# Exploring 'Creating Shared Value' Strategies as it Relates to Operational Challenges and Digital Capabilities of the Oilfield Service Industry in Sub Sahara Africa - A Case Study of Schlumberger

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## DECLARATION & STATEMENTS PAGE

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## ABSTRACT

By exploring the rationality of 'Creating Shared Value' (CSV) concept in the oilfield service industry in Sub Saharan Africa, the research focused on exploring unique challenges and the underlying factors that affect operations in the oilfield service (OFS) companies in SSA using Schlumberger as a case study. With a theory developed from the inputs of interviewed participants, the research analysed ways 'CSV' strategies could be used to address these opportunities using the digital capabilities identified in the case study.

Research findings indicate that issues surrounding logistics are more complicated in SSA and has been exacerbated by the ecosystem limitations that are evident at different interface of the business operations, especially between the OFS, government, third parties and society.

Research shows that there is an intersection between the potentials of digitalisation and the benefits of 'Creating Shared Value' concept. It indicates that friction within identified interfaces can be eliminated or reduced by having a seamless digital workflow across the overlapping value chains. An integrated supply chain that integrates the oil and gas operations of governments, third parties and the upstream oil and gas industry was suggested. An additional literature review on this subject shows that this idea is not new and are at the early stage of development by some logistics and consultancy firms in other industries.

As recommended by the literature review, the case study has 'go to market' digital solutions required for the integration of an industry supply chain. However, these capabilities, are currently focused on the traditional E & P activities.

The researcher is of the opinion that a DELFI powered integrated supply chain (DISC), will create more transparency and provide an acceptable business framework, that will encourage collaboration within the stakeholders, facilitate regional integration and address the current ecosystem limitations in such a scale and way that would not be possible by a logistic firm. Because of the benefit of such a platform to the industry, the society, and the competitive advantage for the firm, the researcher considers this move as a 'Creating Shared Value' Strategy worthy of taking.

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# CHAPTER 1

## INTRODUCTION

Significant forces have put pressure on the upstream sector of the oil and gas industry in recent years, exposing the limitation of their strategies (Hiddemen et al 2018). With series of downturns in the oil and gas industry the industry players have been living in a new business environment as they struggle to navigate these forces and its interrelated factors to defend and increase their share of an increasingly lean market (Wethe 2019). Because of these intense competitive conditions, industry players are to treat strategy development as a dynamic process, considering the uniqueness of the industry, the operating environments, and the systemic and synergistic effect from both globalized and localized factors that affect them, in other to reposition in some way and seek areas of new value (Hampton 2019).

Oil and gas operation in Sub Sahara Africa(SSA) also has its own unique vicious challenges as noted by Botes et al (2019), and various efforts have been made by the industry players at various times to navigate this hurdles, however some of these efforts lack the consistency and the scalability required to make significant positive impact to business and the society(GeoExpro 2019). These societal and environmental challenges that curtail markets, restrict productivity, and limits business operations are beyond the control of any single actor and cannot be handled in isolation. Therefore, responding successfully to some of these challenges might require a more integrated collaboration within the industry stakeholders in order to enhance performance in meeting customer needs.

It therefore makes business sense as stated by FSG (2014) in his concept of Creating Shared Value (CSV) to seek out strategies that will allow consistent and scalable solutions towards these societal challenges. Porter (2011) noted that this can be achieved using a business model to tackle these societal and environmental issues, in such a way that a win-win situation is created for the ecosystem and the business. As enumerated by Porter (2011), some of the challenges that are probable opportunities for CSV are environmental improvement, energy efficiency, water use, skilled and educated workforce, health and safety of the populace, job and housing creation, and economic development. In SSA these challenges/opportunities are more glaring and so are their impact on businesses.

To achieve this win-win situations, Barney (1991) noted that firms will have to strategically align through the lens of its suite of unique internal capabilities (both tangible and intangible) to analyze the business impact of the ever changing societal and environmental issues pose. The firms will have to make dynamic strategic choices, in an attempt to position the firm to reduce the impact of the threat and utilize the opportunities the challenges present among the various product and service lines, to attain sustainable competitive advantage (Helfat and Winter 2011).

Though CSV strategies in the oil and gas industry are not widely explored because of the belief that oil and gas industry is not the best use of the concepts as they claim that the primary process of the exploration and production of oil and gas leaves significant environment footprints in addition to other by-products that have adverse effects to the society as highlighted by Preston (2018). However, like Hiddemen et al (2018) noted, the industry has contributed significantly to the energy demands that have been used to improve livelihoods and it is better to explore such strategies than avoiding them. FSG (2014) also noted that exploring CSV strategies could open up discussion like: do we have viable alternatives for oil and gas, can it be explored in a more efficient and safer way, can it be explored and produced without harm to man and the environment , can the process be more energy efficient, can the value chain be better, can the ecosystem benefit or benefit more from the industry?

Studies indicate that some of these discussions are already ongoing especially amongst the International and National Oil and Gas Producers, also there have been focus over the years both by these companies and various governments to tackle societal and environmental challenges not necessarily using the CSV framework, but also using related frameworks. However not much has been explored on the involvement of the Oilfield Service industry as regards addressing some of these societal and environmental challenges using the CSV framework. Considering the benefit of competitive advantage that the CSV framework gives as highlighted by Porter (2011 & 2018), and the need to involve all the oil and gas industry players to overcome these challenges as suggested by FSG (2014) the study focuses on exploring CSV opportunities that could be used by the oilfield service companies to address some of the most pressing and unique challenges in Sub Saharan Africa.

In achieving this, the research proceeded to realize the following objectives; to identify unique challenges affecting the OFS industry in SSA, in order to understand which of them have the greatest impact to operational performance. Secondly to analyze the underlying issues behind these challenges. Thirdly to understand how capabilities of OFSC can be used in providing customized solutions to the highlighted challenges (in SSA), in a way consistent to the CSV concepts and providing competitive advantage to the companies.

# CHAPTER 2

## LITERATURE REVIEW

The purpose of this literature review is similar to that highlighted Saunders et al (2009), it is to help refine the research idea and to discover the current state of knowledge, so as to identify the general assumptions within the area of study and the research scope.

Several definitions of strategy have emerged over the years. From the definition of Chandler (1962), Porter (1979), and Mintzberg (1996), strategy can be summarized as a determination of long-term direction of an enterprise and an adoption of a unique stream of decisions in such a way that a competitive edge is achieved. Porter (1979), further described strategy as an act of aligning and maintaining a dynamic balance between a firm's capabilities and its environment. This act of maintaining dynamic balance can be conceptualized in set of theories and frameworks that help firms think, plan and act strategically (Stonehouse and Pemberton 2002).

Modern strategy research has focused on coming up with the right theories and frameworks for superior business performance and these researches aimed to basically answer why, and how businesses form, how they drive and sustain performance and how they consistently outperform competition? These questions and the quest to understand the sources of sustained competitive advantage for companies have become a major area of interest in the field of strategic management (Porter and Kramer 2002). Since the 1960s the research structure have made use of a single organizing framework as noted by Andrew (1971), that suggest that firms obtain sustainable competitive advantage by implementing strategies that exploit their internal strengths, exploit the environmental opportunities, while avoiding internal weakness and neutralizing external threats (Porter 1985). Multiple frameworks have emerged over time to further provide answers to these questions as stated by Wilden et al (2016). Like Lamb (1984) noted, a lot of work tends to focus mainly on analyzing a firm's opportunities and threats in its competitive environment. In the same line of thought, Porter (1980) focused on environmental conditions that favor high level performance of a firm. As exemplified in the market-based frameworks Porter (1985) explains how firms prosper by

achieving competitive advantage, describing how external factors influence firm strategies and performance.

However, Barney (1991) was of the opinion that relying on external factors alone to achieve competitive advantage may render strategies reactive and short-term, and therefore came up with the resource-based view (RBV). According to Barney (1991), firms can create long-term competitive advantage and superior performance based on their idiosyncratic resources and capabilities that are valuable, rare, non-substitutable and non-imitable. This is a move away from Porter (1980) assumption that firms should analyze their competitive environment, choose their strategies and then go after acquiring resources needed to implement their strategies. Garcia et al (2014) relating the RBV to the oil and gas industry, noted that capabilities most likely to differentiate a firm in such a competitive industry are complex bundles of complementary capabilities needed to solve challenges and that are hard to develop and copy. However, this view on strategy has been criticized for being static and not taking into account the ever-changing business environment (Wilden et al 2016). As noted by Garcia et al (2014) operational capabilities of a firm that once made it successful could entail a dimension of values that hinder innovation and limit the firm's chances of moving beyond its current practices.

As noted by critics of the resource-based view, the view does not account that the main challenge a firm has, is to sustain competitive advantage in the long run by continuously realigning its capabilities (Garcia et al 2014). Therefore to address complex business environments especially as seen in the oil and gas industry as outlined by Hokroh (2014), (where changes in the external and internal factors such as disruptive technologies, institutional challenges, economic crisis, high competition, new entrants and foreign competitors having tremendous capabilities, and strategy and governance disputes cause the market to be highly dynamic,) Eisenhardt and Martin (2000) view on capabilities, known as dynamic capabilities view (DCV) will be appropriate. The dynamic capability view of the firm arose to identify the unique combination of resources that makes a firm distinct and gives the firm competitive advantage over time (Garcia et al 2014). It attempts to analyze why some firms thrive in turbulent operating environments and aims to identify the underlying drivers of long-term firm survival and success (Wilden 2016).

Parallel to the DCV concept, is the architectural competency concept by Henderson and Clark (1990) that enables a firm to integrate and deploy component competences and capabilities in new and flexible ways. Critics of this concept believe that it is a good concept, but it is difficult to build and adapt (Garcia et al 2014). Garcia et al (2014) therefore proposed a merger of the architectural perspective and the dynamic capabilities view, especially for the oil and gas industry, so as to emphasize the importance of integrating and recombining core concepts and components at a system level. Teece et al (1997) in that same line, argued that dynamic capabilities are integrative, in addition Helfat and Winter 2011 further explained that both dynamic capabilities and operational capabilities are integrative as well. Garcia et al 2014 also attempted to examine the evolution of the constructs used in the DCV, and to provide a wider and more inclusive theoretical structure that integrates the DCV with configuration theory and a more recent thinking on the micro foundations of Dynamic capabilities. He noted that this integration enabled the development of the architectural model of the DCV by Henderson and Clark 1990 and also refers to it as the 'House of Dynamic Capabilities'.

As noted by Kramer and Pfitzer 2016, businesses whose growth and resilience are constrained by the localized business environment and societal issues are obliged to kick-start social change. Though conventionally it is believed that government and NGOs are the drivers of such change, but as noted by Porter and Kramer (2011) businesses can be crucial in addressing such issue in a scalable and profitable manner. Porter and Kramer (2006) noted that if firms were to analyze their opportunities for social impact using the same frameworks that guide their core business choices, which is based on their uniqueness and dynamic capabilities, they would discover that there are opportunities that can be potent sources of innovation and competitive advantage. They further argued that rather than continue in a zero-sum competition and focusing on short term gains, that firms ought to rethink their strategic positioning in light of social demands. Porter and Kramer (2011) went ahead to offer the Creating Shared Value (CSV) framework that entails policies and operating practices that enhance the competitiveness of a firm while at the same time advancing the economic and social conditions in the ecosystem in which they operate. This framework is parallel to the social innovation concept by Kanter (1999) and the social entrepreneurship perspective by Mair and Marti (2006), which is the process where firms use societal needs as opportunities

to develop ideas and business technologies through the innovation and combination of resources, to find and serve new markets, and to solve long standing business problems.

Firms that understand and use their dynamic capabilities to address needs in light of the CSV framework will be able to profit from their activities while simultaneously improving their ecosystem and restoring the legitimacy of the business and capitalism (Porter and Kramer 2011). Like Aakhus and Bzdak (2012) noted, the CSV is mainly from Porter's widely known views on strategy and competitive advantage, and the essence is pursuing competitive advantage by seeking profitable points of intersection between business opportunity and making positive social impact. They went further to note that CSV recognizes that a firm's success depends in important ways on the context in which it operates and that it is imperative for the firm to shape its context to optimize competitive advantage. This shaping of a firms context to optimize its competitiveness is also in line with the argument of both the DCV of Eisenhardt and Martin (2000) and architectural competences concepts of Henderson and Clark (1990), that enable a firm to integrate and deploy component competences and capabilities in new and flexible ways while trying to seek profitable points of intersection between business opportunity and social value.

Like Porter and Kramer (2006) noted, firms should not feel responsible of solving all societal problems, but they should identify the particular set of societal problems that through their 'House of Capabilities' they are best equipped to help resolve and from which they can gain the greatest competitive advantage. Donaldson (2014) also noted that not every social value problem in business can be solved using such concepts. However, Crane et al 2014 has referred to this position as Corporate cherry-picking which looks out for win-win solutions and individual projects, while leaving unresolved the deeper social issues to which they are connected.

The concept of CSV has also been criticized for other issues as noted by Crane et al (2014), Beschorner and Hajduk (2017), and Reyes et al (2017). It has been questioned as a theoretical concept, as a business idea, about its claims, about its originality, about its vagueness, and its usability as a standalone framework. Though they acknowledged the concepts progress towards raising attention to the social dimensions of business, however Crane et al 2014 contested that the concept was unoriginal and ignored the rivalry that sometime exists

between economic and social goals. They also pointed out that the concept did not address the reality of the challenges in business compliance and hinged the role of businesses in society on a shallow concept. Camarena-Martinez et al (2016) supported the unoriginality of some assumptions of the CSV concepts but argued that this might be due to the variegation view of most CSR literature. Crane et al (2014) also noted that CSV overstates its novelty and makes wrong outdated assumptions that the Corporate Social Responsibility was mainly for philanthropy and not connected to the firm's core businesses. Dembek et al (2016) further suggest that CSV conceptualization is vague with discrepancies in its definition and application and went ahead to argue that it overlaps with many other known related concepts and that it lacks empirical grounding.

Beschomer and Hajduk (2017) while comparing CSV with the modern understanding of corporate responsibility stated that the model falls shot on the more adequate idea about the relationships between firms and their ecosystem. In the same light, Beschorner (2013) notes that the concept lacks normative resources to fix the overwhelming societal and business issues due to its reliance on an economic logic. Denning (2011), also stated that CSV is more about laundering of the image of Capitalism in an attempt to provide a quick fix to a mode of capitalism that has been outmoded by current business realities and that Porter and Kramer (2011) examples does not provide a wholistic view of the firms, and that their performance cannot be said to be extraordinary. He further argued that CSV does not prescribe a fundamental change in practices or behavior of the firm. Hartman and Werhane (2013) even argued the CSV will further create a divide between businesses and societies by the assumption that they are two separate spheres. Lee (2017), further argued that CSV lacked practical applicability as an instrumental framework. He noted that the consequential reasoning that assumes that managers will evaluate all their strategic options based on their potential to lead to shared value creation is not feasible based on the immense complexities. Levinthal (2011), towing the same line referred to this problem as bounded rationality.

In the midst of the pool of critics the key question still remains what the consequence of CSV will be to business practice. Dyllick (2014) was positive that CSV leads to real improvements in business practice, as it opens up space for firms to engage in social problems and legitimizes socially relevant, wider, and longer-term strategies. In response to the critics about it earlier claim of CSV "fixing capitalism", Porter and Kramer (2014) clarified that CSV is not to fix

capitalism but instead it will help companies align their products and practices to resolve societal needs. Geipel (2015) and Preston (2018) also agreed that because companies have to remain profitable to stay afloat, using CSV concept as a lens allows them to recognize where their interests and those of society align in such a way that they gain competitive advantage. Porter and Kramer (2014), and Heikkurinen (2018) also clarified that CSV and Corporate Social Responsibility (CSR) are complementary rather than opposing, stating that they serve fundamentally different purposes. As noted by Preston (2018) there are many societal challenges for which CSV will play little or no role in which CSR and other related agendas will drive the needed change and notes clearly that CSV works best at the intersection of meaningful market needs and societal challenges. Porter and Kramer (2014) also replied Crane et al (2014) that CSV never intended to side-line ethics and social norms, as they remain the basic minimum while CSV acts as a 'lens' for stimulating corporate innovation that helps resolve societal challenges.

Garcia et al (2014), also noted that CSV strategies that could be a differentiating factor today could be normalized as a social or industrial norm in future. Geipel (2015), further advised that CSV should not be a dogma, but that managers should determine when CSV is useful to use and when the traditional ideas of ethical above-board corporate behavior will come into play. Reyes et al (2017) further noted that for CSV to be a holistic framework, it needs to be augmented by an ethical norm-taking and norm-making framework, which will guide the win-lose and lose- win social engagements instead of only addressing the win-win business and societal issues. He argued that a framework that also responds to the win-lose scenarios will help provide legitimacy to a firm's strategy. While Reyes et al (2017) position stands and should be adopted, it is suggested that beyond providing legitimacy, the real competitive advantage in CSV is using 'House of capabilities' within the firm to move a clearly know win-lose situation in the industry to a win-win situation for the firm, (Henderson and Clark 1990). But as noted by Reyes at al 2017 systematic and clear managerial framework will need to be added to CSV for win-lose scenario, as consequences of mishandling them are often severe. These scenarios frequently present themselves in the oil and gas industry that operate under multiple jurisdictions and cultural value systems, and more so operate in developing countries as is the case in some countries in SSA, where there are regulatory or enforcement voids (GeoExpro 2019).

As it relates to an industry like the oil and gas industry, Crane et al (2014) further noted that the CSV suggest a rather myopic focus on reconceiving new products and markets, in terms of hybrid enterprise, where products and services design are developed for new market opportunities which are beneficial to the firm and the society. However, Porter (2018) argued that opportunities of CSV abound beyond reconceiving new products in the oil and gas industry, irrespective of the industries particularly mixed record on environmental footprint and social issues. Though FSG (2014) consented that the huge profits from the oil and gas companies do not always translate to societal and environmental benefits and as a result lead to various levels of strife, which in turn increase the non-technical risks and the cost of doing business in these areas. However, FSG 2014 also noted that oil and gas companies will need to explore CSV opportunities beyond their traditional products and services to improving collaborations between stakeholders, to redefining productivity in value chain, and creating enabling local environment. Botes et al (2019) is of the opinion that gaps in value chain and creating enabling local environment are more obvious in Africa, where challenging operating environment, coupled with other challenges like deficit in infrastructure, lack of transparency, regulatory and policy uncertainty needs to be navigated.

The Literature review shows that most study around utilizing CSV opportunities in the oil and gas industry revolve round the producing companies, and little attempt have been made to understand the CSV opportunities of Oilfield Service Companies(OFSC) in Sub Saharan Africa, which is an identified gap if CSV concepts are to holistically implemented in the oil and gas industry. Also, there have been focus on strategies of oil and gas companies navigating the challenges in Africa and leaving it to the governments to fix them, as against addressing some of these issues using the CSV framework.

In parallel to Porter and Kramer 2011, Kramer and Pfitzer 2016, and Lee 2017 proposition, the framework used in this work begins with simplifying the strategic problem space by identifying significant problems affecting business operations in the area, (in this case Sub Saharan Africa) and in parallel use Dynamic Capabilities View to identify areas of uniqueness that has the potential of providing competitive advantage. Secondly the results are then passed through the lens of the CSV to identify win-win and win-lose scenarios. Depending on the characteristics of the involved capabilities and perceived potentials to give competitive edge, these win-win scenarios are flagged up to be prioritized and pursued.

# CHAPTER 3

## RESEARCH METHODOLOGY

## 3.1 INTRODUCTION

The Literature review indicates that there are limited studies about the utilization of the Creating Share Value (CSV) strategy in the oil and gas industry basically because of the bias that the industry is involved in the exploration and production of fossil fuels which is adjudged to leave significant environmental footprints, which in itself is harmful to society. However, the industry still provides significant contribution to the energy and economic needs of the world and has the potential to do much if the right strategies are used to benefit both the firm and society. Understanding of CSV and related strategies will not only facilitate the reduction of the environmental footprints but also the discovery of other opportunities to improve the societies where the oil and gas industries operate.

In addition, there are even more limited studies on the utilization of these CSV strategies in the oilfield service industry, which is mainly because of the assumption that addressing societal issues should be driven by the government and oil producers. However, since competitive advantage can be achieved by adopting a CSV strategy, then it is worth exploring CSV opportunities available to oilfield service companies operating in SSA that could improve the society while providing competitive advantage for the OFS companies.

## 3.2 RESEARCH PHILOSOPHY

The research is rooted in an interpretivist philosophy which focuses on the participants perception of the unique operational challenges in Oilfield Servicing (OFS) Industry in Sub Sahara Africa and its interaction with the firm's capabilities in other to understand overlaps and possible CSV opportunities that can be enacted. As noted by Morgan and Smircich (1980) this subjective epistemology orientation will enable Creating Shared Value (CSV) strategy process to be understood as it relates to the Oilfield Servicing Industry and will Improve its adoption by stakeholders. This process is associated with the term "social constructionism" and is in line with Remenyi et al (1998), who stressed on the necessity of seeking to understand the reality behind a situation. As noted by Saunders et al (2009), it is important

that this interpretivist philosophy adopts an empathetic stance by entering the social world of the managers to understand their view of how their business performance is being affected by these unique challenges.

## 3.3 RESEARCH APPROACH

The research uses a certain level of the combination of both the Deductive and Inductive approach. This is because the researcher explored the applicability of the CSV concepts which is a known theory to not just the oil and gas industry, but to the oil and gas industry service industry in SSA. However, the CSV concepts involve the interaction of solving societal issues, using a combination of a firm's capabilities in such a way as to create a win-win situation for both the firm and society, and creating competitive advantage for the firm. These individual components of CSV in this specific scenario and how they interact with each other are not known. So, in attempting to understand these phenomena the researcher used an inductive approach to interact with the data to make meaning of the data.

