THE GRAYING OF THE OIL AND GAS INDUSTRY IN THE UNITED STATES: KNOWLEDGE TRANSFER PERCEPTIONS AND EXPERIENCES IN A MULTIGENERATIONAL WORKFORCE

A Dissertation

by

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ABSTRACT

Knowledge transfer is an important component of corporate sustainability in the oil and gas industry that has often been overlooked and undervalued. Transferring knowledge in a multigenerational workforce is impactful for the corporation and the employees who encompass the workforce creating the culture.

This qualitative study was designed to examine both perceptions and experiences of employees in the oil and gas industry and discover (a) how knowledge possessed by Baby Boomers is being transferred to future generations and (b) what interventions by organizations enable and encourage the knowledge transfer process that creates a knowledge transfer culture. The research questions that guided the study were the following: (1) What are employees' perceptions of knowledge transfer within the oil and gas industry? (2) What interventions have workers in the oil and gas industry experienced that enable and encourage generations to facilitate the knowledge transfer process? and (3) What recommendations do workers in the oil and gas industry have for maintaining and advancing a knowledge transfer culture?

The participants for this qualitative study included 16 participants from three generations prevalent in the workforce and from all business segments that encompass the oil and gas industry. Networking and purposive sampling were used to obtain data for this study. Each of the 16 participants were individually interviewed utilizing an interview guide with semi-structured interview questions for consistency.

The findings of this study revealed the shared experiences and perceptions of employees working in the oil and gas industry. Their views of what gives their organizations a competitive advantage are presented. In addition, the research participants provided their knowledge transfer experiences and discussed what interventions, if any, their organizations are implementing to combat the aging workforce. Participants also explored why employees are reluctant to share knowledge. Last, observations about how organizations within the oil and gas space can create knowledge transfer processes and develop a culture of knowledge transfer utilizing both monetary and non-monetary incentives are presented. Based on the findings, recommendations for both practice and future research are offered.

DEDICATION

This dissertation is dedicated to my family. Without their unwavering support and prayers, the completion of this journey would not be possible. I would like to especially give thanks to my wife Barbara, my children Alexander and Chandler, and my parents Ronnie and Shirley Ford.

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I can do all things through Christ who strengthens me.
—Philippians 4:13

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I was inspired by my work experience to investigate knowledge transfer in the oil and gas industry while working at Swift Energy Company, Moran Enterprises, Enable Midstream, and Enerflex Energy Systems. Without my life experiences at these companies, this study would not exist.

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But as it is written, Eye hath not seen, nor ear heard, neither have entered into the heart of man, the things which God hath prepared for them that love him.

—1 Corinthians 2:9

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NOMENCLATURE

BLS	Bureau of Labor Statistics
HRD	Human Resource Development
HRM	Human Resource Management
IOCs	Integrated Oil Companies
IRB	Institutional Review Board
KM	Knowledge Management
LMS	Learning Management System
PhD	Doctor of Philosophy
RBV	Resource-Based View
STEM	Science, Technology, Engineering, and Mathematics
U.S.	United States

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CHAPTER I

INTRODUCTION

Members of society born after World War II between 1946 and 1964 are commonly referred to as the Baby Boomer generation (Giancola, 2006). In 2021, these individuals are between the ages of 57 and 75. This segment of human capital has been in the workforce for many years and is a great source of industrial and organizational knowledge. Members of this generation currently hold multilevel positions within a large number of organizations in various industries, including oil and gas. These workers have made a significant impact in the oil and gas industry. Whether they are blue-collar workers serving as roustabouts, gas compression field technicians, process operators, line-hot tap technicians or white-collar workers, such as reservoir engineers, geoscientists, project managers, or geo-technicians, their impact and knowledge is invaluable to the oil and gas industry. The average age of workers in the oil and gas industry is estimated to be over 50 years old, and half of the workforce will retire within 10 years (Werner et al., 2016). The average age of oil and gas workers has consistently been one of the highest in comparison to other industries; the taskforce on the Aging of the American Workforce noted that the energy industry has the second oldest average age, and only the aerospace industry has a higher average age (Noble & Harper, 2009; Sampath & Robinson, 2005). For viability and sustainability in the future, it is imperative that oil and gas companies successfully capture and transfer the knowledge of their aging workforce (Cochran et al., 2012; Werner et al., 2016).

Background

Within the last few decades, the U.S. upstream oil and gas industry's workforce has declined by an astounding 1.1 million jobs, not taking into account the other facets of the industry, such as downstream, midstream, and services (Sampath & Robinson, 2005). Presently, jobs are continuing to decline because of the cyclical nature of the industry, which has experienced two significant downturns since 2000. In addition, a downturn in the mid-1980s caused many oil and gas workers to leave the oil and gas industry and work in industries that were less volatile. A Maxwell Drummond International survey found oil and gas corporations continue to be ill-equipped in regard to knowledge transfer, which serves as an organizational stressor that poses a threat to future profitability (Brocato, 2009; Werner et al., 2016). More time has been afforded to rectify this issue due in part to the 2008-2009 recession that delayed many retirement-eligible workers. The Society for Petroleum Engineers estimated that 231,000 years of cumulative experience and knowledge may have been lost in the industry between 2000 and 2010 due to the retirement of petroleum engineers and other technical staff (Grant, 2013). A significant decline in petroleum engineering undergraduate majors has occurred according to Gonzalez (2005), who noted a 79% decrease in the enrollment of undergraduate students pursuing petroleum engineering programs. According to Calo (2008), "Intellectual capital and employee talent have become areas of competitive advantage, and even of survival, for organizations" (p. 404). Although the industry is cyclical, it is estimated the industry will see "1.4 million new jobs in the United States between 2012 and 2020" (Werner et al., 2016, p. 9).

Theoretical Framework

The theories that inform this study's theoretical framework are *resource-based view* (RBV), *human capital theory*, and *organizational knowledge creation theory*, which have been used in a limited number of studies in relation to knowledge transfer in the oil and gas industry. The findings of this study will expand knowledge transfer literature specific to the oil and gas industry.

Resource-Based View

The Resource-Based View is a strategic management theory that was developed in the late 1950s (Barney, 1991, 1996; Penrose, 1959; Wernerfelt, 1984). RBV's focus is twofold; the theory (a) analyzes both a firm's tangible and intangible assets in order to (b) understand and maintain current and future competitive advantage by creating sustainability (Barney, 1991; Wernerfelt, 1984; Wright et al., 2001). The theory states for companies to have a sustainable competitive advantage, they must possess four attributes. First, a company must be valuable in the sense that it exploits opportunities and/or neutralizes threats in a firm's environment. Second, organizations must also be rare among a firm's current and potential competitors. Third, they must be imperfectly imitable, and fourth, there cannot be strategically equivalent substitutes for this resource that are valuable but neither rare nor imperfectly imitable (Barney, 1991)

Human Capital Theory

Established in 1960, human capital theory is a widely used economic theory in human resource development (HRD) (Sweetland, 1996). Gary Becker and Theodore W. Schultz are the two most prominent human capital theory scholars (Sweetland, 1996).

Human capital theory is defined by Becker (2001) as "the knowledge and skills that people acquire through education and training [that is] a form of capital, and . . . this capital is a product of deliberate investment that yields returns" (p. 12). Schultz (1961) recognized five activities that improve human capability: investments in wellness of individuals, on-the-job training, emphasis on education, external certification programs, and individual and familial adjustment to future job opportunities. A corporation can improve its return on investment and future sustainability through its investment in human capital.

Organizational Knowledge Creation Theory

In today's competitive and ever-changing work environment, companies are continually looking for ways to maintain a competitive advantage within the marketplace while striving to innovate and grow. It is this notion that has pushed the idea that a company's most important asset is not the product or service it provides but the knowledge and processes that drive creation. According to this view, an organization is a collection of resources, and those with superior resources will provide a return on investment. This idea has driven the concept of knowledge creation and its importance within organizational structures (Conner, 1991; Mahoney & Pandian, 1992; Penrose, 1959; Teece, 1980; Wernerfelt, 1984). Knowledge creation strives to capture the essence of what drives a company by amplifying and testing ideas, processes, and structures. In addition, the Japanese concept of *Ba* has been applied, which looks to incorporate a wider array of external and internal knowledge influencers. External influencers ranging from customers, suppliers, local communities, and even competitors all factor into the

process of *Ba* and its role in capturing knowledge within an organization (Nonaka & Toyama, 2015).

By utilizing the theories of human capital, RBV, and organizational knowledge creation, the conceptual model interconnects all three theories. The conceptual model uses these theories to yield corporate competitive advantage through transferred knowledge by investing in human capital to increase the knowledge, skill, and ability of the workforce. A further discussion of the conceptual framework and its relevance to this study is found in Chapter II.

Statement of the Problem

The retirement effects of an aging workforce will be felt by all industries; however, some will be more affected because of their current demographics (Cochran et al., 2012). The imminent retirement of the Baby Boomer generation signifies a major problem for the oil and gas industry and has created a demographic shift known as the *great crew change* (DeLong & Storey, 2004; Kundu et al., 2013; Werner et al., 2016). Currently in the United States, the energy sector is faced with this problem because more than one-third of the workforce is over the age of 50. This age group was expected to grow by more than 25% by 2020 (Strack et al., 2008). Thus far in scholarly academic literature, the oil and gas industry has not been a focal point of consideration in regard to the importance of knowledge transfer.

Three major themes exist within the literature in respect to this topic: (a) future workforce shortage, (b) lost knowledge, and (c) generational differences. Understanding

these problems as they exist in the graying workforce may build a case for a strategic direction for industry leaders and HRD practitioners.

The Future Workforce Shortage

The U.S. population is decreasing, and the workforce is graying and aging demographically. One of the most critical issues the oil and gas industry faces is labor availability (Werner et al., 2016). Toossi advised in 2012, "The projected labor force growth over the next 10 years will be affected by the aging of the baby-boom generation, persons born between 1946 and 1964" (p. 43). The Bureau of Labor Statistics (BLS) revealed that the labor force's median age in 1990 was 36.4 years old, and it was 39.3 in 2000. In 2010, the median age of the workforce was 41.7, and was projected to be 42.8 in 2020 (Toossi, 2012). Thus, the median age of the workforce continues to increase with the age of the Baby Boomer generation. The workforce is not only aging but also shrinking at the same time (Stam, 2009). In the near future, there will be a supply and demand issue in regard to human capital (Stam, 2009; Szinovacz, 2011). Stam (2009) noted, "In the coming years, large numbers of our most experienced workers are going to retire. At the same time, it will be increasingly difficult to counteract this loss of knowledge because of a sharp decline in the supply of labor" (p. 437). In the United States, a 30 million worker deficit exists between Baby Boomers and Millennials, which will make it challenging for employers in all industries, including oil and gas, to fill leadership roles with experienced personnel (Houlihan, 2009).

Lost Knowledge

The U.S. Census Bureau projected that by 2029, when all Baby Boomers will be 65 years of age or older, 20% of the U.S. population will be over 65 years (Colby & Ortman, 2014). Since the beginning of the Baby Boomer generation, birth rates have been on a steady decline. Thus, in the coming years, there will be less talent for oil and gas corporations to pursue and a loss of knowledge if there is no plan in place to transfer the knowledge. Since Baby Boomers are at retirement age, it is imperative for organizations that comprise the oil and gas industry to prepare for their employees' pending mass exit. Lahaie (2005) asserted—regarding corporate knowledge—that 42% of knowledge is present in the minds of the workforce, but institutional knowledge follows the person as they exit the organization, and the company loses both explicit and tacit knowledge. In 2008 it was noted that oil and gas companies will undergo a major challenge by 2010 because of individuals who are not only retiring but also starting their own companies (Gray, 2008). These individuals who are exiting the workforce obtained knowledge through their work experiences and know "how things work, how to get things done, and who to go to when problems arise" (DeLong & Storey, 2004, p. 3).

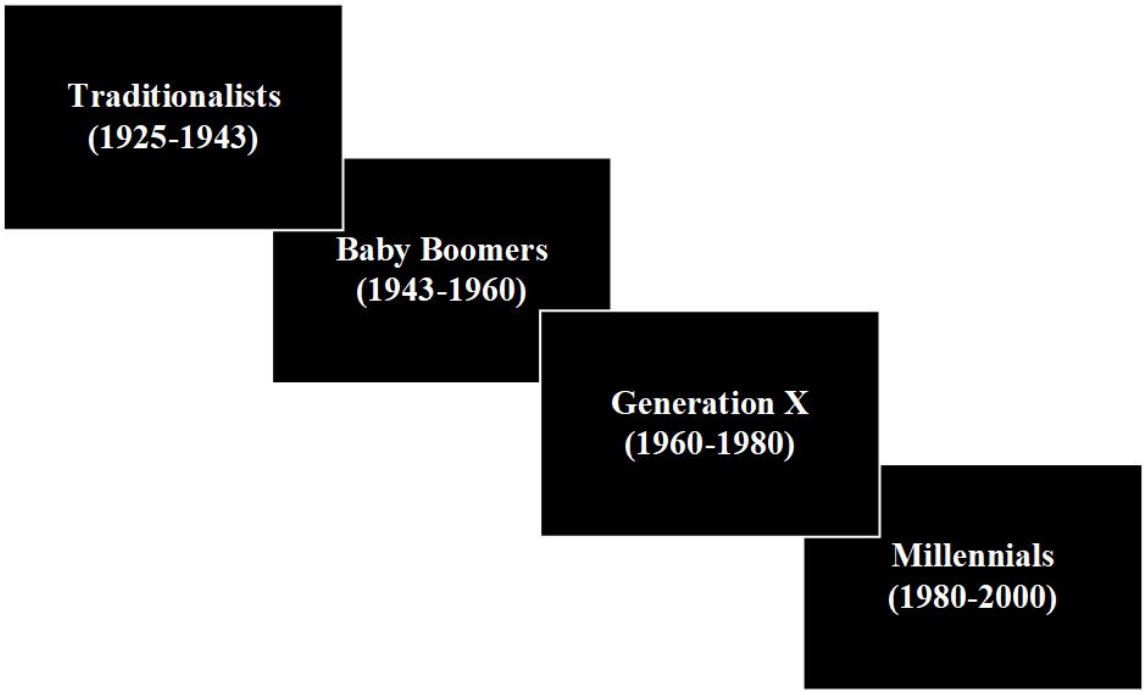
Generations in the Workplace

Three generations comprise the majority of the present-day workforce, but there are as many as four generations present in the workforce in total. As these diverse generations work together, it should be noted this is the first time in U.S. history of having four generations in the workforce at the same time (Twenge et al., 2010; Zemke et al., 2013). The individual generations present in the workforce are the Silent

Generation (or Traditionalists), Baby Boomers, Generation X, and Millennials, as shown in Figure 1 (Crumpacker & Crumpacker, 2007; Giancola, 2006).

Figure 1

Generations in the Workplace Birth Years



The notion of generations has been further developed by Strauss and Howe (1991) and was based on the fact that major historical events shape individuals. Generational differences between the Silent Generation, Baby Boomers, Generation X, and Millennials are noted as a challenge in the current workforce. Giancola summarized that each generation's values are fashioned by life experiences:

> The "generational" school of thought maintains that values are imprinted for life by defining historical events that occur as people mature into adulthood. For example, the generation that grew up during the Great Depression is said to be particularly thrifty because its members experienced hard economic times. Because of the power and influence of these shared events, each generation develops a unique set of beliefs and attitudes to guide its members' behavior. Generational advocates typically place people, by birth date, into one of four generations, each with an assigned peer personality, as shown in one well-known typology (Strauss & Howe, 1991): 1. Silent (1925-1942)—Adaptive; 2. Baby Boomer (1943-1960)—Idealist; 3. Generation X (1961-1981): Reactive; 4. Generation Y, or Millennial (1982-present): Civic. (2006, p. 33)

One major difference between these generations is the knowledge and use of new technologies. Generation X and the Millennials grew up in different technological times than the preceding generations (Kapp, 2007). Kapp (2007) noted, "They have different ideas about connectivity, reporting hierarchies, learning, and communication—ideas forged while playing video games, manipulating gadgets, and surfing the web" (p. 22). Their experience with such technological advances is a pillar of their generational framework. Retirees' knowledge will be hard to replace because of the many technological advancements that have transpired during their tenure. DeLong and Storey (2004) noted,

> Lost knowledge has been a problem throughout the human history, but its significance has taken a quantum leap in the last generation. The proliferation of

> computer technologies has not only produced advances in knowledge in all technical and scientific fields, but also work processes have become much more integrated and interdependent, creating all kinds of new knowledge needed to make things work. (p. 4)

Purpose of the Study

Due to the fact the Baby Boomer generation is at retirement age, it is imperative their technical and institutional knowledge be captured and transferred to younger generations. However, there is limited scholarly research concentrated on knowledge transfer specific to oil and gas companies. The purpose of this qualitative research study was to examine perceptions of employees in the oil and gas industry and discover how knowledge possessed by Baby Boomers is being transferred to future generations and what interventions by organizations enable and encourage the knowledge transfer process and create a knowledge transfer culture.

Research Questions

When analyzing the knowledge transfer from Baby Boomers to future generations of workers in the oil and gas industry, several questions served to guide this research study:

1. What are employees' perceptions of knowledge transfer within the oil and gas industry?
2. What interventions have workers in the oil and gas industry experienced that enable and encourage generations to facilitate the knowledge transfer process?

3. What recommendations do workers in the oil and gas industry have for maintaining and advancing a knowledge transfer culture?

Significance of the Study

This study has practical significance for HRD because little research has been published addressing knowledge transfer specific to the oil and gas industry. If organizations in the oil and gas industry do not effectively manage the great crew change, it will have an economic impact on their profitability because of the workforce shortage and lack of proper knowledge transfer. For example, companies will experience a supply and demand issue in regard to human capital, which might potentially "delay projects, increase risk taking and increase accident rates because it will constrain growth, delay expansion, constrain innovation and blow out budgets because of costlier alternative staffing methods" (Werner et al., 2016, p. 230). This study provides employees' recommendations regarding knowledge transfer that can be presented to corporate leaders in oil and gas companies, which ties economic gain specific to a sustained competitive advantage. Tying economic gain to a sustained competitive advantage through human capital provides corporate leaders a framework that is fundamentally rooted in economics and sustained profitability, which are key drivers for HRD initiatives being supported and valued. Second, it equips HRD professionals with information about how current employees perceive knowledge transfer and such interventions within the industry. Third, it highlights employee perceptions of how a knowledge management (KM) culture can be created and/or sustained. Once the programs and interventions have been established, they will need to be maintained. The

best way to maintain the programs put in place is by creating a KM culture and keeping knowledge transfer foremost in the minds of the workforce. HRD practitioners are focused on improving human performance and unleashing human potential for the viability and sustainability of the organizations (Gilley et al., 2002; Swanson & Holton, 2001). Thus, the oil and gas industry and the companies comprised thereof can maintain their viability and continuation of a competitive advantage through human capital knowledge transfer.

Operational Definitions

Several terms are used throughout the study, and the following definitions provide the meanings that fit their intended use in this study.

Baby Boomer. The generation that includes individuals born between 1943 and 1960 (Zemke et al., 2013).

Downstream. The downstream sector of the oil and gas industry focuses on the refining of oil and marketing (Werner, Inkpen & Moffett, 2016).

Explicit Knowledge. Explicit knowledge can be defined as knowledge that is easily communicated, documented, or processed (DeLong & Storey, 2004).

Generation X. This generation is comprised of individuals born between 1960 and 1980 (Zemke et al., 2013).

Great Crew Change. The large scale replacement of retiring, experienced workers in the oil and gas industry.

Human Capital. Human capital is a measure of the economic value of an employee's skill sets. Skill sets consist of knowledge, experiences, skills, and abilities (Shultz, 1981).

Human Resource Development (HRD). HRD is "a set of systematic and planned activities designed by an organization to provide its members with opportunities to learn necessary skills to meet current and future job demands" (Werner & DeSimone, 2012, p. 4).

Japanese Concept of *Ba*. Capturing the process of knowledge creation through different communication mechanisms, which results in advancement of both individual and collective knowledge (Shimizu, 1995).

Knowledge Management (KM). Knowledge management can be defined as the process of capturing, distributing, and efficiently using knowledge (Dalkir, 2005).

Knowledge Transfer. Knowledge transfer can be defined as "the process through which one unit is affected by the experience of another" (Argote & Ingram, 2000, p. 151).

Midstream. The midstream sector of the oil and gas industry is dedicated to the storage, trading, and transporting of oil and natural gas (Werner et al., 2016).

Millennial. This generation includes individuals born between 1980 to present (Zemke et al., 2013).

Services and Supply. Service and supply involves companies that perform functions or produce materials to support the oil and gas industry (Werner et al., 2016).

Tacit Knowledge. Tacit knowledge "includes cognitive skills such as beliefs, images, intuition and mental models as well as technical skills such as craft and know-how" (Nonaka & Takeuchi, 1995).

Traditionalists. This generation is comprised of individuals born between 1925 and 1943 (Zemke et al., 2013).

Upstream. The upstream sector of the oil and gas industry includes exploration, development, and production of oil and gas assets and incorporates identification, drilling, and production (Werner et al., 2016).

Organization of Study

This study consists of five chapters. The first chapter introduces the study and provides the background, problem, purpose, research questions, significance, theoretical framework, operational definitions. The second chapter provides a review of literature pertaining to the oil and gas industry, generations in the workplace, and knowledge transfer. The third chapter details the methodology used for the study, which consists of the rationale for a qualitative study, context, selection of participants, data collection, data analysis, and trustworthiness. The fourth chapter specifies and gives participant descriptions and reports categories and themes developed from the research conducted. The fifth chapter contains an overall summary of the research and includes recommendations for practice, recommendations for future research, and a discussion of the study's limitations in detail.

