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Exploring the relationship between oil and gas organizational culture and the management of tacit knowledge

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Abstract

Ten years after the Deepwater Horizon disaster, knowledge management practices directed toward utilizing employee tacit knowledge remain underdeveloped within oil and gas operations. This is despite the management of tacit knowledge being an environmental safeguard, providing collaborative information on learning experiences to reduce environmental/financial risk, and promoting environmentally sustainable practices. Managing tacit knowledge is a research theme with limited exploration within an oil and gas context. This research addresses this gap and analyzes two oil and gas companies of differing size and scale. A qualitative investigation with key stakeholders is undertaken based on Hansen et al.'s "Codification vs. Personalization" framework. The findings of this research support that the organizational culture within the two oil and gas companies influences their attitudes and behaviors towards their management of tacit knowledge. It identifies an organizational culture that is short-term in focus, reactionary, risk-averse and possessing a fear of change. Factors for limiting effective management of tacit knowledge include organizational structure (especially the use of temporary contractors), hiring policies, and approaches to codification and personalization. These current practices leave a picture of an industry that uses knowledge management strategies for individual and organizational "competitive advantage" rather than for wider beneficial sharing and collaborative learning.

Keywords: Environmental Sustainability; Knowledge Management; Oil and Gas Industry; Tacit Knowledge; Organizational Culture

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1. Introduction

It is 10 years since the "Deepwater Horizon oil spill," widely regarded as the worst environmental disaster in US history (Levy and Gopalakrishnan, 2010). On April 20th, 2010, the BP-operated Macondo Prospect drilling rig ignited and exploded, engulfing the platform and beginning a total oil discharge of nearly five million barrels (United States Coast Guard, 2011). Marine life died in record numbers and the environmental impact to the US Gulf Coast is set to last for decades. In 2014, the US District Court declared BP primarily responsible for the disaster due to reckless conduct and gross negligence (Griggs, 2011) and as a result, the blowout cost the company over $65 billion in legal fees, clean-up costs, and financial penalties (Milne, 2011).

A White House Commission into the reasons behind the environmental tragedy attributed a series of cost-cutting decisions and an inadequate safety system to be key factors (Weaver, 2014). This was facilitated by industry-wide "incompetence" and "complacency" toward environmental safety (Eagan, 2014). This included actions to leave well-drilling liner overlaps uncemented, to not use recommended casing centralizers, to not confirm proper conversion of float equipment, and many other dangerous practices (Norazahar et al., 2014). Bea (2011) notes, "Critical things were compromised for the wrong reasons in the wrong ways at the wrong times." At the core of this "incompetent" environmental disaster were issues surrounding ineffective knowledge management practices and the culture within the oil and gas industry that influences them.

Knowledge management is a key component for enabling competitive advantage, efficiency, sustainability, and reducing risk for organizations (Nonaka, 1994). It involves both the *creation* and *utilization* of knowledge (Anjum, 2017). Oil and gas leaders are realizing that often their greatest financial resource and asset is employee knowledge (Grant, 2013). This knowledge within organizations is either in the explicit or tacit form (Collins, 2010). Whereas explicit knowledge is tangible and easy to express, tacit knowledge is intangible and difficult to communicate (Abbariki et al., 2017). This presents a problem to organizations since most knowledge within employees is, in fact, tacit (Hislop et al., 2018). It is based almost entirely on personal experience (Colquitt et al., 2010), is always subjective, and as such, it could also be defined as "personal" knowledge – something unique to each individual (Stevens et al., 2010). Most tacit knowledge is uncodified and consists of the things we intrinsically "just know" how to do over time and after much experience, making it akin to the term, "expertise" (Schindler, 2015). When people leave an organization, if their tacit knowledge has not been captured and stored to some degree before they depart, it can greatly weaken organizational competitive advantage and introduce additional risk to future operations (Grant, 2013). This is a particular issue within an oil and gas context. Within this industry, employment and opportunities are heavily reactive to fluctuating production cycles and volatile oil prices (Regnier, 2007), in addition to the culture that influences its operations and decision-making (Mearns and Yule, 2009). This has been further complicated by the recent industry downturn that began in 2014 (Henni, 2015). This has seen over 5 years of significant negative economic impact with drops in employment, spending, and oil well development by 30%, in addition to a 45% drop in the price of oil (Baffes et al., 2015). As part of the research that led to the creation of this article, an interviewee shared his own opinion of how the Macondo oil spill happened. His insight is particularly valuable, not only because of his 30+ years working in leadership within the oil and gas industry but also because of his experience currently leading a group of employees who operated the Macondo Prospect at the time of the blowout. He shared the following:

"I work with some of the team that operated Macondo. That all happened during a downturn and a lot of people who worked on that project got made redundant right before the disaster. New people came in to operate the rig and nothing was done to capture the tacit knowledge of their predecessors before they left. If more effort had been made to capture their tacit knowledge, I seriously wonder if this could have been avoided somehow?"