The deductive approach led to the organizing and structure of the research, aligning the research objectives to the key components of the CSV concept. Though some components of the CSV concepts are majorly similar across industry, but components like individual firms' capabilities differed from firm to firm and affect the individual opportunities available to these firms to carry out CSV strategies. Therefore, researcher choose a case study as a way to frame the research question (Harrison et al 2017).

However, the inductive approach provided the required flexibility and open mind required to understand the real issues and or relationships between some of the known CSV concept and unknown issues. So, the researcher chose the grounded theory as a general strategy on how the field data was collected and analyzed in the case study (Corbin and Strauss 2008).

Because this approach is particularly concerned about the environmental context as noted by Saunders et al (2009), this qualitative approach obtained data from different sources of data, ranging from documents, field data in the form of interviews and focused literature reviews on findings. The data collection and analysis went on concurrently and continued till theoretical saturation was reached.

## 3.4 RESEARCH DESIGN AND STRATEGY

The research has an exploratory research design which focuses on the collection and analysis of the key sets of capabilities of the oilfield service companies through their published documents, strategy statements and annual statements (Nayak and Singh 2015). This was followed by a more in-depth interviews as regards of the identified capabilities and some of the challenges which are unique to the region (SSA) and exploring CSV opportunities that might improve the business climate and performance. Though the challenges facing the OFSC industries in SSA are largely uniform to the firms in the industry, their individual capabilities differ. So is their capacity to navigate or create CSV opportunities with these challenges.

Therefore, a case study strategy was adopted so as to get an in-depth understanding of the components of CSV in the chosen case using different sources of relevant data. Schlumberger was finally chosen as the case study because the firm is arguably the leading oilfield service company with a widespread cover in terms of scope and geography (Fortune Business Insights 2020). The spread also enabled the researcher to develop a detailed and more intensive knowledge that is representative of the Oilfield Service Company in SSA. It was also chosen because the researcher had more access to potential participants in the firm.

Schlumberger provides products and services in more than 120 countries and employs approximately 105,000 people from a diverse background of 170 nationalities, and this same diversity, operational spread and experience is also reflected in SSA, operating in 37 of the countries in the region (Schlumberger Limited 2020). Schlumberger has vast customer base ranging from the International Oil Companies, National Oil Companies and their affiliates, Independents, Local Oil Companies, with several kind of partnerships both with these customers, fellow international and local service companies and many more (Schlumberger Limited 2020). This has given then a vast amount of experience in SSA over the years.

## 3.5 DATA COLLECTION AND ANALYSIS

The researcher started data collection and analysis only after the appropriate approvals were obtained. The research was guided by a theoretical sampling process, using Non-Probability, Purposive, Convenience sampling technique. With the case study already selected, the research objective guided the use of different sources of data. To understand the capabilities

of the firm, the researcher used the document collection and analysis method to collect and analyze data from published documents, the firm's website, annual statements and public strategy documents as the source of data. Whereas to explore the unique operational challenges in SSA and their underlying factors the researcher chose field data using primary semi structured interviews with different levels of managers in the region, across various functions and countries.

In preparation for the interview the researcher sent invites to 40 potential participants. The researcher came up with a metrics to select participants that qualified to be invited called SSA Exposure Metrics, which weighed maximum of 10 points and based on; years of experience in the industry(Max 3.5), scope of current managerial position(1), countries in SSA worked in(2), no of OFSC worked for(1.5), Number of across function experience(2). The participants invited scored above fifty percent. The objective and scope of the research was contained in the invite that was sent to all the potential participants via mail. Subsequent follow up was done on some potential participants with attachments of approvals and interview schedule.

The interviews were all scheduled and conducted on virtual (Skype and Zoom) platforms. The platforms had scheduling and recording abilities, and this enabled all the interviews to be recorded. The Interview data analysis involved an iterative process, using a constant comparative method as exemplified in grounded theory, and was started simultaneously with the data collection as researcher engaged in memo writing during and after the interview session (Glaser and Strauss 1967). Transcription was done manually by researcher and a family member and the analysis continued during this process as researcher familiarized with the data. The semi-structured interview slightly metamorphosed during the interview process based on the information gathered by the previous participants, data from the document collection and analysis process going on in parallel and/or from the opening remark the participants made.

Each interview was transcribed within few days of data collection and the analysis process continued using the dedoose analysis software. The analysis process involved the coding of the transcripts to capture the essence of the data so as to understand the phenomenon and develop a construct as highlighted by Saldana (2013). The researcher developed codes during the analysis, and as the analysis progressed relationships between some of the codes became

obvious. The coding was done in two major stages as recommended by Saldana (2013). The first cycle coding was mainly a combination of descriptive and interpretative. This was mainly because the second sets of interview questions aligned directly to the research question one and two. So, in cases where participants address them directly a more descriptive approach is used in coding. However, where participants addressed the question indirectly or addressed the question during their introduction, business overview question or at any other point a more interpretative approach was used. By the end of the first cycle coding, the total of number of codes developed was 96. The second stage of the first cycle coding involved grouping of the codes based on the underlying meaning, and the relationships between the codes in other to get categories. The codes with high frequencies or a code that was more representative across the related codes was used to name the categories and this was done after the 9$^{th}$ participant transcript was coded.

The second cycle coding involved examining the categories, the initial codes, emerging codes, memo write ups, and results from the document data analysis side by side with nine transcripts that had been analyzed and the new transcripts of the other participants. This second cycle enabled researcher to identify core categories, and new relationships and patterns between the core categories and other categories in order to create a 'storyline' or theoretical code as noted by Saldana (2013). The researcher reached out to two participants for further information and clarification during this process.

## 3.6 RELIABILITY AND VALIDITY

A practitioner-researcher role was adopted in this research, as the researcher was an employee of the chosen case study at the time of the study. Though this comes with the advantages of access and the understanding of the complexities of some of the firms within the industry and within the location of interest, however as noted by Saunders et al (2009), this might come with a significant disadvantage of researcher bias. The researcher used memos to separate surrounding thought around the data with the actual data during the data collection and reflected some of such thoughts on the discussion section of the report. During the analysis the researcher used an iterative process that focused on comparing data to data in other to come up with the theoretical constructs that were developed, and as such reducing the potential biases that may arise at each point of the research.

Because researcher works in the OFS industry and particularly in the chosen case study, this would have influenced the choice of the area of the research and the case study chosen. However, the literature review reveals that a gap exists and is worthy of study due to the potential benefits of the CSV concept in the industry. The case study choice is also justified, as highlighted by Fortune Business Insights (2020) the firm is arguably the leading OFS company in the region and are not shy to publish their capabilities, and as such remain the most representative case with sufficient information in the public space for this research. The geographical area that the research covers, the SSA, is also influenced by the researcher as the researcher hails and works in this region and has access to managers from different countries in the region from where the participants were chosen from.

Attempt was also made to reduce participants error and bias to the barest minimum, by allowing participants to choose their interview timing at a time most convenient for them, and interviews were rescheduled in cases where the interview clashed with other activities. The participants were also availed the research objectives and proposed interview plan so as to enable participants reflect deeply on the issues before the interview. The additional verbal assurance that was given to the participants before the start of the interview, about the potential benefits of the research and about anonymity of participants help limit any potential participant bias. Another factor that could affect the participants bias was status gap between the participant and the researcher of the same organization. Though all the participants are higher up in the carder than the researcher, this limitation was not applicable because of the healthy work culture in the firm and also, the phenomena being studied was not regarded as sensitive and the objectives had potential benefits and as such the managers were willing to participate.

I addition to participants error, researchers' error could also affect the reliability of the research (Saunders et al 2009). However, conscious effort was made by researcher to space out the interviews with a maximum of two interviews a day. This ensured that the researcher was always focused to ask relevant questions and capture any non-obvious lead by participants. In addition, the interview was recorded, and this gave the researcher the opportunity to go over the recording as much as was required to capture any meaning that was not clear in the transcribed manuscript.

As regards validity, the construct validity of the research is centered around the methodology chosen by the researcher. As the literature review reveals, little is known about OFS industry CSV strategies in SSA. This was the basis of using a rather exploratory research nature to go about this research. This also led to the researcher approaching the data in an inductive way, however drawing from the general concepts of CSV a deductive approach was used to structure the research questions. Because these different components needed to be explored simultaneously in detail, a case study was chosen to study the phenomena. To add to the validity of the study, the researcher picked three participants from outside the case study and confirmed that their response did not vary significantly from the participants picked within the firm being studied. During analysis researcher limited it is coding to descriptive and interpretive method in order to ensure that the reported accounts were true, accurate and representative of the meanings given by the participants. In few cases participants were approached a second time for clarification to ensure validity. Researcher kept notes of each step of the research, transcripts, and recordings for verification where applicable. The researcher also conducted a peer review with a post graduate student friend to ensure that the theoretical validity was maintained in the interpretations and conclusions vis-a vis the collected data.

## 3.7 ETHICS

Collecting data from an organization or its employees has its own ethical challenges, even more so when the researcher works in the same industry and firm (Saunders et al 2009). Though, in this case, the data sought were not company sensitive information and in some cases the data was accessible by the public. However, the researcher did not take this for granted as all relevant approvals were obtained from the firm and the individual participants before beginning the data collection and analysis process. Approval was also sought from each participant before the researcher started recording, and anonymity of each participant was maintained at each point during the research.

# CHAPTER 4

## RESEARCH FINDINGS AND DATA ANALYSIS

### 4.1 INTRODUCTION

The primary purpose of this study was, first, to identify the unique challenges of the (OFS) industry and also the underlying factors that have incubated these challenges. The other purpose is to identify some of the opportunities of implementing the 'creating shared value' CSV concepts and analyse which of these opportunities can be facilitated through the identified capabilities. However, to achieve this objective a key component of the CSV, which is the firm's capabilities will have to be analysed.

To enable an in-depth study on these CSV components, and in other to properly frame the research question, a single firm 'Schlumberger' was picked as a case study. The first stage of the study was Document Collection and Analysis, which focused mainly on understanding the capabilities of the firm. The second stage of the study was primary field data collection through semi-structured interviews, which focused on gathering field data from participants concerning the operational challenges of the firm, which in their own perception is unique to SSA. This stage also occurred concurrently with analysis, which focused on reviewing the preliminary reports from the first stage and the data collected from the participants. Finally, the results and findings were put through a more focused literature review, to weigh the operability of some of the identified CSV opportunities in the oilfield service industry in SSA.

### 4.2 STAGE ONE- DOCUMENT COLLECTION AND ANALYSIS

Following the document collection and analysis, the researcher developed a capability charts based on line-by-line coding of the relevant public documents. During this exercise, list of some of the key standalone capabilities were identified based strictly of the researcher's interpretations and not arranged in any particular order as seen below in Table 4.1.

The researcher observed that most of all the 'go to market' solutions noted in Schlumberger Limited (2019, and 2020) have come from using their digital capabilities to align the firm's

| IDENTIFIED STANDALONE CAPABILITIES | |
|---|---|
| 1 | Innovative Technologies Capabilities |
| 2 | Petrotechnical Domain Expertise |
| 3 | Data Access and Utilisation Capabilities |
| 4 | Wide Geographical Reach |
| 5 | Integrated Synergies Capabilities |
| 6 | Talent attraction and retention |
| 7 | Highly Skilled and Diverse Workforce |
| 8 | Robust Digital Technology Enablers |
| 9 | Safety Performance Culture |
| 10 | Financial Capabilities |
| 11 | Industry 'Goodwill' and track records |
| 12 | Proven Collaboration and Partnership Capabilities |
| 13 | Software and Hardware Development Capabilities |
| 14 | Vertical Integrated Oilfield Service Portfolio |
| 15 | Consistent Investments in digital foundations |
| 16 | Clear Environment friendly commitments |
| 17 | Energy transition commitments |
| 18 | Industry Leadership Capabilities |

Table 4.1 Key Standalone Capabilities as interpreted by researcher from 2019 documents

innovative technologies and data, or a combination of other standalone capabilities to provide product and service optimisation or provide a totally new value stream. Schlumberger Limited (2019 and 2020), noted that revenue from these kinds of innovative technology made up 23% and 26% of total revenue in 2018 and 2019, respectively.

These alignments of technologies, domain experts and processes have resulted in a combination of some standalone capabilities in unique ways to allow for vertical integration of related activities. The list of some of the key joint capabilities identified based strictly on researcher’s interpretations and not arranged in any particular order as seen below in Table 4.2. These combined capabilities in conjunction with other capabilities are used to provide applications and platforms that are used to provide a variety of products and services throughout the value chain of Exploration and Production for the customer thereby increasing efficiency and reducing environmental impacts (Schlumberger 2019,2020) & (Fizz 2019)..

| COMBINED CAPABILITIES | APPLICATIONS | OTHER APPLICATIONS &PLATFORMS | DIGITAL ENVIRONMENT | DELFI SUPPORT | SUPPORT CENTRES |
|---|---|---|---|---|---|
| Integrated Drilling | DrillPlan Solutions, OneDrill System | **GAIA**-digital subsurface PLATFORM,<br>**SENSIA**-Integrated Measurement & Automation Solutions,<br>**AGORA** -IIOT Solutions,<br>**OSDU**-Open Subsurface Data Universe,<br>**APOLLO-** Software & Hardware fusion | **DELFI cognitive E & P Environment** | SOFTWARE CENTRES (SC) | WELL CONSTRUCTION SC |
| Integrated Completions | OneStim System | | | | UNCONVENTIONAL COMPLETIONS AND SIMULATIONS PLATFORM SC |
| Digitally enabled Well testing | Concert Performance Technology | | | | EXPLORATION & FIELD SC |
| Integrated Production Systems | OneSurface System | | | | PRODUCTION PLATFORM SC |
| Schlumberger Production Management | Integrated Service Management | | | FOUNDATIONAL CENTRES (FC) | DELFI PLATFORM TECH CENTRE |
| Operating on the Edge | Digitised Fields | | | | INDUSTRIAL INTERNET CENTRE |
| Integrated Digital System | ORA Intelligence wireline testing platform | | | | DIGITAL FOUNDATION CENTRE |
| | | | | | TECHNOLOGY INNOVATION CENTRE |
| →→→→→→→→→→→→→→→→→→→→→→→→→→ | | | ■ | ←←←←←←←←←←←← | |

Table 4.2 Digital Capability Chart as interpreted by researcher from 2019 documents

These applications and platforms operate from a cognitive E & P environment called DELFI. This unique digital environment enables data to 'be liberated' and allows work efficiency with unrestricted data and brings new opportunities for collaboration among stakeholders in the oil and gas upstream industry (Schlumberger 2019,2020).

This environment is flexible in that it does not keep the customers and other users locked to the firm, in case of future scalability. It also does not limit its users to its existing infrastructure but gives them a head start as they do not need to build their own data ecosystem.

To enable the value from this environment to be extracted by all stakeholders, DELFI has an open and extensible API infrastructure with uniquely delayered stack, and a foundation for open source projects. In this model the domain ingestion, domain storage and data life cycle will be open source and will be accessible to the industry on multiple infrastructure below it. While the engines and analytics, domain data consumption, and the applications will be managed by the firm (FIZZ 2019).

This cognitive E & P environment, DELFI, is robust in terms of its functionality and market readiness, and an expression of the other capabilities of the firm such as the firm's experience, historical understanding and thought process as a technology leader in the industry. It is supported by digital technology functions responsible for the enterprise architecture and the infrastructure development for data, cloud, IIOT, User Experience and cybersecurity across the platforms and involved in the promotion of software tools and practices (Schlumberger 2018).

The digital capabilities are organised around some application spaces, with support from foundational people competencies and technological capabilities. Associated with this are enabling capabilities that have been invested in, over the years by the firm. This support systems included software and foundational centers as highlighted in Table 4.2.2. These centres are a piece of the puzzle that support the various platforms and support the DELFI cognitive E & P environment. Together, these support centres help provide seamless workflow for the Exploration and Production domains by accessing all other reservoir capabilities, thereby enabling the firm to construct a very robust digital ecosystem that is flexible and scalable (Schlumberger 2018).

The study records show that these digital capabilities have added value to other capabilities, and its inherent products increase efficiency and, in some cases, reduce environmental footprints. This could be said to be consistent with the CSV concept, however the objective of this study is to use this identified digital capabilities to address challenges that are unique to the OFS companies in SSA, in a way consistent with the CSV concept. Therefore, the next phase of the research focused on understanding the unique challenges in SSA, in order to explore where these identified digital capabilities (from Stage 1) could be utilised to address the issues.

The next stage of the research focuses around the digitalisation capabilities of the firm, as 'Stage 1' findings have shown that it cuts across most of the new products and services highlighted in Schlumberger (2019, 2020). It also cuts through most of the other capabilities in various ways like; the effect it has in the way innovative product and services are rendered to the customers, to the kind of talent it attracts and retains in the firm, to the way it fosters partnership and collaboration with other stakeholders in the industry, to the way it integrate portfolio suite, to the way it contributes to the provision of safer and more environmental friendly products and services, to its contribution to cost savings and capital disciple efforts, to the way technical support is provided to the wide geographical locations, to other ways in which the firm plans and drives business in the future.
Therefore, the capability aspect of the Creating Shared Value concepts and how it could create win-win opportunities in SSA, was limited to Digitalisation Capabilities of the firm in this research.

## 4.3 STAGE TWO- FIELD RESEARCH

Participants' experiences and feedback added insight to the research questions posed in this study. By listening to and analysing the experiences of these participants, valuable information was obtained about the operational challenges, and an understanding was gained about the root causes and how intertwined the issues are.

In this chapter, the three research questions are addressed with supporting evidence, including both quotations and feedback from the participants. The main source of data is from

primary semi-structured interviews. The method used to analyse the data is already discussed in the methodology chapter.

### 4.3.1 Demographics of the Interviewees

The results of this qualitative study are based on interviews of fifteen managers in the OFS industry in SSA, thirteen from the picked case study and two from different OFS firm and one who is currently the CEO of a Local OFS firm. These managers are at various levels of management and experience across functions and countries. They, therefore, had various levels of exposure in the industry and in the region. To be able to choose participants, a term 'SSA Exposure Metrics' was developed to logically group the potential participants with relevant weighted metrics based on participants experience, current job role, number of countries worked in or managing, areas of experience and number of OFS firms worked for. (See table 4.3 below) The 'SSA Exposure Metrics' was rated 1 to 10. With 10 as the highest and 1 as the lowest. Invites were only issued to potential participants with score 5 and above.

| | **SSA EXPOSURE METRICS** | | | | MAX WEIGHT |
|---|---|---|---|---|---|
| **YEARS OF EXPERIENCE IN THE INDUSTRY** | 5 - 10 years (P=1) | 10-15 years (P=2) | 15-20 years (P=3) | 20 years and Above(P=3.5) | 3.5 |
| **HOW MANY OFSC WORKED IN** | 1(P=1) | | 2 and Above(P=1.5) | | 1.5 |
| **CURRENT POSITION** | Manager (P=0.5) | | Manager of Managers(P=1) | | 1 |
| **AREAS OF EXPERIENCE** | One Area (P=1) | Two Areas (P=1.5) | Two Areas & Above(P=2) | | 2 |
| **COUNTRIES IN SSA WORKED IN** | 1(P=1) | 2(P=1.5) | 3 & Above (P=2) | | 2 |
| GRAND WEIGHT | | | | | **10** |

Table 4.3 SSA Exposure Metrics

Forty managers were initially invited to participate in the research, and fifteen of the managers voluntarily participated. Analysis started with the first interview, comparing results of the findings of stage one and data from each participant, and comparing data to data in an iterative process. The interview session was discontinued after the 15th interview, once theoretical saturation was reached.

Participants interviewed for this study are at different level of management and across distinct functions in their organisation, and operate from Nigeria, Angola, Gabon, Congo. From these countries, they manage oilfield service businesses spanning the whole of Sub Saharan Africa. Out of 15 participants, 4 were women while 11 others were men. (See below Table 4.4 Category of Participants) Specific demographics about the 15 participants are included in Appendix 4.1

| SSA Exposure Metrics | Number of Participants | Percentage (%) |
|---|---|---|
| 5 | 0 | 0 |
| 6 | 5 | 33.3 |
| 7 | 4 | 26.7 |
| 8 | 2 | 13.3 |
| 9 | 4 | 26.7 |
| 10 | 0 | 0 |
| **Total Number of Participants** | **15** | **100** |

Table 4.4 Category of Participants

The interview questions evolved during the entire process as more focus interests emerged with each interview, and with the clues provided by the participants. Each participant was interviewed via the Skype or Zoom platform. The virtual platform was an effective and necessary way to communicate with participants, because the participants were located in several countries, and because of the social distancing guidelines that were in force during

the time of the interviews. These platforms also had recording capability, and this allowed for convenient recording of all the interviews after the required permission was granted. The Interview transcription was done manually on the oTranscribe Platform within a couple of days of its occurrence. During this process the content was further reviewed for deeper understanding, which helped to construct the emphasis on the next interview. Memo writing was done immediately after most interviews and during transcription. Interview times varied and were scheduled at times conducive for both participants and researcher, some of the meetings were reschedule either due to participants or researchers change of schedule. The researcher also took field notes during each interview. All interviews were conducted during May and June 2020. The analysis was done using the Dedoose software, where two stages of coding was done; the initial coding and the theorical coding. The categories were changed three times as researcher matched codes and transcripts to categories and vice versa before the themes were developed. (See appendix 4.3 and 4.4)

## 4.4 RESEARCH FINDINGS

### 4.4.1 Introduction

This part of the chapter presents the findings from the data obtained from the individual interviewees on the unique challenges of the oil and gas field service company in Sub Saharan Africa, the opportunities that these challenges present and how these opportunities can be taken advantage of using the identified digital capabilities in the case study. The data were extracted and analysed according to the objectives of the study.

### 4.4.2 Research Questions

Three primary research questions guided this study:

1. *What are the unique challenges affecting the Oilfield Service (OFS) industry in Sub Sahara Africa (SSA), and which of them have the greatest impact to operational performance?*
2. *What are the underlying issues behind these challenges?*

3. How can the capabilities of OFSC be used in providing customized solutions to these challenges in a way consistent to the CSV concepts and providing competitive advantage to the companies?