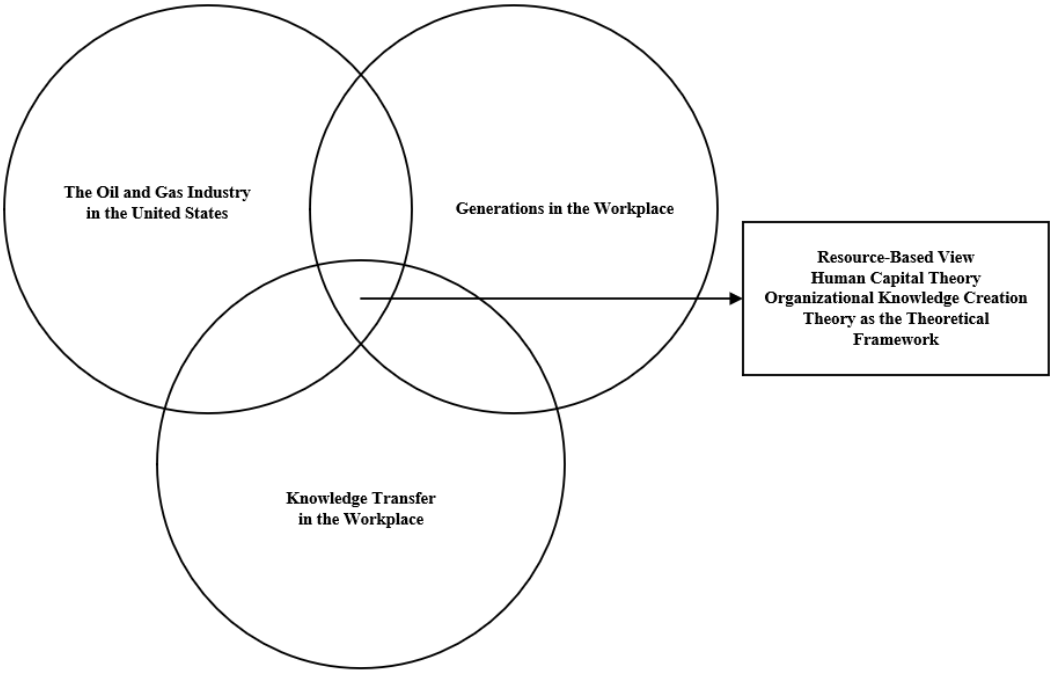
CHAPTER II

REVIEW OF LITERATURE

This literature review explores themes related to the topic of knowledge transfer and identifies a gap in the literature. The identified gap is how knowledge is transferred in oil and gas companies. The literature review also describes the history of the oil and gas industry, generations, and knowledge transfer in the workplace, which is depicted Figure 2.

Figure 2

Areas of the Literature Review



The Oil and Gas Industry in the United States

The Beginning

The oil and gas industry dates back to the early 19th century. At that time, petroleum had various names, such as rock oil, snake oil, and Seneca oil (Yergin, 2009), and oil was mainly used as medicine for humans and animals (Yergin, 2009). The idea of oil exploration started with businessman George Bissell; he hired Yale University chemistry professor Benjamin Stillman to analyze the properties of oil (Knowles, 1983). Stillman was one of the most respected scientists of the 19th century (Yergin, 2009). Bissell and his investors wanted to know if oil could serve as an illuminant and be distilled. The promise of such a venture led Bissell and his business partners to develop the Pennsylvania Rock Oil Company (Yergin, 2009). Stillman's report showed that oil could be refined, its chemical properties separated, could turned into kerosene (Knowles, 1983). The report allowed Bissell and his partners the ability to raise capital through the selling of shares to fund their venture (Yergin, 2009).

The birth of the oil and gas industry as we know it today began in the village of Titusville, which is located in northwestern Pennsylvania (Dukert, 2009; Giddens, 1938). Bissell and his investors choose Edwin L. Drake to direct the operations of the Pennsylvania Rock Oil Company (Werner et al., 2016). After many failed attempts to strike oil, Drake hired a knowledgeable driller named William Smith to drill a well (Giddens, 1938). On August 28, 1859, Smith and his nephews struck oil for the first time and a new industry was born (Giddens, 1938; Inkpen & Moffett, 2011; Yergin, 2009).

A discovery in the East Texas town of Beaumont in 1901 started the Texas oil boom and ushered in a new era in the industry (Werner et al., 2016). Werner et al. (2016) noted,

> After Spindletop, petroleum would be used as a major fuel for new inventions, such as the airplane and automobile. Ships and trains that had previously run on coal began to switch to oil. For the next century, oil, and then natural gas, would be the world's most important source of energy. (p. 42)

Cyclical Nature of the Oil and Gas Industry

Less than 2 years after the establishment of the first oil well, the profit/investment ratio from one oil well went from $15,000 to $1 per oil well (Yergin, 2009). A year and a half after Drake's breakthrough, there were about 75 producing wells in the northwestern Pennsylvania region. From 1859 to 1861, oil prices had risen and fallen from the initial price of $40 per barrel to $.10 per barrel within a 2-year time period because of over-production (Yergin, 2009). The boom and bust reality of this industry made instant millionaires of some and paupers of others.

Since this industry's inception, it has faced many up and down cycles because of its cyclical nature. More recently in the United States, the industry has experienced significant downturns in the 1980s, 2008, 2015 and recently during the Corona Virus pandemic in 2020. From 1948 through 1969, the price of oil was between $2.50 and $3.00 per barrel but greatly increased in 1974 as the result of the Arab oil embargo (Inkpen & Moffett, 2011). Oil prices drastically fell in the 1980s because of rising global production and reduced demand, which resulted in many layoffs of employees (Inkpen

& Moffett, 2011). Likewise, natural gas pricing is volatile as well. For example, in June of 2008 the price of natural gas in the United States was $10.82 per 1,000 cubic feet, yet 15 months later, the prices decreased 73% to $2.92 (Werner et al., 2016).

The Oil and Gas Workforce Industry Dilemma

An ongoing workforce staffing dilemma has existed within the oil and gas industry in the United States for years. The issues stem from declining birth rates, an aging workforce, and a skills shortage that creates a talent gap and problems attracting new talent because of the cyclical nature of the industry (Werner et al., 2016). Werner et al. projected that in 2018, workers 55 years or older in the United States are projected to be 24% of the workforce, which is a 6% increase within a 10-year time span (Werner et al., 2016). The U.S. workforce is aging in all industries; moreover, the aging workforce is not only a domestic problem but a global phenomenon that undoubtedly affects the oil and gas industry. There are several factors that contribute to the aging workforce, such as a decline in birthrates, an increase in life expectancy, and a skill shortage that creates a talent gap. Werner et al. advised, "The lack of enough new entrants into the industry with needed skills leads to firms enticing older employees to stay longer. The global recession of 2008-2009 also caused many older employees to postpone their retirement" (p. 222).

It is estimated that 50% of the U.S. energy workforce will retire within the next decade (Tennant, 2012) and there is a lack of young, new entrants because of less interest in science, technology, engineering, and mathematics (STEM) careers, the growth of jobs in the attractive high-technology sector, and oil's negative reputation.

Another cornerstone of the talent gap is that women are underrepresented within the oil and gas industry because it is a male-dominated industry. There are several reasons the industry is not extremely appealing to women, such as tough field working conditions/living arrangements, demanding work schedules, and work-life balance and family obligations (Ainane, 2017). In the global oil and gas industry, women make up less than 8% of the global work force (Ainane, 2017). In addition, women comprise a low percentage of engineering positions and only encompass 11% of board positions in the top 100 oil and gas companies (Ainane, 2017). Moreover, Tennant (2012) noted that the American Petroleum Institute predicts that one-fourth of the U.S. workforce—including engineers, geoscientists, skilled maintenance professionals, process and production operators, and health and safety professionals—are currently eligible for retirement.

Current Business Sectors of the Oil and Gas Industry

The oil and gas industry is currently comprised of four business sectors: upstream, midstream, downstream, and services/supply (Inkpen & Moffett, 2011). Various types of companies make up the oil and gas business sector, such as:

1. Independent oil company—A company that receives almost all its revenue from production, downstream, or petrochemicals and is non-government owned. The term is mostly used as a means to identify oil and gas producers.
2. Integrated oil company (IOC)—A company that is involved in many business sectors, such as upstream, midstream, and downstream business segments of

the oil and gas industry. Integrated oil companies might also participate in petrochemical industries.

3. International oil company—A company that has a global focus and is not restricted to one country.
4. Junior oil company—A company that is small in size and produces between 500 and 10,000 barrels of oil equivalent per day.
5. National oil company—A company controlled by a government that manages its oil and gas resources of its country.
6. Major oil company—A company that is large in size and not owned by a government.
7. Supermajor oil company—A company that is one of the largest integrated oil companies—for example, British Petroleum (BP), Chevron, ConocoPhillips, ExxonMobil, Shell, or Total (Inkpen & Moffett, 2011; Werner et al., 2016).

The upstream sector of the oil and gas industry encompasses exploration, development, and production (Inkpen & Moffett, 2011). Inkpen and Moffet (2011) described the upstream sector in this manner: "In simple terms, after a lease is obtained, oil and gas are discovered during exploration; the discovery requires development; and production is the long-term process of drilling and extracting oil and gas" (p. 21). The midstream sector of the oil and gas industry is dedicated to the storage, trading, and transporting of oil and natural gas. The downstream sector of the oil and gas industry is focused on the refining of oil and marketing. Inkenpen and Moffet noted, "The refining of crude oil produces a variety of products, including gasoline, diesel fuel, jet fuel, home

heating oil, and chemical feedstock" (p. 26). Service and supply involves companies that perform functions or produce materials to support the oil and gas industry. Such companies provide products and services that allow upstream, midstream, and downstream companies to operate effectively (Werner et al., 2016). As an example, Werner et al. (2016) explained, "The firms involved in drilling and seismic services provide drilling rigs and expertise for onshore and offshore wells" (p. 57).

Generations in the Workplace

Generations

This section of the literature review focuses on the four distinct generations that currently comprise the workplace in the United States, which encompasses individuals born before World War II. These generations are known as the Traditionalists, Baby Boomers, Generation X, and Millennials. Table 1 includes a summary of the generations, their birth years, and ages in 2020.

Table 1

Generational Birth Years, Ages, and Percentage of Workforce

Generation	Birth Years	Ages in 2020	% of Workforce
Traditionalists	1925-1943	77-92	2%
Baby Boomers	1943-1960	60-77	25%
Generation X	1960-1980	40-60	33%
Millennials	1980-2000	20-40	35%
Post Millennials	2000-	20-	5%

Further, it is noted that the titling of generations is not consistent, and the generational birth years differ among academic scholars. For purposes of this study, generations are defined in the following way: Traditionalists were born between 1925 and 1943 and consist of 2% of the U.S. workforce (U.S. Bureau of Labor Statistics). The Baby Boomer generation was born between 1943 and 1960. This generation encompasses 25% of the U.S. workforce (U.S. Bureau of Labor Statistics, Pew Research Center). The next generation in the workforce is Generation X, who were born between 1960 and 1980. This generation encompasses 33% of the U.S. workforce. The next generation that is present in today's workforce are Millennials, who were born between 1980 and 2000. Millennials currently make up 35% of the U.S. workforce (U.S. Bureau of Labor Statistics, Pew Research Center).

Traditionalists

Traditionalists were born between 1925 and 1943; they presently make up a very small portion of the American workforce because of their age. Other names given to this generation are Veterans, Matures, Silents, GI Joes, and Seniors (Arsenault, 2004; Zemke et al., 2013). Several key historically critical life events impacted this generation, such as the Great Depression, during which "millions of workers lost their jobs; in 1932, about 14 million people were unemployed—nearly one of every four workers" (Strauss & Howe, 1991; Zemke et al., 2013, p. 28). Traditionalists were heavily impacted by conflicts too, including the Hindenburg disaster, World War II, and the Korean War (Smith & Clark, 2010). In addition, this generation introduced color television into the

home, and culturally impactful TV shows such as *Mickey Mouse*, *Amos 'n Andy*, and *The Lone Ranger* were watched. Aside from television, radio was another prevalent form of media enjoyed by this generation, along with the pastime of playing jukeboxes in diners. Traditionalist contributions have been plentiful; they are recognized for the creation of transportation infrastructure, landing a man on the moon, and the creation of several major medical advances, among them creating vaccines for polio, tetanus, tuberculosis and whooping cough and conducting the first human heart transplant (Zemke et al., 2013). Their role models were political figures such as Franklin Roosevelt and Winston Churchill; war heroes such as Douglas McArthur, George Patton, and Dwight Eisenhower; sports figures like Babe Ruth and Joe DiMaggio; and a fictional superhero, Superman (Zemke et al., 2013).

Traditionalists are defined by their loyalty to employers, consistent performance, strong work ethic, and conservative financial values (Macon & Artley, 2009). This group prefers a more directive style of leadership in the workplace and looks for structure within authority roles and expects the same from those working around them; they shy away from drastic changes and prefer a more regimented organizational structure (Arsenault, 2004).

Baby Boomers

Baby Boomers were born between 1943 and 1960; this generation derived its named from the drastic rise in birth rates, which started in 1946 and lasted for 20 years (Zemke et al., 2013). Zemke et al. (2013) noted,

> Not only were more babies being born every minute—actually one every 17 minutes for 19 years—but thanks to the miracles of postwar medicine, more of them were surviving birth and babyhood, formerly the highest mortality segment of life span on the planet. (p. 61)

Similar to the Traditionalist generation, this generation was historically impacted by conflict, namely the Cuban Missile Crisis and the Vietnam War. Baby Boomers were also impacted by events of the Civil Rights Movement—Rosa Parks refusing to move to the back of the bus and the various marches and demonstrations that took place during this time—which led to the U.S. Congress passing the Civil Rights Act in 1957. This generation was also impacted by the assassinations of both President John F. Kennedy, Robert Kennedy, and civil rights leader Martin Luther King, Jr. One distinction for this generation is that a major social event is listed as an influential event for the generation—namely, Woodstock. This generation affectionately remembers watching *The Ed Sullivan Show*, wearing poodle skirts, and eating TV dinners.

Baby Boomers are known for having a personality that consists of being seen as idealistic, driven, and willing to make personal and professional sacrifices to reach a consensus; they tend to be micromanagers who look down on idle workers (Macon & Artley, 2009). Boomers prefer a collegial-style workplace accompanied by individuals who are passionate and concerned about participation in the workplace. Valuing personal interaction and communication, Boomers are about working together as a whole to reach goals (Aresnault, 2004).

Generation X

Generation X was born between 1960 and 1980 and represents the majority of the American workforce today. Compared to previous generations, Generation X is comprised of fewer people; there were "76 million Boomers vs. 51 million Xers" (Zemke et al., 2013, p. 89). Generation X has been impacted by ecological and national disasters such as Chernobyl, the Exxon Valdez oil spill, and the Challenger shuttle explosion. Generation X was also impacted economically by the stock market crash of 1987, which directly impacted the oil and gas industry. Political events such as the Watergate scandal and the fall of the Berlin wall and a major medical trauma, the AIDS epidemic, all had a profound effect on Generation X. Other events that shaped the lives of Generation X were the Iran-Contra affair and Desert Storm. Last, this generation experienced great technological advances with the advent of the first computers in the home (Zemke et al., 2013). This generation fondly remembers TV shows such as *The Brady Bunch*, *Dynasty*, *MTV*, and *The Simpsons*, wearing platform shoes, and watching the movie *ET: The Extra-Terrestrial*. As children, they were deemed latchkey kids because many had both parents who worked and left them home alone. It should be noted that this generation was also one of the first to be exposed to and interact with new technology (Murphy et al., 2010).

Generation X is defined by having personality traits as a group who harbors a sense of skepticism toward authority and are likely to change jobs to improve their skill set for the next opportunity; work-life balance is a large driver for this generation's career choices (Macon & Artley, 2009). Generation X values fairness in the workplace,

tends to be direct and straightforward in their communication style and leadership, and denounces traditional authority structures. They are more open to change and embrace new challenges as they strive to create a more egalitarian culture in the workplace (Aresnault, 2004).

Millennials

Millennials were born between 1980 and 2000 and are known to be the most racially and ethnically diverse of all generations in the workforce. Other names given to this generation are Nexters and Generation Y (Arsenault, 2004; Werner et al., 2016). Several key events impacted Millennials, such as war, acts of terror, and economic crises (Zemke et al., 2013). Some of the most impactful events were domestic and foreign acts of terror such as the Oklahoma City bombing, the school shooting at Columbine, and 9/11. Also impacting this generation was the War on Terror in Iraq and Afghanistan. Last, this generation was impacted by an economic recession that impacted many of this generation because they began their careers in the face of massive layoffs, unemployment, and the "longest and deepest slump to hit the global economy in 80 years" (Zemke et al., 2013, p. 129). This generation has a spectrum of role models, from their parents, to entrepreneurial philanthropists such as Bill Gates, to the 9/11 heroes of Passenger Flight 93 and firefighters and first responders at Ground Zero (Zemke et al., 2013). This generation was entertained and remembers cartoons and movies such as *Teenage Mutant Ninja Turtles*, *Transformers*, and *Shrek* (Zemke et al., 2013).

This generation is noted by Werner et al. (2016) as having the following specific traits in relation to the oil and gas industry:

1. Long-term career development.
2. Sense of purpose and meaning in work.
3. Availability and access to mentors.
4. Work/life flexibility.
5. Tech-savvy work environment.
6. Open social networks. (p. 235)

In the workplace, Millennials are seen as have a personality type that is considered the most confident. *Millennials* are defined by their high level of optimism and requirement for immediate feedback. Driven by the aspiration for a personalized career, Millennials will job hop until they find a job that they connect with (Macon & Artley, 2009; Sacks, 2006). Millennials value balance in the workplace and strive to work together collectively utilizing teamwork to reach a set goal. They do not respond well to structured systems and prefer a more fluid structure in the workplace (Aresnault, 2004).

Generational Differences in the Workplace

The current workforce is as diverse of a workforce as has ever been seen. The workforce encompasses various views, mind sets, values, demographics, and cultural diversity. Because of these differences, generational conflict is inevitable. Long past are the days of homogenized views and ethics as industry moves beyond the localized industrial mindset of the past and the workforce mirrors the global economy.

In the modern workplace, four different and distinct generational groups working together currently exist—the largest overlap of generational coverage in the workplace

to date. For the first time in history, four distinctly different and diverse generations have been tasked to work together to accomplish positive organizational results. The generations currently identified in the workforce consist of Veterans, Baby Boomers, Generation X, and the Millennials, who comprise most of the workforce. With Baby Boomers set to retire over the next decade, there is cause for concern as more of the Millennial generation begin to enter the work force and create conflict between the two groups (Deyoe & Fox, 2012). Consequently, this influx of new generational workers drives the need to understand how to better navigate the ever-changing workspace.

In a workforce made up of multiple generations, styles clash as differences between generations arise due to one's particular worldview. Generational values, beliefs, and expectations formed during childhood drive individual actions in the workplace. As different generations interact with each other in the workplace, some claim the differences that do exist are exaggerated, and a lack of research fails to identify a clear path forward on the matter. It should also be noted that it cannot be assumed that all individuals within a generational cohort fall into their categorical description in full; this assumption also hampers identifying true causality between generational friction in the workplace (Macky et al., 2008).

Wey Smola and Sutton (2002) performed an empirical workplace study focusing on the different values in a multigenerational workforce, specifically on differences in their 1974 and 1999 survey of values in the workplace. The study sought to tackle three major questions: (a) Do generational differences exist in work values within today's workforce? (b) Are work values different compared to a similar study conducted in

1974? and (c) Are work values consistent or do they change with age? When reviewing the surveys in this time period, Wey Smola and Sutton pointed out the values between Generation X and Boomers differed because Generation X employees' attitude toward company loyalty and personal growth and promoting ability clashed with the Boomer mentality of towing the company line and putting in one's time. Within the study, Wey Smola and Sutton also identified that values were more greatly influenced by the experiences of a generation than by the age of the individual. Wey Smola and Sutton's study on generational differences has been deemed a critical piece of work because it outlines through anecdotal information the differences between generations while empirically outlining the differences that exist.

In their 2005 study, Lyons et al. explored an external population subset outside the United States and focused on the work-related values of Canadian knowledge workers. The study was conducted on individuals in full-time roles within the private, public, and not-for-profit sectors. Generationally, the study consisted of Veterans, Baby Boomers, and Generation X for workplace input and relied on university students for data from the Millennial generation since they had not yet entered the workplace. The study's survey focused on five factors: intrinsic work values, extrinsic work values, prestige work values, altruism work values, and social work values (Lyons et al., 2005). Results varied between the generations. Generation X valued intrinsic work values, while Veterans and Boomers placed a greater value on altruistic work values. Although the study outlined various differences within generational responses in relation to value, researchers found that all generations ranked extrinsic work values as second in their

evaluation, leading Lyons et al. (2005) to conclude that, at a minimum, extrinsic values should be met to ensure motivation across generations. While this study highlighted key factors in generational differences, it lacked the full scope of necessary range because it failed to capture Millennial data from individuals in the workplace.

In a 2015 study, Costanza and Finkelstein (2015) examined the untruths concerning generations and the risks involved in organizations because of generational myths or stereotypes to provide recommendations to both practitioners and researchers on how to progress with future generations. Costanza and Finkelstein concluded that where generational differences do exist on work-related outcomes, they are relatively small and inconsistent and do not support the hypothesis of systematic differences. They proposed that both external environmental factors such as technology and development changes that occur in individuals over time are larger drivers for differences (Costanza & Finklestein, 2015; Sackett, 2002). The study also explored the reason generational stereotypes are widely used within the field and surmised that such practices are due to people's nature to create heuristics or cognitive shortcuts to make quick judgments on individuals and people groups within the workplace (Bodenhausen & Hugenberg, 2009; Costanza & Finkelstein, 2015). Although these mental shortcuts can help categorize groups and help action plans, they can also hinder an organization because not all individuals fall into their prescribed stereotypes, and a blanket approach may damage positive growth or key talent acquisition.

Generational Conflict

Conflict in the workplace stems from the different values of the generations, most notably found in the difference between generational intrinsic and extrinsic work values. Intrinsic work values can include finding meaning and interest in the work, whereas extrinsic values include things like status, respect, and high salary (Twenge, 2010). In Twenge's (2010) time lag study on generational differences, it was concluded that the rift between generations began with Generation X and has been exacerbated by Generation Y's entry into the workplace because Generation Y expresses a weaker work ethic, believes that work is less central to their lives, values leisure, and seeks more freedom to meet a work-life balance than their Baby Boomer counterparts. The values that Generation Y espouses directly clash with those that make up the Baby Boomer generation but overlap with some of Generation X values. However, when examined in further detail, studies show that intrinsic values appear to be the same across generations, as revealed in Twenge's time lag study (Twenge 2010), which raises the question, if the generations currently represented in the workforce today share similar intrinsic values, why is there conflict between groups? Because everyone simply gets caught up in the stereotypes and both diagnose and prescribe solutions off those pretexts? To truly understand and manage generational differences in the workplace, proper ways to communicate these differences and work toward a solution must be developed.