This article explores this concept, asking whether organizational culture within oil and gas companies influences their approach toward managing tacit knowledge. Such practices, it could be argued, are essential for promoting environmental sustainability, minimizing risk, and reducing the likelihood of future environmental disasters, such as the Deepwater Horizon.

2. Background

While knowledge management as a research theme is established and expansive (Alavi and Leidner, 1999), it is also a practice that should be done formally and strategically, being customized to each unique organizational culture (Liebowitz, 1999). The current literature presents a generic overview of knowledge management within the oil and gas industry, with a lack of narrow focus on the management of tacit knowledge. Grant's (2013) research, however, did identify some knowledge management practices within some of the world's biggest oil and gas companies, including Shell, BP, and Chevron. Grant clarifies that the industry has undergone some significant changes over the past 20 years; what once was an industry-focused solely on tangible inputs (such as equipment, employees, and investment) to achieve tangible outputs (mass production of oil and gas reserves) has now become something of a knowledge-based industry, where employee knowledge is captured for the long-term prosperity of the business. In addition, Ochieng et al. (2018) found that knowledge management played a significant role in industry growth and in providing a competitive advantage for oil and gas organizations in Nigeria. They also concluded, however, that there remain significant challenges in utilizing tacit knowledge that has been codified; although large amounts of tacit knowledge have been explicitly documented and stored in company databases, few employees maximize this resource effectively due to information overload or ignorance in how to navigate these databases.

Organizational culture is one of the biggest sources of competitive advantage within business marketplaces (Cameron and Quinn, 1999; Sadri and Lees, 2001). It provides shared values, norms, and rules (Tsui et al., 2006). Schein and Schein (1990), one of the prominent authors in organizational culture theory, believe culture can be analyzed through a critique of the organization's physical surroundings, articulated values, and deep underlying assumptions within the organization on what is right and wrong. Suppiah and Sandhu (2011) argue that organizational culture fosters creativity and facilitates greater sharing of tacit knowledge. Organizational culture also directly influences the organization's ethical approach to the environment and their attitudes and behaviors toward knowledge management (Cameron and Quinn, 1999; Colquitt et al., 2010). Based on a review of the literature, there remain gaps within the research knowledge that this article seeks to address. First, there has been nothing specifically written on the impact of lost tacit knowledge on oil and gas operations (and the associated potential risks to the environment). What has been documented is a generic overview of knowledge management within the industry, with a lack of narrow focus on tacit knowledge. Second, none of the literature thus far has explored the concept of whether organizational culture within oil and gas companies has an impact on the attitudes and behaviors of their employees towards managing tacit knowledge. Such a relationship between these variables in an oil and gas context, if

one exists, has not been explored. This leads to the aim of this article – to investigate whether organizational culture within oil and gas companies has an influence on their management of tacit knowledge.

3. Method

Hansen et al.'s (1999) framework were utilized to provide theoretical foundations in responding to the research aim. This ensured that analysis included both codification and personalization toward uncovering knowledge management attitudes and behaviors in the companies researched (Jasimuddin et al., 2012; Kim et al., 2014; Lin, 2011). A qualitative research approach, through the semi-structured interview method and snowball sampling technique, was used to gather the data. Two oil and gas companies were selected as the focus of the research. To preserve anonymity, the identity of these two companies will remain confidential. The first organization (referred to hereafter as Company 1) is one of the largest international oil and gas corporations in the world. It has annual revenues of over $300 billion and over 70,000 employees worldwide. The other organization (referred to hereafter as Company 2) is a small engineering consultancy, in existence for 20 years and has about 100 employees. These companies were selected to assess whether organizational size has an impact on the quality of knowledge management behaviors (Mohd Nor and Egbu, 2010).

Twelve interviews were conducted in total (six within each company), with participants based in the UK and the USA. Employees interviewed included: Company directors, VPs, managers, project leaders, engineers, and graduates. This was done to explore a diverse range of perspectives. These interviews investigated the relationship between organizational culture and the management of tacit knowledge within the oil and gas companies researched. NVivo thematic coding analysis was chosen to interpret the data with deductive reasoning applied to arrive at final conclusions.