### 4.4.3 Research Results

The major themes identified from the results of this study include:

1. **Logistics Complexities** are the major operational challenge faced by the OFSC in SSA.
2. SSA **Ecosystem Limitations** are at inter-related and are at the root of these logistics complexities and other related issues of the region.
3. **Intersection between 'Creating Shared Value Concepts' and digitalization** objectives exists in the industry, and business problems within this intersection could create competitive advantage.

Themes 1 answered the first research question; *What are the unique challenges affecting the Oilfield Service (OFS) industry in Sub Sahara Africa (SSA), and which of them have the greatest impact to operational performance?* Theme 2 answered the second research question; *What are the underlying issues behind these challenges?* Theme 3 and results from research stage 1(Document Collection and Analysis) answered the third research question; *How can the capabilities of OFSC be used in providing customized solutions to these challenges in a way consistent to the CSV concepts and providing competitive advantage to the companies?*

#### 4.4.3.1 Theme 1: Logistics Complexities

100% of the participants either directly or indirectly referred to logistic issues as one of the major challenges faced in the oil and gas service industry. Six of the participants were direct in pointing out that it was the biggest or main issue affecting operations. **Participant 11** noted that, '*The biggest challenge in SSA for me is logistics*' and **Participant 6** also noted '*I find logistics to be huge problem in SSA or Sub Saharan Africa,'.* **Participant 14** in the same line of thought noted '*The biggest challenge we face in SSA is logistics. Moving things between countries, or bringing in equipment from outside,' and so did* **Participant 10** who expressed the same opinion '*The main thing for me is logistics, I think we have a huge infrastructure challenge in this region and logistic is a big problem mostly in terms of time delay, in terms of cost, because the cost of the logistic is high.'*

All other participants, while referring to the same issue, either referred to the logistic complexities rather indirectly, as they enumerated other components of the logistics process as the main issues. See *Appendix 4.2 (DedooseChartExcerpts_2020_6_8_133)* for detailed excerpts. *S*ome other participants expressed their opinion in a more wholistic way as they referred to these issues as supply chain complexities**.** As illustrated in Participant 3 comment *'One of the major hiccups I see, for the International Service companies, National service companies and the locals has to do with supply chain management' also* Participant 13 *'In SSA my main challenge is supply chain, so on the supply chain side, we've been struggling the most….'*

While other participants mentioned Logistic complexity as one of the other challenge in SSA, they did not specify if it was ranked as the major or biggest challenge to operations in the industry, but in most cases, the frequency of mention and instance given by the participants implied that the Logistic challenge is significant in their opinion. *See Appendix 4.3 (Code Applications_DedooseChartExport_xlsx) for the code frequency table per participant.*

The participants with experience in other region's operations were also quick to compare the logistics status in SSA with that of other regions, and noted some issues that hinders the agility of logistics in SSA. They further noted that there were significant differences between the regions. Participants 7, 4, 9, 1, made the following statements;

> *'compared to other locations, I would say the biggest challenge is the lead time for ordering equipment...for them they can just call for a supply and get it in one week, ...for us it is not so...', '…doing business in SSA is different. When it comes to custom regulation, local authorities it is not that easy compared to Europe that you can do clearance in one day.', 'So unlike what you have across Europe, America and all that, where you are able to move things easily and freely between different countries, it's a different issue in Africa, in fact, you most probably get things moving from Europe to Africa faster than you will get from within some African countries..', '…we should borrow leave from Dubai and customise it to suite...'*

This further collaborates that this Logistic complexities in its current state is unique to SSA. See *Appendix 4.2 (DedooseChartExcerpts_2020_6_8_133) for detailed Excerpts*

Some of these participants went ahead to express their pain, frustration, helplessness, in the negative impact these challenges have posed to the business. Terms like; '*…we've been struggling the most…we have lost so many opportunities'* , '*…we cannot continue to compete like this', '…it is (logistics)so time consuming', '… it is very, very difficult ..to forecast', '…I wish that I can deliver as soon as possible', '… it was a complete nightmare', '… sometimes it has caused friction between operations and supply chain', '….it then also adds some supply chain challenges in terms of logistics, so that alone is a little bit depressing', 'you wouldn't move items from Nigeria to Ghana, it's not....it doesn't come so easily', '…the stress and all that you will go through', ' …I was so frustrated, because of … the logistic …'*

*All these were emotions displayed by Participants 13, 10, 15, 4, 2, 1, 8, and more as expressed in the swiftness of their responses to related questions, and the passion in their voice, as they spoke about these issues. This clearly indicates how significant this issue is to them and their operations. See Appendix 4.2 (DedooseChartExcerpts_2020_6_8_133) for the detailed Excerpts*

The Breakdown of these Logistic complexities come from the different operations interfaces as mention below;

- **Interface between OFSC and the government institutions**; with a frequency of **30** with focus on customs, unfriendly policies, non-uniform policies within the countries in SSA.
- **Interface between OFSC and third parties** with a frequency of **25** with focus on product scheduling, limited transportation routes, consistency of available transport routes, digital maturity of third party.
- Internal interface across functions and segments within the **same firm but outside the operating location** with a frequency of **10** with focus on order tracking, coordination of activities, effective forecasting, and communication among teams
- Internal interface across functions **within the firms, within the same operating location**. with a frequency of **9** with focus on (reactivation of ideal equipment, different objectives between functions, competency gaps, effective forecasting and communication among teams.

The breakdown shows that the interface of OFSC and government institutions and the interface between OFSC and the third parties have the highest frequencies of 30 and 25 counts respectively. See Table 4.5, and interface column in *Appendix 4.2 (DedooseChartExcerpts_2020_6_8_133) for more details.*

| | | |
|---|---|---|
| Theme 1: Logistics Complexities | Interface between OFSC & government institutions | Cumbersome custom process |
| | | Unfriendly policies |
| | | Policy Variations within region |
| | Interface between OFSC and third parties | product scheduling, |
| | | limited transportation routes |
| | | consistency of available transport routes |
| | | digital maturity of third party. |
| | OFSC Internal Interface within operating location | Forecasting and Inventory management issues |
| | | Order tracking-Multiple source of truth |
| | | Communication gaps |
| | | Across region cordination gaps |
| | OFSC Internal Interface outside operating location | Competency gaps |
| | | Communication gaps |
| | | Different objectives across functions |
| | | Forecasting and Inventory management issues |

Table 4.5 Theme 1- Summary of Findings

Some other challenges highlighted by the participants are as follows; Micro Business Outlook Uncertainties, Human Resource Challenge, Direct Financial Strain, Government Bureaucracy, Social Issues, Lack of Coordinated Safety Regulations.

#### 4.4.3.2 Theme 2: Ecosystem Limitations

In addition to the unique challenges highlighted by participants in theme 1 above, participants also highlighted some of the underlying factors that have caused or exacerbated the operating conditions in SSA. Participants linked some of these factors to the Ecosystem Limitations, and the theme was further described in four parts: a) Infrastructural Deficits b) Institutional Deficits c) Government Participation Gap d) Transparency issues.

When other sectors are underdeveloped in a region, the region will have limited opportunities to generate the required volume to create a consistent and predictable trade flow, and its corresponding infrastructure. The less developed a country is, the more the logistics burden to be borne by the oil and gas industry operating in that country, also the more likely the government will rely and interfere with the industry.

#### 4.4.3.2.1 Infrastructural Deficits

In most cases during the interview, participants were not asked these questions directly about the underlying factors behind the challenges highlighted in Theme 1. Participants 10 noted that 'I think we have a huge infrastructure challenge in this region…'

In describing the infrastructural deficit unique to SSA, participants noted **the limited transportations options** both in terms of interconnectivity of location, consistency, and reliability. This was expressed by Participant 11 and 15 respectively '*(we have), challenges with transportation. '..Transportation option is another challenge, … because we are Oil & Gas Company and not a transport company, we do not have the trucks , vessels and planes lineup on standby waiting for call hence the difficulty in moving from one point to another…'*

These limitations are true for both personnel and goods, as noted by Participant 15 *'to move from one place to the other is a hassle, so to move around is difficult…, the same applies to goods as well'*

The limited options therefore have their negative impact on forecasting and other associated high costs for the limited services. This was highlighted by Participants 6 *'if you are going to smaller countries that maybe don't have frequent flying, erm.... logistics all of a sudden gets more expensive, …'* Participants are of the opinion that in some cases the level of consistent trade generated by the industry or group of industries in individual countries are relatively low to sustain a vibrant transportation and logistics industry in those locations on a consistent bases. So the transportation industry therefore tends to follow the cyclic nature of the oil and gas industry, which does not leave real growth in the logistic companies in the region and makes it difficult for them to respond during any bullish end of the industry.

*Participant 11 'with the downturn, it has worsened the logistic, because with the reduction on production we had in the previous downturns in 2014, '15 & '16, a lot of the(logistic)*

*companies had also to reduce their (activities) and reduce the number of connection (routes) or transportation availability.'*

Others logistic companies take up orders for different countries in the region in a single trip which further creates long lead time and more room for inefficiencies.

> *Participant 2 '.... for example, if you are moving items from the UK to Ghana, the same sailing ship might dock at more than four/ five different African countries, cause they are picking bits and pieces, so that can impact the delivery time, you know....'*

> *Participant 4 'In SSA we do not have much of the sea vessel and coast to coast options…'*

These pressure on transportation of goods are mainly because the region has **inadequate manufacturing capabilities** as highlighted by Participant 11 *'…we import a lot of things from outside SSA, and a lot equipment, spare part, materials comes from abroad and very few are available in our countries,… so it's very expensive.'* Participant 2 and 3 noted below that especially for the patented items the OFSC have their plants at economic viable locations from where they will manufacture and distribute this items to different locations, as they will not be able to have this plants in different locations due to economic reasons.

> *Participant 2 'since … most SSA countries do not have manufacturing capabilities, there is very high reliance on European, and in fact western franchise within the same sister company.*

> *Participant 3 '…we solely, I would say depend on the technical capabilities and manufacturing capabilities of the ISCs …abroad'*

However, participant 3 stressed that because the countries within the region do not have a viable steel plant, the gap created affects all the stakeholders in the industry.

> *Participant 3 '…the earlier the countries have steel plants in their country, I mean for OCTG tubular goods, the better, and I know that conservatively 80% of what goes into the well are tubulars.'*

Participants 11 and 1 also noted that adverse cost implication of these limitations.

*Participant 1 'One of the reasons (why products are cheaper in other locations compared to SSA) is closeness to the manufacturing plant'*

*Participant 11 '…we import a lot of things from outside SSA, … so it's very expensive.*

Another area of the infrastructural deficit the participants highlighted was the **third parties' administrative capabilities** and that of other local stakeholders in terms of its digital adoption of processes in their interface with OFSC. Participants identified that capabilities of stakeholders in the ecosystem that have interface with the OFSC could erode some of the benefits of the digitalization efforts by these OFSC. As some of the digitalization benefits are fully realised, only when the ecosystem value chain is fully integrated. Participants 4, 14, 15, 6, were among the participants that shared these views. See below some of the related Excerpts;

*Participant 4 'But because of some of the infrastructure deficit you can go sometimes, and the (internet)systems will be down and will remain so for days without resolution …'*

*Participant 14 '…You have to get paper works signed by different people and it is a very cumbersome process…'*

*Participant 15 'By default, we are working in a Geo-Market where digital administration structure does not exist, talking about logistics (third party clearing agents) to be specific… are working with are not advanced as we are. Sometimes you will find payment system is a bit difficult to manage if you are a dealing with a local supplier, with not a lot of digitization in terms of internet, computers etc Some don't even have e-mail address with their domain, and it's difficult.'*

*Participant 6 '..smaller companies, ... a lot of times may not have all the expertise that is necessary to make proper decisions right?, you know... some of them do, some of them do not..'*

*Participant 15 'We are not at par in terms of the administration (efficiency) most of the time, there is resumption and dismissal time difference, then there is days-off, or*

*customs on strike, or no internet platform where you can initiate your request and so on, though we have in some locations but not all.'*

#### 4.4.3.2.2 Institutional Deficits

Apart from the infrastructural deficits highlighted by the participants, the participants also noted institutional deficits as part of the Ecosystem Limitations. Institutional structures are institutions or policies that create business enabling environment not just for the individual countries but regulations that encourage **collaboration and harmonised playing field** within the region. See below some of the related Excerpts;

*Participant 10 '… one of the things that I think will help will be to have more homogeneity in the countries, …having something more harmonious within the region, and learning from the places where it works fine.*

*Participant 10 '…but I will say that if we had a data collaboration between the countries of the division, that will allow more flexibility'*

*Participant 9 '…So that free flow of trade, of goods and equipment is something that needs to be looked into because it doesn't help to maximize and optimize resources within the region.'*

*Participant 2 'additional bottle neck with the importation and exportation rules are a little bit complex, different SSA countries have different rules. Some are following the English system; some are following Portuguese and all that…'*

*Participant 1 '… (you will see in some cases policy conflicts) for example there are situations where an item is forced to be cleared twice because the items move from one location to the other within the same country but because of the different custom regime and this makes no sense and that is why some of this items end up costing so much ….'*

Participants 1, 2, 5, 9, 12, also noted that beyond the creation of policies that will encourage collaboration within countries, **monitoring and compliance** have been inadequate and will be needed for the benefits to get to OFSC operating in the regions. Proper institutions that understands the business and that will follow through on well-coordinated polices and

regulations with transparency and ensure that the benefits of the regulations are obtained. See below some of the related Excerpts;

> *Participant* 2 '…the second angle to it is also a cultural thing. Ahhmm....(here) people don't follow through on procedures. … you know, business compliance…'
>
> *Participant 9 'So SSA needs to hold that together…… The regulatory bodies need to understand what they are regulating, it's very critical.*
>
> *Participant 12 '…the impact will definitely be more in SSA, because we have a lot of deficiencies already in the way we manage our economies, in the way we manage businesses, in terms of initiatives, policies that drive the industry, we are still trying to get things right. Whereas in other places, mainly the west they already have structured policies…'*
>
> *Participant 5 ' …the obvious places are where we see regulation being enforced are where the enforcement of regulation yield revenue to a government parastatal, you know like when we talk about off shore permit, registration of vessel, vessel test-run permit, so without actually ensuring that these are systems are properly followed and documented and a bit again about transparency right?..'*
>
> *Participant 3 '… are they really monitoring, is it(promised government support) really going on? Again, don't forget what I hate to mention the case of corruption. Every country has a little bit of it doesn't matter which country.'*

Participants noted that there are obvious **human development gaps,** which might be signs of gaps in the educational systems in place, as they are not correctly positioned to feed the human resource assembly-line with the required skilled personnel. See below some of the related Excerpts;

> *Participant 5 '…The people we are graduating at the moment from the Universities are not, they are not job ready in most cases, right?'*
>
> *Participant 10 '..A lot of (the SSA) countries have almost nothing in place to ensure this knowledge sharing with population,*

#### 4.4.3.2.3 Government Participation Gap

In addition to the Infrastructural and institutional deficits, participants are of the opinion that some of the government's actions or inactions have either impacted on the operations of the OFSC directly, or have made the region more susceptible to the harsh impact of the global industry volatilities. Participants 3,8,9 are of the opinion that **inadequate government investment** into the sector by countries in the region through their national oil companies have created limitation in the region. They argue that only a deliberate national oil company can follow through on long term plans to develop the industry and other ancillary sectors irrespective of the fluctuations in the global market, so as to create the consistency required to streamline the operations and drop the operating cost in the country. As against waiting for the International oil companies that will operate only when the conditions are favourable. See below some of the related Excerpts;

> *Participant 8 'The SSA region is a lot more volatile with Oil & Gas, …. The national oil companies are not as established as we have in some other parts of the world to hold things together. …a lot of the operating companies here are from the West. So, it's easier for them to shut down and focus on some other things either in their home country or some more viable projects.*
>
> *Participant 9 'So SSA needs to hold that together. If we are going to be a National Oil Company, be a strong one, be very competitive with anybody and everybody, you should be able to hold your ground together.'*
>
> *Participant 3 If the budget is not announced by that country, it's going to be difficult to, to, to start the project because (the government is) supposed to pay a certain percentage …. Because the IOC's are not going to go wherever to bring all their money to come and do a project that is JV and wait for two, three years down the line to collect the money back(from the government). That's not good business. Yeah. Well so they need that commitment to kick start the project…'*
>
> *Participant 5 'I'll say that there has been some of those efforts (by Government), but they are few and far between,…'*

Beyond the direct government investment, participants noted that there are **inadequate enabling environment** and that there is a need for government to coordinate its agencies and policies to create enabling business environment that will make the industry competitive, attract more investors and drive the trade volume. Most of the participants specifically highlighted the bureaucracy surrounding the import and export regulations amongst part of the bottle necks. See below some of the related Excerpts;

> *Participant 1 '…the main issue here is the government which should make enabling environment for the industry to thrive and remain competitive…'*
>
> *Participant 12 '…if the government does not create enabling environments for those kind of collaborations to happen then it's going to be difficult…'*
>
> *Participant 13 '… but inside the GEO market, moving things around is more difficult as it seems, and we incur a lot of cost on custom duties.'*
>
> *Participant 14 '…because of the very complex customs regimes we have in every country…'*
>
> *Participant 8 '... a typical example, here… you can't send anything out to Nigeria right? Meaning that if you bring anything…, it cannot get out. Now, if you put yourself as an investor for example, right? ...*
>
> *Participant 15 '…and you do know that you cannot export out of there, by the government it's forbidden in the oil & gas Industry, you cannot import something that you know cannot take easily out….'*
>
> *Participant 4 ' … whole bureaucracy within the locations(SSA). It makes it harder for you to work in an easy and effective way.'*
>
> *Participant 8 '…in SSA you know, when you have elections coming up, you want to execute your projects and complete it before the elections, so that.... you don't know who wins and you don't get stuck with the person that lost out of an election, because it's a deal, continuity is not that assured in most country states in Sub Sahara Africa.'*

Another factor highlighted by participants is '**government over-reliance'** on the sector that has led to a lot of government interference, which has also led to unstable policies. It has also led to the neglect of other sectors that could have supported the sector in generating the require trade volume. See below some of the related Excerpts;

> *Participant 6 '…I mean in SSA we know Oil to be the Cash Cow, so it's a case of if that is almost every country, especially Nigeria and Angola, … I see a Government trying to maximize out of that, …, because at the end of the day, they find that millions or billions are going to be made, so why should they reduce their own cost, right?*
>
> *Participant 10 '…the Oil and Gas Industry is, most of the time one of the main contributors to the economy of the country, … so it's a domain that is also particular in the of the Government.'*
>
> *Participant 1 '…there is so much focus on the sector by the government as a revenue cash cow, there by neglecting other areas…'*

#### 4.4.3.2.4 Transparency Issues

As noted by participants, the perceived opacity in the industry cuts across different facet of the industry and has an indirect limiting factor in various interfaces, which can hinder the collaborative efforts required to extract value from the industry. The negative effect of these transparency issues occurs in interface between OFSC and the producers, between OFSC and the government, between the Industry and society, and between industry, society and government.

**Between OFSC and customers;** While the OFSC tries its best to satisfy the customer, there seem to be a misalignment of objectives and compensations from time to time, which might have its own negative consequences.

> *Participant 8 '… because I've discussed with customers, different customers in different countries, and sometimes, the perception they have is that, we don't understand them, and when we go there, we go full force, and want to do things the way we do them, but sometimes, what the client needs is just for you to call and listen to what we want.'*

*Participant 2 '…there are times, there are contingencies that come up even the operators want to engage oil field service companies without a duly signed contract(especially in JV), they just want to solve the problem, and so when it comes to payment sometimes, you now have dispute, you now start seeing clauses that were not agreed hitherto…'*

*Participant 3' Some (OFSC) will ask the local partners to give upfront payment, whereas they don't have that money.*

*Participant 3 'Say for example, Some Producers can owe you beyond the contract terms.'*

**Between Industry and Society;** The participants believe that the oil and gas industry will need to retain or regain the trust of the society for the operations to run smoothly devoid of any form of rancour that will negatively affect performance.

*Participant 5 'So, transparency issue is something that is systemic right? and until we start building that culture of transparency from top to bottom right? the system will still remain inefficient and corruption will foster right?'*

*Participant 2 'Once the local communities are stakeholders, issue of vandalization, issue of kidnapping, of instabilities, security instability would be eliminated because they see themselves as stakeholders in the industry'*

*Participant 3 '… in locations where there have been environmental issues that leads to the death of fishes, if you are from the community, what do you think your reaction will be?'*

**Between OFSC and Government;** The participants believe that a good working relationship needs to be maintained between the OFSC and the government to smoothen-out some of their interface especially during import and export of goods, and safety monitoring.

*Participant 5 'How transparent are the Government in terms of making the activities in the industry easily accessible, … when a system is not transparent, it's prone to corruption, it's prone to inefficiency…'*

*Participant 8 .. a typical example, here… you can't send anything out here. Meaning that if you bring anything…, it cannot get out. Now, if you put yourself as an investor for example, right? ...'*

*Participant 6 '… also customs, ... I feel changes very frequently, today this rule applies, tomorrow, no it doesn't apply, errm... so..,… from each country, which can be challenging.'*

*Participant 5 ' If you want to see all …the Oil and Gas related injuries in UK Oil Industry, in the past one year okay? those systems and those information are available and you see the regulation trying to reduce this as an industry and working with others in Industry, you don't see that in SSA at the moment right?. .'*

*Participant 5 'There are several health bodies in the UK,… to ensure that the environment is safe for both the employees and the employers, and make sure that there is visibility, clarity, transparency in reporting the safety situations of every facility in the Oil & Gas Industry. So, this is something else that can be done by the Industrial leaders in terms of the company's asides Government.*

*Participant* 6 '*… the only issue is, if like now, we cleared (swellable packers, as packers). Now, the Government came back and said, "nope! this is a seal", because it's all rubber, ..... they're limited, right*?'

