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Knowledge Management in Nigeria Oil and Gas Industry: Theoretical Frameworks, Practical Challenges and Opportunities

By

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Abstract

It is incontrovertible that we currently live in a globalised world characterized by fast information transfer across large geographic areas by means of the internet technology. A consequence of this is the emergence of knowledge-based economies where premium is placed on effective management of human capital to ensure that workers continue to create the right value for the economy. The gross domestic product (GDP) growth rate of economies will be determined amongst other factors by the quantum and quality of knowledge stock harnessed and applied in the production process in sectors of the economy. The knowledge-based economies require that knowledge management (KM) good practices be put in place to improve organization effectiveness.

This paper reviews the knowledge management theories, concepts and practices and examins key KM challenges and opportunities that exist in the industry in Nigeria. There is a critical need to increase top management commitment and resources to leverage the value of knowledge management practices in the industry. The establishment of an online Knowledge Management Forum (i.e. KMF)is recommended as a first practical step going forward. The paper suggests that there is more work to be done to get to a state of reasonable knowledge management penetration in the industry.

Introduction

The global oil and gas industry has been a catalyst to the economic advancement of many countries in the last four decades. The world is grappling with key global energy challenges which include providing access to modern energy at optimum cost. The industry, particularly the upstream sector, has been growing in Nigeria and indeed in the West Africa sub region. There is therefore need to deploy optimally extant capability (i.e. people and technology) for business profitability and long-term sustainability for the society.

Knowledge management is a key aspect of organisation capability that is critical in deploying best available resources. It is noteworthy, that every individual, society or nation needs knowledge to be able to make real and sustained progress over time. Philosophically, knowledge is the source of light (i.e. physical and spiritual), which the almighty God has created and revealed or inspired for the guidance of mankind. Therefore, the acquisition of knowledge is not an end in itself but a means to justify the right end for society both temporal and spiritual. If, as they say, knowledge is power then knowledge management is the key to power.

The globalization of the knowledge-based economy will increase knowledge management requirements in strategic alignment with the organization objectives. Knowledge management is seen as being in the realm of human resource management (HRM) practice, though it is emerging increasingly as a distinct discipline in managing organization capability with strong interfaces with learning and development / training, organization design and effectiveness. In Nigeria, top management of some international Oil corporations (e.g. Shell Production Development Company) are now committing more time and resources to leverage the value of knowledge management practice for their organization. There is, however, a lot more work to be done to make the right impact.

I intend to address the following objectives in this paper, drawing from my professional experience, global ‘best’ practices and focusing on extant issues from the industry in Nigeria.

- Review key KM concepts and models.
- Discuss some industry KM 'best' practices.
- Examine key challenges in deploying KM.
- Identify and discuss opportunities for further KM deployment in the oil and gas industry.

What is Knowledge Management?

Definition

Knowledge Management (KM) is the art and practice of exploring, collating, storing, and deploying expertise (i.e. knowledge and experiences) of people for an effective performance of the organisation. Sometimes knowledge management is mistakenly equated with information management (i.e. data storage and retrieval). It is, however, more than that and it is about sharing expertise with emphasis on the cognitive, social, cultural, and organizational aspects of the human being. It impacts and stimulates intellectual properties of the organization.

> The idea of a KM system is to enable employees to have ready access to the organization's based document of facts, sources of information, and solutions. For example, a typical claim justifying the creation of a KM system might run something like this: an engineer could know the metallurgical composition of an alloy that reduces sound in gear systems. Sharing this information organization wide can lead to more effective engine design and it could also lead to ideas for new or improved equipment.1

Historically, knowledge management evolved as a school of thought in the 1980s, originating from intellectual capital and information management theories. The initial theories and models, which were developed many years ago, have become increasingly popular and widely accepted over the past few years. It is posited by KM experts that rather than focus on the management level of an organization, expertise sharing should focus on the self-organized activities of the organization's members. Globally, companies no longer solely compete on the basis of financial capital but knowledge (an aspect of human capital) is the new competitive advantage in business.