Managing Generational Differences

For employers to maximize employee engagement, it is necessary to understand what drives engagement as well as the threats that might keep employees from becoming

fully engaged (Schullery, 2013). In the United States, engagement levels are measured at 33%. As these levels continue to drop with each subsequent generation, it is imperative that organizations identify ways to intervene and improve the drivers of engagement (Schullery, 2013; BlessingsWhite, 2011). In order to bridge the gap and engage a multigenerational workforce, identifying generational values and requirements is key because no one size fits all approach to generational cohesion works. One way employers can approach the issue is through mentorship programs that allow both parties to benefit from their interaction with each other by creating an active and engaging environment that can meet the needs of each individual. As Schullery identified in a 2013 study, many organizations can fall into the pitfall of "mistaking fun" as the complete answer to the "engagement riddle," and she suggested that a more holistic approach should take priority when exploring methods to bring generations in the workplace together (Schullery, 2013, p. 261). Deyoe and Fox (2012) explored the idea of managing generational differences in their 2012 study, noting three policies to follow when managing a multigenerational workforce. The first is provide clear communication and expectations within the workplace; second is develop job shadowing at certain levels to appreciate the efforts of others; and, finally, push to work with local colleges to teach the younger generation how to conduct themselves within the workplace (Deyoe & Fox, 2012). It is important to keep in mind that "everyone brings something really important to the workplace. If you could take all four of these [generations'] value systems and absorb them into one culture at the workplace, you would have much happier and productive workers" (Wagner, 2007, p. 30).

Knowledge Transfer in the Workplace

Knowledge

Knowledge is an important and often underestimated competitive advantage in today's workplace. Szulanski and Capetta (2003) noted, "The rise of the knowledge economy has helped organizations recognize that knowledge assets are rapidly becoming their most precious source of competitive advantage, and that learning to better manage those assets has become a competitive necessity" (p. 2). Defining *knowledge* has been questioned and debated since the ancient Greek era; however, a general definition of knowledge from a Western perspective is a "justified true belief" (Nonaka & Takeuchi, 1995, p. 21). Another current definition of knowledge was provided by Davenport and Prusak (1998):

> Knowledge is a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms. (p. 5)

DeLong and Storey (2004) reported that at least four types of knowledge exist: human, social, cultural, and structured. Human, or individual, knowledge focuses on the knowledge a person possesses and what an individual knows how to do. Social knowledge, or social capital, occurs in "relationships between individuals or within groups" (p. 23). Cultural knowledge constitutes a general understanding of how things

are to be done within an organization. DeLong and Storey noted that cultural knowledge signified "how to think and how to behave if you want to be accepted as a member of a particular group" (p. 23). Last, structured knowledge is "embedded in an organization's systems, processes, tools, and routines" (DeLong & Storey, 2004, p. 23).

Several methods for classifying knowledge in an organization exist. The literature differentiates types of knowledge based upon the degree to which they can be transferred, structured, and codified (Grant, 1996; Joia & Lemos, 2010; Kogut & Zander 1992; Nonaka, 1994). The literature also distinguishes between two types of knowledge—explicit and tacit knowledge.

Explicit knowledge is easily articulated through written or verbal language, drawings/symbols, sharing, and storage of information in an organization (Joia & Lemos, 2010; Nonaka & Von Krogh, 2009; Polanyi, 1966). Nonaka and Takeuchi (1995) defined *explicit knowledge* as "expressed in words and numbers, and easily communicated and shared in the form of hard data, scientific formulae, codified procedures, or universal principles" (p. 8). Tacit knowledge is gained from personal experience, perceptions, and/or context and is more difficult to formally specify (Davenport & Prusak, 2003; Leonard & Sensiper, 1998; Nonaka & Takeuchi, 1997; Nonaka & Von Krough, 2009; Polanyi, 1966). Nonaka and Takeuchi (1995) defined *tacit knowledge* as "highly personal and hard to formalize, making it difficult to communicate or to share with others. Subjective insights, intuitions, and hunches fall into this category" (p. 8). Tacit knowledge and a high percentage of explicit knowledge is bestowed within individuals and is organization-specific, meaning it is mostly created

within such organizations (Grant, 1996). People often confuse knowledge with information but the two are mutually exclusive, and they are important pillars of KM (Dalkir, 2005). Obtaining knowledge necessitates the processing and transformation of information. Dalkir (2005) noted, "Knowledge is a more subjective way of knowing and is typically based on experiential or individual values, perceptions, and experience" (p. 7). McDermott (1999) distinguished knowledge from information using six distinct qualities:

1. Knowledge is a human act.
2. Knowledge is the residue of thinking.
3. Knowledge is reacted to in the present moment.
4. Knowledge belongs to communities.
5. Knowledge circulates through communities in many ways.
6. New knowledge is created at the boundaries of old.

Having an understanding of knowledge is foundational to grasping KM, which will be discussed next.

Knowledge Management

Over the last several decades, KM has become increasingly important to organizations of all industries, and the oil and gas industry is no different. However, KM in the oil and gas industry still has not gotten the attention that it deserves since few scholarly articles are dedicated to the topic. Varying perceptions and opposing definitions of KM have been proposed by scholars. O'Dell and Grayson (1997) defined KM as "a conscious strategy of getting the right knowledge to the right people at the

right time and helping people share and put information into action in ways that strive to improve organizational performance" (p. 6). Moreover, Mack et al. (2001) defined KM as

> capturing knowledge and expertise created by knowledge workers as they go about their work and making it available to a larger community of colleagues. Technology can support these goals, and knowledge portals service as a key tool for supporting knowledge work. (p. 925)

The most comprehensive definition is the following:

> Knowledge management is the deliberate and systematic coordination of an organization's people, technology, processes, and organizational structure in order to add value through reuse and innovation. This coordination is achieved through creating, sharing, and applying knowledge as well as through feeding the valuable lessons learned and best practices into corporate memory in order to foster continued organizational learning. (Dalkir, 2005, p. 3)

Although there are differentiating definitions of KM, all of their summative aims center on unleashing and leveraging knowledge through capturing, sharing, and storing it within an organization through its workforce in an organized way to impact the corporation positively and extract value through monetization. After exploring the many definitions of KM, it is notable that scholars derive each definition from their own idiosyncratic perspective. For example, several scholars derive their definition from the strategic perspective, such as O'Dell and Grayson (1997), Milton et al. (1999), Dawson

(2000), Bollinger and Smith (2001), and Bhatt (2002). Other scholars' definitional perspectives focus on the process of KM, for example, Bassi (1997) and Albert (1998).

KM established firm roots in the 1980s, but its pedigree can be traced back to earlier periods, including the 1960s, when Peter Drucker created the term *knowledge worker*, which would be popularized later (Drucker, 1964). There are many management scholars who influenced the discipline and development of KM, such as Ikujiro Nonaka, Hirotaka Takeuchi, Peter Senge, Thomas Stewart, and Peter Drucker. Nonaka and Takeuchi (1995) studied knowledge creation and innovation. Senge (1990) focused on how organizations can learn from their past experiences creating learning organizations.

Four popular KM models of the KM life cycle have subtle differences but also have similarities. The KM cycle is the process by which information is transformed into knowledge within organizations by way of capturing, processing, and disseminating information. The four popular models were developed by Karl Wiig (1993), Michael Meyer and Michael Zack (1996), Bukowitz and Williams (2000), and Mark McElroy (2003).

Wiig's model centers on the organization of information in a practical manner so that the information is useful (Dalkir & Liebowitz, 2011). The model is based on four functions: (a) building knowledge, (b) holding knowledge, (c), pooling knowledge, and (d) applying knowledge. In this model, individuals build knowledge through books, training/development, learning from personal experiences, learning from peers, media, and all sources (Wiig, 1993). Knowledge is held through the retention of knowledge on the individual level, though knowledge repositories and knowledge archives utilize

books, knowledge bases, and documents to make it successful (Wiig, 1993). This model identifies that knowledge can be pooled and expended in many different ways by coordinating, assembling, and accessing/receiving knowledge through KM systems utilizing intranets or other KM technology systems and teams. The last foundation of this model is application, which suggests that it can be applied through standard and unusual tasks because of what has been learned (Wiig, 1993). In essence, the learner uses or modifies their approach depending on the task.

The Meyer and Zack KM model is similar to the Wiig model but is focused on the process at each of five stages and is centered on the design and development of physical products (Dalkir, 2005; Meyer & Zack, 1996). The two central focuses of this model are *repository* and *refinery*. Repository is focused on the structure/organization, content, and retention of data from the product platform. The knowledge refinery is centered on five information processing stages: (a) acquisition, (b) refinement, (c) storage/retrieval, (d) distribution, and (e) presentation. The first step is acquisition, or the collection of knowledge and information, which is evaluated by "quality, scope, breadth, depth, credibility, accuracy, timeliness, relevance, cost, control, exclusivity, and so on" (Meyer & Zack, 1996, p. 48). The next step is refinement, which consists of organization, cleanup, and standardization of content. Meyer and Zack (1996) noted that refinement is "the primary source of value added" (p. 48). Storage or retrieval consists of ensuring that knowledge products are housed by varying types of mechanisms, such as papered documents or more complex tools such as "databases and knowledge management software" (Meyer & Zack, 1996, p. 48). The next step is distribution, or

how the information is disseminated to its audience and in what timeframe. The final step is presentation, which consists of using the information. It is a critical stage since it shows how effective or ineffective the proceeding information processing stages of the Meyer and Zack KM were.

The Bukowitz and William KM model's aim is to structure "how organizations generate, maintain and deploy a strategically correct stock of knowledge to create value" (Bukowitz & Williams, 2000, p. 8). The phases of this model are (a) get, (b) use, (c) learn, (d) contribute, (e) assess, (f) build/sustain, and (g) divest. The model sets boundaries between these phases that are either tactical or strategic. The get, use, contribute, and learn phases are tactical, and the assess, build/sustain and divest are strategic. Get is the first stage of this model, and it entails seeking and gathering information required to innovate, solve problems, and make informed decisions. The second stage is use, which ensures information is collected in various formats for use at the individual and/or group level for the organization's benefit. The next phase is learn, which encompasses utilizing formal processes of learned experience to impact and progress the organization by creating competitive advantage. The contribute phase means getting buy-in from employees to share what they have learned to increase the knowledge base of the corporation through a repository. For the strategic phases, the assess phase is concerned with evaluating existing intellectual and collective information and knowledge to determine what is needed in the future at the individual, group, and organizational levels (Bukowitz & Williams, 2000). The build and sustain phase ensures the viability of the organization in the future by certifying its intellectual capital is

adequate with the allocation of appropriate resourcing. Divesting is the final phase in this model, and this phase focuses the organization on dissociating with non-value-adding assets.

The McElroy KM model assesses and evaluates knowledge to determine if it should be integrated into the organizational memory. The model focuses on two segments—knowledge production and knowledge integration. Knowledge production encompasses individual or group learning, knowledge claim formulation, information acquisition, and knowledge validation (McElroy, 1999, 2003). Individual and group learning is centered on the creation of new knowledge, either individually or collectively. Knowledge claim formation is created as part of a process that engages social interaction by which organizational knowledge claims are formed and then codified. Information acquisition is a process wherein the organization purposefully or by chance acquires knowledge claims or information outside of its organizational context. Knowledge validation is accomplished when the organization has a set form of criteria wherein determinations are made regarding knowledge and its usefulness and validity to the organization. Knowledge integration is focused on transforming and integrating knowledge through various means, such as teaching, knowledge sharing, or other social actions (Dalkir & Liebowitz, 2011; McElroy, 1999, 2003). One of this model's key focuses and differentiators is that it emphasizes the identification of knowledge content that is value added to the organization and their employees (Dalkir & Liebowitz, 2011).

Ruggles et al. (1999) recognized the key attributes of KM as follows:

1. Generating new knowledge.
2. Accessing valuable knowledge from outside sources.
3. Using accessible knowledge in decision-making.
4. Embedding knowledge in processes, products, and/or services.
5. Representing knowledge in documents, databases, and software.
6. Facilitating knowledge growth through culture and incentives.
7. Transferring existing knowledge into other parts of the organization.
8. Measuring the value of knowledge assets and/or impact of knowledge management. (p.14)

Dalkir (2005) distinguished KM attributes based on previous studies of KM and developed an integrated model of KM. The integrated model consists of three major stages:

1. Knowledge capture and/or creation.
2. Knowledge sharing and dissemination.
3. Knowledge acquisition and application. (p. 43)

Since all KM cycles have a basis of the three major stages that Dalkir distinguished, this study is focused on knowledge based on the second phase which is knowledge transfer.

Knowledge Transfer

Knowledge transfer is defined in organizations as the process by which one individual, group, or department is affected by the experience of another (Argote & Ingram, 2000). Argote and Ingram (2000) noted, "Although knowledge transfer in organizations involves transfer at the individual level, the problem of knowledge transfer

in organizations transcends the individual level to include transfer at higher levels of analysis, such as the group, product line, department, or division" (p. 151).

Managing Knowledge Transfer in the Workplace

Appelbaum et al. (2012) advised that "few organizations train managers to identify critical knowledge or set up formal processes to pass on the experience of soon-to-be retirees to their successors. As an employer, it is crucial to build strong relationships between generations" (p. 281). This section of the literature review provides a detailed discussion about four key aspects of managing knowledge transfer present in the literature: (a) managing knowledge transfer through understanding, (b) managing knowledge transfer through proper workforce planning, (c) managing knowledge transfer by utilizing creative work solutions for a graying workforce, and (d) managing knowledge transfer by building a KM culture.

Managing Knowledge Transfer Through Understanding

As oil and gas companies focus on capturing the knowledge of their graying workers, it is important for an internal knowledge transfer process to be developed. DeLong and Storey (2004) stated, "Knowledge is commonly classified as residing in either individuals, groups, or the organizations as a whole" (p. 83). First, a determination of what specific knowledge is most important to the organization needs to be made. Leaders must have an understanding and appreciation for the value that each employee possesses in an organization and must "encourage collaboration and create a team environment that will naturally cultivate the transfer of knowledge" (Appelbaum et al., 2012, p. 282). In the literature, two terms are referred to often in reference to knowledge:

explicit and tacit. Explicit knowledge can be defined as knowledge that is easily communicated, documented, or processed (DeLong & Storey, 2004). Tacit knowledge can be described as knowledge that is hard to articulate (Leonard et al., 2015). Tacit knowledge is defined by Nonaka and Takeuchi (1995) as "includes cognitive skills such as beliefs, images, intuition and mental models as well as technical skills such as craft and know-how" (p. 8).

Explicit and tacit knowledge can be transferred in several distinct ways, such as by storytelling, mentoring/coaching, after-action reviews, knowledge networks, and thorough documentation. For example, in regard to knowledge being transferred through storytelling:

> NASA uses storytelling in two very different ways to help support knowledge retention. Since early 1999, the library at NASA's Jet Propulsion Laboratory has sponsored storytelling sessions conducted by veteran JPL scientists, engineers, administrators, and project managers. The monthly program serves several purposes. It helps share the Lab's distinguished history of space exploration with a new generation of employees. Whether it's the experience of driving the Mars Pathfinder Rover or the challenges of architecting a deep space network, these stories are intended to convey what it felt like to be part of a pioneering project. (DeLong & Storey, 2004, p. 103)

Knowledge can also be transferred effectively through mentoring/coaching programs. Orr and McVerry (2007) noted, "In some cases, a mentoring or 'journeyman' approach may be useful for developing very specialized skills" (p. 23). Mentoring and

coaching have been noted to be the most effective way to transfer tacit knowledge, and they can assist primarily in transferring technical, operational, or managerial skills on an individual basis (DeLong & Storey, 2004). A prime example follows:

> At the World Bank, for example, a primary purpose of mentoring is to introduce less experienced employees to a network of people who will be helpful in the future. The bank also places a heavy emphasis on action learning or learning-by-doing, and leaders recognize that protégés are much more likely to absorb tacit knowledge by observing it in the context of daily practice. Thus, the practice of "showing" more experienced mentors is frequently encouraged. (DeLong & Storey, 2004, p. 110)

The knowledge transfer strategy of companies should include a mentoring program. Houlihan (2009) stated, "For a company to have a successful transition, the younger generation needs to work side-by-side with the older workers for some time" (p. 8).

Knowledge can also be transferred through after-action reviews (AARs). This type of transfer is best for larger groups. Analog Devices has adopted AARs to generate and retain knowledge that can be used to continually improve its product development process. Each product development team holds weekly meetings to reflect on its recent performance and to see what new lessons can be applied to improve its effectiveness. By using AARs to facilitate experiential learning and knowledge retention within the teams, Analog Devices supports ongoing process improvements in its business that would be impossible if employees' unarticulated experiential knowledge was being allowed to dissipate in the crush of daily activities (DeLong & Storey, 2004, p. 112).

A more recent method to transfer knowledge is by the establishment of knowledge networks. The purpose of knowledge networks is to form a group of individuals with similar experience to build a learning community (DeLong & Storey, 2004). For example,

> to connect professionals who were distributed across project teams, Shell created networks of employees who shared a common discipline. One such network consisted of geologists, reservoir engineers, petrophysicists, and other geoscientists who were all concerned with a particular geological formation known as turbidite structures. . . .BP's 3D Mod network is another example from the energy industry of how communities of practice can support knowledge retention. This far-flung group includes employees from a variety of disciplines seeking to improve the management of subsurface oil reservoirs through the use of three-dimensional reservoir modeling. Although members of the community rarely meet face-to-face, they help each other improve their modeling capabilities by sharing what they have learned through an electronic collaboration toll such as Microsoft Exchange. (DeLong & Storey, 2004, p. 115)

The last means to transfer explicit knowledge is formal documentation and training. Trugman-Nikol (2011) listed what she called continuation tools used in this process:

1. Organization charts.
2. Job descriptions.
3. Process analysis work-flows and charts.
4. Task-by-task documentation (SOP manuals).

5. Technical videos.
6. Training. (p. 56)

Trugman-Nikol further presented an example provided by Anne Shybunko-Moore, president, GSE Dynamics:

> One of my key employees was retiring. I was able to hire a new employee and have her operational within two weeks. The return on the investment is clear, as the training phase is decreased, and the productivity phase is almost immediate. The need for operational documentation has proven to be critical to my company. (p. 58)

Another example was provided by DeLong and Storey (2004) and shows the need for proper documentation:

> In one major U.S. city government, for example, a senior industrial hygienist unexpectedly left his job in the Office of Environmental Health and Safety, giving his colleagues only three days to transfer knowledge about his work. He had files and records of all industrial hygiene work done in his unit for the last seven years. But in many cases the paper records had been lost and the electronic files were unorganized, so only the departing employee knew what they were. No one in the office had time to open, read, interpret and refile the scores of documents, which could protect the city in future litigation over workers' compensation claims. This lack of documentation would only exacerbate the extremely high costs of workers' compensation claims for this urban administration. (p. 89)

Managing Knowledge Transfer Through Proper Workforce Planning

Another solution to assist in addressing this issue is to properly plan and calculate workforce needs through the creation of a workforce plan. A workforce plan gives the organization an opportunity to plan ahead and provides a methodical process that ensures the organization will have what it needs in the future. James Hylko (2006) provided an accurate assessment of what a workforce plan does:

> The plan establishes a systematic, integrated organizational process that involves planning ahead to avoid talent surpluses or shortages. The process is based on the premise that a company can be staffed more efficiently if it forecasts talent needs and the actual supply of talent that is or will be available. With proper planning, organizations can avoid the need for layoffs or panic hiring. Human resource professionals can provide managers with the right number of people, with the right skills, in the right place, and at the right time. (p. 22)

In addition, the common mechanisms of a workforce plan include the following: forecasting and assessments, succession planning, leadership development, recruiting, retention, potential retirement, career path, backfilling, internal placement, environmental forecasting, identifying job and competency needs, and metrics (Hylko, 2006).

Managing Knowledge Transfer by Utilizing Creative Work Solutions for a Graying Workforce

As Baby Boomers near retirement age or contemplate retiring, many are not able to do so because of the current state of the economy, market instability, and/or because

healthcare for retirees is extremely expensive and often unaffordable (Noble & Harper, 2010). A creative workforce solution, noted in the literature, is phased retirement. Phased retirement is the reduction of required hours (full or part-time) for older workers as agreed upon by the employer and employee, with or without drawing from the employee's retirement. Creative solutions such as phased retirement for older workers can assist in keeping knowledge within the organization, while also serving as a recruiting tool to attract older workers with industry knowledge to a firm (Appelbaum et al., 2012; Piktialis, 2007). Phased retirement is now sometimes referred to as the new retirement, because as individuals reach retirement age, they continue to work (Rappaport, 2009). Piktialis (2007) gave a synopsis of different companies in various industries that are using the phased retirement approach:

> The Aerospace Corporation provides a range of phased retirement options as an effective way to maintain its long-term experience in the space program and its long-standing relationships with its government customers. Older workers, often talented scientists and engineers, can continue working as employees or retired consultants with reduced schedules (Piktialis and Morgan, 2002). IBM (329,000 employees) has taken an interest in maintaining an on-demand workforce to address potential workforce and knowledge needs (Morton, Foster, and Sedlar, 2005). The company is working on how to tap into alumni networks within business units to bring back retirees to work on specific projects. (pp. 77-78)

Managing Knowledge Transfer by Building a Knowledge Management Culture

The last solution that will mitigate the graying workforce dilemma is to create a corporate culture that values knowledge and knowledge sharing. Hokanson et al. (2011) stated, "By building a knowledge management sharing culture, younger generations are engaged in learning from senior staff and in turn, imparting their knowledge to subsequent junior staff members" (p. 148).