**Between Governments/Society and Industry**

Some participants are of the opinion that the social and security issues are rooted in perceived opacity within the Government, Society, and the Oil and Gas industry. Once this equilibrium is distorted by lack of trust, then the social issues will begin rearing its ugly head. This will in turn increase operating cost and impact on the performance of the OFSC. See below some of the related Excerpts;

*Participant 5 'So if the stakeholders don't want to be transparent, or the majority of the stakeholders prefer not to be transparent, this will be very difficult.'*

*Participant 5 '… so, you will wish that a lot of things going on in the Oil and Gas sector were a lot more transparent in SSA than it currently… in terms of making the activities in the industry easily accessible, ...referring to all stakeholders.*

*Participant 5 addition to that lack of transparency, is the security issues, right? …, from my perception it's mainly as a result of corruption, poverty and non-equitable distribution of the resources, right? If people that are right there where the Oil & Gas is being produced are not properly motivated, they tend to sabotage the process right? So, most times the security in an area is often affected by opposing interest, either from the host communities or even possibly from inter-community clashes, as they struggle to take ownership of the area or the resource, …'*

*Participant 7 '… another challenge I would say also ...social situation, political situation…'*

*Participant 7 'quite often we have custom strikes, when you know that you're not gonna get equipment out of customs and you don't know when it's gonna happen, so this happens also from time to time. So this is.. I would say the biggest, you never meet strike in US, strike of the customs right?'*

*Participant 5 '… some of the places I see we need to improve is Security, it affects other things like mobilization of equipment offshore and stuff like that…'*

*Participant 1 '… host communities where oil is been exploited are not been taken care of especially where there are environmental issues …. and these issues give rise to tensions with community and security issues…'*

*Participant 8 '…in SSA you know, …(for political reasons) continuity is not that assured in most country states in Sub Sahara Africa.'*

Some of the emphasis as expressed by some of the participants, highlights some of their sincere feeling that there are lack of transparency surrounding some of the processes in the industry. If this belief is entertained my participants in the industry, this perception will most likely be more in the society at large.

*Participant 5 '…in fact, asking the companies …. So, we(the society) need to start asking these companies, we(the society) need to remind them of their responsibilities right? get them motivated by asking questions about what they do, about their responsibilities, what is the corporate social responsibility? how did they demonstrate this?*

*Participant 1 ' You see that the host communities where oil and gas is been exploited are not been taken care of especially where there are environmental issues they really don't care,… and this issues give rise to tensions within the community and security issues.*

| | | |
|---|---|---|
| Theme 2: Ecosystem Limitations | Infrastructural Deficits | Limited transportations options |
| | | Inadequate manufacturing capabilities |
| | | Third parties' administrative capabilities |
| | Institutional Deficits | Inconsistent regulation within region |
| | | Inadequate regional collaboration |
| | | Inadequate monitoring & compliance |
| | | Human development gaps |
| | Government Participation Gap | Inadequate government Investment |
| | | Inadequate enabling environment |
| | | Government over-reliance |
| | Transparency issues. | Between OFSC & Customers |
| | | Between OFSC & Government; |
| | | Between Industry & Society |
| | | Between Government, Society & Industry |

Table 4.6 Theme 2- Summary of Findings

#### 4.4.3.3 Theme 3: Overlapping Opportunities between CSV and Digitalization Objectives

The participants highlighted that opportunities abound in the various interface, similar to the interface discussed above, where the challenges were created. These opportunities differ

depending on which stakeholder is looking at it, but the opportunities noted here are those highlighted by participants that relate directly or indirect to potential value for the OFSC. The opportunities are grouped into various interfaces; the **OFSC and Customer** interface, which is mainly focused on products and service delivery improvements. While the other interfaces; **OFSC and Third parties'** interface**,** internal interface **within the OFSC,** and interface between the **Industry, Government and Societies, are** mainly value chain improvements**.**

#### 4.4.3.3.1 Opportunities for Product and Service Delivery Improvement

As noted by participants opportunities exist across the various interfaces, but the most highlighted opportunities are those of product and service delivery improvement, under the **OFSC and Customer** interface. These product and service delivery improvements are grouped as; **remote operations** as highlighted by Participants 3, 7, 11, 13, **automation** as highlighted by Participants 2, 12, 4, 6, **data gathering /utilization** as highlighted by Participants 3, 7, 11, 13, **safer/environmentally friendly products** as highlighted by Participants 2, 9, 12 , and **innovative products** as highlighted by Participants 2, 9, 12, 13. While the product and services improvements are not tailored made to address some the unique challenges highlighted by participants in earlier themes some of products and services improvements contain attributes if utilized to capacity and linked to other value chain improvements has the potential to address some of the ecosystem limitations highlighted in the previous theme.

See below product and service delivery opportunities identified by participants under the OFSC and Customer interface;

**Remote Operation**

> *Participant 7 'we are reviewing on how we can avoid bringing specialists from abroad,…we're actually looking at how we can do it remotely. (By using) … the camera and the video streaming very well, very good quality, so the guy be anywhere else in the world, and we're just performing our job locally and he's instructing us.'*
>
> *Participant 13 'also finding a way to monitor drilling parameters (remotely) whilst drilling, (to ensure that personnel are using the correct and optimum parameters), so what we are doing, is find an interface where the client in the office can have a console,*

*my company also has a console and the console will also show on the rig floor the will also have a green zone showing the actual best parameters to be used while drilling.'*

*Participant 3 ' …just like real time drilling, you see exactly what is happening in the client's office, everyone has to be ready for that.'*

*Participant 11 '…The good thing about digitization is that we can work remotely… follow up on jobs in real time, which was not the case before for me it is a good development.'*

*Participant 3 '…people will just sit in the office and determine or decide what they want to produce from, well A to Z or 1 to 100 what chokes to remotely manipulate…'*

**Automation**

*Participant 2 '…and would give you a better result, because it's automated. It's more like a robot, now handling the ehh.... the make-up and will tell you if the make-up passed or failed, so tubing integrity is guaranteed…'*

*Participant 12 '… start automating the things that we have to do, because really what's the point of working so hard when there are few robots that can do the work alongside and make it more efficient…'*

*Participant 4 'Even the GR, we have the GR is now automated that may contact you if the items have been delivered, received or not. The company is using a lot of digital platforms and it is the new trend right now'*

*Participant 6 '…access to data, or doing stuff automatically ….they are getting the gauge data daily, in their office. '*

*Participant 2 '… Right now, there are a lot of ways information is being transmitted that is eliminating that human interface.'*

**Safer/environmentally friendly**

*Participant 12 '…i don't necessarily have to be there, or expose myself to the risk on the rig, when i can seat back in my office and press some buttons and i can continue to the job.*

*Participant 12 'Also the company in terms of the environmental bit is innovating, they are improving the technology constantly to make sure that they are reducing their impact or environmental foot print, so it is something they are consciously working with and on…'*

*Participant 9 '… the oil field industry as well needs to evolve with external action technology that would make the environment safer and cleaner.*

*Participant 2 'So, Artificial Intelligence will drive the way we do things in the next ten years. It's going to be a very significant shift,… there's going to be less dependence on human.*

**New and innovative Value Creation**

*Participant 13 '…(with digitalization we are) able to penetrate markets that we couldn't because we didn't have more information…'*

*Participant 9 '... the basic thing is, as more challenges come, we see different forms of innovation on how to do things better...'*

*Participant 2 '…people are trying to add value to the society, trying to think optimization, what do I do to squeeze-out another one percent out of this oil reserve that we have?'*

*Participant 9 ' … so as technologies evolve, even the traditional oil extraction would become easier and cheaper and cleaner,…. if you talk about several years ago, nobody would imagine there would be Shale Oil competing with traditional oil extraction, and it's because technologies came on board and made it easier.*

*Participant 12 '…*also the company in terms of the environmental bit is innovating, they are improving the technology constantly….'

*Participant 13 'Basically we have lots of digital tools, … we are trying to leverage on all the(existing) tools that are in use now and use the digital revolution to increase our market share, …'*

**Data Gathering and Utilization**

*Participant 13 '…(with digitalization we) get more information on what is actually going on, and be able to penetrate markets that we couldn't because we didn't have more information…'*

*Participant 9 ' … understanding of the fields is a lot better …now we have a lot of data and I think that's an area that's a lot more improved nowadays than we used to have in the past.'*

*Participant 2 '.... things will come more advanced, more knowledgeable, information will be out there…'*

*Participant 2 ' … (if )Managing Directors need to get a report,(it is ) just on their finger tip. They want to check their production as a company, they don't have to ask somebody, they log in and it tells them, … and then, the guy can ask questions…'*

*Participant 6 '…even our business systems are becoming more, digital (integrated)where anyone can pull data as opposed to before, where you will need to call a finance guy to get information related to finance that you need to do your job.'*

*Participant 9 ' that's an area that is of challenge to a lot of operators, but a lot of solutions have been put in place as well in terms of well placement, and that's where you see new technologies….. in the drilling and wireline side to get data to optimally place the wells, and now, we're beginning to talk about some ahead of this issue, data that will also help with formation evaluation.'*

*Participant 13 ' we have early engagements with the client, make sure we know the field and what the need will be and then we push to have a PO. Based on the PO, whatever the time we deliver…'*

*Participants 13 '… the sales population at the H.Q level to engage with the client early to figure out when they plan to have project, and whenever they mention, we can start approaching the client(for better (forecasting and planning)'*

#### 4.4.3.3.2 Opportunities for Value Chain Improvement

The value chain improvements highlighted by participants cuts across the interface between third parties, interface within the OFSC, interface between OFSC and customer, and interface between society, government and the other OFSC industry. Some of these highlighted value chain improvements have the potential to directly address some of the ecosystem limitations highlighted in the earlier theme.

Workflow and process improvement, collaboration and partnership Opportunities exist between **OFSC and third parties** as highlighted by participants 13, 15, 4.

> *Participant 13 '…our business system is way too cumbersome, for(some of) the third party to be paid, …'*
>
> *Participant 15 But then, we need to work round, put functions together & link them under supply chain…'*
>
> *Participant 15 ' So, if they (the third party and local contractors) are very manual, we need to adapt ourselves so that we can operate with them until they decide to digitize.'*
>
> *Participant 4 '… but because of some of the structures of the company having different hubs spread around the world, it was manageable to push through with client request…'*

Moreover, opportunities exist between the **internal interface within the OFSC** as highlighted by Participants 12, 8, 13, 2, 14, as seen below. Some of these highlighted opportunities are; Resource optimisation and sharing opportunities, workflow improvement.

> *Participant 12 '…you will find that there will be opportunities for improvement, for efficiency improvement particularly e.g something that four people may have been doing, you can restructure to have one person do it. It could be overwhelming on the person, but with time, with innovation around technology ….'*
>
> *Participant 8 '(before)i was so frustrated, the logistic team and the operation team, they didn't have a common platform. … to be able to track an order, all the jobs is on the coordinator and he… needs to get the information are like fifty places, …'*

*Participant 13 'to put a PO on the system, the chain of approval is very heavy. We have different objectives, …'*

*Participant 2 '… Often times, policies and very big visions are within the boardroom, and they leave it to themselves. They are asked to cascade to their team, but..., some managers just keep it within them, and the team doesn't get to know "why am I doing this?'*

*Participant 14 '…The other challenge I faced in SSA is competency of the functions. A times you feel that the person doing the job is not maybe well trained or competent for the task, and long response time compared to other Geo-Markets I've worked in the past. So, I think we need to get more focused on getting these guys trained, better accustomed to the business systems that they use and (the regulations applicable in their locations) to improve response time.'*

Also, value chain improvement opportunities exist between the **OFSC and Customer interface** as highlighted by Participants 11, 7, 3, 2, 6, as seen below. Some of these highlighted opportunities are; Collaboration and partnership opportunities, cost cutting solutions, asset and inventory management opportunities, performance focused workflow creation, Scaling of internal solutions.

*Participant 7 'we are reviewing on how we can avoid bringing specialists from abroad,…we're actually looking at how we can do it remotely. (By using) … the camera and the video streaming very well, very good quality, so the guy be anywhere else in the world, and we're just performing our job locally and he's instructing us.'*

*Participant 11 '…The good thing about digitization is that we can work remotely… follow up on jobs in real time, which was not the case before for me it is a good development.'*

*Participant 3 '…people will just sit in the office and determine or decide what they want to produce from, well A to Z or 1 to 100 what chokes to remotely manipulate…'*

*Participant 6 '…access to data or doing stuff automatically …. they are getting the gauge data daily, in their office. '*

*Participant 2 '… Right now, there are a lot of ways information is being transmitted that is eliminating that human interface.'*

Participants 10, 9, 5, 3, 12, also pointed out the opportunities in **the interface between the industry and the Society as;** Local human resource development, Local content partnerships, business and digital inclusion amongst others.

*Participant 10 '… providing knowledge and empowerment to the society which is obviously beneficial for them as well. So, from my point of view, having the mindset of making sure we develop the talent locally where we are, then we involve them to our economy and to our business, I think this is the most cost effective solution and the best one for the society.'*

*Participant 10 '…the way I see it is that the biggest impact we can have on the society is getting them to be part of the business…'*

*Participant 9 '…to build capacity locally, develop work force locally, …we look at things we can get locally. … it means that you can look into things that you would normally get from outside of the country, look at what you can get locally as replacement…'*

*Participant 12 '…opportunity for talents to be developed locally as well.*

*Participant 5 '…some training programs affiliated to companies, not just companies training their personnel but also giving scholarships to graduates…'*

*Participant 3 '… (the OFSC) has to be environmentally friendly. Whether is to the community, the environment itself and the government,*

*Participant 6 'it's internally that we know that, okay, this is a swell packer, this is this, this is that, but to the lay man in custom, it's rubber you're bringing in. But for generic items, like safety valves, there's already a cost there, there's a duty to that, so I believe that yes, it is more efficient now, …(but) do we have efficient people in that role(in the government agencies)?....,*

*Participant 12 'Also the company in terms of the environmental bit is innovating, they are improving the technology constantly to make sure that they are reducing their*

*impact or environmental footprint, so it is something they are consciously working with and on*

| THEME | CATEGORIES | | OPPORTUNITIES |
|---|---|---|---|
| Theme 3: Overlapping Opportunities between CSV and Digitalization Objectives | Opportunities for Product and Service Delivery Improvement | OFSC and Customer interface | remote operations |
| | | | automation |
| | | | data gathering |
| | | | data utilization |
| | | | innovative products |
| | | | environmentally friendly products and services |
| | | | safer products and services |
| | | | innovative products |
| | | | new value creation |
| | Opportunities for Value Chain Improvement | OFSC and third-party interface | Workflow & Process improvement |
| | | | collaboration and partnership Opportunities |
| | | OFSC internal interface | Resource optimisation |
| | | | Resource sharing |
| | | | Workflow & Process improvement |
| | | OFSC and Customer interface | Collaboration and partnership opportunities |
| | | | cost cutting solutions |
| | | | asset and inventory management opportunities |
| | | | performance focused workflow creation |
| | | | Scaling of internal solutions. |
| | | Industry and the Society interface | Local human resource development, |
| | | | Local content partnerships, business |
| | | | digital inclusion |

Table 4.7 Theme 3- Summary of Findings

Creating Shared Value opportunities from the Oilfield Service Company point of view would traditionally come from the interface between the OFSC and the customer or interfaces within the individual firms as suggested by the frequency of their opinion. But participants 15, 12, 2, 10, 6, have also noted that focusing on the solutions on these individual interfaces will not give the kind of results needed to change the business environment in SSA, Like participant 8 noted 'we are being too classic, and sometimes, we are just a little bit afraid of thinking out of the box'. Therefore, participants are of the opinion of a grand interface that will lead to an integration of the entire system through collaboration.

*Participant 15 But then, we need to work round, put functions together & link them under supply chain. So, we are trying to work together, trying to have initiatives together, trying to align with the product line. So, we are going towards the same objectives, and i hope in the near future, all those gaps people are seeing and saying that it's a challenge will be opportunities definitely*

*Participant 12 '…(with digitalization)it helps you refine the process and minimize a lot of the ways that we have and stop some of the things that are done in silos, create collaborative environments for people to work and achieve even greater impacts.'*

*Participant 10 …'for things that can be handled by the companies directly, I would probably say that especially for personnel, making the focus on training local personnel that would be more available than expert coming from remote areas would help us to better handle the personnel challenges in terms of mobility.'*

*Participant 2 '…at the end of the day impacts in terms of the project costs. So that's why I said it's a combination of so many factors, you know... coming into that and at the end of the day, it impacts the project cost, and brings down profitability if you look at it on the long run.'*

*Participant 2 '… So that way, rather than we going to get new equipment, spend freights, spend custom duty and all that, you can use within the country and eh... you get back some value, instead of destroying these equipment on the shelf, you get back some value, and this other, the project timing comes faster. So, we've been sharing such collaboration efforts, some information have been shared and we use it and I think that would bring a win-win for every party, .... we make the cost of such projects to be less when they can get some equipment locally that is already existing, instead of wasting these items, you know.... so this areas I think personally I've seen and I think would help to drive eh.... the cost down and make profitability even better for all parties involved.'*

Participant 10 'From my point of view, the main challenge is how to have this long-term vision…'

## 4.5 RESEARCH ANALYSIS

### 4.5.1 Introduction

The research analysis section analyses the findings of the research as presented earlier, in line with the research questions. Research question 1 and 2 was analysed together.

### 4.5.2 Research Question 1 and 2

> *'What are the unique challenges and the underlying issues affecting the Oilfield Service industry in Sub Sahara Africa (SSA), and which of them have the greatest impact to operational performance?'*

The research question 1 was directly related to the interview question 2, and results were purely descriptive, based on the participant's answers. Out of 162 first cycle coding frequency on the answers to this research question, 100 points, representing 62 percent of the answers centred on the **logistics complexities** in SSA (*See Appendix 4.3*). However, the co-concurrence analysis indicates that the key underlying issues are the ecosystem limitations. These limitations worsen the supply chain challenges and increases the cost of doing business, which in turn creates more ecosystem limitations and continues the cycle of challenges (*See Appendix 4.5*). The combination of these intertwined factors feed on each other to survive and support the cycle of challenges within SSA.

While it is acknowledged that there are global effects that affect the industry, all the participants noted that there were conditions more prevalent in SSA, as compared to other regions of the world, or that limits its ability to respond to issues in certain efficient ways. These unique issues surrounding the oil and gas upstream industry in SSA, further limits the agility of the OFSC needed to react swiftly to the volatile industry. The co-concurrence analysis (Appendix 4.3) indicates that in the second cycle coding the Logistics complexities category has the highest frequency of 68. The co-concurred with the Ecosystem Limitation for 48 times, and this is mostly lead by infrastructure deficit and micro business outlook uncertainties. The table also shows that the 'logistics complexities' have the highest impact on the 'direct financial strain'.

The transparency issues, surrounding some of the processes in the industry also puts a limit on the kind of investments and collaboration the industry can attract. However, these investments and collaborations by stakeholders are essential in creating a viable ecosystem that enables the business to consistently thrive. Therefore, providing solutions that will improve transparency in the industry, along various business interfaces, will stimulate various collaborations and partnerships required to improve business performance.

### 4.5.3 Research Question 3

> *'How capabilities of OFSC can be used in providing customized solutions to the highlighted challenges (in SSA), in a way consistent to the CSV concepts and providing competitive advantage to the companies?'*

Findings from Stage 1 research indicate that digital capabilities utilised by the case study have improved efficiency, reduced operational cost, improved revenues for the firm, and facilitated more environmentally friendly and safer operations (Schlumberger Limited 2020). This positive influence on social issues, obtained by the firm's investment to align their core capabilities to their long -term business venture, aligns perfectly with Porter (2011) and FSG (2014) definition of 'Creating Shared Value'. However, the objective of this research is to explore ways in which this concept could be used to address the unique challenges the OFS face in Sub Sahara Africa, as highlighted earlier.

The question then becomes; 'how can the identified digital capabilities be used to address the logistics complexities, or any of underlying ecosystem limitations mentioned, in such a way that is consistent with the CSV concept?'

Like Porter (2011) noted, CSV could be obtained by creating new value in rendering products and services, in redefining value chains, and strengthening local clusters. Findings from research question 1 & 2 indicate that most of the unique challenges to SSA, borders on the strengthening of the local clusters and redefinition of value chain, but research findings indicate that the focus of the case study is slightly different. The focus of the firm has been mainly on the creation of new value through reconceiving their product and services, and through value chain redefinition limited to the interfaces within the upstream industry. Also, participant's examples as regards opportunities of digitalization and CSV are also focused

more on product and service improvement, and improvement of their internal processes. Therefore, while still maintaining focus of their current strengths, the firm and in extension other OFSC, should consider looking for CSV opportunities for competitive advantage beyond product and service improvement and OFSC-Customer value chain interface. They should consider using their digital capabilities to improve the local cluster as suggested by Porter (2011). This can be achieved by digital inclusion of third parties and the government agencies that they interface with in the normal course of their business in SSA.

Focusing on improving local cluster is even more important, because the research participants all noted that logistics complexities emanating from weak local clusters and ecosystem limitations have the greatest impact on their operational performance in SSA. However, most of their suggestions did not address these areas from the OFS company's point of view, as in most cases, they relegated most of the responsibility the Government and the Producers. Some examples of these suggestions for government and producers, which are also CSV opportunities for the OFS companies are: Encouraging local participation, improving transparency in various processes, and improving the collaborations and partnerships between stakeholders (governments and their agencies, within service companies, third parties, IOC's, NOC's , Local and independent Oil Producers). Therefore, it is important that the OFSC, not only look for ways of navigating some of these societal issues, but also attempt to address them, using the CSV concept where applicable. Attempting this will broaden the opportunities of competitive advantage beyond the traditional means for the OFS industry. Also, because collaboration is required to solve these issues, OFSC should not relegate these issues to the government and producers, but attempt to make significant strides, using their digital capabilities or any of their other capabilities to transform the way business is being done in SSA.