> Globalization and technology have revolutionized the way the world does business and created a new knowledge era. Companies are searching for a way to compete in the new knowledge-based economy. Focus is being shifted from the industrial era's classic management methodology of vision and values to a more holistic, strategic approach that realizes the benefits of value networks.2

The 4-Stage Knowledge Cycle

Competence which is a key aspect of human capital development can be defined as knowledge, skills, abilities and attitudes. The acquisition or loss of knowledge is an interesting experience through a 4-stage continuum. The four stages in the knowledge cycle which individuals pass through many times in their lives are.

a) Stage 1 – **Unconscious incompetence** (e.g. one who does not know that a motor car exists)
If you don't know what you don't know, does it worry you? It most probably does not worry you.

b) Stage 2 – **Conscious incompetence** (e.g. a motor driver who is a learner)

1 Baikar, Sachin, Gartner Group – Internet chatroom contribitor
2 Crozier, Alison, Strategic Knowledge Management: Leveraging Intangible Assets in Adult Education Consulting

If you now know that you don't know. Are you comfortable or not with this state of consciousness? May be you are or may be not.

c) Stage 3 – **Conscious competence** (e.g. a recently qualified professional driver.)

If you now know that you know. How do you feel about this state of consciousness (e.g. are you confident or arrogant)? It depends on who you are.

d) Stage 4 – **Unconscious competence** (e.g. an experienced motor driver or bicycle rider)

If you are not conscious of your competence, how do you feel? (e.g. confident, arrogant or nonchalant)?

e) Reflective Questions - Consider the following questions for your self:

i. Which one of the 4 stages in the knowledge cycle would you as an individual like to be at all the times?
ii. Which stage is the most comfortable to be at any time?
iii. Which is the most dangerous stage to be at every time?

Whenever I asked the first question above, most people had answered that they would like to be in stage 3 (i.e. conscious competence) and next preference is stage 4. Nobody has expressed preference to be in stage 1 at all. Similarly, most have responded to the second question above by indicating comfortability in stage 4. Stage 1 is seen as the most dangerous place to be in. Whilst the first question explores the preference of the respondent to the 4 stages, the second tests the natural instinct of the respondent. In reality, it is natural for people to feel comfortable, without being conscious of it, only in stage 1 because what you do not know does not worry you. Can you imagine knowing that you know some incident (either extremely good or bad) will happen to you tomorrow or the in the next 5 minutes? How will you feel about this? I can predict that the resulting anxiety, worry and/ or emotional turbulence could cause cardiac arrest in some people. However, our Creator is a merciful God who Has made living merciful for the creatures by not allowing us to have perfect knowledge but desirous of it. The fact that stage 1 is a natural comfort zone for most people should not make it a permanent place for those who consciously and constantly seek new knowledge to improve themselves and their environment. Stage 4 is the most dangerous because 'he who knows not that he knows not' can be likened to a loose canon in flight seeking an unfortunate victim as impact target. This could be worse than a one-eyed man in the land of the blinds. Therefore, seeking to know yourself first before your environment is the right sequence in expanding one's knowledge horizon.

Knowledge Management Theories

As a seeker of knowledge in KM theory and practice, I have reviewed the literature and would like to highlight Knowledge Management theories of four notable thought leaders in the western world namely, Verna Allee, Karl-Erik Sveiby, Hubert Saint-Onge and Charles Armstrong who respectively champion the theories of Value Networks, Intangible Assets and Knowledge Capital.

a) Value Network

Verna Allee is a renowned Knowledge Management thought leader in the western world. In her book *The Future of Knowledge*, she theorizes that to be successful in today's knowledge-based economy organizations must adopt a value network approach. She argues that knowledge management is

> "Any web of relationships that generates both tangible and intangible value through complex and dynamic exchanges between two or more individuals, groups, or organizations3

Verna sees value networks as part of Knowledge Management and as business tools to assist organizations in recognizing relationships, identifying transactions, aligning strategic decisions and communicating complex concepts. The value network approach provides a whole system view indicating where key processes and business areas work together. A value network is constructed by identifying areas, within the organization and its external network, that create value through tangible and intangible transactions or exchanges. Each tangible and intangible transaction is then identified and mapped onto the value network. The whole system approach allows organizations to objectively analyze the flow of knowledge throughout the value network and better understand the "role of knowledge and other intangibles in value creation"[4]. It is argued that adopting this modeling process provides organizations with the opportunity to critically identify value opportunities, align tangible and intangible transactions with value and strategy, and support the business model.