As this KM culture is built, it is best if knowledge is transferred in a formal, structured manner. Gray (2008) offered great insight on this position:

> This knowledge can be exchanged in two different ways: it can be formally transferred (intentionally, systematically and within a planned knowledge-transfer program that is monitored), or it can be informally shared (whenever and however issues come up, around the water cooler, on an elevator between floors, in a hurried phone call to a recent retiree). Obviously, the latter method leaves a lot to be desired and may lead to unintentional knowledge gaps. These gaps can end up costing the company time or money later during the execution of specific E&P projects or business-development goals. (p. 1)

It is important to get all individuals of the organization on board— including senior leadership, midlevel management, and individual contributors—to make the valuing and creation of a KM culture seamless. Hokanson et al. (2011) identified the key to making this culture work:

> In order to gain buy-in by employees to participate in knowledge transfer and sharing, a shift in organizational culture needs to occur to encourage and

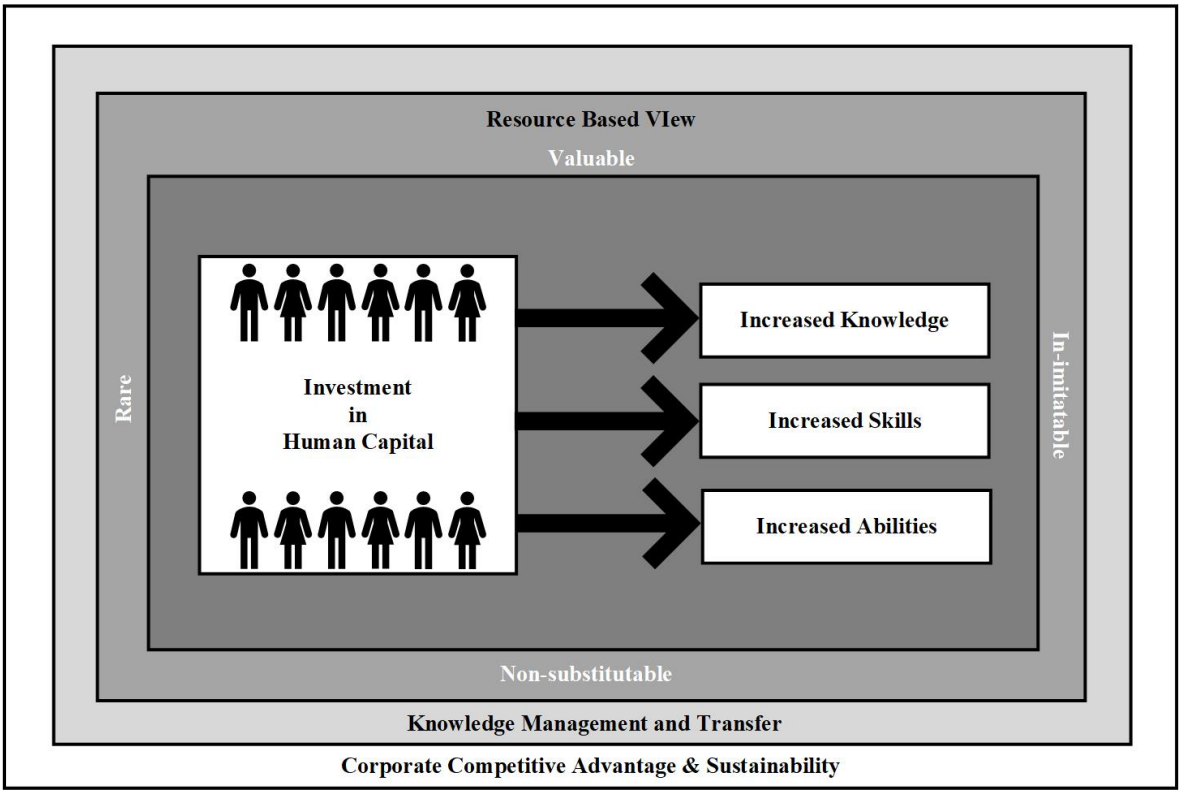
motivate employees to participate. Knowledge transfer should be ingrained in the fabric of an organization's strategy, and become a common practice for employees. (p. 142)

Theoretical Framework

This study was developed utilizing RBV, human capital, and knowledge transfer theory as a theoretical framework that leads to corporate competitive advantage and sustainability. Figure 3 depicts the theoretical framework model that was utilized in this study.

Figure 3

Theoretical Framework of Sustained Competitive Advantage With Knowledge Transfer



Resource-Based View

The RBV is a strategic management theory and is considered one of the most prominent theoretical perspectives (Barney, 1991; Penrose, 1959; Wernerfelt, 1984). RBV is centered on analyzing both a firm's tangible and intangible assets in order to understand and maintain current and future competitive advantage, thereby creating sustainability (Barney, 1991; Wernerfelt, 1984; Wright et al., 2001). Groundwork for RBV began in the late 1950s, and within 20 years RBV had begun to be acknowledged as a prominent theory describing the dynamics of organizational relationships (Barney, 1996). Table 2 provides the key concepts that encompass RBV and provides a definition of each concept.

Table 2

Key Concepts of RBV

Key Concepts	Definition
Firm Resources	Encompasses competitive strengths of the firm, including all assets, capabilities, organizational processes, firm attributes, information, and knowledge (Daft, 1983). A firm's resources include (a) Physical

	Capital—A firm's technology, equipment, location, and access to raw materials (Williamson, 1987); (b) Human Capital—A firm's training, experience, judgement, intelligence, relationships, and insight of management and employees (Becker, 1964); and (c) Organizational Capital—A firm's organizational structure, planning, systems, and internal and external relationships (Tomer, 1987).
Competitive Advantage	The implementation of a value-creating strategy not being implemented by competitors.
Sustained Competitive Advantage	The implementation of a value-creating strategy not being implemented by competitors; moreover, other firms are not able to duplicate the benefits of the strategy.

Source: Barney (1991).

For a company to have a sustainable competitive advantage, it must have the following four attributes:

> (a) it must be valuable, in the sense that it exploits opportunities and/or neutralizes threats in a firm's environment, (b) it must be rare among a firm's current and potential competition, (c) it must be imperfectly imitable, and (d) there cannot be strategically equivalent substitutes for this resource that are valuable but neither rare nor imperfectly imitable. (Barney, 1991, p. 105)

A company's valuable resources can undoubtedly be a competitive advantage or sustainment of such when they are valuable (Barney, 1991). A firm's resources are considered to be valuable when defined strategies increase "efficiency and

effectiveness" to improve performance and build on the strengths and exploit weaknesses (Barney, 1991, p. 106). Further, companies can have the other attributes of competitive advantage—rareness, inimitability, non-substitutable—but can only take on these attributes because of the resources it employs. A firm's rare or specialized resources can present a competitive advantage that differentiates it from its competitors. For a firm to accomplish having imperfectly imitable resources, it must be impossible to exactly imitate and present a rare resource. The last indicator of competitive advantage is that rare and imitable resources are difficult to substitute by competitors currently or in a future state, thereby ensuring there are no strategically comparable solutions. The RBV framework allows companies to exploit its resource value to generate competitive advantage.

The inwardly focused RBV complements outwardly focused theories of competitive advantage such as Porter's Five Forces (Miller, 2019; Potter, 1980). Although RBV has contributed heavily to the planning and development of resources within a firm, RBV has begun to be readdressed in order to meet new issues with the advent of a new workforce (Barney, 2001). RBV has been positioned to aid in the strategic alignment between managing human resources and maintaining a competitive advantage within the workplace through proper allocation of resources while leveraging knowledge within the firm (Kogut & Zander, 1992). Utilizing human capital is crucial to the ongoing success of a firm. As changes continually take place and new issues arise, RBV focuses on combating those changes while ensuring that human capital is accounted for. Maintaining human capital requires the proper bundling of resources in

order to create a profitable and maintainable inflow of human capital within a firm, while sparking innovation and the transfer of knowledge throughout the organization. According to Barney and Wright (1998), RBV principles "promote and maintain socially complex relationships characterized by trust, knowledge sharing and teamwork," resulting "in the creation of a high quality human capital pool that cannot be easily imitated" (p. 10). Failure to maximize on human capital can lead to an outflow of resources, causing a shift in the firm's overall structure. Quantity and quality play a pivotal role within RBV because a firm looks to balance its strategic objectives with the needs of its resources in order to produce an outcome that is beneficial to both. Any loss of these qualities is a setback that forces the firm to develop new strategies within the RBV framework and organizational structure (Barney, 1991).

Application of RBV has forced firms to reevaluate their position on human resources as a key factor for sustainability. Analyzing a firm from a resource perspective allows for a breakdown of needs and helps forecast and plan for potential pitfalls in the future. One of the key factors involved in RBV on a strategic level is the application and retention of knowledge within a firm, and it is the main focus and key commodity to maintaining longevity (Barney, 1991). Previous views on knowledge retention focused on transferring information necessary to understand the function, but recent generational changes have required more understanding of the application rather than the function alone. Firms look to utilize human capital to capture knowledge from individuals and the groups they create to maintain their most valuable resource in today's world. Because processes and products can be easily replicated, true value is seen in information and

practicum. In order to properly gather this information, the right teams must be groomed and allowed to interact socially to produce and translate processes into a more sustainable form of knowledge, or firms may be forced to go out in search of the proper resources to bring into the fold that can try to yield the same results. Transfer of this knowledge is another key factor because RBV looks to develop the proper systems to disseminate and capture new information as it arises throughout the firm (Kogut & Zander, 1992). RBV guided this study by tying economic principles to human capital, which forces firms to reevaluate their position on the importance of knowledge transfer for the future viability, growth, and sustainability of oil and gas corporations.

Human Capital Theory

Human capital theory is a widely used economic theory in HRD that was established in 1960 (Schutz, 1961; Sweetland, 1996). This theory's foundations—as a precursor to its official establishment in 1960—can be attributed to the seminal works of economists such as Adam Smith, John Stuart Mill, and Alfred Marshall (Blaug, 1976; Schultz, 1961; Sweetland, 1996). The theory's roots can be traced to Adam Smith's *Wealth of Nations in 1776*. Smith defined human capital as acquired knowledge gained through study, education, or apprenticeship. Smith proposed two elements that serve as critical pillars of human capital theory today; he proposed that labor inputs are not only quantitative, but are qualitative as well and that all knowledge, skill, and ability is part of a country's capital (Schultz, 1961; Sweetland, 1996). He also proposed that aptitude taught through "education, study or apprenticeship" is associated with cost but could be realized in a person (Sweetland, 1996, p. 343). John Stuart Mill further established the

foundational elements for the theory in the 19th century. Mill's outlook toward human capital is centered on humans being lifelong learners and the value that can be abstracted from such a resource. He viewed human abilities as "economic utilities—means to wealth—liberally acknowledging all activities which lead to their improvement" (Sweetland, 1996, p. 344). Last, Marshall's view of human capital was founded on the premise that such capital's abilities were capable of producing wealth (Sweetland, 1996).

The two most prominent human capital theory scholars are Gary Becker and Theodore W. Schultz (Sweetland, 1996). This theory was further developed by Becker in 1962. Human capital theory was defined by Becker (2001) as "the knowledge and skills that people acquire through education and training being a form of capital, and . . . this capital is a product of deliberate investment that yields returns" (p. 12). Ultimately, this theory proposes that when companies or societies make investments in people, economic benefits are achieved (Sweetland, 1996). Schultz (1961) recognized that investments in the following five activities improve human capability:

1. Health facilities and services, broadly conceived to include all expenditures that affect the life expectancy, strength and stamina, and the vigor and vitality of a people;
2. On-the-job training, including old-style apprenticeships organized by firms;
3. Formally organized education at the elementary, secondary, and higher levels;
4. Study programs for adults that are not organized by firms, including extension programs notable in agriculture;

5. Migration of individuals and families to adjust to changing job opportunities. (p. 9)

For the purposes of this study, corporations needed to commit to investing in human capital to achieve monetary growth, and the focus was on the second and third category, on-the-job training (including old-style apprenticeships organized by firms) and formally organized education at the elementary, secondary, and higher levels.

Fundamental to human capital theory is the belief that an individual's learning can parallel other resources that have economic value (Nafukho et al., 2004). Becker (1993) advised,

> I am going to talk about a different type of capital. Schooling, a computer training course, expenditures on medical care, lectures on the virtues of punctuality and honesty are capital too, in the sense that they improve health, raise earnings, or add to a person's appreciation of literature over much or his or her lifetime. (p. 15)

Becker is recognized as classifying "education and training to be the most important investment in human capital" (Torraco, 2001, p. 109). In the context of this study, when resources are properly trained and utilized effectively, the organization benefits from positive economic gain. When companies choose to not invest in human capital, it results in lessening future earnings and a competitive advantage cannot be developed or sustained (Becker, 1962, 1993; Schultz, 1961). In addition, investing in human capital can yield advantages over corporate competition through the ability to learn faster or more efficiently (De Gus, 1997).

Organizational Knowledge Creation Theory

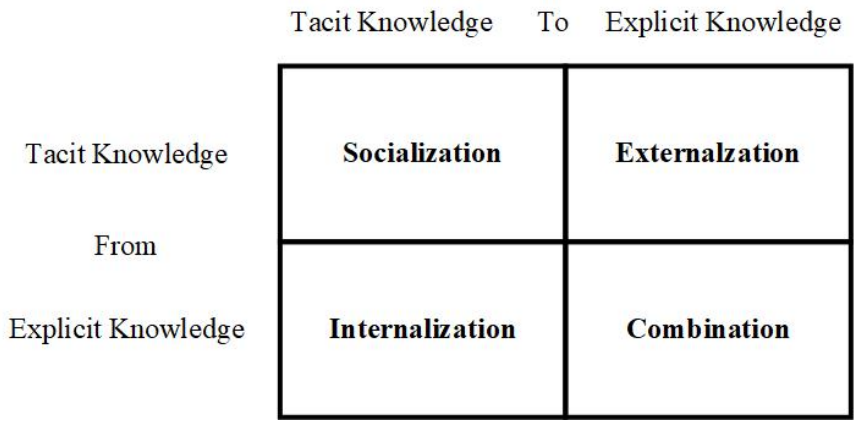
Over the past few decades, the concept of knowledge creation has spread among organizations as they look to navigate the ever-changing waters of business and push to maintain a competitive advantage in the marketplace. *Organizational knowledge creation* was originally defined by Nonaka and Takeuchi (1995) as "the capability of a company as a whole to create new knowledge, disseminate it throughout the organization, and embody it in products, services, and systems" (p. 3). In addition, Nonaka and Takeuchi maintained that organizational knowledge creation "should be understood as the process that 'organizationally' amplifies the knowledge created by individuals and crystallizes it as part of the knowledge network of an organization" (p. 59). Their distinctive focus on the individual shows the rich importance of employees in the collective organizational framework of creating knowledge and sharing it.

Knowledge and the capability to create and utilize it are considered the most important source of a firm's sustainable advantage. Various researchers suggest that a company's true product is the knowledge and processes it creates through human capital (Drucker, 1993; Grant, 1996; Leonard-Barton, 1992; Nonaka, 1994; Nonaka & Takeuchi, 1995; Quinn, 1992; Sveibly, 1997). Knowledge creation is developed and framed within the context of tacit knowledge and explicit knowledge; explicit, or codified, knowledge refers to knowledge that is transmittable in formal, systematic language, whereas tacit knowledge has a personalized quality that makes it difficult to formalize or communicate directly (Polanyi, 1966). It is the interplay between these two types of knowledge that facilitates knowledge creation within an organization.

It can be argued that the foundation for all knowledge creation is tacit knowledge (Nonaka & Toyama, 2015). Tacit knowledge can be described as knowledge that involves both cognitive and technical elements. These cognitive elements can be described as mental models that individuals work through. It is this type of knowledge that drives the knowledge creation process as individuals share and adapt the other information in their surroundings to hone and sharpen ideas and processes (Johnson-Larid, 1983). Tacit knowledge is not implicitly known but is rather formed by the environment around the individual, and it is the refinement of tacit knowledge through testing and interaction that usually allows organizations to grow—through smaller individual teams for Western organizations and within cross-departmental information sharing within Eastern organizations (Nonaka et al., 2006). Through forging and testing tacit knowledge, organizations can then move to apply this into more concrete processes exemplified by explicit knowledge. Explicit knowledge can be defined as knowledge that is collected from inside or outside the organization and then combined, edited, or processed to form more complex and systematic explicit knowledge. Through the creation of this knowledge, organizations push to develop information that can be disseminated in a structured, formatted process (Nonaka & Toyama, 2015). Within these two types of information are four modes of knowledge creation that build off each other: socialization—tacit to tacit; externalization—tacit to explicit; internalization—explicit to tacit; and combination—explicit to explicit (Nonaka & Takeuchi, 1995; Nonaka et al., 1994).

Figure 4

Four Modes of Knowledge Creation



Socialization is when tacit knowledge transfer commences by means of shared experiences, either verbally or nonverbally. Socialization can be transferred by "observing, imitating and practice" through experience (Nonaka & Takeuchi, 1995, p. 63). *Externalization* involves the process of converting tacit knowledge into explicit knowledge. Externalization encompasses taking tacit knowledge and communicating it as explicit knowledge. *Combination* is knowledge transfer through documentation, databases, and process refinement through collaboration. *Internalization* involves the execution of a defined process through action by an individual. These four modes of knowledge creation depicted in Figure 4 (1) are where conversation enables conversion of tacit knowledge, (2) involve using the social process to combine different types of explicit knowledge held by individuals, and (3) and (4) are the conversion to related patterns of conversions involving both tacit and explicit knowledge (Nonaka et al., 1994). The relationship between these knowledge types can further be seen in the

application of the spiral knowledge creation, which consists of the interaction between tacit and explicit knowledge and is amplified through the four modes of knowledge (Nonaka et al., 1994). Following this spiral progression, one can visualize the knowledge creation process from beginning to end. Although these four modes are the template for what builds knowledge creation within an organization, one must also factor in the surroundings of those parties within the four modes because multiple influencing parties can shape the knowledge creation process. External factors can include customers, suppliers, local communities, competitors, and even learning institutions (Nonaka & Toyama, 2015). Although individuals do have a place in shaping knowledge within an organization, these external factors also play a pivotal role in the process. Within the spiral theory lies the Eastern knowledge creation theory originating from Japan; this concept is simply known as *Ba.*

Ba is defined as the "shared space of emerging relationships" and was originally developed by Japanese philosopher Nishida in 1970 and later refined by Shimizu in 1995 (Nishida, 1990; Nonaka & Konno, 1998; Shimizu, 1995). The concept of *Ba* focuses on the idea that organizations build knowledge through interdisciplinary communication within a shared space—be it physical, virtual ,or mental—by emphasizing a nurturing environment that fosters the flow and creation of knowledge through the support of multiple parties both internal and external to the organization (Nonaka & Konno, 1998; Nonaka et al., 2006). Western organizational culture is focused on a more hierarchical organizational setting, while Eastern organizations focus more on a heterarchical structure; this differing perspective is referred to as the Japanese versus Western

dichotomy (Hedlund, 1994). The heterarchical structure encourages more information dissemination and collaboration among all different groups within the organization, whereas the hierarchical approach practiced mainly in the West focuses on dissemination of information and a more segmented approach to knowledge creation that pushes for individual groups to refine and shape isolated aspects within the process (Nonaka et al., 2006). The application of the concept of *Ba* has been tested by researchers such as Nonaka et al. (1994); their study showed, through limited data and samples, that the application of *Ba* can prove successful in capturing and utilizing knowledge within an organization. It was seen within the study that middle managers and leadership play a pivotal role in helping guide the process and aligning all the parties in the *Ba* process. Even though this study has given credibility to the use of *Ba* in an organizational setting, it should be noted while the study was successful in identifying the four modes of knowledge creation in action, the study itself "would have been strengthened if qualitative data were available to enrich the empirical findings," but given time, the study shows promise in future application (Nonaka et al., 1994, p. 350). For *Ba* to be successful, collaboration is critical; individual parties both internal and external to the organization play a critical role as ideas are shared among different groups, allowing for the formation of more concrete structures of knowledge. The different players in the process all bring new perspectives, leadership, and application to the process (Nonaka & Toyama, 2015).

Conclusion

In summation, this literature review contributes to the knowledge transfer body of knowledge and specifically expands the literature in regard to the oil and gas industry. The researcher took an in-depth look at the highly relevant area of knowledge transfer, which is extremely applicable to the rapidly aging oil and gas industry. The purpose of this literature review is to uncover and explain the research that focuses on knowledge transfer from Baby Boomers to other generations in corporations. Knowing that there are ways to properly plan, preserve, and transfer the institutional knowledge of an aging workforce gives guidance and hope to executive leaders and human resource practitioners in the oil and gas industry. Furthermore, as oil and gas leaders continue to combat the aging workforce dilemma, it is important to focus on the creation of a KM culture and workforce plan. For oil and gas companies to remain competitive and for the viability of the industry in the future, they must develop strategies to retain the knowledge of the older workers within their organizations and disseminate it to other employees (Calo, 2008).

CHAPTER III

METHODOLOGY

This chapter provides a synopsis of the research methods used to conduct the study. The chapter includes a restating of the purpose and research questions, rationale for the selection of a basic qualitative design, and a thorough explanation of the context and selection of participants for the study. Last, a detailed description of the data collection, data analysis, and trustworthiness is provided, along with a summary of the chapter.

Restatement of Research Questions and Purpose

The purpose of this study was to examine how job knowledge gained over time from the Baby Boomer generation transfers to future generations of workers, what interventions are used to transfer knowledge, and how a KM culture can be developed within oil and gas companies.

In analyzing the knowledge transfer from Baby Boomers to future generations of workers, several questions served to guide the research study:

1. What are employees' perceptions of knowledge transfer within the oil and gas industry?
2. What interventions have workers in the oil and gas industry experienced that enable and encourage generations to facilitate the knowledge transfer process?

3. What recommendations do workers in the oil and gas industry have for maintaining and advancing a knowledge transfer culture?

Research Methodology

A research methodology provides a road map for the study and is a means by which one investigates how data are collected and what instrumentation will be employed (Creswell, 2013; Creswell & Creswell, 2017). To understand research methods, an understanding of paradigms must first be established. *Paradigm* is defined by Thomas Kuhn (1996) as "an accepted model or pattern" (p. 23). Further, paradigms are described by Guba (1990) as a "basic set of beliefs" that guide "action, whether of the everyday garden variety or action taken in connection with a disciplined inquiry" (p. 17). According to Guba (1990), paradigms can be characterized based on responses to ontological, epistemological, and methodological questions. The three questions Guba posed are as follows:

(1) Ontological: What is the nature of the "knowable"? Or, what is the nature of "reality"?

(2) Epistemological: What is the nature of the relationship between the knower (the inquirer) and the known (or knowable)?

(3) Methodological: How should the inquirer go about finding out knowledge? (p. 18)

Paradigms assist researchers in creating the possibility to study a specified topic. They lead to asking research questions, formulating the intent of the study, identifying additional research theories, conducting a review of literature, and choosing methods by

which to investigate a study. This enables the researcher to construct their findings and conclusions. At the onset, paradigms can be limited, but Kuhn (1996) noted, "Paradigms gain their status because they are more successful than their competitors in solving a few problems that the group of practitioners has come to recognize as acute" (p. 23). Paradigms are not concrete foundations; they do change over time. Unlike foundations upon which houses are built, paradigms shift when new thoughts are deemed valid. Peshkin (1993) stated, "No research paradigm has a monopoly on quality. None can deliver promising outcomes with certainty. None have the grounds for saying, 'this is it' about their designs, procedures, and anticipated outcomes" (p. 28). Thus, no paradigm will be the last ever developed; as scholars gain more knowledge and build upon the paradigm's foundation, new ideas emerge, creating new paradigms.

