

KNOWLEDGE MANAGEMENT FOR THE OIL AND GAS INDUSTRY: OPPORTUNITIES AND CHALLENGES

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ABSTRACT

In the current era of knowledge-driven society, knowledge becomes the most critical success factor in the current business environment. It needs to be handled and utilized effectively and efficiently to compete in the global market by creating a sustainable competitive advantage for the organisation. A technology-driven organisation needs to leverage knowledge management process to be effective and competitive, where professional can play an important role while managing the knowledge to handle the challenges comfortably. But the ability of handling cannot be inculcated within a day like technology, it is culture to be cultivated since a long time through experts and their experience they gained a practices. The Oil and Gas industry has seen massive changes in the recent years influencing all its sectors, including searching, production, drilling, and refining, which in turn has great effects on their market and marketing strategies, production strategies, and Research and Development strategies. Keeping up with these changes can only be achieved through effective knowledge management, covering both knowledge production or generation and knowledge sharing or transformation and distribution. That's not the issue today, where making the most of an oil field is a knowledge-intensive affair involving expertise in engineering, earth science and facilities maintenance. This study introduces a brief idea about knowledge management and explores the opportunities and Major Challenges of oil and Gas industry involved in knowledge management implementation. Also it provides strategic considerations in the aspects of oil and gas industry, should follow during knowledge management implementation as one of the key success factor.

Key words: Knowledge management, Knowledge and information management, oil and gas industry, Energy Sector.

INTRODUCTION

The primary objectives of Knowledge Management initiative in any organisation are to enhance the performance of the people involved along with the organisation. It is not mere knowledge sharing but also valuable bi-product of the business process, by explicitly designing and implementing tools, processes, systematic approaches, structures, principles to improve the decision making with indirect improvements in identifications, capture validations and transformation of knowledge relevant for decision making. Today we have significant number of the tools to do successful business, methodology, methods to handle knowledge, to analyse its flow in organisation, way to improve the flow, opportunities to utilize up and way to observe. Today, with the help of Knowledge Management, ample number of tools, crisp methodologies, methods to provide ability to blend and various approaches to knowledge management are available to organization to enjoy competitive advantage. This progress gives strength to organization to handle and tackle real business problem easily. Thus, Knowledge Management becomes a solution provider to business problem with drastic difference; there are growing recognition to apply knowledge management to handle any business issues and progress. Apart from that it helps to create, user friendly technologies to handle information with collaboration and access, but Knowledge Management cannot be measured quantitatively but either impact gauged. Thus, Knowledge Management becomes a systematic approach to make decisions where and how to invest.

KNOWLEDGE MANAGEMENT

Knowledge Management can be defined as information practices and learning strategies, which is accepted in organizations as a set of practices, which helps to improve the applications and use of data and information during decision making. Knowledge Management in any organization can be implemented by hiring a Chief Knowledge Officer (CKO) to improve information sharing, similarly as a system to support staff involved in the organization with help of technology, to enhance the information flow, to enhance evaluation of outcomes, to improve learning strategies and to develop a framework for the betterment of the organizational growth. To commence a project for the application of knowledge towards knowledge sharing also

Knowledge Management can be implemented, to understand and estimate the long term effects of learning system.

KNOWLEDGE MANAGEMENT APPROACH IN THE OIL AND GAS SECTOR

Organisations are functioning with help of system not machines, in organisational development the machine model describes different inputs for specific process into outputs, may be not accurate or useful in understanding the complexity of the functions. Similar, to eco system rejuvenate them according to season, organisations can also rejuvenate themselves through knowledge they have already and to be created, the process to pass to others the methods to utilize in exchanging, and the relationship that they foster among them. Organisations used to share and have to share knowledge to employees both internally and externally. There are challenges while sharing such valuable information and knowledge. Technology can help to generate data, information and knowledge depends upon the people involved, situation arisen, but cannot activate knowledge sharing without interest and involvement of people involved.

To facilitate such knowledge sharing in organisations easily, it has to focus towards Human Resource policies, information policies, group dynamics, departmental cooperation and organisational incentive structure and any other relevant activities according to the nature of the process involved. Also, in the aspect of pressure from external environment, dynamic customer expectation, expectation of regulating authority, community supports, people involved and other related dynamics. So, Knowledge Management can build such as a customer centered approach that can be viewed as a complex system. Thus, Knowledge Management can be thought of as either a framework or an approach, which will enable to develop a set of practices to collect and share knowledge, as what they have, what they know and implement, which can help them to improve the present and future outcomes. In balancing information culture and technological culture, there are major three resources named people, process culture and technology which can enable the organisation to utilize and share the information effectively and efficiently towards the betterment of the organization, where oil and Gas industry cannot be an exception.