Verna advocates analyzing the value network by using a three-step process of Exchange Analysis, Impact Analysis, and Value Creation Analysis. The purpose of the Exchange Analysis is to assess the health and sustainability of the value system through the identification of overall patterns of exchanges; the Exchange Analysis identifies patterns of reciprocity, value bottlenecks, tangible and intangible transaction ratios, and system optimization[5]. The Impact Analysis determines the costs and benefits of the tangible and intangible transactions for the participants, and their respective impact. Value Creation Analysis "focuses on one Participant at a time, analyzing how each Participant is extending value to other Participants in the system."[6] The health and sustainability of a value network is determines by the ratio of positive to negative value inputs and outputs; it is crucial that each Participant recognize the positive or negative value created by his/her inputs and outputs, and how it affects the other Participants and the network as a whole.

b) Intangible Assets

Karl Erik Sveiby theorizes that the knowledge economy thrives and is based on the value created by intangible assets. Traditionally, in financial terms, the difference between an organization's book value and market value was defined as "goodwill"; instead, Karl attributes the difference to the value created by intangible assets. Karl's methodology focuses on identifying three types of intangible assets: Competence, External Structure, and Internal Structure. These assets contribute to an organization's balance sheet and the development and implementation of measures for evaluating organizational growth, efficiency, and stability.

c) Knowledge Capital Model

Hubert Saint-Onge and Charles Armstrong theorize that in the new economy, the conductive organization will be the ideal knowledge-based entity. The conductive organization will achieve success in the marketplace by aligning its knowledge with five organizational capabilities: **strategy, culture, structure, systems**, and **leadership**. Conductive is defined as ability to Turn information into knowledge that can be acted upon to create value for the customer and the organization.7

The Conductive organization aligns its strategic capabilities with its internal and external strategy to create a cohesive brand, increase performance, nurture a consistent environment, and develop a

3 Allee, Verna, The Future of Knowledge, 2003, p.192
[4]Allee, 2003, p.198
5 Allee, Verna, The Future of Knowledge, 2003, p. 201-202
6 Allee, Verna, The Future of Knowledge, 2003, p.206
[7] Saint-Onge, Hubert & Armstrong, Charles, 2004, p.20

customer focus. Knowledge management is seen as an organization's strategic ability to be responsive to its changing internal and external customer needs.