Two specific research paradigms are positivistic and naturalistic research paradigms, more specifically known as quantitative and qualitative research. Zimmerman (1989) differentiated between qualitative and quantitative research in elementary terms by asking, "How are we to think about empirical-analytic mode of research in contrast to others such as interpretive or critical science? Is it by whether they use numbers (quantitative) or words (qualitative) as their data?" (p. 32). John Smith (1983) differentiated between quantitative and qualitative research even more:

> One approach takes a subject-object position on the relationship to subject matter; the other takes a subject-subject position. One separates facts and values, while the other perceives them as inextricably mixed. One searches for laws, and the other seeks understanding. (p. 12)

Denzin and Lincoln (2011) made a distinction between quantitative and qualitative research by saying, “Qualitative researchers use ethnographic prose, photographs, life histories, fictionalized “facts” and biographical and autographical materials, among others. Quantitative researchers use mathematical models, statistical tables, graphs, and usually write about their research in impersonal, third-person prose” (p. 10). Qualitative research is exploratory in nature, and its aim is to obtain understanding of a specific problem by means of individual interpretation. Conversely, quantitative research is a form of research that uses statistical and mathematical instruments to formulate outcomes.

Rationale for Qualitative Approach and Basic Qualitative Design

Three categories of research methodologies exist: qualitative, quantitative, and mixed methods (Creswell, 2013; Creswell & Creswell, 2017; Moustakas, 1994). This study employed a qualitative methodology. Denzin and Lincoln (2011) defined qualitative research in-depth as

> a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretative, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them. (p. 3)

Qualitative research involves observing the world in a natural setting, making sense of this domain in various forms, and is based on the interpretation of the researcher. Utilization of the qualitative approach enables the researcher to dig deeper and find meaning by reviewing documents and archival records, making observations, conducting interviews, and taking field notes. According to Creswell (2013), qualitative research is based upon a need to explore a problem or issue. Because limited scholarly research exists concerning knowledge transfer specific to the oil and gas industry, this study met Creswell's criteria for why qualitative research should be conducted. Empirical evidence will assist in making known perceptions of knowledge transfer in the oil and gas industry. Neither quantitative research nor mixed methods design were utilized because this study's aim was not to test a hypothesis; rather, it sought to provide an in-depth and rich understanding of the problem. Below are six reasons qualitative methods were chosen for this study:

1. Limited studies on this topic (Creswell & Poth, 2018).
2. Phenomena exploration (Merriam, 1998).
3. Conducted in real-life setting (Creswell & Poth, 2018; Yin, 2014).
4. To obtain in-depth, holistic understanding (Hoon, 2013).
5. Flexibility and time commitment.
6. Use of multiple data sources (Denzin & Lincoln, 2011; Hoon, 2013).

Rationale for Basic Qualitative Design

This study was underpinned using the basic qualitative research design. The basic qualitative design is appropriate per Merriam (2015) when a researcher is

"interested in (1) how people interpret their experiences, (2) how they construct their worlds, and (3) what meaning they attribute to their experiences. The overall purpose is to understand how people make sense of their lives and experiences" (p. 24). The basic qualitative research design was deemed appropriate because the goal of this study was to examine how job knowledge gained over time from the Baby Boomer generation transfers to future generations of workers, what interventions are used to transfer knowledge, and how a KM culture can be developed within oil and gas companies. This research design provided the researcher with tools that gave clarity to a phenomenon and the individuals involved (Merriam, 2015).

Research Design

A research design outlines the process by which the researcher will conduct a study (Bogden & Biklen, 2003; Creswell & Poth, 2018; Denzin & Lincoln, 2011; Merriam & Tisdale, 2016). The research design is the researcher's roadmap for the study. Yin (2014) defined a *research design* as "a logical plan for getting from here to there, where here may be defined as the initial set of questions to be answered, and there is some set of conclusions about these questions" (p. 28). By establishing a set path, the researcher was able to use an organized procedure to develop a path that led from here to there within the framework of the study.

Sampling Procedures

Selecting participants for a study is not an exact science and can be very complex because no set criterion is required (Stake, 2013). According to Lincoln and Guba (1985), "For naturalistic investigations, which are tied so intimately to contextual

factors, the purpose of sampling will most often be to include as much information as possible" (p. 201). Sampling should be done through a balanced approach to emphasize a diversity of perspectives and demographics to draw well-rounded assumptions. With this in mind, this study was developed so that it did not limit the types of participants in the study (Merriam, 2015; Stake, 2013).

When the researcher is considering sampling techniques in qualitative research, it is important for him or her to consider representativeness to ensure the sample can be properly generalized in regard to the population (Lunenburg & Irby, 2008). Lincoln and Guba (1985) recommended sampling to where data are saturated or have replicated themes to a point where collecting additional data contributes no added value to the study. After data have been saturated, sampling procedures will conclude. The sampling technique most often used in qualitative research is purposive sampling (Lunenburg & Irby, 2008). Purposive sampling is derived through careful selection of the phenomenon to yield the most pertinent information for the study by selecting participants that align with the researcher's familiarity and knowledge of the sample group (Erlandson et al., 1993; Merriam, 2013). When utilizing this sampling approach, the researcher selects the sample for his or her research based upon their knowledge of or familiarity with the group to be sampled (Lunenburg & Irby, 2008). This sampling technique is justified because it provides a starting place to narrow down interview candidates to candidates who will add value to the study. For this study, purposive sampling was employed using network sampling. Network sampling "involves locating a few key participants who easily meet the criteria you have established for participating in the study" (Merriam &

Tisdell, 2016, p. 98). Criterion sampling is utilized by identifying participants based on specific standards set by the researcher. For this study, the participants were selected based on the following criteria:

1. Each participant was currently employed in the oil and gas industry.
2. Each participant had a minimum of 2 years of experience specific to the oil and gas industry.
3. Each participant was a member of the Baby Boomer, Generation X, or Millennial generations.

Applying criterion-based sampling delivers "balance and variety," yielding a greater breadth and depth to the research (Stake, 2013, p. 26). Once a list of potential participants was made based on the criteria, convenience sampling was used. Convenience sampling takes into account, "time, money, location, availability of sites and respondents" (Merriam & Tisdell, 2016, p. 98). Furthermore, to provide added breadth and depth to the study, research participants were purposefully selected by considering diversity in areas such as race, sex, work experience, and oil and gas business sector.

Participant Recruitment

The participants for this study were recruited via email using LinkedIn as a resource. Using LinkedIn gave the researcher access to a network of professionals in the oil and gas industry. Each participant received a personal introductory email to establish rapport. In the email, the researcher introduced himself, provided the purpose of the study, provided eligibility criteria, and requested participation in the study (Appendix

A). Attached to the email was a demographic questionnaire for each participant to complete (Appendix B). This study included 16 participants and concluded once saturation was met (Lincoln & Guba, 1985). All participants were over the age of 18, so obtaining permission from a parent was not required. The participant consent form for this study (see Appendix C) was developed in accordance with guidelines set forth by the Institutional Review Board (IRB) at Texas A&M University. Participants were selected based on their potential to add valuable perspectives to the research topic (Merriam, 2015; Miles & Huberman, 1994).

Data Collection

The data collection process commenced once approval had been granted by Texas A&M's IRB. Data collection in qualitative research involves setting the restrictions of how data will be collected for the study and collecting information utilizing multiple mechanisms (Creswell, 2013). Qualitative researchers use various methods to collect data, such as observations, interviews, and reviews of documents, archival records, and physical artifacts (Creswell & Poth, 2018; Lincoln & Guba, 1985; Merriam, 2015). During observation, the researcher takes a series of field notes, which chronicles the happenings of the research site (Creswell & Poth, 2018). There are various ways interviews can be conducted. They can be structured or unstructured and can be conducted face-to-face, by telephone, or as a focus group (Creswell & Creswell, 2017; Merriam & Tisdale, 2016). The researcher may also use public or private documents. Examples of public documents are new paper articles or board meeting minutes. Examples of private documents are personal journals or emails (Creswell &

Poth, 2018). Last, qualitative researchers use audio/visual materials such as social media videos and photographs (Creswell & Poth, 2018). Since this was a basic qualitative study, the researcher employed interviews as the main source of data collection, along with resumes and job descriptions of study participants (Merriam, 2015).

Interviews

Interviews were chosen as the main data collection source because of the richness of data that could be gained by participants. More specifically, one-on-one, semi-structured, open-ended interviews were conducted by the researcher as a data collection mechanism (Creswell & Poth, 2018; Yin, 2014). The interview questions can be found in Appendix D. Interviews were conducted via Zoom because of COVID-19 protocols and were conducted in a quiet and distraction-free environment (Creswell & Poth, 2018). One-on-one interviews were used to ensure participants' comfort and to allow the researcher to build rapport with the participants. Semi-structured interviews were chosen because they allow for a conversational approach to the interview and afford the participants freedom to express their experiences without restriction. An open-ended line of questioning was applied to allow the participants to freely answer and share their experiences fully. Moreover, it empowered the researcher with flexibility to ask follow-up or probing questions based on given responses.

Digital Recording

The researcher digitally recorded the interviews via Zoom and a handheld recorder. The recordings were used to transcribe the dialog, aiding the researcher in the development of themes. The interview questions were established to directly link and

answer the research questions with the theoretical framework in mind. The interview questions were field tested by two qualitative research experts. Questions were modified by the researcher based on the qualitative experts' guidance.

Documents

Several documents were gathered for use in the study. The participants' resumes/LinkedIn profiles, training documents/career ladders, and in some cases job descriptions were examined to inform the researcher about participants by providing a greater understanding of their experience and positions held within the oil and gas industry. This insight into their personal career journey allowed the researcher to make connections that would otherwise not be made. Yin (2014) recommended combining document analysis with other qualitative research methods as a means of triangulation. Additionally, using such documents offered the researcher the ability to gather greater meaning that was relevant to the study (Merriam, 2013). If the decision had been made to exclude documents from the study and to only use interviews, the outcome of the study would be limited and not as rigorous. To limit researcher bias, this study involved a combination of interviews and document analysis.

Data Analysis

The thematic qualitative analysis developed codes inductively by letting the data drive coding. According to Creswell and Poth (2018), "Data analysis in qualitative research consists of preparing and organizing the data for analysis, then reducing the data into themes through a process called coding" (p. 183). Thus, the researcher utilized a data-driven method to discover themes and develop a coding technique (Boyatzis,

1998; Corbin & Strauss, 2008). In this study, the researcher continuously reflected on the data and wrote memos during the course of the study (Creswell & Poth, 2018; Denzin & Lincoln, 2011). Appendix G provides a sample memo. The researcher transcribed the interviews using both notes and audio recordings. The information was properly coded into categories. Narrative quotes were used to communicate the findings of the study (Creswell & Poth, 2018). Data were analyzed using Creswell's five-step method for data analysis:

1. Step 1—Organize and prepare the data for analysis.
2. Step 2—Read and review all the data.
3. Step 3—Start coding the data.
4. Step 4—Generate a description and themes.
5. Step 5—Represent the description and themes. (Creswell & Poth, 2018)

The constant comparative analysis method (Bogdan & Biklen, 2007) was administered to gain a full understanding of the data by the identification of codes with alignment into categories and subcategories. Each interview was analyzed and compared to other interviews as they were collected to determine similarities and differences (Bogdan & Biklen, 2007).

Trustworthiness

Trustworthiness focuses on ensuring the intended audience and researcher's confidence that the study is credible and the investigation is valuable and worthy of exploration (Lincoln & Guba, 1985). Creswell and Poth (2018) proposed eight strategies to ensure a study's credibility and validation in qualitative research: prolonged

engagement, triangulation, peer review, negative case analysis, clarifying researcher bias, member checking, rich/thick description, and internal audits. In a qualitative research study, at least two measures of trustworthiness should be present (Creswell, 2013). This study applied seven measures of trustworthiness: (a) triangulation; (b) member checking; (c) rich, thick description; (d) peer review; (e) reflective journaling; (f) clarifying research bias; and (g) audit trail. By utilizing each of these strategies, the researcher achieved trustworthiness. A brief description of each measure of trustworthiness is provided in the following subsections.

Triangulation

Triangulation is the use of multiple data collection tools that enables the researcher to find similarity from different viewpoints (Creswell & Poth, 2018; Lawrence-Lightfoot & Davis, 1997; Lincoln & Guba, 1985; Yin, 2014). It is also a means to establish credibility of the findings and interpretations (Denzin & Lincoln, 1998). Triangulation occurs when a researcher uses more than one technique to collect data (Stake, 1995). Stake (1995) noted that "we use triangulation to minimize misconception and the invalidity of our conclusions" (p. 134). Triangulation was used as a technique to improve the likelihood that the study's findings and interpretations are deemed credible. The use of triangulation enabled the researcher to use different data collection tools with the aim of finding positions of congruence from the use of different lenses (Lawrence-Lightfoot & Davis, 1997). This study was developed using two data collection methods to establish triangulation: interviews and documents.

Member Checking

Member checking, the most critical technique for establishing reliability and trustworthiness, was used (Lincoln & Guba, 1985). Member checking allows the participants the opportunity to ensure plausibility of the researcher's interview interpretations (Creswell & Poth, 2018; Glesne & Peshkin, 1992; Lincoln & Guba, 1985; Miles & Huberman, 1994). For this study, participants were given the opportunity to review their transcript to ensure that the researcher accurately captured their account, showing the trustworthiness of interpretation. All participants were emailed the transcript from their interview; an example is shown in Appendix F.

Rich, Thick Description

Rich, thick description allows the reader to make judgments regarding transferability of the study (Erlandson et al., 1993; Lincoln & Guba, 1985; Merriam, 1998). Creswell and Poth (2018) noted in reference to generating rich, thick description that "the researcher allows readers to make decision regarding transferability because the writer describes in detail the participants or setting under study" (p. 263). Rich, thick description was to express and properly communicate the findings of this study. Furthermore, Lincoln and Guba (1985) explained that thick description delivers a thorough and rich description of participants of the study.

Peer Review

Peer review, or debriefing, was applied, which involved using an individual to review the researcher's process and ask questions to ensure clarity and connection with the reader (Creswell & Poth, 2018; Erlandson et al., 1993; Glesne & Peshkin, 1992). The

researcher and peer kept a written record that chronicled their peer debriefing sessions (Lincoln & Guba, 1985).

Clarifying Researcher Bias

Another measure of trustworthiness used was clarifying researcher bias, which involves letting the reader know any apparent biases that the researcher may have at the onset of the study and provides clarity to the researcher's positionality or viewpoint from which the study is conducted (Creswell & Poth, 2018). It is also used to explain how the researcher is part of the study and, due to his or her expertise, is in a better position to interpret the findings.

Audit Trail

Last, an audit trail with clear dated records was kept to provide a "detailed account of the methods, procedures, and decision points" in the data collection process (Lincoln & Guba, 1985, p. 229). Creswell and Poth (2018) defined *audit trail* as a "document that allows a researcher to retrace the process by which the researcher arrived at their final findings" (p. 323). In addition, an audit trail was expended to track the participant pseudonyms for the data collected.

Researcher's Positionality

Disclosing their positionality toward a study enables researchers to set aside their personal biases that may be a result of their experiences and background. Researchers have discussed the importance of providing one's perspective and biases in research studies (Merriam & Tisdale, 2016; Moustakas, 1994; Stake, 2013; Yin, 2014). Moustakas (1994) noted the importance of "setting aside prejudgments, biases, and

preconceived ideas about things" (p. 85). Researchers set aside biases to be as objective as possible. Creswell and Poth (2018) noted the researcher should comment "on past experiences, biases, prejudices, and orientations that have likely shaped the interpretation and approach to the study" (p. 261). To that end, I am a Doctor of Philosophy (PhD) student in the College of Education and Human Development at Texas A&M University, with a focus on HRD. The section below provides an overview of my background and motivation for conducting this study and includes my past experiences, biases, prejudices, and orientations that have shaped me in regard to the study.

Researcher Background and Motivation for the Research Study

I obtained my undergraduate degree from a Tier 1 institution specializing in HRD in the summer of 2005. During my undergraduate work, I was required to complete an internship that gave me experience as an HR practitioner. After graduating, I immediately started in the HRD Master of Science program and graduated in the fall of 2006. While obtaining my master's degree, I worked full-time as an academic advisor for general academic programs at the same institution.

Before entering the PhD program, I worked for an exploration and production company as a human resource representative and as an HR business partner for 3 years, focusing on human resource information systems. As the HR business partner for both the engineering and geoscience departments, I experienced the aging workforce firsthand and realized it would be a suitable topic to research specific to the oil and gas industry. In scanning the workforce and talking with other HR practitioners, I recognized that the

oil and gas industry is staffed with older and more experienced workers. My curiosity led me to conduct some analysis to identify the average age of the workforce. I was astonished to discover that the age of most employees was 55 or older. I also noticed after working for the company for a few months that there were not many employees like me with professional degrees. I was one of the youngest employees and the only African American employee below the age of 40.

Since starting the PhD program, I have gained experience in human resources at two additional oil and gas companies. One company is in the midstream segment, while the other is in the service and supply sector of the industry. In my career within the oil and gas industry, which has spanned 14 years, there is one constant theme that has been prevalent regardless of business segment, and that is an employee base that is staffed by a majority of upper-middle-aged workers. These experiences led me to develop a passion to investigate and research the topic of knowledge transfer within oil and gas companies. I believe few companies have taken the appropriate steps to mitigate the aging workforce issue and have not properly dealt with the transference of knowledge from Baby Boomers to the next generations. I have learned that few studies have focused on knowledge transfer specific to the oil and gas industry. Therefore, I believe this study has merit to expand the body of knowledge on the topic. For the future viability of oil and gas companies, knowledge transfer must take place to develop the less experienced staff.

I believe this problem can be solved by using several talent management strategies. My professional career has led me to develop rotational job assignments,

educational assistance, and knowledge transfer retirement programs, which are great vehicles by which to facilitate knowledge transfer. In addition, establishing knowledge transfer as a key performance goal sets expectations and rewards these endeavors. Succession planning and designing a career development program focused on mentoring and coaching are key talent management strategies that can help with this dilemma. Succession planning in particular helps a business plan for the types and numbers of positions that it will need to be successful in the future. Development of career paths is another strategy that can be utilized so that younger talent can see a path forward for their career, which can help guide them and serve as a retention tool.

Summary

This chapter provided an overview of the research methodology related to this study. The purpose of this chapter was to highlight the methodology, the research design, and the trustworthiness of the study.

CHAPTER IV

RESULTS

This chapter provides a description of the participants and presents the major research findings of this study. The purpose of this study was to examine how job knowledge gained over time from the Baby Boomer generation transfers to future generations of workers, what interventions are used to transfer knowledge, and how a KM culture can be developed within oil and gas companies. The data for this study were collected from 16 interviews of workers within the oil and gas industry that took place over a 1-month and 23-day period. Table 3 shows the percentage breakdown for gender, generation, and business segment and notes whether the participants believe their current employer has knowledge transfer practices in place.

Table 3

Participant Percentages—Gender, Generation, Business Segment, and Knowledge Transfer in Place

Gender		Generation		Business Segment		Knowledge Transfer	
Male	75.00%	Traditionalist	0.00%	Upstream	37.50%	Yes	50.00%
Female	25.00%	Baby Boomer	12.50%	Midstream	25.00%	No	50.00%
		Generation X	43.75%	Downstream	12.50%		
		Millenials	43.75%	Service & Supply	25.00%		

Twelve men and four women participated in the study. There were two Baby Boomers, seven participants from Generation X, and seven Millennials. All four

business segments were represented in the study, with six participants from upstream, four from midstream, two from downstream, and four from service and supply. The average interview took approximately 51.5 minutes. When asked if their current employers had knowledge transfer practices in place, 50% said yes and 50% said no.

Participant Profiles

Table 4 provides a profile of each participant, including their pseudonym, gender, generation, role, years of experience, and oil and gas segment. The average age of the 16 participants in this research study was 46 years old. The average oil and gas work experience for those interviewed was 20 years. Pseudonyms were chosen to protect the identity of the participants and ensure confidentiality.

Table 4

Participant Profiles

Pseudonym	Gender	Age	Generation	Role	Experience	Oil & Gas Segment
Alexander	Male	58	Generation X	Technical Expert	30 Years	Service & Supply
Barbara	Female	51	Generation X	Lead - Human Resource Service Center	12 Years	Upstream
Shirley	Female	33	Millennial	Supervisor - Information Technology	12 Years	Upstream
Chandler	Male	57	Generation X	Executive President - Operations	29 Years	Midstream
Ronnie	Male	41	Generation X	Senior Engineering Advisor	17 Years	Upstream
Darren	Male	51	Generation X	Executive President - Chief Executive Officer	30 Years	Service & Supply
Charlene	Female	62	Baby Boomer	Reserves Analyst	35 Years	Upstream
Bobby	Male	31	Millenial	Finance - Corporate Controller	9 Years	Downstream
Jacob	Male	36	Millennial	Senior Engineer	13 Years	Downstream
Brian	Male	37	Millennial	Senior Reservoir Technologist	12 Years	Upstream
Chase	Male	53	Generation X	Senior Manager - Pipeline Integrity Management	23 Years	Midstream
Ciara	Female	39	Millennial	Manager - Human Resources	17 Years	Upstream
Jackson	Male	32	Millennial	System Control Representative	4 Years	Midstream
William	Male	38	Millennial	Executive - Legal	9 Years	Service & Supply
Elvan	Male	51	Generation X	Manager - Operations	25 Years	Midstream
Christopher	Male	73	Baby Boomer	Supervisor - Drafting and Design	46 Years	Service & Supply

The following are descriptions of the 16 oil and gas workers who participated in this study. As previously specified, each participant is currently employed in the oil and gas industry and has a minimum of 2 years of experience specific to the oil and gas industry. Last, each participant is a member of the Baby Boomer, Generation X, or Millennial generations.

Alexander

Alexander is a full-time technical expert with 30 years of experience in the oil and gas industry and currently works in the service and supply sector. He is 58 years old and identifies as a member of Generation X. His current company does not have knowledge transfer practices in place.

Shirley

Shirley is a full-time human resource service center lead with 12 years of experience in the oil and gas industry and currently works in the upstream sector. She is 51 years old and identifies as a member of Generation X. Her current company does have knowledge transfer practices in place.

Barbara

Barbara is a full-time IT supervisor with 12 years of experience in the oil and gas industry and currently works in the upstream sector. She is 33 years old and identifies as a member of the Millennial generation. Her current company does have knowledge transfer practices in place.

Chandler

Chandler is a full-time president with 29 years of experience in the oil and gas industry and currently works in the midstream sector. He is 57 years old and identifies as a member of Generation X. His current company has knowledge transfer practices in place.

Ronnie

Ronnie is a full-time senior engineering advisor with 17 years of experience in the oil and gas industry and currently works in the upstream sector. He is 41 years old and identifies as a member of Generation X. His current company does not have knowledge transfer practices in place.

Darren

Darren is a full-time executive president and chief executive officer with 30 years of experience in the oil and gas industry and currently works in the service and supply sector. He is 51 years old and identifies as a member of Generation X. His current company does not have knowledge transfer practices in place.