Creating digital inclusion will not just be helping the third parties and government agencies, but will help create a foundation for the full integration of supply chain, and improve transparency and collaboration. Like Jones (2019) noted, lack of digital integration will limit the benefit of digitalisation by about 50%, but if all participants in the value chain are not digitally mature to a reasonable level then the firm will not reap from all the potentials that digitalisation can offer.

However, strategies that resolve these issues could only be regarded as a 'Creating Share Value' (CSV) strategy, to the extent that, while solving some of these highlighted ecosystem limitations, the industry and related value chains are improved. The CSV strategy would add value to both the OFS companies, the customers, the society, and the government, and most importantly the added value, will be in such a way, that it is profitable to ensure consistency and scalability.

# CHAPTER 5.

# DISCUSSION AND CONCLUSION

## 5.1 DISCUSSION AND IMPLICATIONS

### 5.1.1 Integrated Upstream Supply Chain-A CSV concept

While the strategy direction of reconceiving products and services for superior performance to meet customer needs sustainably remains key for the growth of the OFS companies, it is also necessary to go beyond the traditional services that they provide for their client. OFS companies should also apply their innovative capabilities to look out for opportunity for collaboration in the industry, through openness and transparency that will add value to every strata of industry. Application of these innovative capabilities should focus on the interface with both the customer, third parties and the government in a view of creating efficiency, eliminating waste and cutting down cost. This will eventually lead to better 'return on investment' for the customer, and opportunity for both the producers and the government to embark on more capital projects. Reduction of cost will attract more investments that will provide additional streams of revenue for the stakeholders. Also, some marginal fields that are presently uneconomically viable because of the high operational cost could become viable. Such an integrated system will also benefit the OFS companies by increasing their agility, efficiency, and giving them broader opportunity to deliver new kind of value beyond the producers to other stakeholders. For the society, such an integrated system will provide a tool that aids transparency and trust, between the society and the industry, and also increase local skill development and employment opportunities.

Using the identified digital capabilities of the firm, these solutions could be achieved through championing a digitally integrated upstream oil and gas supply chain, to increase efficiency in the end to end flow of goods and service, and by doing so increase transparency for the stakeholders. This should be piloted in SSA where the impact and business value of such project will be significant. The collaboration could ride on the existing digital platforms and architecture by this OFS company, in the case study, which in opinion of the researcher has the right mix of capabilities required to make this shift in the industry.

A rare mix of capabilities are required to drive the actions necessary to cause significant change from the private sector perspective and this can hardly be achieved by a logistics company. The logistic complexities facing the OFSC in SSA as noted by participants, will be best addressed by a firm that understands the industry, a firm with a large size both in scope and geography, a firm that already has goodwill and credibility developed with stakeholders. The firm also needs the required skilled workforce and a capacity to attract more if needed. Most importantly, the firm has to show leadership in technology innovation, and a consistent investment track record in digital foundations, with demonstrated market readiness with go-to -market solutions. These sets of resources as a portfolio is 'heterogenous' and 'immobile' and has a potential to give a firm a competitive edge if used to solve some of the logistics issues in SSA.

Also, the transparency issues highlighted by participants as part of the ecosystem limitations in SSA can be significantly addressed by the openness and collaboration that digitalisation brings. This can be achieved if these digital capabilities that are in place, as exemplified in the case study, are used beyond the OFSC -customer interface, to cover all other stakeholder's interfaces in and outside the upstream oil and gas supply chain. It is therefore important that the stakeholders in the industry, especially digital leaders, rise to the occasion to fill the various logistics gaps by creating a digital integration of the supply chain.

### 5.1.2 Practicability and Benefits -Integrated Supply Chain

It was observed that most of the ideas by participants about navigating through the logistics challenge was to engage the client early, get purchase orders and contracts in good time and start in good time to go navigate the logistics issues within the region without doing much to solve the issue. The problem with this idea is that while the services companies succeed to get a contract to protect themselves and manage their inventory positions, it still leaves the problem unresolved. The inventory management problem ends up being pushed to the customer, who will now have excess inventory in their books, if there is a delay or cancellation of the project. This highlighted solution by most of the participants though necessary, does not provide additional value to the value chain. However implementing and integrated supply

chain will provide value for the producers, service companies, government agencies and third parties involved in the supply chain.

An integrated supply chain will involve creating a virtual representation of each significant equipment right from the point the customers issue the purchase order. Once the purchase order is acknowledged digitally, traceability is created, and the item can now be tracked by all stakeholders in the supply chain. It will enable a wholistic picture by the customer, who is the end users and the contract owners, at different value points in the supply chain. With this level of openness and integration, the system will automatically generate the expected delivery dates of items involved in a project. The stakeholders will also be able to take charge of sections related to them for better planning and they will better visualise the impact of a delay on the whole supply chain. As noted by Schlumberger (2019), a small scale of this concept is being applied in the 'OneDrill integrated drilling system', in conjunction with the 'DrillPlan solutions'. In this case this integrated solution enables drilling workflows to be optimised by establishing the right rig schedule to account for usage of material, delivery, shipping and determination of inventory levels, thereby assuring operational integrity and resource optimisation.

This integrated supply chain can he hosted in a digital environment where relevant government agencies can create their spaces with up-to-date data as regards their countries export and import regulations and their enterprise management system for items that relate to the upstream oil and gas industry. From such an integrated system, they can gain visibility and check for discrepancies or resolve potential issues on imported items even before the items are physically present in the country. This will also enable the government agencies to have digital traceability of all transactions, thereby improving transparency. This system can also allow the customers to visualise all their ordered items from different service companies spread at various locations and coordinate the service companies to share resources when necessary to transport them to the end user. Depending also on the level of access granted, the service companies could also be able to use the visibility granted by the platform to coordinate and share resources. This kind of platform will help track inventory utilization per well either for troubleshooting purposes, for audit purposes, for performance review or for tracking of the government exonerations.

A similar environment as described above, which will be adequate to host the integrated supply chain for all the stakeholders, is already operational by the firm, referred to as the DELFI cognitive E & P environment. The DELFI environment is robust, flexible, scalable, and secure. Like the operations of the GAIA platform as noted by Schlumberger (2019), the DELFI powered Integrated Supply Chain (DISC) can grant different stakeholder the required level of access according to what users need and agreed terms. Although, DELFI is currently open for the upstream oil and gas industry, hosting the integrated supply chain (DISC) will mean that the environment will be open to a wider group of stakeholders.

With the DISC, stakeholders could also have more options for inventory management of purchased inventory. Items that were purchased and imported into the location but that were not utilised (either because it was a backup or contingency equipment or because the project was cancelled), could be flagged and made visible on the DISC platform for possible buy-back or repurchase either by other IOCs, NOCs, local independents or service company that might need such items. Because keeping the inventory for years after the project has ended or the job cancelled will in most cases be uneconomical. This process if done in an efficient way through this platform will create a win-win situation for all the stakeholders. The government will get some fee for the change of ownership without having to do much. The seller will have its inventory better managed, more flexibility in its operations and improved cashflow. The buyer will have access to acquired items in record time and at a discounted price. The original service company will have opportunity to cross sale services to the buyer, and the platform host will also make a fee for facilitating the transaction.

Just like this system, most of the CSV initiatives in the industry can only be profitable to the all stakeholders at the long run as noted by Porter (2018). The CSV strategies can only thrive in a culture that looks out for long term gains, and even with the cyclic nature of the industry this long-term outlook will eventually drive down cost and better empower the society. To achieve this, stakeholders will need to collaborate and come out with a blueprint that foster the required cultural change compatible with Creating Shared Value Strategies.

### 5.1.3 Other Features of the Digital capabilities that could facilitate DISC

The core idea of DELFI as a digital environment, is the democratization of data. In this cognitive environment data becomes central to all that is done and will be available to all

plug-in applications at all time (Fizz 2019). It is a uniquely differentiated mature data ecosystem in the upstream oil and gas industry, which still embodies the core IPs that have been the firm's differentiator. Most of their digital technology organisations and the different products in the firm's portfolio have been moved to this environment. This has facilitated the management of the heterogeneous product mix in a fully integrated development system, thereby providing efficiency, productivity in this system, reusable technology, and solutions in the form of microservices are used as shared components across the different product application. Other capabilities from the foundational centres from the case study that will be required for the DISC are as follows:

- Ability to integrate ecosystem data and decisions in the DELFI E & P environment in other to maximise the availability, integrity and security and value of E & P data.
- Ability to provide cloud foundational and developmental services to solidify the foundation of an open and extensible DELFI E & P environment that maximises a secure workflow development efficiency and facilitates collaboration among the stakeholders around data, science and workflow.
- Ability to provide Virtual representation of products and processes enabling data analysis, providing a foundation for the fusion of both software and hardware and proactive monitoring of systems.
- Ability to build relationships non-traditional companies to create an ecosystem of partners to influence their road maps and leverage them towards company requirements.
- Ability to upscale their Internal Supply chain Enterprise Management, Agent Compliance System and Trade and Custom Compliance systems that enables tracking of orders, facilitates import and export activities amongst other things. To create the ingestion pipeline into the data lake including enrichment, and the consumption services to enable the platforms to leverage the power of DELFI
- Ability to maintain a centralized model for delivering client engagements directly from the different regions.

In addition to the CSV concept that was identified earlier, by using digital capabilities to reconceive product and services, using the firm's digital capabilities to pilot a DELFI powered Integrated Supply Chain will also align to the CSV concept. Moreover, in the case it will also

address some of the ecosystem limitations in SSA by making operations more efficient, reduce waste, improve transparency, improve local participation, improve collaboration between Local and international companies, improves efficiency and capabilities of government agencies.

**5.1.4 Additional Literature Review based on findings and discussion.**

World Economic Forum (2017), agrees that digitalisation in the oil and gas industry will not just improve profitability and add value to the customer, but it will also improve safety and benefit society. But as GDS Summits (2019) noted, to get the full value of digitalisation requires a deliberate journey. In line with this, Infosys (2018), noted that going through the journey requires designing a digital transformation roadmap. But a good road map requires leadership from top management and a holistic understanding of an organisation's capabilities, priorities, culture and digital maturity level in terms of 'go to market' solutions.

Fortune Business Insights (2020), noted that there will be significant increase in the global digital oil market size and this is driven partly from the first three-party partnership and collaboration efforts of Schlumberger, Chevron and Microsoft, which aims to use the DELFI cognitive E&P environment that will aid firms to process, visualize, analyse and interpret insights through different data source. The case study, Schlumberger is playing a critical role in this partnership. GlobalData Thematic Research (2019), also referred to Schlumberger as the leading oilfield services provider in digital technologies and has continued to lead by utilising its vast expertise in exploration and production activities.

However, like noted by Infosys (2018), that true competitive advantage would come from the application of digitalisation beyond the traditional technology aspects, to enterprise-wide initiatives. One of such suggested non-traditional moves as highlighted in this research, is an integrated supply chain for the industry. But as BCG (2020) noted, that a first movers in this field must acknowledge that there is no perfect blueprint in the digital supply chain journey. The digital supply chain will change over time due to the rate of change in technology. Therefore digital structures should be built with such flexibility in mind, and use cases should be prioritised and the value obtained from the use cases, should be used to facilitate the next stage of the journey. In this case, SSA will be a right use-case to launch such a system, because of some of the obvious highlighted challenges that the system will address.

Adoption of such system will help reduce cost across board and help get the potential benefits from digitalisation. ETHealthWorld (2020), notes that in average supply chain cost about 20 to 30 % of the product delivery cost and therefore has a lot of room for improvement. Jones (2019) also noted that variation of digitalization adoption across the entire supply chain will reduce the value from efficiency and synergies by 50% of the expected targets, and therefore agreed with an adoption of such an integrated system that has a holistic approach to digital inclusion.

Mickensy 2019 report as quoted by SAP TV (2020), noted that 29 percent of companies in different industry are running a version of integrated supply chain within the firm at a global scale. While Skalex (2018), noted that this kind of integrated supply chain will enable stakeholders manage and monitor risk within the supply chain and track delivery of orders at every stage, bringing transparency and reducing operational cost within the industry.

## 5.2 LIMITATIONS

The findings of this study have to be seen through the lens of some limitations. There are more broader implications of the study's findings and suggestions that would affect its practicability that were not covered in the study. Issues like regulation on data ownership, cybersecurity, standardization and culture change, will all have to be addressed, before such a system 'goes to market'. Irrespective of this, the study aims to ignite the thought of stakeholders in the industry, towards non-traditional value streams that might seem to trespass beyond the current industry borders to other overlapping industries.

This type of research requires more time and human resources if the CSV opportunities of all the capabilities in most of the firms in OFS industry, are to be analysed. However, the study was limited by time and access to all the OFS operational in SSA. So, the study was narrowed to one firm and one combined capability. But the researcher ensured that one of the leaders in the industry was chosen and ensured that a key capability of the firm that overlaps with other capabilities was chosen.

There may be some possible limitation of selection bias in this study. Though 40 participants across the countries and functions were initially invited for the interview, there is a chance that the participants that accepted the request had previous interest in the topic and might

have views that are not representative. It is also possible that their perceived view does not represent the real state of knowledge or view of managers from other OFS companies. An extra effort to include few participants from outside the case study was used to regulate any bias that might exist. There might also be some researcher bias that might have influence the study, especially because the researcher is an employee of the firm chosen as case study.

There were also limitations in the options of primary data collection. It was not possible do a conduct the interview physically, because the managers were in different countries, and because the research was carried out during the period where lockdown restrictions and social distancing guidelines where in force. However, virtual platforms were used to overcome most of this limitation.

There is also a possibility of limitation due to participants bias. The oil and gas industry at the point of the research was experiencing a downturn, and this has the possibility of influencing the participants to be less optimistic about the industry. If this was the case it might influence the participants critique of the industry.

## 5.3 RECOMMENDATION FOR FUTURE RESEARCH

There are a few gaps in our knowledge around the research area that follow from our findings and would benefit from further research.

Further study will be required, to study the additional value that will be extracted from an integrated supply chain platform, and all the surrounding implications that might arise from implementation of such a system.

The research focused on the digital capabilities out of other group of capabilities, therefore it is also important to study the firm more to identify more non-obvious capabilities. Also, to explore ways in which other identified capabilities could be used to address societal and environmental issues.

Though a single case study chosen in this study, similar studies will be required on other firms in the oilfield service industry both international and local companies so as ensure that more of these CSV opportunities are identified and uncovered.

Further study will also be required to come up with a working framework that facilitates the collaboration of the stakeholders. Issues surrounding security of data, inclusion of government agencies into the platform, the right reward system for the platform host, level of access of data by each stakeholder, the required changes to be made in contracts for resale of items to occur.

Research might be required to understand the decision-making framework that will support managers decisions when it come CSV strategies. In order to guide managers, to identify and taking advantage of CSV opportunities and position their organization for competitive advantage.

Though this study shows that some of these ecosystem limitations are made up of set of factors that are related, further work would be required to identified the relationship each of these factors have on one another, because if this is know it will be easier to predict the effect addressing one of the factors will have on other factors.

## 5.4 CONCLUSION

Irrespective of the reservation on the suitability of 'Creating Share Value' strategies in the oil and gas industry and in particular the OFS industry, study shows that capabilities (and in particular digital capabilities) of the case study in the OFS industry could be used in a way consistent with the CSV strategies. Reservations exist because of the environmental footprints and other concerns associated with the exploration and production of fossil fuel by the industry. Nevertheless, CSV strategies could be used to reduce environmental footprints, improve society both in the new ways product and services are reconceived, the redefinition of the value chain and the strengthening of the ecosystem.

The aim of this work was centered around three objectives. To identify unique challenges affecting the OFS industry in SSA, in order to understand which of them has the greatest impact to operational performance. Secondly to analyze the underlying issues behind these challenges. Thirdly to understand how capabilities of OFSC can be used in providing customized solutions to the highlighted challenges (in SSA), in a way consistent to the CSV concepts and providing competitive advantage to the companies.

Though the unique challenges of the OFS industry in SSA and the underlying factor are at the surface similar across the industry, but the capabilities of the individual firms in the industry differ from firm to firm. These differences affect the firm's capacity to handle these challenges. Therefore, to make allowance for these differences in capabilities, and to properly frame the research question, a case study 'Schlumberger' was chosen from one of the leading OFS companies with wide operation footprint in SSA. This enabled a more in-depth study on the firm's capabilities using document collection and analysis method. The developed capability chart highlighted various standalone and combined capabilities of the firm. Amongst these capabilities the study was narrowed down to the digital capabilities, one of the combined capabilities of the firm.

Various challenges unique to SSA were identified by participants during the interview, and based on coding and category frequencies, 'logistics complexities' was identified amongst other challenges, as having the greatest impact on operational performance. This corresponds with 62% of the participants that specifically highlighted logistics as a major challenge in the region.

To understand the underlying factors behind these challenges, a more interpretative approach was used analyze these factors from participants transcripts. It was observed that these factors are so inter-related and work concurrently in a cycle. Indicating that a change of one of the factors will also affect some of the others. Ecosystem limitations made up of infrastructural and institutional deficits, Transparency issues, Government gaps, were identified. However the relationships between these factors were not analyzed as it was outside the scope of this study, but it will be recommended for further studies. The positive news is that addressing any one of these highlighted factors will most likely influence some other factors downwards.

A representative approach was used in addressing research question three. This is because individual firms in the OFS have their own unique capabilities and grouping them as one would not be appropriate. Therefore, a single case study 'Schlumberger' was chosen based on its portfolio and geographical spread and based on access to the researcher. Also, digital capabilities, one of the various capabilities of the firm was also single out because of the complexities of consequential reasoning in analysing every standalone or combined capabilities of a firm against its potentials of achieving CSV framework. Results from stage 1 of the research (document collection and analysis) show that they are current reconceiving

of product and services lead to a safer and environmentally friendly products, and on their own consistent to the CSV concepts. However, they do not address the earlier identified challenges, and are therefore not the focus of this study.

Moreover, findings and analysis indicate that the digital capabilities of the firm are capable of closing the gap between the identified operational interfaces that exists in the various overlapping value chain related to the upstream oil and gas industry. The digital capabilities could be used to facilitate digital inclusion of stakeholders in these value chain, (government and local third parties included). This can be achieved by digitally integrating the supply chain and ensuring that every stakeholder in all the overlapping value chains are integrated. This will lead to increased efficiency, improved logistics and supply chain processes, improved transparency, improved collaboration and partnership, improved forecasting and inventory management, more local participation, reduced cost of business and provide opportunities of new value creation. It will be one of the few opportunities where the OFSC will lead the way in providing a platform that could help bring the stakeholders of the upstream oil and gas industry to the table. The value from these sets of benefits will most likely give any firm competitive advantage. These benefits also align with the objectives of the CSV and we can therefore say that there is an intersection between 'Creating Shared Value Concepts' and digitalization objectives in the industry, which has the ability to give a firm competitive advantage.

With the CSV opportunities achieved in this case study, even though there is no claim that these identified opportunities are generalisable to other OFS companies, but one thing is certain, that CSV strategies are practicable in the oilfield service industry in SSA. It also highlights the importance of digitalisation in achieving such CSV strategies. The structure of this research is such as to highlight the potential usage of CSV strategies so as to enable individual firms to be assured of the possibility and suitability of this concept in achieving business goals thereby spurring up desires by different firms in the industry to explore to identify their own CSV strategies.

Though product/service differentiation which is one of the main aims of most digitalisation projects is a good way to be differentiated, combining it with value chain solutions will aid in further differentiation, and create additional value for the customer. The case study has 'go

to market' solutions and robust digital foundations that can facilitate this kind of endeavour. The DELFI cognitive E & P environment is currently operational and has been used to host digital applications and platforms used to integrate customer focused value chains and workflows within the upstream industry. Using the DELFI environment to host the integrated supply chain will require an increase in the scope, to include other stakeholders in the supply chain and creating a visual digital representation for all items used for each project.

## REFERENCES


Aakhus, M., and Bzdak, M., 2012. Revisiting the Role of "Shared Value" in the Business-Society Relationship. Business & professional ethics journal. 31(2), 231- 246.

Andrews, K., R., 1971. The concept of corporate strategy. Homewood: Richard D. Irwin

Barney, J., 1991. Firm Resources and Sustained competitive Advantage. Journal of Management. 17(1), 99-120

Beschorner, T., and Hajduk, T., 2017. Creating Shared Value. A Fundamental Critique. In: Wieland J. (eds) Creating Shared Value – Concepts, Experience, Criticism. Ethical Economy (Studies in Economic Ethics and Philosophy). Vol 52. Springer, 27-68.

Beschorner, T., 2013. Creating Shared Value: The One-Trick Pony Approach. Business Ethics Journal Review. 1(7), 106 – 112

Botes, A., Lane, A., Edinger, H., 2019. The new frontier-Winning in the African oil and gas industry [online]. Available from: https://www2.deloitte.com/us/en/insights/industry/oil-and-gas/africa-oil-gas-industry-energy-reserves.html [Accessed 15 October 2019]

Camarena-Martinez, J. L., Ochoa-Silva, B., and Wendlandt-Amezaga, T. R., 2016. Exploring the Origins of Creating Shared Value in the CSR Literature. International Journal of Business and Management. Canadian Center of Science and Education. 11(12), 97 – 109

Chandler, A. D., 1962. Strategy and Structure. Cambridge: Massachusetts Institute of Technology Press

CNBC International TV, 2018. Energy Sector (B2C) I.O.T. Powering the Digital Economy [video, online]. Available from: https://www.youtube.com/watch?v=ExMzdN4bfOI[Accessed 11 December 2019]

CNBCAfrica, 2015. Africa's oil and gas potential despite fall in crude prices [video, online]. Available from: https://www.youtube.com/watch?v=ts85Ka383cM&t=469s [Accessed 11 December 2019]

Corbin, J., and Strauss, A., 2008. Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory. Sage Publications.