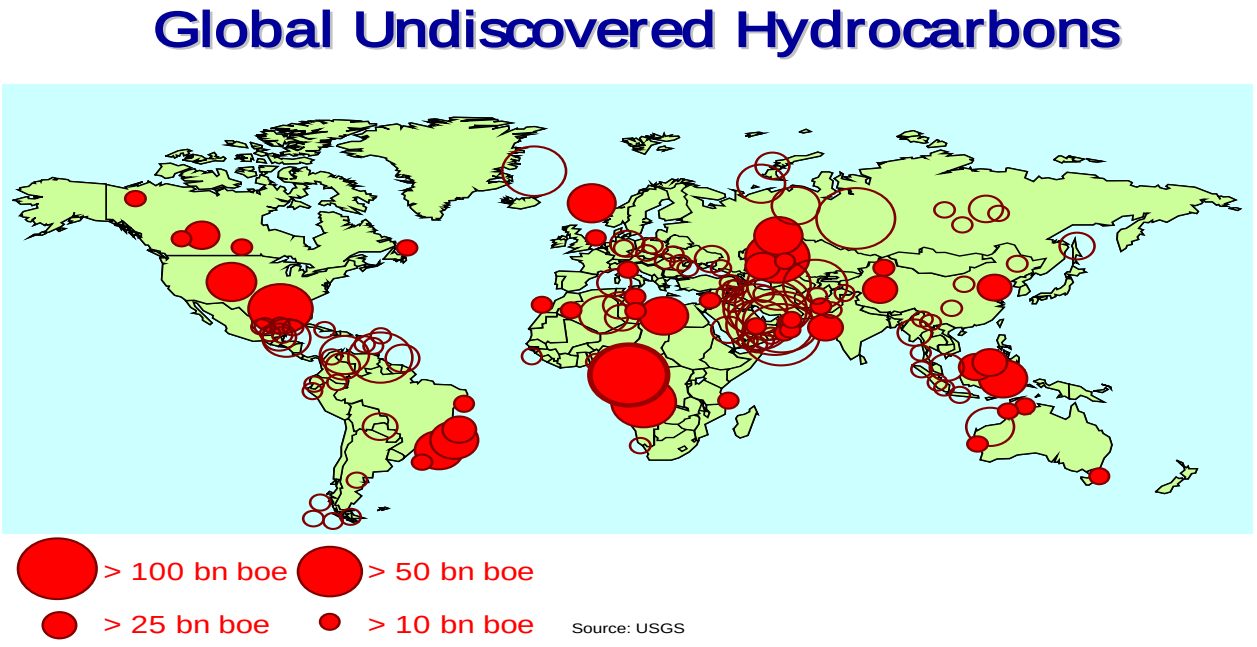
The Knowledge Capital Model has three main components that create knowledge value: Human Capital, Customer Capital and Structural Capital. Human Capital refers to the individual capabilities of the organization's employees. Customer Capital encapsulates the relationships an organization's human capital develops with customers and the value derived from them. Structural Capital refers to the organizational capabilities that provide the platform necessary for the human capital to develop value from customer relationships. Each component offers intangible assets that have the capacity for knowledge creation; the synergy of the three components, Human Capital, Customer Capital, and Structural Capital, creates value for the organization through the flow of knowledge.

Overall, the explicit application of these models is limited in the industry in Nigeria. However, value networking as expressed in discipline forum is an emerging practice in the industry.

Knowledge Management Challenges in the Oil and Gas Industry

The oil and gas industry is currently dominated by Nigeria in the West Africa sub region. Globally, there is a lot of undiscovered hydrocarbon reserves (see Table 1 below) which efficient exploration and production will keep KM practice vibrant for a long time to come. There are huge potential reserves in Nigeria and in the gulf of guinea which would attract investment fund for exploration and production in the coming years. The return on investment will depend a lot on the value being created by workers enabled by KM practices.[8]

Fig 1:



Given the Nigerian sub regional dominance and nascent state of KM in other Oil and Gas producing countries, the Nigerian case has been used to discuss the state of KM affairs. The sub region faces

[8] Source: Shell Petroleum Development Company

certain challenges in nurturing knowledge management practices in the industry. The key challenges particularly in the emerging knowledge-based economies are as follows.

Commitments and Alignment
Securing commitment by top management to deploy knowledge management tools is a challenge. Also, there is need to align Learning and Development and Organization Design activities to avoid duplication / conflict of activities in embedding knowledge management practices in the organisation.

Technology (Internet Penetration)
The availability and use of technology are essential. The level of Internet penetration and impact are some challenges in managing KM in many organizations.

Return on Investment (ROI)
Measuring the value of knowledge management to the organization is not considered a priority but could significantly improve resource commitment and confidence level. Many organizations (i.e. 63% in Europe) shy away from measuring impact and effectiveness because it is not an easy task and not an exact science. Overcoming this challenge of measuring results of KM efforts will promote it further.

Development of KM Professionals
Learning and Development (and Organisation Design) professionals who manage the process must be provided skills building opportunities. The professionals must be at stage 3 (i.e. conscious competence) all the time.

Engagement (Interaction) Culture
The engagement culture, whether it is open or closed, friendly or hostile, willing or unwilling to learn (i.e. learning organization) will influence progress with knowledge management deployment.