Charlene

Charlene is a full-time reserves analyst with 35 years of experience in the oil and gas industry and currently works in the upstream sector. She is 62 years old and identifies as a member of the Baby Boomer generation. Her current company does not have knowledge transfer practices in place.

Bobby

Bobby is a full-time product support specialist with 9 years of experience in the oil and gas industry and currently works in the downstream sector. He is 31 years old and identifies as a member of the Millennial generation. His current company has knowledge transfer practices in place.

Jacob

Jacob is a full-time product support specialist with 13 years of experience in the oil and gas industry and currently works in the downstream sector. He is 36 years old and identifies as a member of the Millennial generation. His current company has knowledge transfer practices in place.

Brian

Brian is a full-time product support specialist with 12 years of experience in the oil and gas industry and currently works in the upstream sector. He is 37 years old and identifies as a member of the Millennial generation. His current company does not have knowledge transfer practices in place.

Chase

Chase is a full-time product support specialist with 23 years of experience in the oil and gas industry and currently works in the midstream sector. He is 53 years old and identifies as a member of Generation X. His current company does not have knowledge transfer practices in place.

Ciara

Ciara is a full-time customer experience lead with 17 years of experience in the oil and gas industry and currently works in the upstream sector. She is 39 years old and identifies as a member of the Millennial generation. Her current company does not have knowledge transfer practices in place.

Jackson

Jackson is a full-time system control representative with 4 years of experience in the oil and gas industry and currently works in the midstream sector. He is 32 years old and identifies as a member of the Millennial generation. His current company does not have knowledge transfer practices in place.

William

William is a full-time legal executive with 9 years of experience in the oil and gas industry and currently works in the service and supply sector. He is 38 years old and identifies as a member of the Millennial generation. His current company does not have knowledge transfer practices in place.

Elvan

Elvan is a full-time manager of operations with 25 years of experience in the oil and gas industry and currently works in the midstream sector. He is 51 years old and identifies as a member of Generation X. His current employer has knowledge transfer practices in place.

Christopher

Christopher is a full-time supervisor of drafting and design with 46 years of experience in the oil and gas industry and currently works in the service and supply sector. He is 73 years old and identifies as a Baby Boomer. His current company has knowledge transfer practices in place.

Major Findings: Categories and Themes

The participants' responses to the research questions were categorized into corresponding themes that encompassed the major findings. The seven categories from the responses are (a) competitive advantage, (b) knowledge transfer experiences, (c) aging workforce, (d) interventions, (e) reluctance to share knowledge, (f) knowledge transfer process and culture development, and (g) incentivize knowledge transfer. Table 5 presents a summary of the categories and major findings from this study. Each category and the corresponding themes are supported by direct quotes in the following sections.

Table 5

Overview of Findings

Research Question	Category	Major Themes
What are employee's perceptions of knowledge transfer within the oil and gas industry?	Competitive Advantage	Employee Knowledge/Experience
		Documentation/Processes
		Investment in Early Career Programs and Hiring the Right People
	Knowledge Transfer Experiences	Trial and Error/Learning Through Failure
		Formal/Informal Mentorship Programs
		On-The-Job Training
	Aging Workforce	No Focus/No Formal Process or Talked About with No Action
		Forced Retirements/Layoff of Experienced Workers
		University/Trade School Internships and Hires
What interventions have workers in the oil and gas industry experienced that enable and encourage generations to facilitate the knowledge transfer process?	Interventions	Creation of Knowledge Sharing Documentation
		Mentoring Programs
		Offering Early Retirement with a Specific Transition Period
		Not Doing Anything
	Reluctancy to Share Knowledge	Job Security/Self-Preservation
		Lack of Confidence/Intimidation
		Cultural/Gender/Race Issues
What recommendations do workers in the oil and gas industry have for maintaining and advancing the knowledge transfer culture?	Knowledge Transfer Process and Culture Development	Use Formal/Structured Approach With Top Down Management Support
		Incentivize Through Performance Management
	Incentivize Knowledge Transfer	Incentivize Through Performance Management
		Recognition

Competitive Advantage

The competitive advantage category demonstrated how participants describe their beliefs of what gives oil and gas companies competitive advantage. Three major themes emerged within this category: (a) employee knowledge/experience, (b) investment in early career programs and hiring the right people, and (c) documentation/processes.

Employee Knowledge/Experience

Nine of the 16 participants in this research study highlighted employee knowledge/experience as their organization's competitive advantage. Alexander explained, "Our competitive advantage probably comes from a deep in-depth knowledge in our engineering and service groups. It's not one-dimensional, so we have a lot of experience that we are able to draw upon." Charlene gave an example of experience being a competitive advantage:

> We have a person that runs our land department that has worked for our company and she's not near her retirement age necessarily, but she just started very young and has remained with our organization. It's the only job she's had, but when I look at the wealth of knowledge she has on things that some of us don't remember or didn't know anything about and something comes up, or a legal issue or something, and some of those things just actually save the company money because just the thought of having to research and find those things and she says, "Oh, yeah, I remember that" or "We had this" and "That family did this" or "That royalty is here" because of, you know, just numerous reasons I guess, but I just think you have an advantage within your company if you just have continuity of knowledge that gets passed down through knowledgeable people.

Brian continued the theme by saying,

> We have very, very strong employees. Every one of them is like top notch. I mean, engineers, to accounting, to finance, to HR, every single one of them was just an all-star. This gave the company competitive advantage. Our analysis is great, our work ethic is great, our people are just really, really good. We can engineer something quicker than most because of our employees.

Jackson commented:

> I would say what gives our company competitive advantage is the top-level management, people that have not only been within the company but also within the industry. We've got some people that have been with the company 30 or 40

> years. As far as gas transmission goes, there's only so many pipelines in a given area and to be able to transfer gas from coast to coast or through our specific footprint, you have to go through us and go through our management in order to do so. It's something you can't get from other companies or from just industry research on your own. It has to be through our company, through our management, through the people that have been doing this for decades. Like I said, it's research and its knowledge that cannot be found on your own. A lot of it is word of mouth, and a lot of it is through experience with upper-level management that have been doing this for years.

These comments show the important roles employees' knowledge and experience play in providing oil and gas companies competitive advantage. This theme is aligned with the Chapter II section on managing knowledge through understanding.

Investment in Early Career Programs and Hiring the Right People

The second theme presented by the research participants concerning competitive advantage was investment in early career programs and hiring the right people, which was mentioned by four of the 16 participants. For example, Barbara stated,

> I think currently it [the company's competitive advantage] is they are heavily invested in early career programs and internships, and, you know, they do a lot of hiring from those folks who come in as an intern, and then they come in as an early career professional and continuously engage them in the work that's being done.

Ronnie noted:

> I think in my current job, it's just in this environment it's kind of low oil price/ low demand environment. We're quite nimble, and it's really about hiring the right people for now, and it's why I was brought to this company. For example: Bringing in somebody who was familiar with a bunch of basins that could actually go in and make a difference initially. I'm more in an advisor senior production engineer role, but there's younger guys that rely on me to get things done. Hiring the right people for the job right now and getting through the downturn, making sure you're profitable becomes a competitive advantage for us.

Chase also explained:

> A lot of stuff that has been rigged up over the years to work by people that have been out there (in the field) for 20, 30, 40 years doing it. Hiring right is so important. For somebody coming in new, it's not something you just know. You are going to have to get out there and you have to get the experience and hopefully the experience is working along with somebody that does know the job.

Elvan noted the importance of having the ability to attract talent and hiring for future needs. He said the company's benefits package is designed to "create tenure and attract talent for the long term."

The research participants point of view was that early investment and hiring the right people provides their oil and gas companies competitive advantage. Both

investment in early career programs and hiring the right people align with Chapter II, managing knowledge through proper workforce planning.

Documentation/Processes

The final theme that was presented by three of the 16 research participants concerning competitive advantage was having documentation and processes. Shirley revealed,

> In the last few years, I've noticed that the company really started to put a focus on documentation and knowledge transfer. We recognize that it's something that needs to happen, and I see the company making steps to make it happen.

Likewise, Chandler communicated, "I can't speak for others, but I know one of the things that we do that I believe gives us a competitive advantage is we are very high on training and procedures." He continued by providing examples of the procedures his company has in place:

> From how do you start a pump, shut it down, if you're going to do maintenance on equipment, exactly how do you do that, because our motto is [follow] 100% of the procedure, 100% of the time. If you do that, then you've got the full support of everyone behind you. If you don't do that, then there may be consequences that you don't necessarily want to deal with. Pushing that philosophy 100% of the procedure, 100% of the time gives everyone confidence to go out and do their job.

The participants made it clear having formal documentation and processes in place gave their oil and gas companies a competitive advantage over their competition.

Knowledge Transfer Experiences

The knowledge transfer experiences category reveals what knowledge transfer interventions were experienced by the research participants within the oil and gas companies where they are employed. Three major themes emerged within this category: (a) trial and error/learning through failure, (b) formal/informal mentorship programs, and (c) on-the-job training.

Trial and Error/Learning Through Failure

Seven of the 16 research participants described their personal knowledge transfer experiences that took place within their organizations as learning by trial and error or learning through failure. Brian described his experience:

> You just do it; just jump in or get fired. It literally is . . . frankly, this is one of the reasons I'm wanting to get out (of the oil and gas industry) right now, especially now that we've had layoffs—we've had two rounds of layoffs. I'm now doing the job of an engineer (the participant is not an engineer) and another analyst. I'm doing four jobs, or four major tasks, and on top of that, since we've been acquired, we now have this jumbled mess of data. So we have different data systems, and none of them talk to each other, and there's nobody to be, like, here's how were going to do it in the future.

Similarly, Darren said, "I learned the jobs, we'll just call it (through) brute force. . . . A lot of it, I hate to say, is trial and error with no formal training programs." Chase said, "You have to get out there (in the field), and you have to get experience working with somebody that does know." Barbara explained her experience as follows:

> For me, some of it is just learning through failure. You mess up, and then you're like, oops, that was not the right thing. It's not like school, right, where you can go and get a book that somebody wrote. . . . It's always interesting with companies that don't have any of that (written documentation), because then you just start from the ground up. Then that's when the mistake piece comes in.

Alexander commented, "I won't say there was no formal training, but a lot has been by trial and error, not (by) design, just by the nature of the business."

During the interviews, the participants voiced their displeasure with learning by trial and error and learning through failure because the process gave them a sense of uneasiness and was not a pleasant experience.

Formal/Informal Mentorship Programs

Formal/informal mentorship programs were identified as a theme experienced within oil and gas companies by six of the 16 participants in this study. Barbara said, "Attaching myself to good mentors, which I think is important in order to get those different perspectives." Likewise, Darren commented,

> There were informal mentors. There were peers with 2 years, or 10 years, or 20 years more experience, co-workers rather than peers to learn from and to ask questions of, but never was there a formal mentorship in engineering or in sales or in management.

Charlene provided an example of her experience with mentors: "I spent 3 years learning things (from mentors). I had mentors in the program that were retiring. . . . I felt like they

had a plan and put some thought into it." William pointed out that he learned his jobs through mentorship:

> Either you were assigned a mentor or just more directly your supervisor taking the time and spending the time to teach you and transfer that information to you. I have not really experienced a culture where there's more of a process or documented method of transferring knowledge; it's always been through just mentorship.

Last, Ronnie gave his perspective from a technical point of view: "From an engineering perspective, it's more about getting in that role and actually having that technical mentor from early on. Once you get further into your career, there's a level of redundancy." The participants definitely valued their experiences with the formal and informal mentorship they have been provided within the oil and gas industry.

On-the-Job Training

In reference to knowledge transfer experiences, on-the-job training was mentioned by four participants. Alexander described most of his experience within his job as follows: "Knowledge transfer for me has been mostly in the area of on-the-job training." Shirley provided insight into her experience:

> Well IT (information technology) is one organization, but I've had different groups. Every role I've went into, no role has come with documentation. Knowledge transfer has been . . . on-the-job training from my first 3 roles; this last role I went into, the supervisor role, this was the role where my predecessor sat down with me and verbally gave me some knowledge transfer.

Further, William provided details of his experience:

> Knowledge has been transferred to me through mentorship that was either assigned or just more directly your supervisor taking the time and spending the time to teach you and transfer that information to you. I have not really experienced a culture where there's more of a process or documented method of transferring knowledge; it's always been through just mentorship.

Thus, on-the-job training has played a part in participants' personal knowledge transfer experiences within this study.

Aging Workforce

The aging workforce category communicates how the participants' current or former organizations are confronting the aging workforce in the oil and gas industry. Three major themes emerged within this category: (a) no focus/no formal process or discussed with no action, (b) forced retirements/layoff of experienced workers, and (c) university/trade school internships and hires.

No Focus/No Formal Process or Discussed with No Action

Six of the 16 research participants revealed there is no focus/no formal processes or their company discussed the aging workforce in the oil and gas industry with no action. Brian voiced, "I've not seen anything formal" regarding his company combating the aging workforce. He added, "Maybe there is some talk, but it's just not published. I have not seen anything or a strategy of here's exactly what we're going to do to address it (the aging workforce)." Similarly, Alexander communicated, "At my current employer, I don't believe it's happening (combating the aging workforce). There's not a

lot of focus on bringing in young talent and mentoring them. It just doesn't seem to be happening." Barbara mentioned her experience with a previous employer and advised,

> At a previous (oil and gas) employer, it was one of those things that they knew we had an aging workforce, they knew it was coming, this was early 2000, they knew those Baby Boomers were going to retire within 10-15 years, and they talked about it, but I never really saw any action.

Chase's experience was different from other participants in that his company has acknowledged the issue, yet similar in that it has not taken action to alleviate the issue. He said,

> Well, they have acknowledged it (the aging workforce). At least within our department, I haven't seen a concerted effort to truly deal with it. When we know somebody is retiring, getting somebody into the position, maybe 6 months early, and kind of work with them and give them a chance to do some knowledge transfer that way, but that's probably the extent of knowledge transfer that I've seen.

William presented his experience within a field services group:

> You know this (the aging workforce) was an issue at my prior company, and I believe currently here as well, and in a lot of ways, I feel like it's been ignored. It was ignored at my prior company, and now people realize it. People say it, but nobody did anything to really focus on it. . . . Where I think we lack [in combating the aging workforce] currently is really in our field service functions, where we have very experienced technicians, and then we've got a gap and we

> have very junior-level technicians and whether or not those junior-level technicians are getting afforded the opportunity to spend time with those senior technicians and shadow them and pass down that knowledge, I don't think that's necessarily occurring.

University/Trade School Internships and Hires

The next theme that emerged from the participants in this study in reference to the aging workforce category was university/trade school internships and hires. Five of the 16 participants shared this view. Shirley provided insight into her experience:

> Even back when I started, the company has placed emphasis on bringing in university hires—bringing in a healthy amount. The number has fluctuated each year given the market, but they make sure they have a class of new hires, so that's not just IT, it's across the company, to help replace the retirements that they're expecting. They make sure that they bring in new talent, and they have the intern pool as well to try to start fostering those relationships and hopefully hire them full-time.

Similar to Shirley, Jacob advised:

> We've hired a lot of people. I think the company did a good study at some point and acknowledged that, hey, we got a big gap in our age demographics. I think I remember hearing a lot about that when I got hired in. I remember when I was being hired (from college) around 2007, hearing a lot of the propaganda: "Hey, we acknowledge we got a major demographic age gap in terms of experience," and they were rapidly hiring on a lot of young people with the intent to quickly

> get them out in the workforce so they can start building the experience necessary to be able to keep things rolling when the older generation starts retiring because we got a lot of that (retirements) we are experiencing and going to continue to experience.

Darren gave his thoughts as a longstanding member of the oil and gas industry:

> Fifteen years ago, there would often be an effort to hire more engineering graduates or hire more welders out of the welding trade school so that you were building that next generation or you're building that group of experience for 5 years later when some people will retire and leave the workforce.

Forced Retirements/Layoff of Experienced Workers

Three of the participants in this research study referenced their companies forcing employees to retire and laying off of experienced workers. Ronnie provided the following details:

> With my former company, in 2014, we went through a difficult spat. A new CEO was brought in. I'm speaking about the onshore group, and the focus was on cost reductions, so there was actually a situation where if you fell into the aging population and you were not of a certain demographic, if you will, you were handed a package or asked to leave, which I thought was a mistake. Not the perfect example of dealing with the aging workforce and transferring knowledge appropriately.

Charlene described her experience as follows:

> At a certain point, you feel like they're (the company) waiting on you (to retire), so I think that is where we are. Promotions come less, raises are less, you've topped out. That's why I was surprised to actually change careers [from accounting to reserves] so to speak or do something completely different, but I also think they were in a position where they needed someone to fill the reserves role. The other person working there [in the reserves role] happened to be a friend; she felt like when they were ready for her to go, they were ready for her to go [retire], and I noticed that too. I felt like you get less work, and I watched that happen to her. I watched them take away her assignments and give her less to do and she was quite capable. There was no reason to do that, especially since the rest of us were being loaded up and it was so that she would go. That's what she felt because she's not the kind of person to sit there without anything to do. I also saw that happen in accounting to a very talented accountant who helped us implement our software and do a whole lot of things. Always getting a super employee award, but she reached a certain age and they took work from her and gave it to someone who was not nearly as knowledgeable and asked her to report to that person and she had too much pride so she was forced out, so she left.

Jackson, who is a member of the Millennial generation, described his experience:

> Now when you're dealing with other pipelines that are in the same business that you are, especially in the oil and gas industry, which is very competitive and kind of cutthroat, you need people that are able to stand up and identify when you are being taken advantage of. Now we had one guy (that was forced out). He was

> kind of the protector for volume control and capacity management and even for system control. He was in every meeting that we had with other companies, especially with our largest customers, and it was always imperative that he was there because he spent so much time with the company that whenever we were in negotiations and they wanted to pull a fast one on us or take advantage of us, he was the one that was there to be able to say, "No that's not good for us; we can't do this." That kind of knowledge base comes through experience, an experience that we kind of identified as isn't very well passed down. From a financial standpoint, it protects you in the long run. It keeps you from losing money to other customers and contracts from people that are wanting to get stuff done that is just not financially beneficial to us. When people retire, move on, or get forced out for whatever reason and the knowledge is not passed down for whatever reason, then the next round of people that are in negotiations are not able to negotiate as tactfully and as well. You might not be seeing it now, but in future contracts we've got a potential to really get screwed.

Interventions

The interventions category relates to what practices the research participants saw being used to facilitate the knowledge transfer process. Four major themes were developed in this category: (a) creation of knowledge sharing documentation, (b) mentoring programs, (c) offering early retirement with transition period, and (d) not doing anything or not doing enough.

Creation of Knowledge Sharing Groups and Documentation

When the participants in this study were asked what interventions they have seen used by oil and gas companies to transfer knowledge, the most common answer was the creation of knowledge sharing groups and documentation. Some of the interventions they shared were formal training programs through the company's learning management system (LMS), lunch and learns, and the creation of webpages and SharePoint sites. Jacob noted:

> One thing I've done in my time is I've implemented a SharePoint system at my job as a means to capture learnings along the way that don't quite fit in our normal library of documentation. It's like an ad hoc learn something that you didn't expect to learn with this job. So I created a SharePoint lessons learned library, and basically they are able to fill out a form and document an event where they didn't know what type of job they were doing and what was the anomaly they encountered and what they end up doing to deal with it to resolve it, and it gives them a way to be able to capture that learning in a manner that can be searchable in a SharePoint database so that someone else who happened to be doing a similar job might have a place to kind of do some searching for some information that they might not otherwise know.

Shirley provided insight into her experience:

> Probably the biggest intervention that I've seen is lunch and learns or brown bag sessions. I know at my job, rather than giving people a document, it's sometimes easier to get everybody in a room and let that person talk and let people ask

> questions and maybe record it, and make it available for others to view in the future.

When asked what other interventions she has seen, Shirley shared, "We have a knowledge-sharing group. It's not as prevalent as it used to be, but pretty much web pages on different topics, dedicated SharePoint sites on different topics, and they encourage all employees to contribute to those modules." Ciara's experience centered on management of change documentation. She shared:

> The only other thing I can think of is there is a management of change process that exists in some organizations where, as folks are coming in and out of roles or before they exit an organization, there's a standard process properly transitioned to someone else before they exit the organization or transition into another position. That's probably the only thing I can think of; and most of that is going to be within the technical or operating disciplines, where it's really important that you've got very clear management of change processes in place.

Mentoring Programs

Four participants in this study referenced mentoring programs as interventions they have seen within companies in the oil and gas industry. Ronnie discussed being part of a mentoring program offered by his employer: "There were senior individuals that were matched up with young people in the program. It was a formal (mentoring) program." Charlene shared her experience of seeing mentoring programs in the workforce by saying that she has seen

> just an extensive sort of training and mentoring program that they had, and I can remember spending 6 months working with one individual accountant who was on his way out to retire. And I trained with everyone, but they specifically mixed and matched and moved us around, and it wasn't just an age, one specific age. They did realize the importance of us gaining that transfer from those at that (higher) level that was on their way out.

Jacob advised that his company had a mentoring program as well. He said:

> We do have a mentoring program in place. . . . It's more geared about career development than acclimating you into the company through a mentor because it's randomized placement of a mentor with a mentee, and they do it in a way where they are intentionally placing you with somebody that has nothing to do with what you probably currently are doing, so it's less about a technical mentorship.

Offering Early Retirement with Transition Period

Four of the participants in this study discussed their companies' offering employees early retirement with a transition period as an intervention. Bobby provided the following details:

> I think a lot of it has to do with the industry downturn, and the companies I know, they still do offer some kind of mandatory retirement plans or forced retirement plans or very lucrative early retirement plans, push people but say this is conditional upon this person being able to take over your job and you have to prove it (knowledge transfer has taken place) for 6 months before we offer you

> that (the retirement package). So you have the two birds with one stone kind of deal where you pushed the top person out to produce your monetary inputs on your books, but then you also force that person to transfer some of the knowledge. But they're still here for the time being.

Chase explained his experience with a former oil and gas employer:

> The one thing that my former company did was once you were going into retirement, you got to a point where you're more or less working part-time during that transition period. So, that gave somebody a chance to be in the position and then have a mentor that used to be in that position. But it gives that time period to transfer some of that knowledge.

Jacob advised:

> There's a backfill or transition process. They have a systematic way to ensure that before this person's move happens, they already know who's going to backfill them and they make sure that there's a transition plan in place so that there's no major drop off.

Not Doing Anything, Not Doing Enough

Although it is not an intervention, a recurring theme presented by the research participants when asked about interventions they saw displayed in the workforce was the notion that oil and gas companies were not doing anything or not doing enough regarding knowledge transfer. For example, Shirley said,

> But honestly, I have concerns that we're not doing enough. One of the problems we have in my group, we are so busy with the day-to-day that the sustainability

> stuff is at the bottom of the list, and we keep postponing it, and I see that across the company.