Crane, A., Palazzo, G., Spence L. J., and Matten, D., 2014. Contesting the Value of the Shared Value Concept. California Management Review. 56(2), 130-153

Dembek, K., Singh, P., and Bhakoo, V., 2016. Literature Review of Shared Value: A Theoretical Concept or a Management Buzzword? Journal of Business Ethics. 137 (1), 231–267

Denning, S., 2011. Why 'Shared Value' Can't Fix Capitalism [online]. Available from: https://www.forbes.com/sites/stevedenning/2011/12/20/why-shared-value-cant-fix-capitalism/#60af324244d1 [Accessed 19 December 2019]

Donaldson, T., 2014. Shared values that are lost in translation. Financial Times [online]. Available from: https://www.ft.com/content/bfdfff94-b34c-11e3-b09d-00144feabdc0 [Accessed 19 December 2019]

Dyllick, T., 2014. The opposing perspectives on creating shared value [online]. Available from: https://www.ft.com/content/88013970-b34d-11e3-b09d-00144feabdc0[Accessed 19 December 2019]

Eisenhardt, K. M., and Martin, J. A., 2000. Dynamic capabilities: what are they? Strategic Management Journal. 21(10), 1105 -1121.

ETHealthWorld, 2020. Supply Chain 4.0: Decoding the Emerging Digital Supply Chain Biz Models [video, online]. Available from: https://www.youtube.com/watch?v=az6cnE9IvZg [Accessed 22 June 2020]

Fizz Digital Innovation Opening Forum by Chetan Desai, 2018. Reviewing the status of the Digital Transformation in our industry [video, online]. Available from: https://web.microsoftstream.com/video/086183fb-9307-479e-ac10-91dfd7c03ec1 [Accessed 2 June 2020]

Fizz Opening Forum by Chetan Desai, 2019. State of Schlumberger Digital Technology [video, online]. Available from: https://web.microsoftstream.com/video/51590657-de04-4bca-a890-d9dcae588ea5 [Accessed 2 June 2020]

Fortune Business Insights, 2020. Digital Oilfield Market worth USD 34.58 Billion by 2026; Collaboration Between Microsoft, Chevron, and Schlumberger to Promote Market Expansion, states Fortune Business Insights [online]. Available from: https://www.globenewswire.com/news-release/2020/01/23/1974071/0/en/Digital-Oilfield-Market-worth-USD-34-58-Billion-by-2026-Collaboration-Between-Microsoft-Chevron-and-Schlumberger-to-Promote-Market-Expansion-states-Fortune-Business-Insights.html [Accessed 21 June 2020]

FSG, 2014. Extracting with Purpose: Creating Shared Value in the Oil and Gas and Mining Sectors; Companies and Communities [online]. Available from: https://www.issuelab.org/resources/extracting-with-purpose-creating-shared-value-in-the-oil-and-gas-and-mining-sector-companies-and-communities.html [Accessed 10 Jan 2020]

Garcia, R., Lessard, D., and Singh, A., 2014. Strategic Partnering in Oil and Gas: A Capabilities Perspective. Energy Strategy Reviews, in press 2014. 3(1), 21 -29.

GDS Summits, 2019. Upstream Digital Transformation: Fundamentals, challenges, opportunity. [video, online]. Available from: https://www.youtube.com/watch?v=62ytSDYjuuw [Accessed 22 June 2020]

Geipel, J., 2015. When is Shared Value the right approach? Shared Value Initiative Community [online]. Available from: https://www.sharedvalue.org/groups/when-shared-value-right-approach [Accessed 19 December 2019]

GeoExpro, 2019. Oil and Gas Challenges and Opportunities in Africa [online]. Available from: https://www.geoexpro.com/articles/2019/09/oil-and-gas-challenges-and-opportunities-in-africa [Accessed 19 December 2019]

Glaser, B., and Strauss, A., 1967. The Discovery of Grounded Theory: Strategies for Qualitative Research. Mill Valley, CA: Sociology Press.

GlobalData Thematic Research 2019. Digital oilfield: Leading companies and service providers named [online]. Available from: https://www.offshore-technology.com/comment/digital-oilfield-leading-companies/ [Accessed 20 June 2020]

Hampton, L., 2019. Oil service firms eye new survival tactics amid weak U.S. market[online]. Available from: https://www.reuters.com/article/us-usa-oilfield-slump-focus/oil-service-firms-eye-new-survival-tactics-amid-weak-u-s-market-idUSKCN1UC2DX[Accessed 10 Jan 2020]

Harrison, H., Birks, M., Franklin, R., and Mills, J., 2017. Case Study Research: Foundations and Methodological Orientations. Forum: Qualitative Social Research, 18(1), 1-17

Hartman, L.P., and Werhane, P.H., 2013. Proposition: Shared Value as an incomplete mental model. Business Ethics Journal Review. 1(6), 36-43

Heikkurinen, P., 2018. Strategic corporate responsibility: a theory review and synthesis. Journal of Global Responsibility. 9(4), 388 – 414

Helfat, C. E., and Winter S. G., 2011. Untangling dynamic and operational capabilities: Strategy of the (n)ever-changing world. Strategic Management Journal. 32(11), 1243 - 1250

Henderson R. M., and Clark, K. B., 1990. Architectural Innovation: The Reconfiguration of Existing Product Technologies and the failure of Established Firms. Administrative Science Quarterly. 35(1), 9-30

Hiddemen, T., Blackford, T., Howell, E., and Warren, L., 2018. Integrated planning for a dynamic oil and gas industry- Insight from an inaugural survey of upstream planning practices. Houston: 3esi-Enersight

Hokroh, M. A., 2014. Analysis of the oil and gas industry's competitiveness using Porter's five forces framework. Global Journal of Commerce and Management Perspective. 3(2), 76- 82

Infosys, 2018. The disruption in oil and gas upstream business by industry 4.0 [online]. Available from: https://www.infosys.com/engineering-services/white-papers/documents/disruption-oil-gas-upstream.pdf [Accessed 22 June 2020]

Jones V., 2019. Oil Industry Can Save $100B with Automation, Digitalization. Rigzone. [online]. Available from: https://www.rigzone.com/news/oil_industry_can_save_100b_with_automation_digitalization-08-oct-2019-160010-article/ [Accessed 21 June 2020]

Kanter, R. M., 1999. From Spare Change to Real Change. The Social Sector as Beta Site for Business Innovation," Harvard Business Review. 77(3), 122-128

Kramer, M. R., and Pfitzer, M. W., 2016. The Ecosystem of Shared Value. Harvard Business Review. October 2016, 80-89.

Lamb, R.B., 1984. Competitive strategic management. Englewood Cliffs, NJ: Prentice-Hall,

Lee, J., 2017. The Limits of Consequential Reasoning in Shared Value Creation. Competitiveness Review, Forthcoming. Available from: https://ssrn.com/abstract=3043866 [Accessed 15 December 2019]

Levinthal, D.A. 2011. A behavioral approach to strategy—what's the alternative? *Strategic Management Journal*. 32(13) 1517-1523

Mair, J. and Marti, I., 2006. Social Entrepreneurship Research: A Source of Explanation, Prediction, and Delight. Journal of World Business. 41(1), 36-44

Mintzberg, H. 1996. Five Ps for Strategy. In: Mintzberg, H. and Quinn, J.B., Eds., The Strategy Process—Concepts, Contexts, Base, 3rd Edition, Prentice Hall, Upper Saddle River, 10-17.

Morgan, G., and Smircich, L., 1980. The Case for Qualitative Research. Academy of Management Review. 5(4) 491-500

Nayak, J. K. and Singh, Y., K., 2015. Fundamental of Research Methodology: Problems and Prospects. New Delhi: SSDN Publishers & Distributors

Porter, M.E., 1979. How competitive forces shape strategy. Harvard Business Review, March 1979.

Porter, M.E., 1980. Competitive Strategy: Techniques for Analysing Industries and Competitors, Free Press: New York, NY.

Porter, M.E., 1985. Competitive Advantage: Creating and Sustaining Superior Advantage, Free Press: New York, NY.

Porter, M.E., 2018. Creating Shared Value: An Inflection Point in the Making[online]. Available from:https://sharedvalue.org.au/porter-shared-value-exciting-inflection-point/[Accessed 10 Jan 2020]

Porter, M.E. and Kramer, M.R., 2002. The competitive advantage of corporate philanthropy. Harvard Business Review. 80(12) 56-68.

Porter, M.E. and Kramer, M.R., 2006. The Link Between Competitive Advantage and Corporate Social Responsibility. *Harvard Business Review*. 12(1), 78-92.

Porter, M.E. and Kramer, M.R., 2011. Creating shared value. Harvard Business Review. 89(1), 62-77.

Porter, M.E. and Kramer, M.R., 2014. A response to Andrew Crane et al.'s California Management Review. 56(2),149-151

Preston, P., 2018. Answering the critics od shared value. Corporate Social Responsibility, Creating Shared Value, Leadership [online]. Available from:https://philpreston.com.au/answering-critics-of-shared-value/[Accessed 10 Jan 2020]

Remenyi, D., Williams, B., Money, A., and Swartz, E., 1998. Doing Research in Business and Management. London: Sage

Reyes, G., Scholz, M., and Smith N. C., 2017. Beyond the "Win-Win": Creating Shared Value Requires Ethical Frameworks. California Management Review. 59(2), 142- 167.

Saldana, J., 2013. The Coding Manual for Qualitative Researchers. 2nd Edition. London: SAGE

SAP TV 2020 The Digitalization of supply Chains [video, online]. Available from: https://www.youtube.com/watch?v=y1wA-C2Q_1s [Accessed 22 June 2020]

Saunders, M., Lewis, P., and Thornhill, P., 2009. Research methods for business students. 5th Edition. Harlow:Pearson Education Limited.

Schlumberger Limited, 2018. 2017 Annual Report [online]. Available from: http://media.corporate-ir.net/media_files/IROL/97/97513/2017AR/interactive/internet-center.html [Accessed 10 March 2020]

Schlumberger Limited, 2019. 2018 Annual Report [online]. Available from: https://investorcenter.slb.com/static-files/26a0c7a1-58ce-4903-b10f-41af7ea18169 [Accessed 10 March 2020]

Schlumberger Limited, 2020. 2019 Annual Report [online]. Available from: https://investorcenter.slb.com/static-files/02610827-ca39-4016-94e1-e3bbdf19ed8f [Accessed 10 March 2020]

Skalex, 2018. Supply Chain Transparency Isn't Optional: Why Blockchain is Part Of, But Not the Whole Solution [online]. Available from: https://www.skalex.io/supply-chain-blockchain-transparency/amp/ [Accessed 20 June 2020]

Stonehouse, G., and Pemberton, J., 2002. Strategic Planning in SMEs-Some Empirical Findings. Management Decision [online]. 40(9), 853-861.

Teece D. J., Pisano, G., and Shuen, A., 1997. Dynamic capabilities and strategic management, Strategic Management Journal [online]. 18(7), 509 – 533

Wethe, D., 2019. Oilfield service industry fighting for life in a world of cheap oil [online]. Available from: https://www.worldoil.com/news/2019/7/2/oilfield-service-industry-fighting-for-life-in-a-world-of-cheap-oil [Accessed 10 October 2019]

Wilden, R., Devinney, T. M., Dowling G. R., 2016. The Architecture of Dynamic Capability Research: Identifying the Building Blocks of a Configurational Approach. Academy of Management Annals [online]. 10(1), 997- 1076

World Economic Forum 2017. Digital Transformation Initiative-Oil and Gas Industry. Availabe from:https://reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/dti-oil-and-gas-industry-white-paper.pdf [Accessed 22 June 2020]

## BIBLIOGRAPHY


Afonina, A., and Chalupsky, V., 2012. The Current Strategic Management tools and Techniques: The Evidence from Czech Republic. Economics and Management Journal. 17(4), 1535 -1544.

Ati, N., Brinkman, M., Peacock, R., and Wood, C., 2016. The oil field services, and equipment market escapes its free fall [online]. Available from: https://www.mckinsey.com/industries/oil-and-gas/our-insights/the-oil-field-services-and-equipment-market-escapes-its-free-fall [Accessed 10 October 2019]

AtlanticCouncil Global Energy Forum, 2020. Financing the upstream in an ESG World [video, online]. Available from: https://www.youtube.com/watch?v=AWJ4djTMgFg [Accessed 20 June 2020]

AtlanticCouncil Global Energy Forum, 2020. The role of the oil and gas industry in the energy transition [video, online]. Available from: https://www.youtube.com/watch?v=kFyygqjOjNE [Accessed 20 June 2020]

Bakerinstitute with Michelle Foss, 2020. The Future of Oil Services [video, online]. Available from: https://www.youtube.com/watch?v=wd1kt-plTw4 [Accessed 19 June 2020].

Bhandari, A., 2018. IIMA PGPX Speaker Series-Ashish Bhandari, CEO-GE speaks on Digital Transformation [video, online]. Available from: https://www.youtube.com/watch?v=J9N9sotT_f4 [Accessed 2 June 2020]

Boston Consulting Group, 2020. Digital Supply Chain of the Future [video, online]. Available from: https://www.youtube.com/watch?v=ZCmndpTNRb4 [Accessed 22 June 2020]

Bryman, A., and Bell, E., 2015. Business Research Methods. 4th edition. Oxford: Oxford University Press.

Crowley, K. 2020. A tale of two oil giants, with two strategies that aren't working [online]. Available from: https://www.worldoil.com/news/2020/1/31/a-tale-of-two-oil-giants-with-two-strategies-that-aren-t-working [Accessed 19 December 2019]

Danesh, M. H., and Yu, E., 2015. Architecting Enterprise Capabilities: Creating Dynamic Capabilities from IT and Software Architecture. University of Toronto, Canada.

Dulock, H., L., 1993. Research Design: Descriptive Research. Journal of Paediatric Oncology Nursing. 10(4), 154-157

Eberhart, D., 2019. Oil Services Sector Ripe for Restructuring to Boost Tight Profit Margins [online]. Available from:https://www.forbes.com/sites/daneberhart/2019/06/29/oil-services-sector-ripe-for-restructuring-to-boost-tight-profit-margins/#4fd977c27029 [Accessed 19 December 2019]

England, J., 2020. The arc of innovation in the oil and gas industry- Using US patent databases to track trends. Deloitte & Touche LLP [online]. Available from: https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/tracking-innovation-in-oil-and-gas-patents.html [Accessed 10 Jan 2020]

Financial Times, 2020. Is digitisation the fourth stage of the hydrocarbon revolution? [video, online]. Available from: https://www.ft.com/content/ac95843c-f02b-11e9-a55a-30afa498db1b [Accessed 22 June 2020]

Kothari, C., R., and Garg, G., 2014. Research Methodology. Third Edition. New Delhi: New Age International Publishers

Law Office of Jeff Williams PLLC, 2020. Oil and Gas intellectual Property. Law Office of Jeff Williams PLLC [online]. Available from: https://txpatentattorney.com/industries-served/oil-and-gas-patent-attorney [Accessed 10 Jan 2020]

Leke, A., Signe, L., 2019. Spotlighting opportunities for business in Africa and strategies to succeed in the world's next big growth market. McKinsey & Company. Available from: https://www.brookings.edu/research/spotlighting-opportunities-for-business-in-africa-and-strategies-to-succeed-in-the-worlds-next-big-growth-market/ [Accessed 2 June 2020]

Microsoft in Business Digital Leaders Series with Jacky Wright and Brad Anderson, 2017. Episode 1: Culture Change: The key to Digital Transformation. [video, online]. Available from: https://www.youtube.com/watch?v=7D23HzXsFfw [Accessed 2 June 2020]

Ponterotto, J. G., 2006. Qualitative Research in Counselling Psychology: A Primer on Research Paradigms and Philosophy of Science. Journal of Counselling Psychology. 52(2),126-136

PowerShell, 2018. State of the Art by Jeffrey Snover [video, online]. Available from: https://www.youtube.com/watch?v=us4HTxtjfa8[Accessed 2 June 2020]

Qehaja, A. B., Kutllovci, E., and Pula, J. S., 2017. Strategic Management Tools and Techniques: A Comparative Analysis of Empirical Studies. Croatian Economic Survey. 19(1), 67-99

Raja, J., 2015. Critical Exploration of Prescriptive and Emergent approaches to Strategic management: A review paper. International Journal of Information, Business and Management. 17(1), 99-120

Scotland, J., 2012. Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms. Canadian Centre of Science and Education. 5(9), 9-16

Shadid, W. K., 2017. A framework for managing organizations in complex environments. Construction Management and Economics Journal. 36(4) 182 -202.

Singh, Y., K., 2006. Fundamental of Research Methodology and Statistics. New Delhi: New Age International Publishers

TiEcon 2015. Big Data, IoT, & Cloud: Game Changers in the Oil & Gas Industry. TiE Silicon Valley [video, online]. Available from: https://www.youtube.com/watch?v=lXVgpzdeABs [Accessed 8 June 2020]

Tomaskovic-Devey, D., 2016. Industry Employment Brief: Employment Patterns in the Oil & Gas Industries Center for Employment Equity, University of Massachusetts, Amherst
Walliman, N., 2011. Research Methods: the basics. London: Routledge

World Bank-Global voices Series with Lana Wong and Paula Ingabire 2019. Digital Transformation in Africa. [video, online] Available from: https://www.youtube.com/watch?v=rlhuHU94ud0 [Accessed 25 May 2020].

Wright, R. P., Paroutis, S.E., and Blettner, D. P., 2013. How Useful Are the Strategic Tools We Teach in Business School? Journal of Management Studies. 50(1), 92-125

Appendix 4.1: Demographics of participants

| S/N | IDENTITY NUMBER | YEARS EXPERIENCE IN THE INDUSTRY | HOW MANY OFSC WORKED IN | MAIN AREA OF EXPERIENCE | GENDER | COUNTRIES IN SSA WORKED IN | EXPECTED EXPOSURE METRICS | DATE OF ACTUAL INTERVIEW | RECORDED | ACTUAL EXPOSURE METRICS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | P1 | 20 | 1 | OPERATIONS/SALES | MALE | 1 | 5 | 02/05/2020 | YES | 7 |
| 2 | P2 | 15 | 3 | OPERATIONS/SALES | MALE | 3 | 8 | 03/05/2020 | YES | 9 |
| 3 | P3 | 22 | 3 | OPERATIONS/SALES | MALE | | 9 | 03/05/2020 | YES | 9 |
| 4 | P4 | 11 | 1 | LOGISTICS | MALE | 1 | 5 | 04/05/2020 | YES | 5.5 |
| 5 | P5 | 12 | 1 | OPERATIONS/SALES | MALE | 2 | 8 | 05/05/2020 | YES | 7 |
| 6 | P6 | 14 | 1 | OPERATIONS/SALES/LOGISTICS | FEMALE | 2 | 8 | 06/05/2020 | YES | 8 |
| 7 | P7 | 9 | 1 | OPERATIONS/LOGISTICS | FEMALE | 2 | 7 | 06/05/2020 | YES | 5.5 |
| 8 | P8 | 8 | 1 | OPERATIONS | MALE | 4 | 6 | 07/05/2020 | YES | 6 |
| 9 | P9 | 20 | 1 | OPERATIONS/SALES | MALE | 2 | 8 | 07/05/2020 | YES | 9 |
| 10 | P10 | 7 | 1 | OPERATIONS/SALES | MALE | 3 | 6 | 09/05/2020 | YES | 6 |
| 11 | P11 | 18 | 1 | OPERATIONS/SALES/HR | FEMALE | 5 | 9 | 13/05/2020 | YES | 9 |
| 12 | P12 | 9 | 1 | OPERATIONS/SALES | FEMALE | 2 | 6 | 15/05/2020 | YES | 5.5 |
| 13 | P13 | 8 | 1 | OPERATIONS/SALES | MALE | 4 | 8 | 15/05/2020 | YES | 6.5 |
| 14 | P14 | 14 | 1 | OPERATIONS/SALES | MALE | 5 | 8 | 17/05/2020 | YES | 8 |
| 15 | P15 | 11 | 1 | LOGISTICS | MALE | 3 | 7 | 20/05/2020 | YES | 6.5 |