The oil and gas upstream industries operate based on its strength of its natural resources, its infrastructure, processing facility and technology, human resources and the most important energy products market demands. If one of the factors fluctuates, it affects the industry operations, planning and production. By nature everything is not gifted there are strengths and weakness, resources without capital, knowledge without management, skilled people without organization, willingness to do but lack of technology, strength in execution but with no quality, no core know how, success with no sustainability, vision with no decision making, and so on so forth. To be a successful venture it is important to make use of best available resources and meet rest of shortcoming by best possible practical approaches. Everyone could be a master in their own domain but to be a master of all in a particular capital venture, one need to understand all available data collectively as teams and groups by analyzing, sharing experience, knowhow and knowledge.

In the current global scenario, according to the social and technological growth with global competition, organizations are in need of knowledge management implementation as a key strategy to handle the global competition and to improve their competence to meet out the challenges in their business irrespective of the size of the organization. Thus, Knowledge and information management becomes the most essential key strategy for the upstream oil and gas industry. Knowledge of those Executives in the Key Position within the industry likely to retire in the coming years, if not managed properly, could lead to a knowledge loss or creates huge knowledge gap in the industry especially in the oil and gas industry. In such situation, only knowledge management can provide solution to meet out that intellectual loss through two different mode of loss called employee retirement and employee mobility.

Organizations in the Oil and Gas industry were early users of knowledge management, and have provided the way in terms of Knowledge Management implementation. **This study focused to explore the possibilities and opportunities to Knowledge management** in the field of oil and gas industry to measure the current state of the art related to and relevant to Knowledge Management, and to highlight the ongoing challenges for the industry as a solution provider to align the same with Knowledge Management. This study explores about knowledge management

and the relevance to their service organisation such as oil and gas industry. Also this study tends to explore the reasons, specifically, to identify, Why, there exist huge knowledge gap in the oil and gas organizations so far ahead in this knowledge management stuff?". Organizations have no clear idea about this and wonder of course whether the lack of clarity are right, and whether the oil companies really are so far ahead, but it does seem to be true that knowledge management has found the right place in the oil and gas industry. There are ample numbers of factors here.

Oil business is a global business. So, oil platform in geography is not that different from an oil platform in the other part of the geography, and a refinery in some part of the country is not that different from a refinery in other part of the country. The challenges are in such a way that the oil and gas businesses are therefore, having some common challenges, and solutions need to be shared and applied all around the globe. Knowledge Management can be a real solution for this challenge in the energy sector, particularly oil and gas sector.

Oil and gas business is not an exemption business to be away from competition. There is no true differentiation in product of the oil industry- the tank of petrol that one buy from one oil refining country is essentially no different from the tank of petrol that the same buys from other refining country, and the companies are not competing on product quality, and they are not really competing on technology either. Required drilling rigs are hired from contractors, refineries are the same in all over the world, and so are gas stations. Instead, the competition in this industry is all towards the application of technology and the use of knowledge at right time, through right people, and at right place in right way.

KNOWLEDGE MANAGEMENT IN THE ENERGY SECTOR

The energy sector incorporates a huge variety of organisations, from oil and gas majors, to conventional, renewable and nuclear power companies, to specialist drilling, mining firm and all allied industries related with. It is an industry dominated by huge number of multinational organisations, each of which must contend with the difficulties and challenges of maintaining a geographically dispersed workforce, operations, and functioning according to clearly defined operational procedures. At the same time, they must cope with external pressures relating to

deregulation, growing environmental concerns and strict health and safety guidelines. It is therefore not surprising that some of the world's biggest energy companies were early pioneers of the principles and working practices of knowledge management and, indeed, still lead the way on a global scale. That said, most energy companies are still to realise the full potential of the resources at their disposal and have not understood the importance of knowledge management and its fruitfulness, and Knowledge Management represents a powerful means for these firms to deal with the challenges that lie ahead and growing endlessly according to the techno and social changes.

MAJOR CHALLENGES AND OPPORTUNITIES

There are Major challenges in finding effective way in the exploration of Oil business, in knowledge-intensive areas such as drilling, geology and geophysics, to access the most valuable knowledge reservoir as one million man-years of experience. Also other challenges are delivering performance improvement in the risky and expensive offshore megaprojects. Also, Way to connecting people those who are useful by real-time collaboration technologies, Opportunities to bring global knowledge and skilled to bear on local problems are additional challenges. Framing user-populated Knowledge Bases, for Protecting the base in Oil Company on reducing capital and operating costs, increasing utilisation and up time, and improving market positioning to compete in the global market becomes a major challenge in Oil and Gas Industry. Organizations should learn and update new culture to handle not only man power and also their knowledge that they kept in their head of the people involved as experts, is also a major challenge to organizations.

