper documentation of meeting minutes and employee feedback for improvement.

Defining career development plans. Six participants referred to employee career development plans as a KT strategy. P1, P3, P4, P5, P6, and P8 explained that managers should identify career development opportunities for their employees. From participants' inputs, business leaders should work with their employees to define their KT expectations associated with career development plans and provide the working conditions to implement these plans.

Some development opportunities listed by participants included training for competency development, increasing employees' duties and job content, transferring duties to peers, and moving employees to new job roles such as expatriate or local assignments. P1 considered using "internal documents related to staffing and development matters" to document employee career development plans as part of the KT process. According to P3, "Employees are usually not aware of the company strategy for their development; as a consequence there is a buy in issue" related to some KT activities. The participant added that "supervisors' performances should be measured against employees' development targets." The performance stewardship will enable business leaders to assess their execution of career development plans as part of KT strategies. To improve the transfer of knowledge within organizational units, P5

explained that, “A strong leadership support in the training and employee development processes is essential to improve the effectiveness of learning initiatives.” The Participants considered development plans effective only when executed in collaboration with employees, including a clear communication of KT and development targets between employees and their direct supervisor. Managers should thus define revised targets as the plans evolve and provide feedback to their subordinates. One of the key success factors of the execution of development plans is stewardship and clarity in setting KT targets.

Two documents included development plans as part of the KT process: staffing and development procedure, and CAS. The documents were guides to define career development goals for employees. The transfer of knowledge from employees to peers and employee KA were among the career development options listed.

The research findings corroborate the literature. Employees and supervisors should have a common understanding of KM initiatives for an effective transfer of knowledge within organizations (Ojo et al., 2017; Omotayo, 2015). Supervisors should define development goals with employees per KM strategies (Magd, 2014; Ragsdell et al., 2014). Supervisors and managers might leverage development plans as a motivation factor for employees to transfer their knowledge. The plans should be discussed with the employee to obtain their buy in associated with a KT from experienced workers. There should be an alignment between the development plans and company business objectives.

Leadership capabilities development. Six participants listed effective

leadership and supervision as a requirement to implement KT strategies in oil and gas businesses. P1, P3, P4, P5, P7, and P9 provided inputs related to the need to develop the capabilities of supervisors as part of KM strategies. According to the research participants, supervisor capabilities included: an understanding of business processes, business strategies implementation capabilities, and the ability to maintain employee engagement or detect engagement issues in the organization. From discussions with participants, not all supervisors had the required skill set to manage their teams. Therefore, there was a need to build supervisor capabilities or mitigate the observed weaknesses.

According to P1, supervisor appointments should consider the leadership competency level within business units. The practice in the organization was to appoint employees with a high technical skill level to supervisory positions with the expectation to build their capabilities in the new job. The participants recommended in such cases to assess the competency gap of newly appointed supervisors. For inexperienced supervisors, the mitigating measure was to rely on other team members to close the supervisor knowledge gap and leverage on group knowledge to build leadership capabilities. The success of this method depends on the individual leadership style and willingness to learn from peers. P9 mentioned, “The sharing initiative may come from the leadership team or subject matter experts depending on the topic discussed.” Supervisors and managers were usually the channels of spreading the word within their teams, and they played a crucial role in detecting talents and identifying employees who could train others.

Participants observed that KT initiatives were successful when supervisors were good team leaders. For P4, “Employees respond positively because of the leadership stewardship and capacity to identify employees’ motivational values (money, promotions, and job content).” According to P5, “High leadership support is essential to improve the effectiveness of training and KS initiatives.” A leadership gap assessment should consider organizational needs and inputs from supervised employees. A mechanism to obtain employees’ feedback on supervision effectiveness should exist. P5 suggested leadership expertise sharing between managers and supervisors, as compared to self-paced learnings, which was less effective. P7 and P9 considered the participation to professional conferences as an excellent opportunity to learn and exchange leadership skills with other professionals in the industry.