*Appendix 4.2: DedooseChartExcerpts_2020_6_8_133*

| interface | Excerpt Copy | Codes Applied Combined |
|---|---|---|
| 0 | , for the ISS national service companies and the locals has to do with supply chain management. | SUPPLY CHAIN COMPLEXITIES |
| 1,2,3,4 | And let me break that down to lead times, lead times, and of course in some fashion in Africa, taxes vary from country to country. Freight charges vary from country to country. | SUPPLY CHAIN COMPLEXITIES |
| 1, | send the money out to A or B without the consent of both. And how much, okay. So what I really wanted to say about supply chain has to do with lead times. Lead times. The ISCs have OEMs (Original equipment manufacturers), and they have plants all over the world. For example, Weatherford has Abu Dhabi, Dubai transit camps when SSA was a region they wanted to do a landing point in Cape town. Why? Because the freight charges are zero for South Africa. I mean, there are classifications executive, um, um, uh, items just like you have the presidency, that items that are not in the call, it's only the executive, uh, president or vice president, then that makes that call, others have to pass through the national assembly, for example. So for oilfield equipment in South Africa, if at all there is any custom charge it is a near zero. So it helps them to develop because why? Yeah. Generating employment on the paying taxes. So they're contributing to, uh, government governance and revenue to run the country.<br><br>Yeah. Uh, in Nigeria it's a double digit interest rate and that hearts, so supply chain management and the lead time is a big thing for both the ISE and the local companies, the local content partners, the NCPS, you know, so | SUPPLY CHAIN COMPLEXITIES |
| 2,3 | Another thing that disrupts supply chain has to do, particularly with the OEM and their manufacturing plant and scheduling. They look at the projects are bringing big money. They can suspend your manufacturing and give you one excuse because they look at which one brings money in more. Yeah. And who pays money upfront? Say for example,Chevron pays, for a project of 5 million, they've already paid 3 million. You will jump the queue on fast track and make sure you produce that equipment so that it can do the project for Chevron. That I know exactly. And nobody's going to tell you that knew why you skipped. I mean you default in the mid time for supplying because supply chain is probably $1 million or 500,000 okay. Because business is all about money, man. Yeah. Business is all about money. | SUPPLY CHAIN COMPLEXITIES |
| 2 | n SSA my main challenge is SSO, so on the SSO side, we've been struggling the most. let's say you have a client that needs a BIT in GABON and you have allocated the BIT in ANGOLA, for you to be able to export a bit that has already been located, you can spend up to two months, with local exporter clearing team in Angola, | SUPPLY CHAIN COMPLEXITIES |
| Kanu | We, have lost so many opportunities just because we couldn't have a correct lead time of delivery and it is the main challenge in SSA. | SUPPLY CHAIN COMPLEXITIES |

| | | |
|---|---|---|
| 4,2 | so on top of that, the sso team, the logistic guys are really not fast to reply. I am not sure if they are overwhelmed or they are undertrained, but you know, even though you pay so much, you end up only being able to deliver after three or four months with constant follow up. | SUPPLY CHAIN COMPLEXITIES, HUMAN RESOURCE CHALLENGE |
| 1 | We cannot compete like this. If you take a market like Europe that can easily move something from Paris to Amsterdam very easy, they are way more efficient. | SUPPLY CHAIN COMPLEXITIES |
| 4 | our business system is way too cumbersome, so for the third party to be paid, you need to put a PO on the system, the chain of approval is very heavy. We have different objectives, | WORKFLOW & PROCESS IMPROVEMENT, SUPPLY CHAIN COMPLEXITIES |
| 4 | in Congo, they can deliver to Gabon in two weeks, when you ask your sso or parent team in Gabon, they will tell you that they are not only processing, but processing, cementing, completion, everybody. So for everybody, they need to go get a cheque, pay customs, clearing agents, so the system is so heavy you have constant follow up, things are not moving, and payments are not done on time | SUPPLY CHAIN COMPLEXITIES, MICRO BUSINESS OUTLOOK UNCERTAINTIES |
| Kanu | The biggest challenge in SSA for me is logistics. M | SUPPLY CHAIN COMPLEXITIES |
| 1 | Most of the countries re not connected by road, even when some are connected by road, | SUPPLY CHAIN COMPLEXITIES |
| 1 | the customs process are not so smooth to allow easy circulation. They're challenges with transportation, customs clearance | SUPPLY CHAIN COMPLEXITIES |
| 2 | When we came back from that downturn, it was very challenging to move things | SUPPLY CHAIN COMPLEXITIES |
| 2 | In the past, for example when the activities were busy, even ourselves in my Company, we were able to have our rented, dedicated flight, we had dedicated vessels that were going around SSA countries 2-3 times a week so we were able to move people. We also had some chattered vessels we were renting and were able to move it to wherever we wanted, so it was also easy to move some of the equipment and spare part and so on, | DIRECT FINANCIA STRAIN, INFRASTRUCTUR DEFICITS, MICRO BUSINESS OUTLOOK UNCERTAINTIES, SUPPLY CHAIN COMPLEXITIES |
| 0 | We used to have long term projects, 2 or 3 years contract, so you work on a kind of continuous project, but when we came back, it was now towards the clients move. A lot of start up and very few long term project. | SUPPLY CHAIN COMPLEXITIES |

| | | |
|---|---|---|
| 4 | hat challenge added up to the limited logistic, and a lot of start up operation which requires to move things. The other challenge we have been having after the previous downturn was that a lot of equipment were idled, and they were left without regular inspection or maintenance, so when we started up the project, we had to go through challenging reactivation of the equipment, reactivation of some bases, for example the base in Equatorial Guinea, Gabon,Ivory Coast was idle for a while, so when we had to resume the operation it was very expensive and challenging to reactivate everything, and most of the times, the contracts were not covering for all those reactivation cost, so it was also challenging to make the profit in some of the countries. | SUPPLY CHAIN COMPLEXITIES |
| 2 | he DHL, when SSA was busy, you were having a lot of flights, but when the downturn came sometimes to get a piece from Douala to Ghana, you will have to go to Duoala, Nigeria and so on. For example we needed to ship something from Gabon to EG, the DHL flights needed to go to 4 other countries before going to EG. This is because they need to have the volume, because they can't go empty, and even on the vessel for example, they will make a plan to sail, or to call some ports and sometimes they will change the plan because they could not get enough cargo, and then if you were planning on that, you might need to chatter vessel if you cannot wait. | INFRASTRUCTURA DEFICITS, SUPPLY CHAIN COMPLEXITIES |
| 2 | There were also a lot of transportation and a lot of possibility to move resources, but this time, the opportunity has been very limited an sometimes they cancel easily | MICRO BUSINESS OUTLOOK UNCERTAINTIES, SUPPLY CHAIN COMPLEXITIES |
| 0 | We should review our lead time and not be shy to tell the client if we need four or five months to get things there. We need to engage the client early to explain some of these issues and try to get the award , PO etc ahead of time to start the process in time. Even the chemical providers will only produce if we order and we also only order if we have the contract. i remember that there was a study we did once and realised that there were some chemicals that the lead time was almost 5 to 7 months. There chemicals that you cannot keep on the shelf, the manufacture will only mix them when you order. By the time you order if the manufacturers are working on other orders, the will provide you longer lead time | CUSTOMER FOCUSED PARTNERSHIP, SUPPLY CHAIN COMPLEXITIES |
| 2 | By the time you order if the manufacturers are working on other orders, the will provide you longer lead time, by the time they are done you need the logistics to takeover and start now to search for transportation, once that is scheduled the vessel will take about 5 to 6 weeks for before it arrives | SUPPLY CHAIN COMPLEXITIES |
| 1 | and when that arrives the custom can take about 3 weeks for clearance | SUPPLY CHAIN COMPLEXITIES |
| 1,2,3 | The biggest challenge we face in SSA is logistics. Moving things between countries, or bringing in equipment from outside, | SUPPLY CHAIN COMPLEXITIES |
| 1 | ou have seen in a recent example, where we tried to bring in some Liner Hanger accessories from Congo to Angola, it took us several months and lot of effort on the Import-Export Team on both sides. So this is where we have most of the challenges that leads to delay, because it's time consuming. | SUPPLY CHAIN COMPLEXITIES |

| | | |
|---|---|---|
| 1 | The main thing for me is logistics, I think we have a huge infrastructure challenge in this region and logistic is a big problem mostly in terms of time delay, in terms of cost, because the cost of the logistic is high. | SUPPLY CHAIN COMPLEXITIES |
| 2 | Mainly because of these two things, it's very very difficult to define with some level of certainty how long it's going to bring one equipment or even personnel from point A to point B. It's difficult to forecast how long it will take, it's difficult to forecast how much it will cost, | MICRO BUSINESS OUTLOOK UNCERTAINTIES, SUPPLY CHAIN COMPLEXITIES |
| 1 | because we have a lot of rules to be compliant with and we are still spending a lot of monies to pay the penalties for non-conformance. I think from my point of view, logistics for both goods movement and personnel movement is a big challenge | SUPPLY CHAIN COMPLEXITIES, DIVERSE BUSINES OUTLOOK, HUMAN RESOURCE CHALLENGE |
| 2 | I would say the Complexity of the Geo-Market, because the SSA is made of 37 countries, (from North,South, East, West) That is the unique challenge of SSA. Angola is a great example, for you to come to Congo from Angola, you need to travel all the way to Addis Ababa or South Africa to get down to Pointe Noire, which are across boarder, I would say they are boarder countries and it take you 7-9, sometimes 12hrs from Angola to Pointe Noire. To move from Angola to Nigeria, you can say how difficult it is for you as you might have to go to various location first. So here is the unique challenge in SSA. The Geo-Market itself is spread within several Geo-Zone or Geo-Unit i would say in the way the operate. to move from one place to the other is a hastle, so to move around is difficult and as a company has to make sure that individuals travel using the approved airlines, reducing the risk of having any crash or any issue. The same applies for goods as well, because we will not just use any truck, taxi or plane around just to move our cargo with the risk that we can loose our cargo on the way, we have damages and so own. So i wount talk about any fuction at all but the uniqueness of the location. | DIVERSE BUSINES OUTLOOK, INFRASTRUCTUR DEFICITS, SUPPLY CHAIN COMPLEXITIES |
| Kanu | If you talk about the Organisation itself as in SSA and maybe what could be an "handicap" to operate in certain locations, I would say Yes, logistics is it, because it's not easy to move people and goods | SUPPLY CHAIN COMPLEXITIES |

| | | |
|---|---|---|
| 2 | Logistics itself is not easy because of all the interface with third parties. However, I'll rather call logistics a challenge rather than an issue, but it is just that the geomarket is spread and though there are boarder countries it is still not yet easy to move things around, though there might be other informal ways of moving things around this boarder countries but they are not approved by the company. and secondly the spread from west africa , central africa, east africa and all that in one geomarket so it is difficult to utilize same resources and because we are Oil & Gas Company and not a transport company, we do not have the trucks , vessels and planes lineup on standby waiting for call hence the difficulty in moving from on point to another. We rely on other companies and third part personnel to make our services happen.<br><br>So yes logistic is a challenge, one because of the geographical spread and in addition Transportation option is another challenge, administrations that are very manual is another challenge. | SOCIAL ISSUES, SUPPLY CHAIN COMPLEXITIES, DIVERSE BUSINES OUTLOOK, INFRASTRUCTUR DEFICITS |
| 1 | Another challenge as well is the processes which is not internal but external to Schlumberger which we need to comply with and it can create bottle neck in the way of operating. Fo me i wish that i can deliver as soon as possible like amazon, i am not saying we should not improve our supply chain, yes we have to but we are not solely a retail, sales or online company, we are Oil & Gas Company and that is what we provide first to the client and of course we need to have to goods available so that we can provide the service. | SUPPLY CHAIN COMPLEXITIES |
| 2,1 | You don't approach every job based on previous experience in a different domain. In some domains, yes, its suppose to be the same because it's the same organization and we're doing the same processes but unfortunately, for instance in U.K, when they want to import or export something out, they get through the system of custom online, send a documentation of the information they want, attach it and wait few minutes to get customs approval online, print it out and call the supplier to collect the cargo and ship it to the airport or to the port, here, we don't have it at all. Yes the process internal before we get to that part is the same for everybody, but when it get to the import or export process, there we have the differences and challenges, because here we depend on an organization where you need to get personnel, sitting on desk, having a pen to sign paper work and if that paper is not signed physically for you, nothing is gonna happen for you. How do you overcome this? | VALUE CHAIN IMPROVEMENT, SUPPLY CHAIN COMPLEXITIES |
| 1,2,3,4 | o, compared to other locations, I would say the biggest challenge is the lead time for ordering equipment | SUPPLY CHAIN COMPLEXITIES |
| 3,2 | .... they can just call supply and then will get what they want in one week from then. For us, if we have an order coming by sea, if the order is big, we need to think that probably the boat will take between one month to two months to reach location, so this is huge and like this...we're obliged to plan 6 months in advance minimum. Then you have also exworks right? So, I think the biggest challenge is lead time for equipment. We really need to plan in advance compared to other locations I would say, and then | SUPPLY CHAIN COMPLEXITIES |
| 1 | when you know that you're not gonna get equipment out of customs a | SUPPLY CHAIN COMPLEXITIES |

| | | |
|---|---|---|
| 0 | s more... I would say, probably first of all, activity right? You need to make sure that this client will come back to you and not going to call your competitor for example, and then this should be something like.. okay, this project is happening say every 2 months, every 3 months right?, not like, they will call you once per year. If they call you once per year you have no reason to keep it in your stock. This is, I would think, the biggest thing. | SUPPLY CHAIN COMPLEXITIES, MICRO BUSINESS OUTLOOK UNCERTAINTIES |
| 0 | Though it was a complete nightmare came to the planning of the jobs as there was pressure from clients to get their jobs ready, so did not give a lot of Lead time for the jobs. | SUPPLY CHAIN COMPLEXITIES |
| 4 | nd they come to the data, one run they may see they need for two runs into an upcoming three runs. Meanwhile the initial order the system was one run.<br>Yeah, we may now use more crossovers or explosive or batteries or whatever so this extra orders will now put pressure on the supply chain.<br>But that's what they're talking about. And I've seen it many times that sometimes it has caused friction between the operations and supply chain departments. | SUPPLY CHAIN COMPLEXITIES, MICRO BUSINESS OUTLOOK UNCERTAINTIES |
| 1,1 | is that doing business in Africa is different. When it comes to custom regulation, local authorities is not that easy compared to Europe that you can do clearance in one day.<br>Here we could wait for about two weeks or three weeks to do a custom clearance | SUPPLY CHAIN COMPLEXITIES |
| 1,2 | Our main challenge in Africa, I may say to you, is regarding custom clearance, moving things around, importation and exportation is our main setback. | SUPPLY CHAIN COMPLEXITIES |
| 1 | It is a bunch of license needed. Y | SUPPLY CHAIN COMPLEXITIES |
| 2,2 | From my side? 6 months in advance. Okay. In SSA we do no have much of the sea vessel and coast to coast options<br>We have two of three options besides the commercial vessels, which I hate working with them because of their frequent schedule change, unless we do not have any other options<br>But to give an example. I don't have much choice or options to go from locations in SSA to Nigeria? I work with two more reliable companies, but they do not go to Nigeria. Then in that case we have to go with commercial options.. That's why I say initially from my sides i need six months to be able to plan.<br><br>Though the commercial vessels have time schedule which contains a lot of stops on different coasts, however their schedule is dependent on businesses demands, they can actually cancel the movement if they feel it will not be profitable irrespective of previously published schedule. They can ask for what we call inducement, that means a fee that you can pay so that even if they do not have enough cargo to go that amount will enable the trip to be confirmed, and for some instances the inducement could be as high 50,000 euros | INFRASTRUCTURA DEFICITS, SUPPLY CHAIN COMPLEXITIES |

| | | |
|---|---|---|
| 1,2 | So, other challenges in the oil field I would say, you know there's what we call logistics challenge as well. So unlike what you have across Europe, America and all that, where you are able to move things easily and freely between different countries, it's a different issue in Africa, in fact, you most probably get things moving fro Europe to Africa faster than you will get from within some African countries, maybe with the exception of Ghana. | SUPPLY CHAIN COMPLEXITIES |
| 0 | because you can't so much rely on the fact that you will be able to move something from one region to the other in a reasonably good timing, if you understand what I mean. | SUPPLY CHAIN COMPLEXITIES |
| 2 | it has happened. It has happened multiple times and it's not peculiar to Africa, it happened in many other locations where I've worked. The critical thing is what you are doing. There are some wells that you are drilling that you call exploration or appraisal. The reason why they are exploration or appraisal is because you do not have enough information concerning that area. So things do come up. Even the ones that you know, there may be well bore instability, well control issues, tragetry issues where you need a different kind of tool or equipment, and it's not just peculiar to drilling, not just peculiar to wire line, not just peculiar to completions, it cuts across different segments, and for them to be able to move ahead, they will need a different kind of solution. So they will definitely put pressure and say "if you can get us this tool..." That's why sometimes we chatter flights to bring some equipment and most cases at the cost of the client as well to be able to provide that service. So, things do come up while drilling, and then you are under pressure to provide that service, | SUPPLY CHAIN COMPLEXITIES, MICRO BUSINESS OUTLOOK UNCERTAINTIES |
| 0 | how we are able to meet up with the clients demand | SUPPLY CHAIN COMPLEXITIES |
| 0 | s has been, (from my logistic point of view), | MICRO BUSINESS OUTLOOK UNCERTAINTIES, SUPPLY CHAIN COMPLEXITIES |
| 2 | There's been a lot of reliance on moving equipment from one end to the other and that alone increases the cost of operation, it then also adds some supply chain challenges in terms of logistics, you know, so that alone is a little bit depressing | SUPPLY CHAIN COMPLEXITIES |
| 1 | timing is impacted and in some countries within the SSA, the laws are little bit different, some have exclusions when it comes to tax, importing items, they have some exoneration, some countries do not have exoneration. | SUPPLY CHAIN COMPLEXITIES, GOVERNMENT BUREAUCRACY |
| 0 | timing is impacted | SUPPLY CHAIN COMPLEXITIES |
| 2 | ou look at the nature of business in SSA, the countries and the water-ways, especially where they move most of the items, the connectivity is a little bit challenging, how they route some these vessels | SUPPLY CHAIN COMPLEXITIES |

| | | |
|---|---|---|
| 0 | ut again, yes, in terms of planning, most of the companies don't plan two/three years ahead, they plan on a short-term, and they want to deliver, and so, they are under pressure to have equipment in on time and the | SUPPLY CHAIN COMPLEXITIES |
| 1 | additional bottle neck with the importation and exportation rules are a little bit complex, different African countries have different eh... rules. Some are following the English system, some are following Portuguese and all that, so it's difficult to have a commonality on how the importation process are, so it creates some kind of confusion | SUPPLY CHAIN COMPLEXITIES |
| 1,2 | most times, you wouldn't move items from Nigeria to Ghana, it's not....it doesn't come so easily, sometimes it's even easier to move fro UK to Ghana than ..... so all that, when you don't plan on time, | SUPPLY CHAIN COMPLEXITIES |
| 1 | cost of getting this items so if you incur more cost in shipping , clearance the stress and the all that and you will need to transfer most of the cost to the client and you will need to ensure you markup covers for the handling and other services that will be rendered before this item is delivered or used by the client. That is sometime almost ten times higher | SUPPLY CHAIN COMPLEXITIES |
| 1 | secondly the Government should also help especially in SSA in terms of logistics , custom clearance and so on. | SUPPLY CHAIN COMPLEXITIES |
| 1 | They should borrow leave from Dubai and customise it to suite their need. They may need to charge custom duties but they need to give them some kind of preference and a rethink on the charges that they place on those oil and gas goods. | SUPPLY CHAIN COMPLEXITIES |
| 1 | the impact will definitely be more in Africa, because we have a lot of deficiencies already in the way we manage our economies, in the way we manage businesses, in terms of initiatives, policies that drive the industry, we are still trying to get things right. Whereas in other are places, mainly the west they already have structured policies of managing so of this cyclic impact in the industry, but in Africa it’s a lot different and that’s why you see that today Africa is worst hit by this oil industry burst. | INADEQUATE GO INTERVENTIONS, INFRASTRUCTUR DEFICITS, INSTITUTIONAL DEFICITS, TRANSPERENCY ISSUES, SUPPLY CHAIN COMPLEXITIES |
| 3 | you have the resources issues as well right? So, I mean, for me. | SUPPLY CHAIN COMPLEXITIES |

| | | |
|---|---|---|
| 1 | you can't bring the equipment resource into the country because you don't know how you're going to get it out if at the end of the day... let's say... the client says "okay, I'm not ready now, I'm going to be ready in five years". You can't keep it, you need to sell it out, but you will not be able to send it out, which means you will loose money. So, you still have... you have that challenge of managing your resources, and... so that's that right? One other problem we have, I mean this is a.... the fact that... I mean, we are Africa, with neighboring countries, I mean, they count SSA as a whole, but if you see the different challenges we're having to move in from one country to the other, right? that as well can reduce the support if you need to bring personnel or equipment from one country to the other. It's not as easy as it would be maybe in Europe | SUPPLY CHAIN COMPLEXITIES |
| 1 | The one is the fact..... how we bring resources in, how we bring them out, that's a problem. It's a problem for us, and it's a problem for clients as well because most of t | SUPPLY CHAIN COMPLEXITIES |
| 3,4 | e are still... we at my company, we are still going through that transition period, I mean, when I was, I mean this is typical example, when i was working as protocol in a tow i was so frustrated, because, the MM Team (Materials Management), the logistic team and the operation team, they don't have a common platform. And they strike my orders which doesn't really work, which means, to be able to track an order, all the jobs is on the coordinator and he has to do that link which is fine, okay? that's okay, but the place he needs to get the information are like fifty places, right? So, ultimately, what that means is that er... if you have to track let's say hundred orders, it's gonna take you the whole day. That's not your job, | WORKFLOW & PROCESS IMPROVEMENT, SUPPLY CHAIN COMPLEXITIES |
| 4 | planning can make or break a project, right? So, it's more vital for us to plan well and if we don't really have information that is necessary, then, that becomes a challenge. So that's the concern. | SUPPLY CHAIN COMPLEXITIES |
| 0 | I find logistics to be huge problem in SSA or Sub Saharan Africa, | SUPPLY CHAIN COMPLEXITIES |
| 3 | I was in a presentation earlier this year, err... the logistics Manager in SSA, and he said "flying equipment around in SSA in 2019 alone, cost us 6.67 million Dollars". Now imagine all that money, yes... so you can imagine the challenges, but now again, the caveat there is, he didn't say "hey!, it is because of poor planning, it is because of remote location", do you see what i'm saying? But again, just asi in.... that figure is too huge to just keep on going, you know... I feel it needs to be investigated, like "hey!, what can we attribute this to?" you know...so, just issues like that you know.... Even when I started the, when I started this role, there was a case in one of the countries where, errm there was... you know... we completed the well, there were issues, and clients says, " hey!, we need to get this stuff, get it get it, you know, get new equipment", so by the time we were flying equipment around, we actually had to approve a flight to take a safety valve back to Houston, and the cost of that was about a hundred and forty nine thousand Dollars, right? So you can see, all these add up, I mean that Hundred and something thousand Dollars is.. is, I mean for one countries salaries, they can pay probably ten people, you know what I'm saying? So I feel business get, way way more expensive here | DIRECT FINANCIA STRAIN, INFRASTRUCTUR DEFICITS, SUPPLY CHAIN COMPLEXITIES |

| | | |
|---|---|---|
| 1,4 | So in addition to logistics, also customs. Customs, I feel change, you know... very frequently, today this rule applies, tomorrow, no it doesn't apply, errm... so.., we need to have err.. you know, finger tips on the latest and greatest rule from each country, which can be challenging. | GOVERNMENT BUREAUCRACY, SUPPLY CHAIN COMPLEXITIES |
| 1 | with the logistics issues, with the customs issues, | SUPPLY CHAIN COMPLEXITIES |
| 0 | So and this is exactly what plays out in the Oil & Gas industry and it's everywhere. So the effect of demand and supply is what most projects are based on right? There is project to sustain current production, or to sustain current.... let me not say production but to sustain current income, right? of business, but there are also projects of expansion or project to take advantage of a spike in price, yes | SUPPLY CHAIN COMPLEXITIES |
| 1 | You see some of these things and we also know that when you clear out these demand and supply, you also see the... there's also the increase and reduction in cost, but depending on when this project is going on and the terrain in which it is going on and, you also have seen that sometimes, an agreement or a particular period, maybe take for instance when we were having issues in the Niger-Delta and they signed this pact with the people in the Niger-Delta, and the militants decided to bury their hatchets and surrender and you see a boom in projects right? As they tried to take advantage of that opportunity created by better operating conditions, right? So, some of those opportunities come and companies try to take advantage of them, and this is when you see a push to deliver and they might appear like a rush. It is not peculiar to SSA, but some of these activities in SSA you know, when you have elections coming up, you want to execute your projects and complete it before the elections, so that.... you don't know who wins and you don't get stuck with the person that lost out of an election, because it's a deal, continuity is not that assured in most country states in Sub Sahara Africa. | MICRO BUSINESS OUTLOOK UNCERTAINTIES, SUPPLY CHAIN COMPLEXITIES |