Similarly, when asked what interventions he has seen being used within oil and gas companies that he has worked for, Jackson said, "There's not really a whole lot to go off of." Charlene summarized her experience by saying, "My current company . . . I just don't see much intervention there; I would say we have very little."

Reluctance to Share Knowledge

The reluctance to share knowledge category conveys why the participants in this study believe employees are not motivated to share knowledge. Three major themes were established in this category: (a) job security/self-preservation, (b) lack of confidence/intimidation, and (c) cultural, gender, and race issues.

Job Security/Self-Preservation

The first theme presented by the research participants about employees being reluctant to share knowledge, stated by 10 of the 16 participants, was job security/self-preservation. Alexander said, "The biggest reason [why individuals dislike sharing knowledge] is job security." Alexander explained his experience as follows:

> It was pretty simple, just working, whenever I was coming up, working with an older, more seasoned technician, and trying to get information out of this individual was difficult, because he felt threatened by the fact that if I knew what he knew, or almost as much as he knows, then it was going to take away some of his job security, maybe me getting on preferred jobs and not him. Now,

obviously he didn't express that to me verbally. It was mainly through actions [rather] than words.

Chandler noted:

> This is not widespread, but within the oil and gas industry, you have some people who want to hold information because they think it's protecting their job. The more I know and less you know makes me more valuable... Early on in my career, there was a lot of that. That kind of really puts younger employees off because they say, I can go to him, but he's not going to teach me anything anyway, so why bother.

Ciara gave her unique perspective that was focused on knowledge:

> I think that some people believe that knowledge is power. So if you're somebody who owns a process or owns a piece of work and others don't have insight into that, some probably see that as power. So the organization, particularly within our industry, I would say it just kind of ebbs and flows. Like, anybody that's worked in the industry knows that you're going to go through reorganization after reorganization and downsizing and we're going to go through crazy hiring. I think there's a bit [reason why] around not letting somebody in; by letting somebody in, other people know how to do [a task], and you're less valuable to the organization.

Similarly, William articulated his experience:

> Because I think at the end of the day, your knowledge is your value to an organization—at least I think that's how a lot of people perceive it to be. I think

> it's perceived by, probably, I don't want to put a number on it, but I would say a large percentage of your standard workforce, that my knowledge is my value in this organization, and the minute I no longer have that knowledge or that knowledge isn't just found in me or a very small group of people, then I am easily replaced. I'm not as valuable to the organization. Whether or not that is a correct line of thinking, I do feel like a lot of people do think that way. Now I don't necessarily think that way personally, because I'll tell you, for me, if my value is this one little thing that I know, then that is going to hinder my growth within an organization. I personally would love to be able to train somebody up and move on.

Christopher's view was that most who do not want to share knowledge are "worried about job security for the most part." He added,

> Some people are just worried about being replaced. I've always looked at it as you're not going to get replaced if you're helping your company. If you help your company, you help yourself. The better the company can do, the better you will do.

Lack of Confidence/Intimidation

The second theme concerning why employees are reluctant to share knowledge is a lack of confidence/intimidation, which was voiced by four of the 16 participants. Barbara shared the following thoughts:

> I think some of it is about a lack of confidence because no one likes to be told, "Hey, you big dummy. No, that's not going to work." So I think confidence is an

> issue. I think intimidation is a part of it. The younger generation might really feel like, you know what, he knows so much, I don't know how we're ever going to work together and vice versa. The older generation sometimes feels that way."

Brian expressed:

> Probably they see that it might lead to less responsibility or authority for themselves. Maybe they are intimidated that what they know is old school and what the kids know coming out is just already advanced. For example, look at my position with Bob. Bob knows a lot, but there's a lot of things that I was just better at period because I grew up with it and he didn't. He had a lot of foundational knowledge about the business that I've never even heard of, so he was very useful in that way. I would think a combination of that, of losing some of their power or some of their influence and just being intimidated.

Charlene said,

> A lot of people are protective of what they've accomplished and what they have. The only reason I think perhaps an older generation might be, because they feel like that's all they've got to make them useful and maybe they feel a little threatened.

Last, Chase remarked, "With the older generation, it's [why Baby Boomers choose to not share knowledge] most of the being threatened. With the younger generation, it's more of tick the box and pad my resume so I can move on."

Cultural, Gender, and Race Issues

The final theme presented by four of the 16 research participants when asked, "Are Baby Boomers comfortable transferring knowledge to other generations?" was centered on culture, gender, and race issues. Shirley said,

> Honestly, in my experience, some days I've questioned do they (experienced co-workers) not want to talk to me because I'm Black or because I'm a woman or because I'm young? So I think it could be a combination of all the above.

Jacob offered his perspective:

> You could place it in the area of racism or just culture differences in general. I suspect if you look more like me, then I'm going to be more open and fluid with you than those who look less like me or function like me, have less in common with me. So I can imagine that's a challenge for people. I would say the older generations, I would think that's the case because they grew up in a time where racial divides (were evident), some tension was probably more prevalent than it is now even though we all know it's still there now. We say especially oil and gas, but they (companies) wouldn't dare say oil and gas is unique on that either.

Barbara specifically honed in on the hiring practices of her current company:

> You want to continue to hire people that look like you and walk like you and talk like you so you don't have any diverse thought around change and processes. Now you're missing some things on knowledge because some people are always going to think the same way and know the same stuff, they're not going to know anything new.

Knowledge Transfer Process and Culture Advancement

The knowledge transfer process and culture advancement category relates to what process and practices participants perceive is best to maintain and advance a knowledge transfer culture. Two major themes were established in this category: (a) use a formal/structured programs with top-down management support, and (b) incentivize through performance management.

Use Formal/Structured Approach with Top-Down Management Support

When asked what process and practices were best utilized to advance a knowledge transfer culture, 11 of the 16 participants discussed using a formal/structured approach with top-down management support. For example, Alexander said, "Well, that [culture] change has to come from the top down." Likewise, Ronnie advised, "It [knowledge transfer] has to be embodied in the managers that lead these departments and it has to have some level of importance." Barbara added, "Besides just being consistent, I think you have to have some sort of a formalized training." Chase noted,

> Well there has to be more focus on it from the top down. It has to be part of the budget, part of the culture, almost like being part of the core values. You got to make sure that it is front and center with everyone. And it has to be ongoing.

Shirley stated,

> All of us are encouraged to document and put it in our team's goals, that by the end of the year we're going to increase our documentation by 20% or whatever. It should be standard practice that there's some form of training material or documentation that you need to leave behind. . . . I think our internal audit or

external audit group should focus on knowledge transfer or documentation. Specifically in IT (information technology), we have auditors that come in and look at all of our system controls, and they often look at our documentation, and I think that it should be a control that you have sufficient documentation for certain levels of the business. That would certainly help and make it more of a requirement.

Chandler said:

> That has to really come from the top. Employees can have a thirst for knowledge, but that has to be recognized by the different management layers, and desire from all of those management layers to feed those employees as much information that they can handle and that they desire. So it has to come from the top, and we went through this many, many years ago, through bad experiences that really showed us that the top has to drive it. It can't be driven from the workers; it has to be driven from management. The management has to buy into it; the staff has to know that they buy into it, and that they're committed to it. As I mentioned to you, the stop work authority, some guy stops work because he feels that something's not right, he doesn't have to have any fear of retribution. That has to come from management down that we're going to stick by you when you do the right thing.

Daren provided his insight as follows:

> Maintaining formal programs would be great, but when that's hard to do and its uneconomical, we got to find a way to make sure we're encouraging the older

> generation to appreciate the legacy they leave by helping to raise up the younger guy. We got to make it where people take some pride in the fact that that new hire that doesn't have any experience 6 months later has learned how to do something because you taught him. . . . I'll go back to we need to document what it is we do. Not that what we do is the right way—you are constantly finding the best way to do it—but document what you do and what you want done so that there could be consistency in how things are done. In the oil field service business and probably in every business, you can go from a region operating in Texas to a region operating in Colorado and find dramatically different work practices. And maybe they both work, but probably one of them works better than the other. Maybe some things about the environment or the culture or whatever that make it not be exactly the same but, generally speaking, I think if we could have documentation and some consistency to what we're doing, it makes it easier to transfer that knowledge.

William added:

> I think at the end of the day, it's got to be focused from the top down, from the president to the vice president level, and then from the vice president level ensuring that people understand that they bring value to an organization other than just what they perceive to be the knowledge that they have. And it's just not means to terminate them (employees) and move them on and bring somebody up that's less expensive. I think once you get over that hurdle, you're probably

> going to gain a lot more acceptance in the older generations being willing to pass that information down.

Incentivize Through Performance Management

Three of the 16 participants highlighted incentivizing knowledge transfer through the performance management process as a practice to advance a knowledge transfer culture. Ronnie noted,

> When you start putting things in people's performance contracts, the person that is delivering the knowledge and the person that is gaining the knowledge, you create a culture. The key is don't overdo it, but when you start doing it you create a culture, without a doubt. I'd say that's a huge takeaway. It doesn't have to be a formal program, but insuring people do those things and developing the younger staff, it takes a little bit of initiative as part of your people development. One of the building blocks of your HR department.

Darren stated, "I think there is an opportunity to find ways to incentivize some of that (knowledge transfer) in our business more than we do." Jackson added his perspective, saying,

> I would say incentives through performance management. Instead of the threat of being replaced by somebody cheaper, that you literally teach your job, why don't you create an incentive to transfer knowledge? I've actually already talked with my manager about creating a training document for the software that we use. In system control, they don't use that software, we just go based off the report that the software creates. And sometimes when those reports don't match up with

> other pipelines, we're kind of stuck; we don't know what to tell the other pipelines. I know because I was a scheduler. I know how to look it up, but the other people don't. So I've actually already created a software, and I've kind of done it through word of mouth just because I'm a low man on the totem pole anyways, so they're not going to fire me. I've got no problem teaching other people how to look up nominations and confirmations and see what the issue is—why our report and another pipeline's report doesn't match up. But there's not incentive (to do so).

Incentivizing Knowledge Transfer

The incentivizing knowledge transfer category shares how research participants within this study believe successful knowledge transfer should be rewarded within oil and gas companies. Two themes were established in this category: (a) monetary incentives, and (b) recognition.

Monetary Incentives

The first theme presented by the research participants when asked what incentives they deemed beneficial to employees for participating in the knowledge transfer process was monetary incentives. Six of the 16 participants in this study discussed monetary incentives being a motivational tool to encourage employees' participation in the knowledge transfer process.

For example, Alexander said, "Well, the biggest motivator would probably be some money, whether that works out as some type of bonus or some type of extra for

training people. That would probably be the biggest motivator." Likewise, Barbara advised:

> I would say, if it's from that Baby Boomer age, it could be extended medical benefits. For our age, it could be an extra percent added on, annual increase interest to their pensions. It could be a lump sum to their 401k. It doesn't necessarily have to be here's $5,000.00. It could be with the younger group to make them retain that information to keep going. It could be, "Hey, look, you do this, and you'll get X amount of dollars put into your 401k." I do think it has to be something that is valuable to the person that is receiving it in order for it to be successful and to work.

Ronnie's view was

> People are goal oriented. You're getting something out of it, it's how the world works. I have something you want and I get something for it, and I make sure it gets done. Like I've been saying, the performance contract thing works. You're not guaranteeing people specific incentives, but you're creating an environment where they could deliver or they could go above and beyond and accomplish their core deliverables. So when it comes to incentives, I don't know specifically; we go to work to make money, so some type of monetary incentive works.

Jacob advised:

> I think it (incentivizing knowledge transfer) would be beneficial because people do not value the effort and time it takes them to document things and to transfer knowledge like that. It's almost considered an extra chore on top of just getting

> the job done and moving on. People don't like to document, people don't like to do more than what they really feel like they have to do, and you're not going to make them do it, then, why waste the time. It goes back to our safety culture. Our company takes safety so serious that they incentivize safety. So they say, "Well, if you do this and this and this and that, then you could get a gift card if you reach a certain objective on your quota from each quarter with respect to safety." They are basically incentivizing a behavior they want you to demonstrate. Otherwise people are going to be like, "Why am I going to waste my time if I'm not going to get anything extra out of it?" It's obvious, so you incentivize it some kind of way and make it something that they see what they can get out of it.

Last, Chase said,

> Well I think the way monetary [incentives] worked was allowing the individual to work part-time and they still had their benefits**.** The big monetary incentive [as people retire] is being able to extend their medical benefits for a period of time. You have to make that a part of the culture. You have to make that an ongoing thing to where it's coming from the top down, that this is how we are going to operate the company, but everyone is trying to share what they can with their direct reports so that we have knowledgeable people coming up to fill positions**.** If not your position, even if they are going to another position that will have them better prepared to go to a same level as the manager is now but a different department, give them some insight on what they will need to expect.

Recognition

The second theme presented by the research participants when asked what incentives they recommended for participating in the knowledge transfer process was recognition. Eight of the 16 participants cited recognition as motivational to employees participating in the knowledge transfer process. Jacob said,

> If you were to make it so that if someone were to acknowledge that, hey, this guy helped me with something that I needed help with, I want to recognize them for that and because they were recognized formally through some formal process for being a good mentor technically on something.

Chandler noted:

> Recognition amongst peers and others within the organization goes a long way. You can give someone an extra $100, as an example, to train someone and within 30 days, that $100 is going to be forgotten about, but the recognition amongst your peers, that, hey, I went above and beyond and I'm being recognized for what I did, that lasts far beyond [the] economic upside. That part sticks within that individual, and it also sticks within the minds of those that are being told. "Here's what Bob did, great job training this person. They were about to make a mistake, you stepped in, prevented something bad from happening." That lasts.

Ronnie further stated:

> I'm trying to think of what they want besides monetary [rewards] at work. A certificate. For example, Ben talked to X amount of people and spent this amount of time. I don't know, I think it just shows a commitment to people in general

and a commitment to the company, and that rolled up with your performance review shows people where you're at.

Darren added,

> Maybe it's a different patch on their shirt, maybe it's a different hard hat sticker, or whatever it is, it doesn't have to be cash. But I do think there's pride when people have themselves completed the multiple steps of training and reach that next level and reach that certification with a small "c." It's not some formal license but just that internal certification to go to work on a different piece of equipment. Most people take pride in that. If you have the ability to make it a visible recognition, again different patch, different hard hat sticker, or whatever, or a plaque on their desk or whatever it is, if you have the ability to make recognizable where others can see, I think that's an extra bit of incentive, extra bit of personal pride and satisfaction that most people like to have—not all, but most people enjoy.

Ciara offered her perspective:

> People like to be recognized, and so I think about if you're a really senior technical expert in your field, so people like to be recognized for that, so rather than it kind of occurring in a vacuum, is there a way to make it more public where you're spotlighting some folks somehow? So they're getting non-monetary recognition for the technical expertise that they bring. Is that like a video that goes on the home page where you're spotlighting somebody's career

or is it them giving presentations and sharing knowledge with other people and some people might thrive on that—I don't know.

Elvan noted,

> What I have seen is recognition or respect or prestige that goes along with being identified as a subject matter expert. When it's time to nail down the operating procedure or revise that operating procedure, you pull a random sample of senior guys into a room and you tell them you're here today because your knowledge ranks amongst the top in our company, and we're going to walk out of here with a new procedure, or we're going to review this existing procedure and fix it, and so they get that prestige or that feeling of belonging, and by the way, you come to the main office and do this and we'll put you up in a hotel, bring your wife and y'all can stay for the weekend or something. There are things like that that are going on in places I've been before where there's an incentive, I wouldn't say is monetary, we didn't give them a bonus or we didn't give them extra pay to train the young guy, but there were things like that would incentivize somebody to participate.

Likewise, Christopher communicated,

> The non-monetary things, everybody wants to hear "good job." Everybody wants to hear that from their supervisor—"you did a good job." That's part of human nature; everybody likes to be praised. They might not admit it, but it's not just everybody, it's almost every cognizant thing. Even animals, our pets, they like to hear "Good boy, good girl." Human beings are even more so that way. We all

want to hear we did a good job or "I like the way you did that, that's good thinking."

Summary

In summary, the findings of this study included the 16 participants' perceptions and experiences pertaining to knowledge transfer within the oil and gas industry. Their responses were categorized into seven major themes: (a) competitive advantage, (b) knowledge transfer experiences, (c) aging workforce, (d) interventions, (e) reluctance to share knowledge, (f) knowledge transfer process and culture development, and (g) incentivize knowledge transfer. In addition to the categories, major themes were discussed as well.

CHAPTER V

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

This final chapter provides a summary, discussion, recommendations and limitations of this study. The purpose of this qualitative research study was to examine perceptions of employees in the oil and gas industry and discover how knowledge possessed by Baby Boomers is being transferred to future generations and what interventions by organizations enable and encourage the knowledge transfer process, thus creating a knowledge transfer culture.

Summary

This study was developed using the basic qualitative research design approach. Both purposive and criterion sampling were used. Research participants were selected based on the following criteria:

1. Each participant was currently employed in the oil and gas industry.
2. Each participant had a minimum of 2 years of experience specific to the oil and gas industry.
3. Each participant was a member of the Baby Boomer, Generation X, or Millennial generations.

The research participants were purposefully selected by taking into consideration diversity in race, sex, work experience, and their work in the oil and gas sector. Participants were recruited via email using LinkedIn as a resource. Each participant received a personal introductory email introducing the researcher, providing the purpose

of the study and eligibility criteria, and requesting participation in the study. The study included 16 participants, and after data saturation was reached, sampling procedures were concluded. All participants were over the age of 18, with each participant consenting to participate based on the guidelines of the IRB at Texas A&M University.

Data were collected after obtaining approval by Texas A&M's IRB. For this basic qualitative study, the researcher employed interviews as the main data collection source. As a result of the COVID-19 pandemic, one-on-one semi-structured interviews were conducted via Zoom. The interviews were digitally recorded via Zoom and a handheld recorder, which were also used to assist in transcribing the dialogue that aided in the development of themes. The interview questions posed to participants were developed to support and connect participant responses to the research questions while keeping the theoretical framework in mind. Each interview question was field-tested by two qualitative research experts, and questions were modified per the experts' guidance.

Several documents were gathered for use in the study. The participants' resumes/LinkedIn profiles, training documents/career ladders, and in some cases job descriptions were used to get a greater understanding of the participants' experience and positions within the oil and gas industry. The researcher continuously reflected on the data and wrote memos during the course of the study. All interviews were transcribed using notes and audio recordings. The information was then appropriately coded into categories with narrative quotes communicating the findings of the study. Data were analyzed using Creswell's five-step method for data analysis:

1. Step 1—Organize and prepare the data for analysis.

2. Step 2—Read and look at all the data.
3. Step 3—Start coding the data.
4. Step 4—Generate a description and themes.
5. Step 5—Represent the description and themes. (Creswell & Poth, 2018).

Each interview was independently analyzed and compared to other interviews as they were collected to establish similarities and differences using the constant comparative analysis method. Trustworthiness was established by using seven strategies to ensure the research study's credibility and validation. The strategies that were applied were triangulation; member checking; rich, thick description; peer review; reflective journaling; clarifying researcher bias; and audit trails.

Discussion

As a human resources professional within the oil and gas industry, this topic is extremely important to me; I have personally experienced companies not adequately transferring knowledge from one generation to another. The goal of this study was to better understand employees' perceptions and experiences with knowledge transfer within oil and gas companies and understand how a knowledge transfer culture could be developed. When starting this study, I assumed many of the research participants' experiences would be similar to my own experience working in the oil and gas industry. I was only partially accurate; a few research participants that worked for larger corporations acknowledged they had knowledge transfer practices in place. However, all research participants made it known that even if they had knowledge transfer practices in place, their interventions could be improved. I was not surprised that many of the

participants felt that their current companies or past companies have not properly dealt with the aging workforce and/or knowledge transfer. One of the overwhelmingly unexpected outcomes is that I interviewed participants from the same company, and their viewpoints concerning knowledge transfer being conducted within their company differed on whether their company had knowledge transfer practices in place. These individuals operated in different aspects of the business, so their company obviously did not have a holistic approach to knowledge transfer.

Employees' Perceptions of Knowledge Transfer Within the Oil and Gas Industry

The research participants' beliefs of what provides oil and gas companies competitive advantage centered on human capital. They highlighted employee knowledge/experience, documentation/processes, investment in early career programs, and hiring the right people as a means of corporate competitive advantage, and these serve as major themes. Their perceptiveness regarding human capital aligns with the theoretical framework in this study, which is comprised of the RBV, human capital theory, and organizational knowledge creation theory.

As a strategic management theory, the RBV examines a firm's tangible and intangible assets in order to understand and maintain current and future competitive advantage by creating sustainability (Barney, 1991; Wernerfelt, 1984; Wright et al., 2001). Four attributes must be presented to affirm this theory and attain sustainability, which are valuable, rare, imperfectly imitable, and non-substitutable resources (Barney, 1991). Human capital theory focuses on the gained knowledge and skills that the workforce attains through either education or training (Becker, 2009). Organizational

knowledge creation theory investigates the competence of a company to create new knowledge, distribute it throughout the workforce, and imbed it through its products, services, and systems (Nonaka & Takeuchi, 1995). Regarding employee knowledge and experience, the participants focused on a corporations having strong employees, top-level management, and business continuity practices in place, which all align with the theoretical framework of this study.

In addition, the research participants expressed the importance of a corporate investment in early career programs and hiring the right people, which is further supported by the literature since it can be concluded that competitive advantage materializes when there is an investment in increasing firm-specific skill sets (Becker & Gerhart, 1996; Delery & Roumpi, 2017; Lado & Wilson, 1994). Inkpen et al. (2016) suggested that investment in early career programs "can also help firms keep a good stock of replacements for retirees in the short and long term" (p. 235). Inkpen et al. also commented on the aspects of having a specified recruiting strategy and being open to targeting employees from other industries and other oil and gas companies, hiring young talent, and hiring more women.

The research participants provided insight into their individual knowledge transfer experiences within the corporations for which they are employed in the oil and gas industry. Three major themes emerged when they presented their experiences: trial and error/learning through failure, formal/informal mentorship programs, and on-the-job training.

There was a mix of positive and negative aspects from the research participants' perceptions of knowledge transfer within the oil and gas industry. The major theme of learning through trial and error/learning though failure was mentioned by seven of the 16 participants. This finding aligns with studies that have identified that the oil and gas industry as a whole has not effectively combated the aging workforce (Gould et al., 2001; Inkpen & Moffett, 2011; Sampath & Robinson, 2005; Sumbal et al., 2017). On a positive note, the participants did provide their perspectives regarding formal/informal mentorship programs and on-the-job training. As previously stated in the literature review, mentoring and coaching are distinguished as the most effective way to transfer tacit knowledge (DeLong & Storey, 2004).