Three documents reviewed included a requirement to build supervisor capabilities as part of the KT strategies: staffing and development procedures, training plans, and company leadership framework. The documents included guidance to build leadership competencies for supervisors and managers. There was a clear definition of leadership expectations, together with their roles in the company KT process.

Participants’ arguments corroborated with literature. Researchers considered business leaders to be the centerpiece of the KC process in organizations (Weightman & Curson, 2018). Managers should define a feedback mechanism to assess the effectiveness of supervision using effective bottom-up communications (Griffin et al., 2014). There was a requirement to enhance supervisory capabilities for effective KT (Iyamah & Ohiorenoya, 2015) and establish cross-functional communications at

supervisory levels for strategic alignment (Ragsdell et al., 2014). The implementation of KT strategies required supervisors to understand their leadership roles and responsibilities. Leadership capabilities development enables the business leaders to build the supervisory and managerial skills needed to implement company strategies.

Applications to Professional Practice

Oil and gas business leaders can use the findings from this study as a guide for knowledge documentation, KA, and KT in their organizations to improve their KM strategies. Business leaders should hold employees accountable for knowledge documentation based on their duties and job criticality. Employees should document acquired knowledge for further use and define their work processes and procedures. Managers and supervisors should be responsible for checking the adequacy of the work processes and documents developed. Some best practices in the research findings included the use of online tools such as SharePoint and local access networks for data storage and collaboration.

The research findings can help managers and supervisors to develop training plans for their employees, define or enhance mentoring programs, develop experience sharing best practices, and enhance communication within their teams to improve their KA processes. Business leaders should implement a training differentiation process based on employee development plans and job requirements. In the oil and gas industry, the training plans should include both technical and soft skills training and delivery mode may vary. The different training delivery methods recommended in the research findings included formal training (instructor-led or online courses) or informal training

as part of on the job learning from mentors and colleagues. Business leaders can use all training methods as they are complementary, and they enable employees to practice the acquired skills. Business leaders should also develop mentoring programs enabling employees to build the required competencies for their jobs. The research findings included some mentoring criteria such as work experience and the availability to coach and assess employees' acquired skills.

The research findings can help business leaders to implement some experience sharing strategies as part of KA in their organizations. Managers and supervisors in the oil and gas industry should identify experienced employees, future retirees who have gained some experience in the organization and subject matter experts to share their knowledge with peers. Employees could share their experience during meetings, by recording videos for further use or discussing working methods with their peers.

The research findings included a requirement to enhance communication methods for an effective KA process. Business leaders should leverage on business meetings to improve communication in their organization. The leaders may define meetings requirements, such as experience sharing among participants and compulsory question and answers sessions. Other communication best practices in the research findings included regular discussions between employees and their supervisors to identify knowledge gaps, email communications, and organizing stand-downs for general information. For effectiveness, business leaders should rely as much as possible on informal communication means such as open discussions with their employees.

The research findings can help business leaders to define strategies to transfer knowledge. These KT strategies should include a definition of job handover and change management processes, the implementation of management systems, competency assurance requirements, setting employee development plans and leadership capabilities development. To verify the effectiveness of hand overs and changes in their organizations, business leaders may implement the use of job handover checklists to standardize their knowledge transfer processes and define procedures to manage organizational changes. Oil and gas managers should develop some management systems as a business practice to standardize their KT processes; these systems may include oil and gas operations and maintenance guidance and business controls requirements.

Based on the research findings, business leaders should define basic training and competency requirements for specific oil and gas technical jobs. Standardized competencies matrixes are required to ensure an appropriate transfer of knowledge in petroleum companies. Managers may establish employee development plans for staff mobility and KT between incoming and outgoing employees. The development of leadership capabilities can enhance supervisory skills in the organization. Business leaders may use the research findings to define leadership profiles and develop leadership skills including mentoring, coaching and leveraging on senior supervisors to build supervisor capabilities.