So, organization in operations, are facing lot of issues and challenges, in handling information required to operate as well as to execute in their business activities. Also organizations should understand the cost of their internal knowledge, which people involved possess in their head called information, and trying to find the way to explore opportunities, and ways to use their information to maximize their corporate returns, as one of their key strategy by implementing

knowledge management in their organization. Also another challenge is that the bottom line for their clients should have better information and smarter decision. Major challenge in Energy Sector is Identifying and framing response team in Energy Sector which can solves majority of their challenges in the aspects of safety and related research and development with related issues. Integrating picture of the oil extracting field as it relates to the presence of hydrocarbons in the water column is a challenge in the oil and gas sector. The organization should have the ability to better understand what kind of threat remains out there and this will also set the stage for long-term natural resource damage assessment and any long-term sampling requirements that might need to be carried out under the shift to the natural resources damage assessment, as the key impact of the knowledge management implementation. Hence, the focus on Knowledge Management from the oil companies started aggressively.

Particularly in the developing and developed countries, developments within the industry to avoid disaster are also likely to impact, if they are in the oil and gas industry. The biggest challenge in the oil and gas sector is safety. Organizations are exploring the possibility of implementing and the opportunities to find to improve safety. However, since the disaster, there are those who have speculated that issues with knowledge management could have contributed to the incident. Regardless of whether these assertions prove to be unfounded or not, there is need to explore the possible ways to avoid disaster in the oil and gas sector, Way to ensure that it should never and ever happen again, to any one, at anywhere, at any time, and ability to provide better solutions than earlier. The Geology and Geophysics data are being continuously produced in giga bytes and terra bytes, way to integrate various data formats, how to analyse, how to model and interpret, how to store and retrieve with simple equerry and search tools, how to display and visualize in 2D & 3D space and 4D space & time are all every day challenge problems in Exploration & Production. Identifying relevant way to analyse Oil and Gas formations, reservoirs, well logs, bore holes, geology, geophysics, geochemistry etc are also challenges of this industry.

The Community of Practice approach is common, and communities are very active in major energy sector organizations etc. These are very popular and very effective way in the exploration end of the business, in knowledge-intensive areas such as drilling, geology and geophysics. In addition to Communities of Practice, another powerful aid to the development of communities is setting up a "people index" or Yellow Pages system, which becomes a new way to access the most valuable reservoir as one million man-years of experience. Lessons Learned systems are crucial for delivering performance improvement in the risky and expensive world of the international and offshore megaprojects, and these are applied with a rigor seen in few other places. Discussion forums, becomes more and more vital for connecting people in communities of practice, and these can usefully be supplemented by real-time collaboration technologies. Many studies reveal that the story of the many energy sector organizations shows how desktop videoconferencing was used to bring global knowledge and skilled to bear on local problems.

User-populated Knowledge Bases are also proving to be valuable tools here. Energy sector organizations have implemented a portal strategy embodied in their service hub on the company Intranet. They use this system of portal, both as a virtual workspace for participating teams, as well as a discussion and document forum for their communities of practice, and is rapidly growing to become the single solution provide for reference material. The major benefit that knowledge management has given oil companies so far is "protecting the base", oil company jargon for maintaining and improving the core business. The objective is on reducing capital and operating costs, increasing utilisation and up time, and improving market positioning to compete in the global market. Knowledge is captured and shared about topics such as increasing success in finding oil fields, reducing maintenance down-time in oil refineries, and increasing the speed of build of gas stations. But as oil runs out, and focus turns to renewable, then the oil majors are going to have to turn their Knowledge Management spotlight on developing new knowledge, on innovation, and on rapid learning of new skills and new business models. That's when the winners and losers will be determined by their learning speed and by the efficiency of their knowledge management. That's when organization will see whether the oil sector really has staked their future on Knowledge Management.

Culture related Knowledge Management becomes more and more popular to ripe the fruits of competitive advantage. Economic conditions remain tough and tougher than earlier due to cut throat competition, globalization, strategic operations against competition both local and global level, smarter work force than harder work forces etc., Companies should learn and update new culture to handle not only man power and also their knowledge that they kept in their head of the people involved as experts, which is not at all easy to codify, which is tough to express either oral way or document way, but it is costlier in comparison with new human replacement, where time becomes quite costlier than the raw materials or services in production or solution respectively. So, organization in operations, are facing lot of issues and challenges, in handling information required to operate as well as to execute in their business activities. Also organizations should understand the cost of their internal knowledge, which people involved possess in their head called information, and trying to find the way to explore opportunities, and ways to use their information to maximize their corporate returns, as one of their key strategy by implementing knowledge management in their organization.