Language – In West Africa, it is important to have facilities for interpretation (of spoken words) and translation (of text) from mainly English to French and vice versa; later to include Arabic.

Knowledge Management Opportunities

There are many opportunities to deploy Knowledge Management practices in the industry; some practices (e.g. Global Networking / Internet networking, Workplace Learning and Managing Pre and Post Crew Change Demographics) have been examined.

Global Networking

Global networking is a valuable KM practice and happens usually through a common discipline / skills group (e.g. Well Engineers, Geoscientists, Static & Rotating Equipment Engineers, Competitive Intelligence Practitioners, Human Resource Practitioners) meeting via the internet to share knowledge and experiences to address their common issues and challenges. A lot of business value is created this way by such networks through the free flow of information enabled by the internet. Some networks have access whilst others are password enabled and require membership registration. See the appendix for web addresses of some virtual network information groups.

I would like to share my personal experience on setting up a global virtual network. I was privileged during my 4-year overseas assignment at the Royal Dutch Shell Central offices in The Hague in 2001, to have designed and coordinated the take-off of a global network. This was the Human Resource Global Network (HRGN), a common interest virtual forum for HR people in Shell Exploration and Production Business across the world. The build phase requires defining the structure (i.e. high traffic area/ general discussion area, focused discussion groups), roles (i.e. process owner, discipline coordinator. discussion moderator), rules for participation and identified list of initial participants (i.e. business leaders, experts, etc). The implementation phase will require a kick-off event championed by a global business leader, sensitisation of potential members across geographic locations or business constituents. The HRGN still exists in Shell and a valuable network which I think would have by now over 5000 registered members including non-HR professionals (i.e. Line Managers) in many countries where Shell operates. It provides platform for knowledge seekers on HR or related discipline issues get professional advice and guidance. This was part of my modest contribution to nurturing good KM practice in Shell.

I would like to propose that an online Knowledge Management Forum (i.e. KMF online) be set up for the oil and gas (upstream) industry in Nigeria (for a start) with focus on sharing non-confidential information on industry practices in exploration, sub surface petroleum engineering and surface engineering and support activities. I am willing to volunteer along with others and contribute to setting it up. I believe that with a clear focus, commitment and resource availability the industry KMF online website can be achieved in a short time. However, we need strong corporate stakeholders' support from NNPC, PTI, DPR, NAPIMS, PTDF, Chevron, Exxon-Mobil, Shell, the Universities, and other selected professional bodies/ tertiary institutions.

Brainstorming and After Action Review

Brainstorming is KM tool that is effective in getting ideas from members of a working or project team. It does not allow pushback/ criticism when ideas are being offered but deal with quality and prioritization of the ideas in the stage in order to get full participation. The After Action Review is another KM tool being used in the oil and gas industry in Nigeria. It enables feedback from members of a group or customers with a view to improving performance next time. Both tools are widely used in the industry though certain cultural challenges (e.g. deference to age/ elder/ seniority/ hierarchy) impede its full value to the organization.

Workplace Learning (WPL)

Knowledge management can also be maximized through an integrated learning and competence application on the job (i.e. workplace learning) approach. Key workplace learning activities include training, coaching, mentoring, knowledge sharing (e.g. lunch and learn sessions).

- Coaching – this could be a task coaching or behaviour coaching aimed to improve performance and personal effectiveness. Peer and lateral (i.e. upward / reverse) coaching can change a 'silo' or winner-takes-all mindset.
- Mentoring – this is to nurture a long-term relationship between the youthful part of the workforce and the others with the aim to ensure generational transfer of knowledge.
- Lunch and Learn sessions – to embed knowledge management culture, continuous sharing of information (e.g. management brief, learning points from a course/ conference/ workshop) should be encouraged during the lunch period.