Implications for Social Change

The implications for positive social change covered two dimensions: internal and external to oil and gas companies. In organizations, tangible improvements for individuals include the potential to improve employees' capabilities based on enhanced training plans and mentoring programs. Employees will also benefit from a standard approach to share their experience with peers and take advantage of defined competency frameworks and development plans in their organizations. The research findings may also enable business leaders to build their leadership capabilities while implementing new KM strategies. Improving KM initiatives in the oil and gas industry may lead to enhanced employee capabilities, increased KS opportunities, and empowerment of employees based on their new competencies. This capacity-building process has the potential to create career growth opportunities for local employees with an increase in their span of responsibility and a potential increase in their revenues.

For organizations, implementing effective KM processes may lead to an increase in human capital obtained from enhanced employees' capabilities. The increase in human capital and competencies in organizations may generate employee satisfaction and improve business profitability. Employees may be willing to keep their jobs in the organization; low personnel attrition may enhance employees' retention rates in organizations. The social effect of employee retention is stability in personnel income and benefits offered to dependents as applicable. In organizations with expatriate personnel, the transfer of expertise from expatriates to nationals may improve position

nationalization processes. Nationalization for organizations is a potential saving in salaries and wages when replacing expatriates with local employees.

External to organizations, improving KM initiatives could increase technical knowledge and business practice sharing with contractors and business partners. Competitors may also take advantage of existing practices in the market. Business leaders can establish some training partnerships with other oil gas companies based on their business needs. The leaders can also share their KM standards, including training plans, management systems, competency standards, and work processes with other petroleum companies, enabling data exchange and the definition of local industry standards. Sharing the same trainers with local companies could lead to best practices sharing with colleagues of the industry and contributing to building employees' capabilities. Local training workshops may be cost-effective for companies as there could exist opportunities to train many workers within the local market. Simultaneously, local training entities may increase their market shares and revenues by training oil and gas workers.

There is also an opportunity to transfer organizational knowledge to customers, vendors, and communities to improve their working methods and operating standards. Qualified vendors may receive some purchase orders to develop their activities, create employment, and increase their profits. The increase in vendor activities may positively affect their revenues and tax contributions. An increase in vendor and personnel income may lead to an improvement in the standard of living of communities. Synergies between oil and gas companies and external partners may contribute to building a

positive reputation for petroleum companies as KM initiatives implementation may lead to profitable business partnerships.

Recommendations for Action

Business leaders can define new KM strategies, adjust existing strategies, or implement some KM best practices in their organizations based on the research findings. Company managers can employ effective KM processes to improve organizational work processes and decision-making (Martínez-Martínez et al., 2018). Other benefits of improved KM initiatives include increased profit, increased corporate social capital, improved relationships between workers, and strategic planning (Hadian, Vaghasloo, & Doroud, 2014; Rechberg & Syed, 2014; Shahmoradi et al., 2015; Tseng, 2014; Zhang & Jiang, 2015). I conducted my research in an organization created 64 years ago. Selected participants were experienced and qualified workers who have used and developed some KM best practices in their organization. The findings of the study may apply to oil and gas business leaders and to other industry business leaders willing to improve their KM practices. All employees willing to establish KM strategies in organizations may use the research findings as a guide to documenting organizational knowledge, and to define knowledge KA strategies and KT strategies.

My recommendations are in three KM areas: knowledge documentation, KA, and KT. To enhance the documentation of existing knowledge in organizations, business leaders should look for practical solutions for checking the existence and accuracy of documents. Solutions include scheduling a periodic review for existing procedures. This review will enable business leaders to confirm updates in procedures, create new

procedures, and validate changes as applicable. Managers may define control requirements around document updates for personnel accountability. They may check the existence of proper documentation with a leverage on technology for filing and verification purposes.