Web Portal becomes the most essential tool in the Energy Sector. Organizations in energy sectors operating at international level started developing and applying required portals to keep a transferable database of reservoir engineering techniques. Initial content is developed by geosciences and engineering professionals, before being added to and changed over time by members of the knowledge community. The ultimate objective that they used to follow for implementing knowledge management is that the bottom line for their clients should have better information and smarter decision, from both an organisational knowledge capture perspective and as an aid to training a transitioning workforce. Filling the need for more information following the disaster, the companies those who understood about the worth of knowledge management and its success stories in various sector, realized their mistakes for not implementing so far, and invalidity of their excuses by saying their size as a reason, is also looking to incorporate web pages into its *Portals*, which contains information on over humpty number of fields, as their knowledge management initiatives.

Major challenge in Energy Sector is Identifying and framing response team in Energy Sector which can solves majority of their challenges in the aspects of safety. Organization can form a team called response team to explore the need and applicability of knowledge management practices to improve the safety of the upstream oil and gas industry. To keep research and development as a continuous process to protect the people involved and their knowledge acquired also to avoid tragedy in future by protecting the knowledge they gained, so far in the repository, and the lessons they learnt, organizations in oil and gas sector started engaging academic institutions, to monitor sub sea oil in association with regulating authority of environmental protection, oceanic administration, atmospheric agency. Organizations understood that only by integrating information and knowledge with association of all these organization through knowledge management can become key strategy to handle relevant issues and challenges in the oil and gas sector.

Also organizations trying to implement knowledge management in the oil and gas sector clearly understood the need of the extensive efforts and necessity to unify them into a comprehensive knowledge management-based picture of the oil extracting field as it relates to the presence of hydrocarbons in the water column. All data relating to hydrocarbon reserves in the countries which contains oil and natural gas called oil field, is to be brought together to provide a picture that can be used to draw conclusions about the region from. These amount of efforts along with knowledge management in the oil and gas sector can help the organization to better understand what kind of threat remains out there and this will also set the stage for long-term natural resource damage assessment and any long-term sampling requirements that might need to be carried out under the shift to the natural resources damage assessment, as the key impact of the knowledge management implementation. Then, there is a very strong performance drive and clear metrics. Organizations should know whenever they have to do a good job, because it is measurable. In their business routine, they can measure the length of feet they drilled that day, or the quantum of barrels they produced that month, or the amount of time it took them to get the retail station built. And if some other organization did the same better and faster, then there's a

real incentive to learn from them. Hence, the focus on Knowledge Management from the oil companies started aggressively.

IMPLEMENTING A KNOWLEDGE MANAGEMENT STRATEGY IN THE OIL AND GAS SECTOR

In oil and gas industry, consulting firms, believes that according to the phenomenal growth of the technology and society, organizations in oil and gas industry should implement knowledge management in their organization without saying their size as their reason and also believes that if there is an organization without knowledge management implementation such organization is not eligible for excuse and those organizations cannot be excused for not implementing and adopting knowledge management strategies. Those organizations should possess web portal At least for their organizational operations, as they are aware of the knowledge management and its impacts as the key mantras in their organizational operations. Many organizations started developing web portals as their interest and involvement to implement knowledge management in their organization.

Organization should have commitment as lessons they learned that could use knowledge to drive learning and improvement in their company. They should emphasize shopping for knowledge outside their organization rather than trying to invent everything themselves. Every day that a better idea goes unused is a lost opportunity. They should have a culture to share more, and they have to share faster. Every organization using Knowledge Management as a key strategy should apply knowledge more effectively than their competitors do, as a commitment after successful implementation of Knowledge management. Knowledge management is the framework for innovation to succeed in the new business while adapting employees to the rapidly changing operating environment, which can be extended to Energy sector to contribute a lot. To handle any amount of projects Knowledge Management can be used to perspective output, in those aspects. Organizations should provide opportunities leaders to share their knowledge at their level and also to create new one. Organization should become experts in capturing knowledge, integrating and preserving it, and then making what has been learned as fast as possible and

make possible to access to everyone involved in the operations to become capable decision makers.