4. Findings

Pertinent questions asked of respondents included invitations for them to share their thoughts on defining their organisational culture, the knowledge management initiatives currently existing within their organization (and their effectiveness), and how this endeavor within their organization and industry as a whole could be improved. An analysis of recurring themes found that it could be strongly argued that the organizational culture within the two oil and gas companies researched does influence their attitudes and behaviors toward the management of tacit knowledge. There were consistent findings from both the large international organization (Company 1) and the smaller engineering consultancy (Company 2) to this effect.

4.1. Organizational culture

Both companies were perceived to have a "short-term focus" organizational culture. A director in company 2 classified their company as having "*a very short-sighted culture.*" All levels of management across both organizations were in firm agreement that there was a lack of long-term vision in their companies. This impacted their approach towards operations and decision making with one participant directly linking this to poor practice with regards to their management of tacit knowledge:

"*We're a short-term focused organization and industry and I feel this is why we struggle with tacit knowledge*" (Graduate – Company 1).

Short-term vision is often associated with quick financial gains (Avery and Bergsteiner, 2011). This was emphatically expressed as being a key factor in oil and gas organizational culture and identity. Some participants described the culture of the industry as a whole (based on their experience of working in different companies over many years) as being "*very money-driven*" and the "*core of our business.*" Profitability and cost-cutting were articulated consistently as being key drivers of operations in their businesses at the expense of other essential factors, including people, safety, and the environment.

"*The company has always talked about people being their most important asset. But really when it comes down to it, the bottom-line is what drives everything*." (VP – Company 1)

With such strong prevalent financial motivators, this suggests the influence of other factors, such as the management of tacit knowledge, to not be high industry priorities. In fact, it could even be a detriment to its wider development and adoption.

"*One reason why we struggle with tacit knowledge is maybe because the industry has so much money – we always feel we can buy ourselves out of trouble*." (Engineer – Company 2).

This reliance on financial resources and short-term results has developed a highly pressurized working environment (Vivoda, 2009), that is reactive to threats and opportunities rather than being proactive through planning and reflection of lessons learned. Respondents from both organizations regularly used the term "*fire-fighting"* to describe their day-to-day approach to work.

"*We just seem to bounce from one project to the next, 'fighting fires', without taking time to reflect upon lessons learned*." (Engineer – Company 2).

This type of organizational culture has had an impact on knowledge management attitudes and behaviors within these companies.

"*Our culture is a reactive and volatile one. Things can change very quickly here from day-to-day. Maybe this is why we don't think long-term of things like tacit knowledge*." (Analyst – Company 2).

This highly pressurized, "*relentless*" working environment, as described by one participant, has been compounded by the industry downturn of recent years.

"*We're often far too busy to take the time to share knowledge. It's even more so now with the downturn and our resources being stretched. Some of us are doing three jobs now instead of one. You just want to get home on time*." (Director – Company 2).

Some participants went further and felt that the sharing of key industry learnings was strategically restricted through organizational processes and was part of company culture.

"*A lot of specialist knowledge gets securely hidden away, only to be accessed by certain authorized personnel. That knowledge potentially leaving the company for a competitor would be a big risk to the company, so they lock it down and nobody learns those important things*." (Manager – Company 1).

Despite there being industry efforts to engage and foster collaboration for knowledge management (Grant, 2013; Ochieng et al., 2018), the "protectionist approach" (Lutchman et al., 2013) to knowledge management practices demonstrated within both organizations was felt to be widespread within the industry and getting worse due to the impact of the downturn.

There was a shared belief that top-down leadership could help change this culture, that, as described by one participant, "*A lot of these challenges with knowledge management we face could be solved by hiring the right leaders and people"*. New ideas and more diverse management approaches, however, were noted to be difficult to achieve for a largely "*insular and selfish industry*", as described by one respondent.

Furthermore, the culture of Company 1 was characterized by a manager there as being "*highly risk-averse and fearful of change*", with any adopting of new approaches (such as a deeper integrated knowledge management system) would deviate from their core objective*, "The primary goal is always to keep oil production constantly flowing.*"

Internal promotion opportunities, particularly in Company 1, were significantly thought to be "*not based on merit*," with "*promotion politics really permeating the culture*," as one VP noted. This lack of internal personnel development has a significant negative impact upon the sharing of tacit knowledge in the workplace as employees lose motivation to share what they know.

"*People are so demotivated in their jobs here at times that they think, 'What's the point in sharing what I know?'*" (VP – Company 1).

Participants from both companies agreed that tacit knowledge is not being harnessed, processed and shared in a formal, strategic manner. This issue is only compounded further by the fact that most of the workforce of these two organizations is currently made up of contractors with short-term ties to the organization.