To improve the KA process in organizations, my recommendation is to involve managers and supervisors in defining employees' training plans, performing a review of training completion status, and monitoring gaps with employees for ownership. Participants mentioned face-to-face instructor-led training and mentoring as the best training methods. Business leaders should choose instructors based on their competencies and KS aptitudes. To improve KT, business leaders have to check the effectiveness of the job handover process and implement a system to assess employees' competency on their job. The business leaders should also define plans to develop the leadership capabilities of supervisors and managers in their organizations as part of their duties in the employee development process. Company managers should develop strategies to solve the identified KM issues in petroleum organizations. Suggested strategies include a standardized KT from retirees to active employees, effective job handover completion between employees, and the use of online resources to learn and file KM documents. Another issue raised by participants was inadequate communication of KM strategies to employees, leaving room for wrong interpretations and disengagement. Business leaders should provide adequate communications related to each initiative rolled out in the organization, including the business justification and benefit for employees.

My goal is to publish the findings of my research to oil and gas business leaders and all business leaders interested in KM strategies implementation to improve their business practice. I plan to disseminate my research findings with the research participants by presenting them with the research results and sharing the entire research study. I am looking forward to publishing an article related to this research in human resources and oil and gas journals.

Recommendations for Further Research

Despite the significance of the research results, I observed some limitations to this research. The results included a broad range of strategies used by oil and gas business leaders to improve KM initiatives. I based my research on the assumption that all the participants were knowledgeable about the research topic, and my sample was representative of experienced business leaders in the oil and gas industry. I conducted my research study using phone interviews, and I could not interact with participants face-to-face. The research was delimited to a single company located in Nigeria; therefore, the findings included only strategies in use in the organization where I conducted the research study. I obtained findings from the review of company documents and interview summaries.

I could improve this research approach by choosing multiple oil and gas companies in different countries to enlarge the sample and confirm the research results. Another improvement could be to have face-to-face discussions with participants to enquire better and to increase the possibility for participants to provide more insights related to the topic under research. In addition to reviewing company documents and

interviewing participants, observing participants at work, focus groups, and surveys could provide more data. I could enhance the research findings by using other research methods such as quantitative research, mixed methods, or other qualitative designs such as phenomenology. I could consider the use of a quantitative approach for further research to measure the effectiveness of the recommended strategies. Measuring the effectiveness of each of the strategies could enable researchers to choose the most appropriate strategy based on research results. Finally, additional experience in conducting qualitative research enables the researcher to conduct future research better. Researchers should consider pairing with experienced researchers in further research to make sure that all qualitative research process requirements are met and to increase the potential to improve the quality of the research results.

I identified other research possibilities when analyzing the data collected. The first research opportunity was the difference between KM strategies applicable to office workers and field workers (operations and maintenance personnel) in oil and gas companies. From the interview results, there was a need to review KM strategies specific to technical jobs in the oil and gas business. Another research possibility was the transfer of competencies from retirees to active workers in the petroleum industry. There was no formal process to transfer experience from senior employees to other team members, and participants considered the absence of a formal process as a risk of knowledge loss. The last research opportunity identified was the effective use of online resources. Participants listed valuable information available to employees on websites and extensive online training opportunities. They recommended an improvement of this

training method because of the lack of human interaction and employees' unavailability to explore online resources during working hours.

Reflections

The doctoral research process was a very challenging and humbling experience. My main issue was scholarly writing, as English is not my first language. I did not expect the resilience required to move along the different steps of the research process. I met elder classmates who were facing more challenges and did not give up until their graduation; this made me determined and stronger. Above all, my doctoral program was a life learning experience. From a personal standing point, I feel more comfortable facing life challenges and I strive for excellence in all I do.