*Appendix 4.3 : 1st Cycle Code Applications_DedooseChartExport_xlsx*

| Research Questions | Rearranged Codes | Freq. | Categories |
|---|---|---|---|
| What are the unique challenges affecting the OFS industry in SSA? | Logistic issues | 11 | Logistics complexities |
| | Long Transportation/lead times | 11 | |
| | Deferment of Low ticket orders | 2 | |
| | Supply chain complexities | 10 | |
| | Timing and forecasting uncertainies | 16 | |
| | Agility issues | 7 | |
| | Mob and Demob cost from cyclic industry response | 1 | |
| | Government inefficiencies | 7 | |
| | custom regime exonerations complexities | 17 | |
| | import/export connectivity issues | 11 | |
| | Resource sharing and optimization issues | 7 | |
| | | | 100 |
| | low volume generation | 5 | Micro Business Outlook Uncertainties |
| | Operational Challenges | 4 | |
| | Operational uncertainties from underexplored fields | 4 | |
| | Political and licensing uncertainties | 3 | |
| | Profitability uncertainties | 4 | 20 |
| | competency gaps | 8 | People Challenge |
| | Inadequate team participation | 2 | |
| | High Cost of Local funds | 1 | Direct Financial Strain |
| | High Expatries upkeep cost | 3 | |
| | High operational cost | 15 | |
| | Inadequate contract terms compliance | 1 | |
| | Government inefficiencies | 7 | |
| | Payment Delays | 3 | |
| | Cashflow issues | 4 | 34 |
| | import/export connectivity issues | 11 | Government Bureaucracy |
| | Government inefficiencies | 7 | |
| | custom regime exonerations complexities | 17 | 35 |
| | Environmental Issues | 1 | Social Issues |
| | Security issues | 2 | |
| | non-compliance culture | 1 | 4 |
| | Lack of Coordinated Safety Regulation | 1 | Lack of Coordinated Safety Regulation 1 |
| | | | |

| | | | |
|---|---|---|---|
| What are the underlining issues behind these challenges? | Underdeveloped downstream sector | 2 | Infracstructural deficits |
| | Limited Transportation routes | 8 | |
| | infastructure deficit | 3 | |
| | Inadequate Manufacturing Capabilities | 6 | |
| | inadequate enabling environment | 3 | |
| | | | 22 |
| | inadequate industry support systems | 7 | Institutional deficits |
| | inadequate institutional structures | 2 | |
| | Weak Regulation and Monitoring | 6 | 15 |
| | Access to Adequate Financing | 1 | |
| | Over reliance on Centralised system | 4 | Government Participation Gap |
| | Over relieance of Govmt on Sector for Revenue | 6 | |
| | inconsitencies in Gov investment in the sector | 4 | 15 |
| | Inadequate communication of Vision | 2 | Lack of Transperency |
| | Lack of Transperency | 3 | |
| | Corruption and poverty | 2 | |
| | Societal trust issues | 3 | |
| | inadequate enabling environment | 3 | |
| | Short term focus | 3 | |
| | Vague and contestable contract terms | 2 | 18 |
| | Non-uniform business outlook within SSA countries | 2 | Diverse Business Outlook |
| | Non-uniform operational framework | 3 | |
| | wide range of clientele | 4 | |
| | | | 9 |
| | | | |
| What are some of the current Market Strategies in reponse to some of these challenges | Change in business scope | 3 | Cost cutting measures |
| | Cost cutting measures | 7 | |
| | Very Lean Structure | 7 | 17 |
| | Creation of Supply Chain Hubs | 2 | Forecasting improvement |
| | Early Customer Engagement | 7 | 9 |
| | internal collaboration | 6 | Customer focus partnerships |
| | Flexible And comprehensive contract terms | 8 | |
| | Reaching of compromise/partnerships | 9 | |
| | case by case customised solutions | 3 | 26 |
| | Talent Retainership | 2 | People<br>2 |
| | | | |
| | Customer focused solutions | 8 | Product &Service delivery improvement |

| | | | |
|---|---|---|---|
| What is the level of adoption of creating share value concepts in OFSC, and what are some of the CSV opportunities presented in SSA? | Environmental friendly products/operations | 6 | |
| | training and exposure | 7 | 21 |
| | Employment of Locals and Capacity | 11 | Value chain Improvement |
| | Local content partnerships | 10 | |
| | Support infastructure development | 1 | |
| | OFSC and client cost cutting initiatives | 2 | |
| | Reducing Air freight Costs | 3 | |
| | Revenue Domestication | 3 | |
| | | | 30 |
| | intra-industry collaboration | 7 | |
| | aligning diff company segment objectives | 3 | |
| | More internal collaboration | 4 | Ehancing collaborative opportunities |
| | Homogenity in legislations within Region | 1 | |
| | Local content partnerships | 10 | |
| | CSV enabling policies by Government | 8 | |
| | Culture of transperency | 3 | |
| | | | 36 |
| | | | |
| How and where can digitalization act as a catalyst in achieving these CSV concepts | Remote tapping of Expertise | 7 | Product & Service delivery improvement |
| | Existing Product Optimisation | 8 | |
| | Industry scalability of internal solutions | 2 | |
| | New Value creation | 7 | |
| | problem focused customised solutions | 3 | |
| | Platform for wholistic project reviews | 1 | 28 |
| | cost cutting oppurtunities | 10 | Value chain Improvement |
| | Integrated inventory custom platform | 1 | |
| | Industry-wide open inventory platform | 2 | 13 |
| | Driving and monitoring Performance | 8 | Workflow and process Improvement |
| | Efficient Archiving | 1 | |
| | Improving business process efficiency | 16 | |
| | Platform for wholistic project reviews | 1 | |
| | more data availabilty and utilization | 6 | |
| | cost cutting oppurtunities | 10 | |
| | Remote OTJ Coaching and training | 2 | |
| | Platform for wholistic project reviews | 1 | 45 |
| | Integrated inventory custom platform | 1 | Ehancing collaborative opportunities |
| | Initiating a Culture of Openness | 6 | |
| | Encouraging Collaboration | 9 | |

| | | | |
|---|---|---|---|
| | Industry scalability of internal solutions | 2 | |
| | Industry-wide open inventory platform | 2 | |
| | Initiating a Culture of Openness | 6 | 26 |

*Appendix 4.4 : 2nd cycle Code Applications_DedooseChartExport_xlsx*

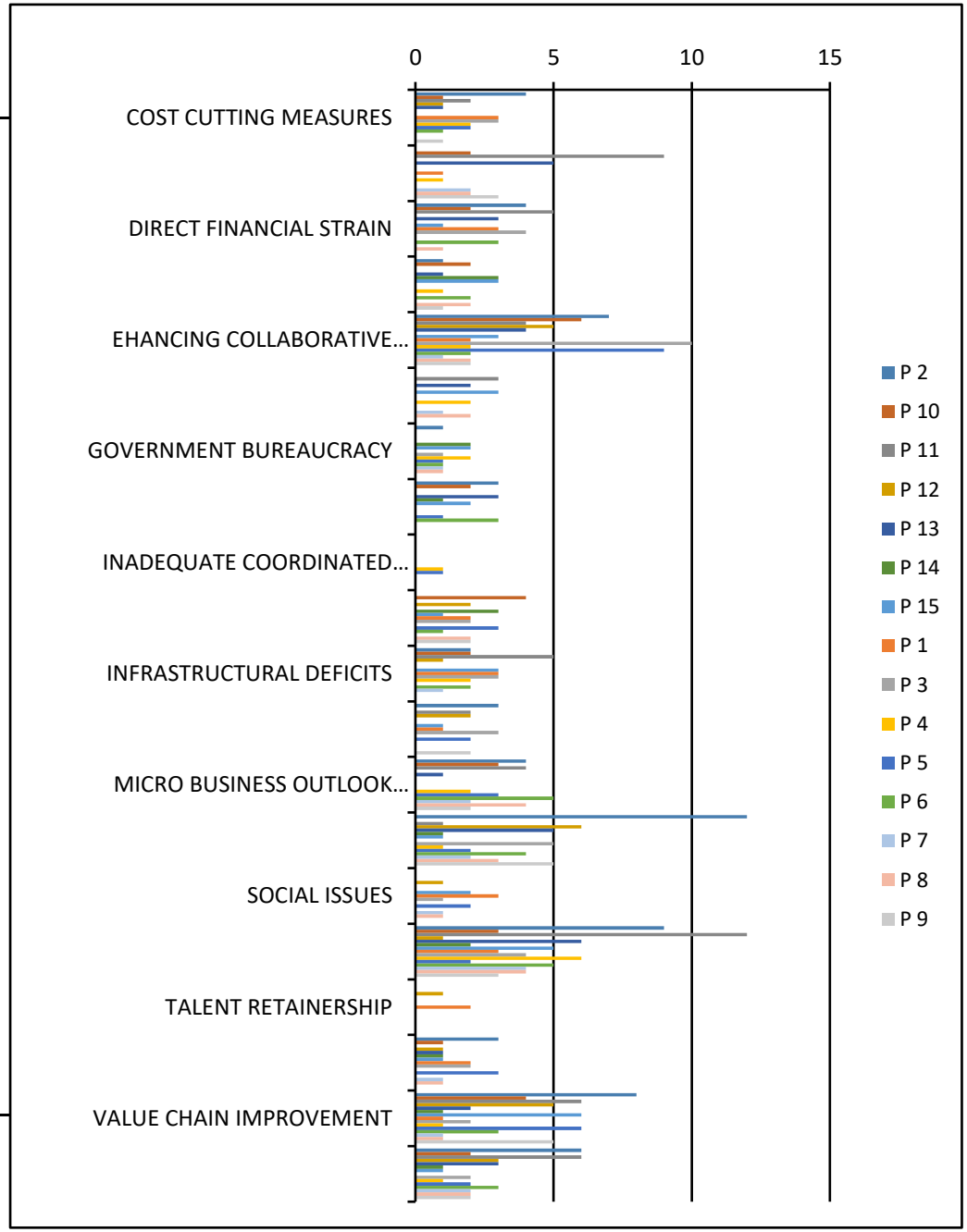
| SN. | CODE CATEGORIES | FEQ. | THEMES | |
|---|---|---|---|---|
| 1 | SUPPLY CHAIN COMPLEXITIES | 68 | SSA ECOSYSTEM LIMITATIONS (344) | |
| 2 | MICRO BUSINESS OUTLOOK UNCERTAINTIES | 34 | | |
| 3 | HUMAN RESOURCE CHALLENGE | 18 | | |
| 4 | DIRECT FINANCIAL STRAIN | 20 | | |
| 5 | GOVERNMENT BUREAUCRACY | 25 | | |
| 6 | SOCIAL ISSUES | 20 | | |
| 7 | INADEQUATE COORDINATED SAFETY EFFORTS | 6 | | |
| 8 | INFRASTRUCTURAL DEFICITS | 42 | | |
| 9 | INSTITUTIONAL DEFICITS | 23 | | |
| 10 | INADEQUATE GOV INTERVENTIONS | 33 | | |
| 11 | TRANSPERENCY ISSUES | 34 | | |
| 12 | DIVERSE BUSINESS OUTLOOK | 21 | | |
| 13 | COST CUTTING MEASURES | 15 | CURRENT MARKET STRATEGIES (131) | CREATING SHARED VALUE OPPURTUNITIES WITH DIGITALIZATION AS CATALYST IN SSA (240) |
| 14 | FORECASTING & PROCESS IMPROVEMENT | 18 | | |
| 15 | CUSTOMER FOCUSED PARTNERSHIP | 22 | | |
| 16 | TALENT RETAINERSHIP | 2 | | |
| 17 | WORKFLOW & PROCESS IMPROVEMENT | 40 | | |
| 18 | PRODUCT& SERVICE DELIVERY IMPROVEMENT | 34 | | |
| 19 | VALUE CHAIN IMPROVEMENT | 61 | | |
| 20 | ENHANCING COLLABORATIVE OPPORTUNITIES | 48 | | |
| | Totals | 584 | | |

Appendix 4.5 co-concurrence analysis

| | COST CUTTING MEASURES | CUSTOMER FOCUSED PARTNERSHIP | DIRECT FINANCIAL STRAIN | DIVERSE BUSINESS OUTLOOK | ENHANCING COLLABORATIVE OPPORTUNITIES | FORECASTING & PROCESS IMPROVEMENT | GOVERNMENT BUREAUCRACY | HUMAN RESOURCE CHALLENGE | INADEQUATE COORDINATED SAFETY EFFORTS | INADEQUATE GOV INTERVENTIONS | INFRASTRUCTURAL DEFICITS | INSTITUTIONAL DEFICITS | MICRO BUSINESS OUTLOOK UNCERTAINTIES | PRODUCT& SERVICE DELIVERY IMPROVEMENT | SOCIAL ISSUES | SUPPLY CHAIN COMPLEXITIES | TALENT RETAINERSHIP | TRANSPERENCY ISSUES | VALUE CHAIN IMPROVEMENT | WORKFLOW & PROCESS IMPROVEMENT | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIRECT FINANCIAL STRAIN | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 1 | 2 | 0 | 1 | 7 | 0 | 1 | 1 | 0 | 20 |
| DIVERSE BUSINESS OUTLOOK | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 1 | 2 | 1 | 4 | 0 | 1 | 2 | 1 | 21 |
| GOVERNMENT BUREAUCRACY | 1 | 0 | 0 | 2 | 1 | 1 | 0 | 2 | 0 | 3 | 2 | 0 | 2 | 0 | 2 | 5 | 0 | 2 | 1 | 1 | 25 |
| HUMAN RESOURCE CHALLENGE | 0 | 0 | 0 | 2 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 4 | 0 | 2 | 2 | 1 | 18 |
| INADEQUATE COORDINATED SAFETY EFFORTS | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 6 |
| INADEQUATE GOV INTERVENTIONS | 1 | 0 | 2 | 2 | 3 | 0 | 3 | 1 | 1 | 0 | 4 | 5 | 1 | 0 | 2 | 2 | 0 | 4 | 1 | 1 | 33 |
| INFRASTRUCTURAL DEFICITS | 0 | 1 | 4 | 2 | 1 | 1 | 2 | 0 | 1 | 4 | 0 | 6 | 2 | 0 | 1 | 12 | 0 | 3 | 2 | 0 | 42 |
| INSTITUTIONAL DEFICITS | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 1 | 5 | 6 | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 1 | 0 | 23 |
| MICRO BUSINESS OUTLOOK UNCERTAINTIES | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 0 | 1 | 1 | 2 | 2 | 0 | 0 | 2 | 14 | 0 | 1 | 1 | 0 | 34 |
| SOCIAL ISSUES | 0 | 0 | 1 | 1 | 1 | 0 | 2 | 0 | 1 | 2 | 1 | 0 | 2 | 2 | 0 | 2 | 0 | 4 | 1 | 0 | 20 |
| SUPPLY CHAIN COMPLEXITIES | 1 | 1 | 7 | 4 | 1 | 2 | 5 | 4 | 0 | 2 | 12 | 2 | 14 | 0 | 2 | 0 | 0 | 4 | 5 | 2 | 68 |
| TRANSPERENCY ISSUES | 0 | 2 | 1 | 1 | 4 | 1 | 2 | 2 | 0 | 4 | 3 | 2 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 2 | 34 |
| Total | 15 | 22 | 20 | 21 | 48 | 18 | 25 | 18 | 6 | 33 | 42 | 23 | 34 | 34 | 20 | 68 | 2 | 34 | 61 | 40 | 0 |

*APPENDIX 4.6 Category distribution per participant*

| P 2 | P 10 | P 11 | P 12 | P 13 | P 14 | P 15 | P 1 | P 3 | P 4 | P 5 | P 6 | P 7 | P 8 | P 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 1 | 2 | 1 | 1 | 0 | 0 | 3 | 3 | 2 | 2 | 1 | 0 | 0 | 1 |
| 0 | 2 | 9 | 0 | 5 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 2 | 3 |
| 4 | 2 | 5 | 0 | 3 | 0 | 1 | 3 | 4 | 0 | 0 | 3 | 0 | 1 | 0 |
| 1 | 2 | 0 | 0 | 1 | 3 | 3 | 0 | 0 | 1 | 0 | 2 | 0 | 2 | 1 |
| 7 | 6 | 4 | 5 | 4 | 0 | 3 | 2 | 10 | 2 | 9 | 2 | 1 | 2 | 2 |
| 0 | 0 | 3 | 0 | 2 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 |
| 1 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 0 |
| 3 | 2 | 0 | 0 | 3 | 1 | 2 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 0 | 4 | 0 | 2 | 0 | 3 | 1 | 2 | 2 | 0 | 3 | 1 | 0 | 2 | 2 |
| 2 | 2 | 5 | 1 | 0 | 0 | 3 | 3 | 3 | 2 | 0 | 2 | 1 | 0 | 0 |
| 3 | 0 | 2 | 2 | 0 | 0 | 1 | 1 | 3 | 0 | 2 | 0 | 0 | 0 | 2 |
| 4 | 3 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 3 | 5 | 2 | 4 | 2 |
| 12 | 0 | 1 | 6 | 5 | 1 | 1 | 0 | 5 | 1 | 2 | 4 | 2 | 3 | 5 |
| 0 | 0 | 0 | 1 | 0 | 0 | 2 | 3 | 1 | 0 | 2 | 0 | 1 | 1 | 0 |
| 9 | 3 | 12 | 1 | 6 | 2 | 5 | 3 | 4 | 6 | 2 | 5 | 4 | 4 | 3 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 3 | 0 | 1 | 1 | 0 |
| 8 | 4 | 6 | 5 | 2 | 1 | 6 | 1 | 2 | 1 | 6 | 3 | 1 | 1 | 5 |
| 6 | 2 | 6 | 3 | 3 | 1 | 1 | 0 | 2 | 1 | 2 | 3 | 2 | 2 | 2 |



*Appendix 4.7 Interview Schedule*

# INTERVIEW SCHEDULE

The interview shall be a semi-structured, and as such questions might not always follow this format, response of the participants will mainly determine the direction. Information provided by the first set of participants might also lead to the updating of this interview schedule.

## INTRODUCTION

- Brief introduction of myself and the work
- Purpose of work
- Assurance of professionalism and privacy.

## BUSINESS AND INDUSTRY OVERVIEW

- What is your experience working in Sub Saharan Africa?
- Can you describe the oil and gas industry in Africa in the past few (5) years?
- What do you consider defining moments in the oil servicing industry especially as it regards Africa?
- Who do you consider as the stakeholders or business influencers in the oil and gas business in Africa?

## CHALLENGES

- What are some of the major challenges you have experienced in your business and industry in the past few years?
- In your view are they challenges you think are unique to Sub Saharan Africa or Africa as a whole?
- Which of these challenges have directly or indirectly impacted performance or business processes in the industry?
- Are they peculiarities in SSA operations that creates additional uncertainties or that put more pressure on the system that has potential to affect performance both positively and negatively?
- Are there some low hanging fruits you believe can be addressed or that can be taken advantage of?

## DIGITAL TRANSFORMATION

- What are the things that come to mind when you think about digital revolution/transformation in the oil and gas industry?
- Do you think we have come up to speed with other industries?
- Do you think it will be a game changer in the nearest future? Do you think it has a potential of solving some of the industry challenges especially those mentioned earlier?

## CONCLUSION

- What's your personal perspective of the future opportunities in the industry?
- Final thought

*Appendix 4.8 Ethics Approval*

**Ikechukwu Samuel Kanu**

**From:** Dannick Dimitri Deffo Fotso
**Sent:** 28 March 2020 15:53
**To:** Ikechukwu Samuel Kanu
**Subject:** RE: Query 2652439 has changed status to Solved Query - ISSUE=2652439 PROJ=19- Ethics Approval request

Hi Ikechukwu,

Thanks for letting me know.

I do not see any issue for you to proceed. However None of your survey participants will provide you with company confidential data and they should remain anonymous. My advice is to call each of the Managers you are targeting.

Regards,

Dimitri

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**From:** Ikechukwu Samuel Kanu <IKanu2@slb.com>
**Sent:** Saturday, March 28, 2020 3:35 PM
**To:** Dannick Dimitri Deffo Fotso <DFotso@slb.com>
**Subject:** RE: Query 2652439 has changed status to Solved Query - ISSUE=2652439 PROJ=19- Ethics Approval request

Hi Dannick,

My name is Ikechukwu Kanu a Completions Engineer assigned to Congo.

I am currently working on my dissertation for my online MSc program in Strategic Engineering Management in Anglia Ruskin University, and will be requiring your approval to proceed with primary data collection from some employees about their process of decision making.

The proposed title of the work is "Exploring Shared Value Strategies in relation to the challenges and capabilities in the Oilfield Service(OFS) Industry in Sub Sahara Africa(SSA)".

The research question seeks to understand "How benefits of Creating Share Value(CSV) Concept can be efficiently incorporated in strategic decision making for the OFS industry in SSA"?

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