The aging workforce was discussed, and three major themes emerged. Research participants felt strongly that there has been no focus/no formal process for the aging workforce or that the aging workforce has been talked about with no action. In addition, participants advised that many of their companies have forced experienced employees to retire or be laid off. To combat the aging workforce, it was noted that some corporations within the industry have utilized university/trade school internships and hires to assist with hiring younger staff members.

Interventions Experienced by Workers in the Oil and Gas Industry That Facilitate the Knowledge

Three major themes were presented by the research participants regarding the interventions they have seen taking place in the workforce: (a) creation of knowledge sharing documentation, (b) mentoring programs, and (c) offering early retirement with a

specific transition period. In addition, it was mentioned that some oil and gas companies are not doing anything to encourage generations to facilitate the knowledge transfer process.

As discussed in Chapter II, the creation of knowledge sharing documentation is an intervention that is commonly used to facilitate the knowledge transfer process. Trugman-Nikol (2011) provided a list continuation tools or knowledge sharing documentation to transfer explicit knowledge:

1. Organization charts.
2. Job descriptions.
3. Process analysis work-flows and charts.
4. Task-by-task documentation (SOP manuals).
5. Technical videos.
6. Training. (p. 56)

Grant (2013) noted the important role that information technology can play in the development and accessibility of knowledge-sharing documentation:

> Information technology has facilitated the assembly of databases that can serve as corporate memories for important information including best practices, technical and managerial performance data, company yellow pages, and supplier and customer information. For instance, Schlumberger relies heavily on the use of IT to create and use directories useful to the management of knowledge. Intranets serve as a common medium of access to information and a variety of tools and repositories such as the Schlumberger Knowledge Hub (the company-

> wide directory and expertise finder), data dictionaries, supplier contracts, digital libraries, catalogs, general news, manuals and online training modules, and bibliographic databases. Companies have developed databases of best practice like Chevron Texaco's Lessons Learned Database and BP's database of After-Action-Reviews meant to capture positive and negative experiences. (p. 100)

Many of these knowledge-sharing documentation practices were mentioned by the research participants within this study.

Four participants in this study discussed mentoring programs as interventions they have experienced or seen practiced in oil and gas companies. In Sumbal et al.'s study on knowledge retention in oil and gas, mentoring was identified as the best way to transfer knowledge "if companies have time to do so" (p. 916). Research participants in this study found informal or formal mentoring to be a valuable intervention that they have experienced or seen used in the companies where they are employed.

The last major theme involving interventions that workers in the oil and gas industry have experienced that enable and encourage generations to facilitate the knowledge transfer process is offering early retirement with a specific transition period. This element was also mentioned in *Managing Knowledge Transfer by Utilizing Creative Work Solutions for a Graying Workforce* in Chapter II. Using creative retirement strategies is something oil and gas companies should be utilizing to retain experienced workers, but many oil and gas companies have not chosen to institute these creative strategies to keep their experienced workers in place to adequately transfer knowledge (Orr & McVerry, 2007).

Oil and Gas Industry Workers' Recommendations for Maintaining and Advancing a Knowledge Transfer Culture

Participants made two recommendations for organizations in the oil and gas industry to maintain and advance a knowledge transfer culture. First, the research participants recommended the use of a formal/structured approach to ensuring knowledge transfer with top-down management support. Second, they recommended incentivizing employees who participate in the knowledge transfer process through performance management and recognition.

Recommendations

Recommendations for Practice

Although the purpose of this qualitative research study was to examine perceptions of employees in the oil and gas industry and discover how knowledge possessed by Baby Boomers is being transferred to future generations and what interventions by organizations enable and encourage the knowledge transfer process creating a knowledge transfer culture, there are recommendations for practice to consider.

As discussed in Chapter I, HRD is defined as "a set of systematic and planned activities designed by an organization to provide its members with opportunities to learn necessary skills to meet current and future job demands" (Werner & DeSimone, 2012, p. 4). With this in mind, there are several recommendations for practice that HRD practitioners in the oil and gas industry should consider: (a) document KM and transfer process, (b) hire more qualified women/minorities to develop diversity inclusion and

belonging initiatives, (c) solidify a recruiting and talent development strategy to combat the aging workforce, (d) recognize the career achievements of those nearing retirement, and (e) create incentive plans motivating the workforce to participate in KM initiatives.

Document Knowledge Management and Transfer Process

HRD professionals should assist their organizations within the oil and gas industry to solidify a KM strategy to include documented KM and transfer processes. This process will provide organizations and employees a structured mechanism to ensure organizational sustainability and competitive advantage. A solidified KM strategy paired with documented process will allow employees and leaders to seamlessly confront employee retirements, voluntary turnover, transfers, and any other employee actions that have the potential to disrupt workflow, efficiency, and profitability.

Hire More Qualified Women/Minorities and Implement Diversity, Inclusion, and Belonging Initiatives

The next recommendation for practice is for HRD and human resource management practitioners to encourage their corporate leaders to hire more qualified women and minorities as a means to combat the declining interest of workers wanting to work in the oil and gas industry. An additional benefit to hiring more qualified women and minorities is the diversity of thought and perspective it provides. As this research study showed, women and minorities had concerns that individuals were reluctant to share knowledge with them because of their gender or ethnicity. As HRD leaders encourage more diversity, it is important to ensure the proper diversity, inclusion, and

belonging initiatives are implemented to fully support these demographics. Without these initiatives, the tenure of women and minorities will be negatively impacted.

Solidify a Recruiting and Talent Management/Development Strategy to Combat the Aging Workforce

Another recommendation for practice is for HRD workers to assist their organizations in the design of effective recruiting and talent management/development strategies to combat the aging workforce. Recruiting and talent management/development is critical to combat the aging workforce. Having a corporate recruiting strategy that keeps the aging workforce in mind will allow organizations to be forward thinking and ensure that their future is solidified per their recruiting strategy that identifies how they will attract top talent to fulfill the strategy. Companies cannot only afford to invest in recruiting new employees, they must also invest resources and time in managing/developing the talent within the workforce. An effective talent management/development strategy will ensure the company is doing all it can to retain employees, ultimately retaining the knowledge and investment it has made in its workforce.

Recognize the Career Achievements of Employees Nearing Retirement

The next recommendation for practice is for human resource professionals to find ways to recognize the career achievements of employees nearing retirement. Recognizing this important group of employees is important to the proper transfer of knowledge before they exit the organization. A plan should be created to recognize the careers of those nearing retirement that allows them to share their knowledge in a

nonthreatening way. This will serve as a motivational factor for many, which will ensure a smooth and noncombative transfer of knowledge. Organizations cannot be successful in the effective transfer of knowledge without having employees who are nearing retirement onboard and committed to transferring knowledge before they retire.

Create Incentive Plans That Motivate the Workforce to Participate in Knowledge Transfer Initiatives

The last recommendation for practice is for HRD and human resource management professionals to create incentive plans that motivate the workforce to participate in knowledge transfer initiatives. Since each organizational culture is different, human resources should work to understand what type of financial and non-financial incentives will motivate its workforce to participate in the knowledge transfer process. If the organizational culture can accept knowledge transfer being part of the performance management process, tying this metric to the employee bonus plan might be an advantage. All generations should be included in the knowledge transfer incentives; this step will ensure that early-, mid-, and late-career professionals buy in to the importance of knowledge transfer. Furthermore, with all generations participating and being incentivized, it reinforces the culture in an impactful and positive way.

Recommendations for Future Research

The findings of this study suggest several ways HRD practitioners can assist the oil and gas industry in combating the aging workforce through effective knowledge transfer. With this in mind, there are several recommendations for future research. The first recommendation for future research is a quantitative study to identify the most

effective incentives to motivate employees in the oil and gas industry to participate in the knowledge transfer process. This process will allow HRD practitioners to make impactful recommendations to effectively incentivize employees who participate in the knowledge transfer process.

The second recommendation for future research is a qualitative comparative research study to investigate what interventions work best to combat the aging workforce and to facilitate effective knowledge transfer within the oil and gas industry. This research is needed because the participants in this study identified many interventions taking place within their workplaces. The recommended focus of such a study will aid HRD leaders in identifying and refining interventions that are most successful within the oil and gas context.

The last recommendation for future research is a qualitative study focused on identifying culture, gender, and race issues within the oil and gas industry that prevent women and minority participants from wanting to join or be retained in the industry. An unexpected outcome of this study identified cultural, gender, and race-related issues affecting knowledge transfer within the oil and gas industry. Within the study, some of the participants intimated that individuals were apprehensive to train them because of their gender or race. The recommended study should focus on identifying the perceptions and experiences of women and minorities from a gender and race perspective working within the oil and gas industry. This study will provide HRD practitioners data points to improve diversity, inclusion, and belonging initiatives within

the oil and gas industry based on the perspective of those who have possibly been impacted since the industry is not known for its gender, culture, and race diversity.

Limitations

As with all research, this study has limitations. Specifically, this study is limited in that the participants were drawn from a single state and region.

Conclusion

In summation, knowledge transfer is an important component in the oil and gas industry maintaining is presence and sustainability in the future. Many of the research participants in this study agree that there has been limited focus, effectiveness, and action regarding the transfer of knowledge within the companies for which they work. As previously mentioned, for future viability and sustainability, it is imperative that oil and gas companies successfully capture and transfer the knowledge of their aging workforce (Cochran et al., 2012; Werner et al., 2016). This qualitative research study examined perceptions of employees in the oil and gas industry to discover how knowledge possessed by Baby Boomers is being transferred to future generations and what interventions by organizations enable and encourage the knowledge transfer process in order to create a knowledge transfer culture.

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APPENDIX A

RECRUITMENT LETTER

Dear Prospective Participant:

I am a currently a doctoral student in the Department of Education and Human Development at Texas A&M University. As part of my requirements for completing a doctoral degree in Human Resource Development (HRD), I am conducting a study of knowledge transfer in the oil and gas industry. This email serves as an invitation for you to participate in this research project. The purpose of this qualitative study is to examine the perceptions of employees in the oil and gas industry with regards to how knowledge possessed by Baby Boomers is being transferred to future generations and what interventions by organizations enable and encourage the knowledge transfer process creating a knowledge transfer culture. This study is under the guidance of Dr. Larry Dooley, associate professor of educational administration and HRD at Texas A&M University.

Your participation is voluntary. You may decide to not participate or to withdraw from participation at any time. If you agree to participate in the study, you will be asked to sign an informed consent form indicating in writing your willingness to be part of the study. If you agree to participate in this study, you will be asked to: (1) engage in two interviews lasting, the first lasting approximately 60 minutes and the second lasting approximately 30 minutes; and (2) review the interview transcript to verify the accuracy. I will be contacting you directly to schedule the interview and location of your convenience. Your interviews will be conducted by me. Your interview transcripts will be stored securely in my office for a period of three years. All the transcripts and recordings with identifying information will be destroyed as soon as my dissertation is defended successfully. Only I will have access to any data collected.

Your identity will not be disclosed in any fashion. The records of this study will be kept private. No identifiers linking you to this study will be included in any sort of report that might be published. Research records will be stored securely and only the two investigators will have access to the records.

This research study has been reviewed by the Institutional Review Board (IRB) at Texas A&M University. For research-related problems or questions regarding your rights as a research participant, you can contact the IRB at (979)458-4067 or irb@tamu.edu.

If you would like to be in the study, please contact me at dford05@tamu.edu or by phone at (281) 650- 2232. Thank you very much for your support!

Sincerely,

Derek C. Ford, Doctoral Candidate
Educational Human Resource Development Program
Texas A&M University

APPENDIX B

DEMOGRAPHIC QUESTIONNAIRE

NAME:
PHONE :
EMAIL:

Please click to check box

1. What best describes your generational cohort?

   ☐ Traditionalist Generation (Born between 1922-1943)

   ☐ Baby Boomer (Born between 1943-1960)

   ☐ Millennial (Born between 1960-1980)

   ☐ Generation X (Born between 1980-2000)

2. What is your current employment status?

   ☐ Full-time ☐ Part-time ☐ Volunteer ☐ Retired ☐ Unemployed

What oil and gas company are you employed?

3. What sector of the oil and gas industry is your company classified in?

   ☐ Upstream ☐ Downstream ☐ Midstream ☐ Services

4. What is your job title? _____

5. How many years of experience do you have in the oil and gas industry? _____

6. Does your oil and gas employer have knowledge transfer practices in place?

   ☐ Yes ☐ No

APPENDIX C

INFORMED CONSENT FORM

Project Title: The Graying of the Oil and Gas Industry in the United States: Knowledge Transfer Perceptions from Baby Boomers to the Next Generations

You are invited to take part in a research study being conducted by Derek C. Ford, a researcher from Texas A&M University. The information in this form is provided to help you decide whether or not to take part. If you decide to take part in the study, you will be asked to sign this consent form. If you decide you do not want to participate, there will be no penalty to you, and you will not lose any benefits you normally would have. You may choose to withdraw from the study at any time without penalty. NOTE: If you are employed then it is your responsibility to work with your employer regarding work leave for participation in this study if during work hours.

Derek C. Ford

Email – dford05@tamu.edu

Phone – (281)650-2232

Why Is This Study Being Done?

The purpose of this qualitative study is to examine the perceptions of employees in the oil and gas industry with regards to how knowledge possessed by Baby Boomers is being transferred to future generations and what interventions by organizations enable and encourage the knowledge transfer process creating a knowledge transfer culture.

Why Am I Being Asked To Be In This Study?

You are being asked to be in this study because:

1. You are currently employed in the oil and gas industry.
2. You have a minimum of 5 years of experience specific to the oil and gas industry.
3. You are a member of the Baby Boomer, Generation X or Millennial generations.

How Many People Will Be Asked To Be In This Study?

Ten to fifteen people will be invited to participate in this study locally.

What Are the Alternatives to being in this study?

The alternative to being in the study is not to participate.

What Will I Be Asked To Do In This Study?

You will be asked to be interviewed to discuss your perceptions of knowledge transfer in oil and gas. Your participation in this study will last between 60-80 minutes for the one-on-one initial interview and no more than 30 minutes for the follow-up interview. You will receive a copy of your interview transcript after the interview is conducted. The follow-up will be used to ensure the accuracy of your interview transcript and to ask clarifying questions.

Will Photos, Video or Audio Recordings Be Made Of Me during the Study?

The researcher will use audio recorders during the study, so that the interview can be transcribed. If you do not give permission for the audio recording to be obtained, you cannot participate in this study.

_____ I give my permission for audio recordings to be made of me during my participation in this research study.

Are There Any Risks To Me?

The things that you will be doing are no more/greater than risks than you would come across in everyday life. Although the researchers have tried to avoid risks, you may feel that some questions/procedures that are asked of you will be stressful or upsetting. You do not have to answer anything you do not want to.

Will There Be Any Costs To Me?

Aside from your time, there are no costs for taking part in the study.

Will I Be Paid To Be In This Study?

You will not be paid for being in this study.

Will Information From This Study Be Kept Private?

The records of this study will be kept private. No identifiers linking you to this study will be included in any sort of report that might be published. Research records will be stored securely and only the researchers will have access to the records. Recordings will be transcribed in within a week of your interview by Derek C. Ford. Video/Audio files will be destroyed after the dissertation has been successfully defended. Information about you will be stored in locked file cabinet; computer files protected with a password. This consent form will be filed securely in an official area.

People who have access to your information include the Principal Investigator and research study personnel. Representatives of regulatory agencies such as the Office of Human Research Protections (OHRP) and entities such as the Texas A&M University Human Research Protection Program may access your records to make sure the study is being run correctly and that information is collected properly.

Information about you and related to this study will be kept confidential to the extent permitted or required by law.

Who May I Contact for More Information?

You may contact the Principal Investigator, Dr. Larry Dooley, to tell him about a concern or complaint about this research at 979-845-5300 or l-dooley@tamu.edu. You may also contact the Protocol Director, Derek C. Ford at 281-650-2232 or dford05@tamu.edu.

For questions about your rights as a research participant, to provide input regarding research, or if you have questions, complaints, or concerns about the research, you may call the Texas A&M University Human Research Protection Program (HRPP) by phone at 1-979-458-4067, toll free at 1-855-795-8636, or by email at irb@tamu.edu. The informed consent form and all study materials should include the IRB number, approval date, and expiration date. Please contact the HRPP if they do not.

What If I Change My Mind About Participating?

Your participation in this research is voluntary, and you have the choice whether or not to be in this research study. You may decide to not begin or to stop participating at any time. If you choose not to be in this study or stop being in the study, there will be no effect on your relationship with the researcher. Any new information discovered about the research will be provided to you. This information could affect your willingness to continue your participation.

STATEMENT OF CONSENT

I agree to be in this study and know that I am not giving up any legal rights by signing this form. The procedures, risks, and benefits have been explained to me, and my questions have been answered. I know that new information about this research study will be provided to me as it becomes available and that the researcher will tell me if I must be removed from the study. I can ask more questions if I want. A copy of this entire consent form will be given to me.

_____ _____

Participant's Signature Date

_____ _____

Printed Name Date

INVESTIGATOR'S AFFIDAVIT:

Either I have or my agent has carefully explained to the participant the nature of the above project. I hereby certify that to the best of my knowledge the person who signed this consent form was informed of the nature, demands, benefits, and risks involved in his/her participation.

_____ _____

Signature of Presenter Date

_____ _____

Printed Name Date

APPENDIX D

INTERVIEW QUESTIONS

Introductory Questions

1. How did you get your start in the oil and gas industry?
2. Tell me about your professional career?
3. What has been your career highlight(s)?
4. What challenges have you faced in your career?

Research Questions	Interview Questions
1. What are employee's perceptions of knowledge transfer taking place within the oil and gas industry?	5. What gives your organization competitive advantage? 6. How has knowledge been transferred to you within organizations that you have worked for? 7. How have you learned your jobs in the positions that you have held? 8. How is your current or former organization(s) confronted the aging workforce in the oil and gas industry? 9. Why do you believe knowledge transfer enables your organization to maintain a competitive advantage?
2. Describe what interventions workers in the oil and gas industry have experienced in organizations that enable and encourage generations to facilitate the knowledge transfer process?	10. Are Baby Boomers comfortable transferring knowledge to other generations? 11. Are younger generations comfortable being mentored and trained? 12. Why do you believe individuals from multiple generations are reluctant to share knowledge with co-workers? 13. Do you believe there are different motivators of why individuals from other generations are reluctant to share knowledge? 14. What specific interventions have the companies that you have worked for established and encouraged Baby Boomers to transfer knowledge to other generations? 15. How is knowledge being transferred between Baby Boomers and younger generations in

	organizations you have worked for? How well is it working? 16. Have the organizations that you have worked for been successful in transferring knowledge from Baby Boomers to future generations? Why or why not?
3. What recommendations do workers in the oil and gas industry have for maintaining and advancing a knowledge transfer culture?	17. Describe the organizations that you have worked for, do you believe they have a knowledge transfer culture? 18. What can be changed or improved to create a knowledge transfer culture? 19. What process do you feel would best be used to maintain a knowledge transfer culture? 20. Do you believe that incentivizing employees for participating in the knowledge transfer process beneficial? Why or Why not and if yes, what incentives do you recommend?

APPENDIX E

SAMPLE INTERVIEW

Derek: How has your current or former organization confronted the aging workforce in the oil and gas industry?

Chandler: Again, it goes back to what we were talking about before. You've got to have training and you've got to have procedures because a lot of the people that we have coming into the organization have absolutely no clue of what we do and how we do it. And that is because the aging workforce and their children maybe going off and doing something totally different. So you've got to then have a way to teach people what they need to know and give them the confidence to do it but because of the aging workforce it is really going by the wayside. That is especially true because I had to close an office in [redacted]. The economics just didn't work out to leave people out there so we transferred everybody here. But part of the decision making process in deciding to bring everybody here was when you look at the demographics of the workforce that's there within the next 5 years or so, you're going to have to replace over 50% of those people because they were going to retire. A lot of those folks were there when I walked in the door. You can't do that if you're just relying on those seasoned veterans to train other people. You have to create a mechanism by which you can give people knowledge so that they can become successful without crippling yourself to one individual, because that creates a single point of failure and the last thing you need is a single point of failure because the consequences of us doing something wrong are so significant from a human health perspective as well as an environment perspective. If we make mistakes it could be on CNN at 6:00 pm with film crews and everything else.

Derek: Why do you believe knowledge transfer enables your organization to maintain a competitive advantage?

Chandler: Very simple, without it, you're going to have a limited life, as far as an organization goes. Because without it, you will undoubtedly make errors, those errors will result in negative consequences from a public image perspective and from a regulatory perspective. In today's environment, if that happens to you, you will not be operating. An example of that is, a natural gas company in the northeast, unfortunately, has a pretty horrific accident and when the investigation starts to reveal some of their

shortcomings, basically the regulators took over and said we're shutting it down, you can't continue to operate. So the consequences are that great so you can't have that single point of failure as far as transfer of knowledge.

APPENDIX F

SAMPLE REFLECTIVE JOURNAL

July 2, 2020

After a few weeks my recruitment letter, informed consent, participant questionnaire, interview questions received IRB approval. I am now ready to start scheduling interviews. This is definitely an exciting day! I've identified quite a few potential participants that meet the participant selection requirements of the study and have used LinkedIn as a resource.

July 3, 2020

I am off of work today (Friday) in observance of the 4th of July and was able to get two interviews scheduled for July 5th (Sunday).

July 5, 2020

I conducted my first and second research interview today. The first interview was with Alexander it took approximately 30 minutes. Alexander has a lot of experience in the oil and gas industry in the services and supply sector. I really enjoyed talking with him and you could tell he was definitely technically sound, enjoyed and was proud of his work. Alexander definitely had an awareness and opinion that the current company that he works for has not done enough regarding knowledge transfer in oil and gas.

The second interview was with Barbara. She almost has 10 years' experience in the oil and gas industry and works in Human Resources for an impressive company. Her company seems to have many knowledge transfer practices in place, so I'm very fascinated. Additionally, she works in Human Resources so we were definitely able to connect as we service in the same corporate discipline. She was my second interview of the day, so I was less nervous and believe the interview went better. The interview took almost an hour. She is definitely an extrovert and has passion for the topic of knowledge transfer.

As this is my first interview I believe going forward I will need to take more time and ask more probing questions to ensure the participant has clearly answered the question. This will enable me to draw more from each specific interview. I was definitely that there were no technology glitches with Zoom or the handheld recorder. I was definitely anticipating something to go wrong.

APPENDIX G

SAMPLE MEMO