Managing Pre and Post Crew Change Demographics

The demographics of the organization would show a normal attrition (e.g. retirement, resignation) rate, which impact if not properly managed could be disruptive to the business. If for instance, 40% of the organization workforce will be retiring in the next 3 years, there is need to apply appropriate retention strategies to the stock of knowledge which the retiring staff would otherwise have carried out with them in to retirement. One strategy is to assign coaching and mentoring roles to these employees. However, their efforts and impact must be adequately recognized and their motivation monitored. For post retirement cases, it is useful to set up a retirees-forum with meetings either face-to-face or virtual, where not only welfare issues will be discussed but technical / business issues and suggestions sent back to the organization for consideration / adoption.

Knowledge Management Benefits

Individual

- Work can be done better, faster and usually cheaper
- Improves personal development (skills and competences)
- Generates easy networking opportunities

Organization

a) Quantitative

- Continuous gathering of "incidental successes"
- Results exceed expectation

b) Qualitative

- Optimises people asset, deepens professionalism
- Promotes challenge to innovate
- Promotes employee and management engagement
- Fosters partnership between key stakeholders (e.g. sponsors, customers, competitors, regulators)

Conclusion

Knowledge management is critical to the continuing growth of the oil and gas industry in Nigeria and beyond. The increasing number of knowledge-based economies globally requires that knowledge management best practices should be put in place to improve organization effectiveness and meet the global energy challenge. This paper has reviewed the knowledge management theories, concepts and practices and examined key challenges and opportunities that exist in the industry. There is critical need to increase top management commitment and resources to leverage the value of knowledge management practices. Certainly, there is more work to be done to get to a state of reasonable knowledge management penetration in the industry. The good news is that we can start from where we are today.

Current KM situation can be improved with industry collaboration and a strategic plan, focus and drive. We need a clear vision, commitment to the vision, practical next steps and demonstrable benefits to be gained upon achievement of the vision. With these, at least the online Knowledge Management Forum (KMF) vision will be achieved within a year.

Appendix

a) Center for Creative Leadership is at www.ccl.org. The standard features include

- Online Bookstore provides publications and assessment materials
- Online 360 degree feedback assessments

- Course catalog with dates

b) Technology latest development is at www.CNET.com. The standard features include

- Reviews on desktops, notebooks, monitors, software
- Latest news on technology related issues
- Financial news with focus on technology related companies
- News and links to important Internet related tools and software
- Comparison pricing on various computer equipment
- Online auction of computer equipment
- Technology jobs database hosted by CareerBuilder

c) News / information about the Internet is at www.Internet.com. The standard features include

- Current Internet news and Internet technology
- Web development progress
- Internet stocks information and collection of general Internet resources

d) Search engine *Mamma* is at www.mamma.com. Standard features include

- Dr Koop on health, White pages / Yellow pages; Public records search
- Business s; URL, submit service search engine

e) Legal and Regulatory Internet Sites

- www.ahlpubs.com; www.adr.com; www.law.cornell.edu/topical.html; www.dol.gov/elaws; www.fairmeasures.com; www.hrlawindex.com; www.lawnewsnetwork.com/practice/employmentlaw.com.

f) International telecommuting Advisory Council is at www.telecommute.org. Standard includes

- A complete series of online workshops
- Development of best practices progress reports

g) Recruiting Internet Sites

- www.careerbuilder.com; www.careermosaic.com ; www.careerpath.com ;

h) Salary Administration Internet Sites

- www.acaonline.org ; www.bls.gov/comhome.htm ; www.abbott-langer.com ; www.wageweb.com ;

i) Training / Career Development Internet Sites

- www.asrd.org ; www.askeric.org ; www.graschools.com ; www.petersons.com ; www.seminarinformation.com ; www.test.com ; www.trainerswarehouse.com ; www.tregistry.com ; www.tcm.com/trdev ; www.trainingnet.com ; www.trainingsupersite.com

j) Energy Internet Sites

- Drilling Research Institute is at www.drillers.com/classifi.htm
- Oil Link is at www.oillink.com
- Offshore Guides is at www.offshoreGuides.com
- Petroleum Place is at www.discoveryplace.com

1. Others are www.emine.com;www.infomine.com ; www.energyjobs.com ; www.miningusa.com/default.asp