After so many years of experience, knowledge management may not be a novel concept. But an existing Knowledge Management infrastructure can be a cost-effective means of addressing new and/or increasingly pertinent operational issues in the oil and gas industry, including retaining valuable knowledge during a period of work force aging/diminishing and increasing efficiency through communities of practice. Furthermore, many companies are fine-tuning their best practices transfer process using content management systems and communities of practice to further minimize downtime at field sites across the globe.

The oil and gas industry should have a leader of the quality movement and in knowledge management. Those who have found success with KM principles can now take advantage of an established infrastructure and a more knowledgeable work force and Knowledge Management team to address pertinent challenges, be they acquisitions, globalization issues, reducing downtime, organizing content, or organizing people. By viewing the challenges as opportunities rather than deficiencies, organizations in the Energy sector particularly Oil and Gas Industry can achieve uniform performance in sharing knowledge just as they are in other areas, even though they are decentralized particularly if they globalized.

CONCLUSION

The oil and gas industry has taken advantage of Knowledge Management developments for more than a decade. In that time, the industry has experienced rapid changes and so many mergers that a one-worded petroleum company name now seems like an oddity. Throughout the rapid advance of technology, an extension of offshore drilling, numerous acquisitions, the growing reliance on foreign oil sources, and a focus on environmental issues, Knowledge Management initiatives have played a part in making operations more efficient and effective. When oil and gas companies have been faced with new technology, outsourcing, new partnerships, and government regulation, their Knowledge Management teams can provide support through technology and knowledge transfer, as well as asset management. When business issues involved

capacity management, cost reduction, and the environment, Knowledge Management can play a part through forecasting/scheduling and process and technique innovation. And Knowledge Management can support to improve speed and convenience; Knowledge Management initiatives can be expanded to address point-of-sale technology adoption and procedure effectiveness. Undeniably, Knowledge Management has been proven to increase stock market valuation, assist in growth through acquisition, lead to better-developed products, and encourage intelligent leadership for tenacious early adopters in many of the Knowledge Management implemented organizations. Always Knowledge Management implemented organization should have the objectives in such a way that processes, tools, and behaviors that deliver the right content to the right people at the right time, and in the right context so they can make the best decisions, exploit business opportunities, and promote innovative ideas.

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The oil and gas business operates within complex global and national frameworks. Expansion into new geographical regions and environments such as ultra deepwater drilling is creating new opportunities for revenue growth. But it is also increasing the complexity and risk of the business operations themselves. (IP) industries in an article for Oil and Gas Monitor. "ACM reduces the time to detect failures in equipment through real-time alert management based on sensing abnormalities, and reduces the time to resolve issues through automated and collaborative data sharing across the extended enterprise." Challenge #6: Get senior executives to engage with process opportunities and move OPEX from cost to value driven performance. Management in the Oil and Gas Industry. El desarrollo de la Dirección del Conocimiento. en la industria del petróleo y gas. Organizations emphasized the broad challenges of knowledge management and did not link particular types of knowledge to particular KM instruments. In the current era of knowledge-driven society, knowledge becomes the most critical success factor in the current business environment. It needs to be handled and utilized effectively and efficiently to compete in the global market by creating a sustainable competitive advantage for the organisation. A technology-driven organisation needs to leverage knowledge management process to be effective and competitive, where professional can play an important role while managing the knowledge to handle the challenges comfortably. But the ability of handling cannot be inculcated within a day like technology; it is culture to be cultivated since a long time through experts and their experience they gained practices. Read about new oil and gas innovation technologies such as hydrogen and renewables from Dr. Carole Nakhle, CEO of Crystal Energy. Technological Innovation Creates New Opportunities in Oil & Gas. October 04, 2018. Dr. Carole Nakhle. The whole history of the oil and gas industry has been one of continuous challenges, matched by adaption and innovation. Many of the world's largest private oil companies started their business in refining oil products (the so-called downstream part of the business), then gradually moved into exploration and production (upstream) as they attempted to diversify their activities and reduce their exposure to volatility of supplies and prices. The oil and gas sector has, from its outset, always been wide open to innovation and every kind of modern technology. In last decade oil and gas industry saw a massive upgrade in terms of technological enhancements. Companies started leveraging the benefits of Industry 4.0 technologies. The rollouts of digital technologies in the oil and gas domain are slower, which even lead to the technology becoming obsolete by the time it's implemented. Lack of in-house technical expertise, reluctance to move on from traditional work practices and complex regulatory compliance in the sector are a few of the other primary challenges that companies have reported to be facing with Industry 4.0 implementations. Strategic Approach Towards Industry 4.0 Implementation in Oil and a Gas.