"*Because we outsource to so many contractors, we're relying on their knowledge. A lot of the knowledge within this building is not actually within the company – it's within the contractors. These contractors are mainly working for themselves - they're not there to help people. They're there to deliver a service, get paid, and go home.*" (Graduate – Company 1).

This same graduate in Company 1 noted that "*Our culture is dependent on experts and consultants*. *About two-thirds of the staff here are contractors with their own private consultancy companies*." Few of these contractors share their tacit knowledge with others, as they find themselves in competition with other contractors for projects. As such, sharing their tacit knowledge and expertise would limit their personal "*competitive advantage*."

"*Tacit knowledge is seen as a strength to hold onto… It's a commodity that you don't want to pass on because we're in a competitive workplace. Your expertise is your biggest competitive advantage*." (Engineer – Company 1).

This guarded practice for the sharing of tacit knowledge in itself poses great risk to the environmental sustainability of oil and gas operations and widespread environmental safety (Al-Jayyousi, 2004; Pietrosemoli and Monroy, 2013). With limited internal recording or sharing of latest industry lessons learned and best practices, it leaves the changing environmental landscape increasingly more vulnerable to higher risk practices (Ruppel and Harrington, 2001).

4.2. Hansen et al.'s framework

Hansen et al.'s (1999) "Codification vs. Personalization Framework" argues that larger companies who depend on knowledge reuse are more inclined to the codification of knowledge (e.g. databases, manuals) over

the personalization (e.g. face-to-face meetings, direct mentoring) of knowledge. This was confirmed within this study, as the larger Company 1 placed primary emphasis on codification (through such primary means as online company databases), with limited personalization.

"*We're completely focused on codification over personalization. The emphasis is on 'let's type it up quickly and get it documented.'*" (VP – Company 1).

However, all respondents within Company 1 perceived these poorly designed codification systems as having a negative impact on tacit knowledge sharing.

"*Technology and databases are more emphasized here than a person's tacit knowledge you work directly with. If nobody knows what's going on, the database will have the answer*." (Geologist – Company 1).

The data indicated that there are perceived flaws in the design and processes of Company 1's codification system. Every respondent spoke negatively of this issue. Lack of training in how to use these systems, information overload, and complicated database designs appear to be some of the challenges within these codification processes. These issues, it could be argued, have created a perceived negative impact toward the management of tacit knowledge within the company. This aligns with Suppiah and Sandhu's (2011) theory that highly procedural and results-oriented organizational cultures negatively influence the management of tacit knowledge.

In contrast to this, the data indicates that Company 2 has predominantly adopted a personalization strategy, through such means as sharing lessons learned at the end of projects with each other, for managing tacit knowledge.

"*Personalized face-to-face sharing of knowledge works better here. Nobody looks at codified documents that get emailed out*." (Director – Company 2).

Respondents felt that this approach had an impact on the organizational culture of the company; that by aligning with a personalization strategy, this created a more "*family-feel*" to work, as one director described it, thereby having a positive effect on job satisfaction and employee motivation.

"*I feel there's more respect for individuals and their knowledge here at a human level than I found in my time working with bigger companies in the industry. Rather than being a number, you're an actual person here*." (Director – Company 2).

This led to a more positive impact toward the management of tacit knowledge, in comparison to company 1. Respondents felt that a personalization approach enabled employees to be a more "critical thinker" rather than being part of a mechanism that requires "check-the-box" processes and unjustified recording of information (Chng and Coombs, 2004). The adoption of personalization was valued by all participants in Company 2 and improved their attitudes towards knowledge management. There was a reciprocal effect where employees were more likely to consider tacit knowledge more valuable because of the method in which it was delivered to them. In turn, they were more likely to share knowledge with others. This benefit was however attributed to the smaller scale of the organization and acknowledged that when trying to apply this within larger structures there would be challenges to replicate the same methods. This strengthens the theory within Hansen et al.'s (1999) framework, which argued that a personalization approach was better suited to smaller companies, such as Company 2, who derive their competitive advantage through knowledge creation. It was also found that due to the consultancy nature of company 2's operations, respondents

perceived tacit knowledge to be valued within their smaller company than in some of the larger organizations they had worked for in the past. This aligns with the findings of Mohd Nor and Egbu (2010), who argued that smaller-sized organizations generally perform better with regards to managing tacit knowledge.