As a human resources practitioner with 15 years of experience in the oil and gas industry, I have noted several instances where effective KT or KS did not occur in organizations. I have also identified issues related to the lack of existing knowledge repositories in organizations and KT issues arising from employee resignations. The specific case of experienced employees retiring has led to immense knowledge and competency losses for organizations. Because of this experience, I wanted to know how business leaders in mature oil and gas organizations dealt with KM issues. Therefore, I enquired about the issues faced in managing knowledge and requested strategies used to manage and maintain the knowledge within an organization. I had a preconceived notion that no formal structured KM strategies were in use within oil and gas companies and considered KM strategies as a very complex process. Upon completion of this research, I found that many strategies were in use to improve KM initiatives in the oil and gas

industry. The difference between the researcher's experience and inputs from research participants was related to defining KM requirements in organizations and monitoring the implementation of defined strategies and the use of existing processes.

The participants were satisfied with the research process as they could share their experiences to solve an important research problem identified in their industry. During the interviews, participants were willing to obtain clarifications related to the research question to provide answers. They requested further clarification and were able to provide specific answers related to knowledge documentation, KA, and KT. I could leverage and consolidate answers from the different participants to obtain a general answer to my research question.

After completing the study, I could identify the KM strategies applied in the oil and gas industry. I improved my understanding of KM concepts presented in the literature, and I was able to analyze the issue from both a conceptual standpoint (literature) and a practical one (interview responses and company documents). I detected some parallels between the literature and the data collected during interviews to answer the research question.

Conclusion

Business leaders are responsible for implementing KM strategies in oil and gas companies, as consequence they play a critical role in the improvement of these strategies. In this research study, I collected data using semistructured interviews with business leaders from an oil and gas company located in Lagos, Nigeria. I reviewed company documents related to KM practices in the organization. Member checking was

used to validate data received from participants. I identified three strategies in response to the research question: (a) organizational knowledge documentation, (b) implementation of employee KA strategies, and (c) implementation of effective KT strategies within the organization. To improve their KM initiatives with their employees, oil and gas business leaders should focus on organizational knowledge documentation by defining work processes, documenting existing knowledge, and using online repositories as a knowledge documentation best practice. Business leaders should define training plans, set mentoring programs, implement experience-sharing programs, and leverage on communication as part of their KA strategies. Company managers should establish effective KT strategies. These strategies include effective job handover and change management processes, setting competency standards, using meetings to transfer knowledge, and building employee development plans. Other KT strategies include the use of management systems and leadership capabilities development.

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Appendix A: Interview Protocol

Interview scheduled date _____ Interview date _____

Consent form receipt date _____

Participant Identification Number: DBA

What was done	What was said—script
<p>1. Introductions: Introduce the interview and set the stage</p>	<p>a. Extended greetings and thanks to research participation</p> <p>b. Introduced the researcher to participants</p> <p>c. Reviewed the consent form clauses with participants</p> <p>d. Requested if there were points to clarify in the consent form</p> <p>e. Provided details about the interview process (1-hour timing to respond to the nine interview questions including clarifications, interviews conducted over the phone, explanation about the interview recording procedures)</p> <p>f. Notified participant about recording and started timer and voice recorder</p>

<ol style="list-style-type: none">2. Started the interview process<ol style="list-style-type: none">a. Asked each question as written (to ensure participants receive the same information)b. Ensured the subject was well understood, if not provided appropriate clarificationsc. Asked probing questions	<ol style="list-style-type: none">1. What strategies are you using to improve KM initiatives with your employees?2. What best practices or methods are you using for the successful implementation of KM initiatives in your organization?3. What are the issues faced during the implementation of KM initiatives with your employees?4. What methods do you find work best to solve issues faced with your employees?5. What are the less effective methods used to improve KM initiatives with your employees?6. What are the documents used in your organization to support KM initiatives?7. What are the methods used for the transfer of knowledge from employees to groups or vice versa?
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	<p>8. How do employees respond to the KM initiatives implemented?</p> <p>9. What additional information would you like to share about KM initiatives?</p> <p>10. Do you need some clarifications related to the questions?</p> <p>11. Can you tell me more about ...?(As applicable- to probe)</p>
3. Recorded interview end time	<ul style="list-style-type: none"> • Our discussion ends at ... minutes after we have started
4. Thanked participant for their time	<ul style="list-style-type: none"> • Thank you for your time and participation in this research.
5. Enquired about follow-up and appointment to conduct data validation	<ul style="list-style-type: none"> • I will write a synthesis of our discussion and send it by email for your review; Please let me know when you have an hour to discuss this synthesis.
6. Sent email invitation/ called participant to agree on a date and time for the follow-up appointment	<ul style="list-style-type: none"> • Sir/ Madam, Following the last interview conducted within the scope of the research. Would you please confirm

	<p>availability on (time and date) for alignment. You will find attached the summary of the interview for your inputs. Please feel free to provide supplemental information or edit the document for data accuracy. We will discuss the attached document during the next call. Kind regards.</p>
<ul style="list-style-type: none"> • Member checking process • Introduced the follow-up interview and set the stage • Shared a copy of the concise synthesis for each question • Brought in probing questions related to other information found—note the data was associated so that I was probing and adhering to the IRB approval. • Walked through each question, read the interpretation, and asked: “Did I 	<ul style="list-style-type: none"> • Extend greetings and thanks to the research participant • Define the scope of the discussion (review of data collected) • You have received my input by email. Please open the document received for discussion <ol style="list-style-type: none"> 1. What strategies are you using to improve KM initiatives with your employees?—perhaps one paragraph or as needed 2. What best practices or methods are you using for the successful implementation

<p>miss anything?” Alternatively, “What would you like to add?”</p>	<p>of KM initiatives in your organization?—perhaps one paragraph or as needed</p> <p>3. What are the issues faced during the implementation of KM initiatives with your employees? —perhaps one paragraph or as needed</p> <p>4. What methods do you find work best to solve issues faced with your employees? —perhaps one paragraph or as needed</p> <p>5. What are the less effective methods used to improve KM initiatives with your employees? —perhaps one paragraph or as needed</p> <p>6. What are the documents used in your organization to support KM initiatives?—perhaps one paragraph or as needed</p> <p>7. What are the methods used for the transfer of knowledge from employees</p>
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	<p>to groups or vice versa?—perhaps one paragraph or as needed</p> <p>8. How do employees respond to the KM initiatives implemented?—perhaps one paragraph or as needed</p> <p>9. What additional information would you like to share about KM initiatives? — perhaps one paragraph or as needed</p>
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Appendix B: Invite Email

Date:.....

Dear Mr./Mrs.....,

I am pleased to invite you to participate in a doctoral research study related to knowledge management in the oil and gas industry. The title of the research study is Strategies to Improve Knowledge Management Initiatives in Oil and Gas Companies. The purpose of this qualitative single case study is to explore strategies that business leaders use to improve knowledge management initiatives with their employees.

The research is conducted by Ms. Aissatou Oumar Seydi, who is a Doctorate in Business Administration candidate at Walden University. The researcher has obtained a letter of cooperation from an oil and gas company located in Lagos, Nigeria, and Institutional Review Board approval, to conduct the research study. You have been chosen as a business leader who has used successful strategies to improve knowledge management initiatives with employees in your organization.

The research study will be conducted via phone interviews. The interviews are comprised of nine open-ended questions that can be answered within an hour at your convenience. An hour follow-up interview, called member checking, will also be conducted to confirm the data collected and the researcher's interpretation of the data. You will also be required to email relevant documents that include strategies used in knowledge management processes and knowledge management initiatives to the researcher. The detailed list of the documents requested will be issued, and all materials will remain confidential. You will receive a consent form for review and signature if you

confirm your participation in this research. The consent form will include detailed information related to the research study and your rights as a participant. You may contact the researcher if you need any additional information.

Please reply to this email to confirm or decline voluntary participation in the research.

Sincerely,

Aissatou O. SEYDI
Walden University
Doctorate of Business Administration Candidate