In both organizations, a consistent theme of the discussion was the acknowledgment that there were real benefits to managing tacit knowledge. Participants highlighted many potential advantages that would add real value to their operations including additional safeguards for reducing environmental risk/hazards and providing a path for long-term sustainability to the environment and industry. Despite positive attitudes for its inclusion, the lack of knowledge management practices (specifically toward harnessing tacit knowledge) was described as an "opportunity missed" by all respondents. Senior leaders at Company 1 acknowledged an "ignorance" toward what knowledge management and tacit knowledge is. Despite being an expansive multibillion-dollar global organization, when it came to their knowledge management strategy, as described by one VP, "*There's no formal plan around knowledge management*. We *have been mediocre at managing tacit knowledge.*" One manager articulated the impact of this approach towards quality improvement and sustainable operations:

"We're not building on the past or progressing into the future. We're stagnating as a company, staying at the same level. Not doing good at knowledge management is a real lost opportunity." (Manager – Company 1).

This is a significant concern for a high-risk and high-impact industry (Aven and Vinnem, 2005; Hudson, 2003). Practices towards the management of tacit knowledge, which would provide additional safeguards and protections against negative environmental and economic impacts (such as Deepwater Horizon), are not being applied; all of this despite there being approval and a realization of the significant benefits of doing so amongst key organizational stakeholders in both organizations.

5. Conclusion

With limited exploration on the management of tacit knowledge within the oil and gas industry, this study sought to build upon the findings of Grant (2013) and Ochieng et al. (2018), who presented a generic overview of knowledge management practices within the industry but left several relevant gaps within the research. This rationale provided the aim to investigate whether organizational culture within the two oil and gas companies researched has an influence on their management of tacit knowledge. This research articulates that it could be strongly argued that the organizational culture within these two companies does influence their attitudes and behaviors toward the management of tacit knowledge.

Company 1 was perceived by respondents to have a short-term focus organizational culture. In addition, their organizational culture was recognized to be bottom-line and financially driven. Company 1's organizational culture was also viewed by respondents as reactionary, risk-averse, and possessing a fear of change. These factors, it is perceived, contributed towards a lack of effective knowledge management processes and wider adoption within its practices. Company 1's workforce was perceived to be consisting of several individualistic and competitive employees, frustrated by promotional decisions and exhausting working conditions that have only worsened with the recent economic downturn. In addition, respondents perceived the workforce to predominantly consisting of consultants/contractors, who felt that tacit knowledge was a personal asset to be kept for the sake of their own job security/prosperity, rather than

something to share and collaborate with their colleagues to enhance learning. Employees within Company 1 perceived these elements described within their organizational culture to have a negative impact on their performance in the management of tacit knowledge. A short-term focus and lack of long-term vision was perceived by most respondents to influence neglect towards tacit knowledge sharing. Being risk-averse and fearing change was perceived by several respondents to influence an ignorance of "strange" new concepts such as tacit knowledge and a reluctance to embrace them. Individualistic and competitive employees were perceived by all respondents to have a negative influence on tacit knowledge sharing and frustration associated with promotional decisions was perceived by some to create apathy toward tacit knowledge transfer.

Company 2 was perceived by respondents to have many of the same organizational cultural challenges, including having a short-term focus and being bottom-line driven. Employees, like those in Company 1, were also perceived to be individualistic, competitive, and extremely busy. However, respondents within Company 2 perceived that their focus on personalization over codification created a more social and familial culture. This had a positive impact on knowledge management practices and fostered an increased willingness for wider collaboration. Due to their consultancy nature, all respondents perceived tacit knowledge to be of greater value and a "competitive advantage" for their scale of a company. This aligns with the literature in this area (Mohd Nor and Egbu, 2010) and supports, within an oil and gas context, the theory of Hansen et al. (1999) that smaller companies who depend on knowledge creation are more inclined to personalization.

5.1. Implications for theory and further research

All respondents in Company 1 felt that many of their company's challenges with the management of tacit knowledge were also common in larger companies throughout the industry, based on previous working experiences and interactions with employees in different organizations. Though this research doesn't make such generalized external validity claims, the opinions of these respondents deserve attention and further research. An opportunity to study further large oil and gas corporations and their approaches to tacit knowledge management would strengthen the findings within this study, particularly if similar failings were discovered. A similar, more in-depth exploration of how this differs in smaller oil and gas companies would also present an opportunity for further research. A limitation of the study is that only two organizations were evaluated, larger sample sizes (more companies researched, and more employees interviewed) would also provide further insight to these findings.

Another opportunity to expand upon the findings of this study exists with regard to methodology. A mixed-methods triangulated methodology, where the qualitative and quantitative methods are both utilized, has the potential to support these findings. Further triangulation, in the form of different industries being researched and contrasted with the findings of the oil and gas industry's performance in tacit knowledge management, would also be relevant.

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