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Research paper

Knowledge Management in Human Resource in Oil Companies from Technologies Perspectives a Literature Review

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Abstract

The aim of the current work is to discuss how has human resource (HR) and knowledge management (KM) technologies been developed in oil and gas industry. In order to fulfil this aim, four sub questions were formulated, which sought to understand: how technologies are supporting KM activities, HR activities, cultural KM relations, and the relations between HR and KM. This was done with the main purpose of coming up with a model that explains the development of HR and KM technologies. The study assumed a secondary approach wherein secondary data from peer reviewed studies were used in coming up with the findings. The different studies used in coming up with the findings were discussing how knowledge management has developed in the field of HR also the significance of understanding the oil and gas industry HRKM Technologies. According to the findings of the research, the importance of the developed Framework /Model for HR and KM can summarized into three major points: (1) there are the unique meanings of the term KM strategy; (2) the normal use of correlation of technologies to knowledge processes in the past studies has not adequate enough to explain their links to business strategy; and (3) technologies applied in KM can be used together in many different levels. The findings suggested contingency approach, which centres on KM initiatives, might be helpful when it comes to explaining the manner in which KM technologies can support strategy.

1. Research Background

There has been a general decline in the number of resources available for different industries over the past few decades. Nonetheless, an article published by McKinsey & Company claims that one of the hardest hit industries by this scarcity is the oil and gas industry (Hagen et al., 2017). The researchers claim that this lack of resources is the main reason why the world has been experiencing high oil prices over the last couple of decades.

Aside from the problem of resource scarcity, the report by McKinsey & Company underlines three other major challenges that are disrupting the oil and gas industry, including resource abundance, profound technological advances, and demographic shifts (Hagen et al., 2017). For resource abundance, the report claims that traditional talent is no longer scarce and that oil and gas producers are no longer limited to megaprojects in order to realize their profits. On the other hand, profound technological advancements are revolutionizing the ways of working and allowing significant changes in productivity through automation. A major issue here is that the automation is also replacing knowledge workers. Demographic shifts are being experienced in the workers' demand for change in their working environment in addition to the role oil and gas companies play in society (Hagen et al., 2017). These changes have not only been noted by Hagen et al. (2017), but also other researchers such as Alhanshi and Albraiki (2015). Alhanshi and Albraiki (2015) argue in their publication that even though organizations acknowledge the significance of knowledge within their organizations and the economy at large, automation has been the leading threat to maintaining a knowledge workforce in most organizations today. Shuen et al. (2014) arguments are based on the demographic shifts challenge. The researchers argue that millennials, people from the early 80s to the early 2000s, will soon form most of the labour force; they will also be required to climb the executive and management roles. The millennials generation is also expected to come with its own expectations about technology, working together, accountability, and pace (Shuen et al., 2014).

Revolutionized HR practices and knowledge management have been recommended as the main ways of dealing with such changes (Hagen et al., 2017; Alhanshi & Albraiki 2015; Khan, 2010; Inkpen & Moffett, 2011; Sidani & Al Ariss, 2014). Hagen et al. (2017) for instance, presents three themes the prove the significance of HR and knowledge management when it comes to dealing with these disruptions in the oil and gas industry. According to the researchers, (1) managing for value and energy is derived from the notion that every worker creates more business value with increased automation and digital tools at their disposal brining about increased returns through personalized development and support since these tools tend to get the most out of their efforts; (2) people analytics and digital tools are offering HR new methods of delivering individualized, prompt and forward-looking interventions, whereas artificial intelligence (AI) is freeing the HR from transactional duties and simple judgment-based duties; and (3) the increase in the number of organizational models are equipping the HR with more powerful tools that fasten the pace of change and encourage constant

improvement – this is because new technology is opening up better methods of managing how humans work in addition to their interaction (Hagen et al., 2017).
In light of this information, the current research will discuss how has human resource (HR) and knowledge management (KM) technologies been developed in oil and gas industry. The uniqueness and significance of this research comes from the fact that even though researchers have extensively studied the development of HR and KM, these findings have been generalized across different industries (Janev & Vranes, 2011); these researchers have kept a minimal focus on the development of HR and KM technologies in the oil and gas industry. The current research seeks to reduce this research gap by adding to the literature that is specifically focusing on the dynamics involved in the oil and gas industry. It is hoped that by the end of this research, a unique Framework/Model will be developed that will show the reader the development of HR and KM technologies.

1.1. Research Questions

The research seeks to answer the following questions:
How is the development of HR and KM technologies?
How technologies are supporting KM activities?
How technologies are supporting HR activities?
How technologies are supporting cultural KM relations?
What are the relations between HR and KM?

2. Technologies and Their Support to KM Activities

There is general consensus among management researchers that organizations must collaborate internally as well as with other organizations in order to create added value (Andreeva & Kianto, 2012; Inkinen, Kianto & Vanhala, 2015; Hislop, Bosua & Helms, 2018). Specifically, Hislop, Bosua and Helms (2018) pointed out that competitive advantage can only be built on the basis of the unique knowledge created and shared by stakeholders. Therefore, it is easy to agree with Geisler and Wickramasinghe (2015) that such knowledge must be management in order to take full advantage of it. Botha, Kourie and Snyman (2014) defined knowledge management as the process through which an organization identifies, selects, organizes, transfers and circulates critical expertise and information that reside in an unstructured manner in the organization are part of its memory. On the other hand, the technology that makes knowledge management (KM) available to the entire organization is known as knowledge management system (KMS). According to Ellison, Gibbs and Weber (2015), KMS provides organizations with the technical support that facilitates the capture and exchange of knowledge to take place readily, openly and freely across different employees and stakeholder groups. It follows, therefore, that the development of systemic support designed for KM is a crucial means for instituting knowledge practice. This is a view supported by Brunswicker and Vanhaverbeke (2015), who argue that technologies intended to contribute towards knowledge management solutions have both short-term and long-term capacity to improve an organization's collaboration and business intelligence capabilities. A KMS essentially becomes a powerful tool for increasing team efficiency and effectiveness both within the organization's internal and external environments and Donate and de Pablo (2015) demonstrated that it is strongly correlated to human resource management. Additionally, studies by Andreeva and Kianto (2012) also showed that information communication technology (ICT) practices improve financial performance significantly only when they are tied to human resource management.
Although there are numerous knowledge management approaches, most traditionally focus only on cultural and social aspects while overlooking the role played by technology (Girard & Girard, 2015). However, it is also noted that there are also technology-based approaches that do not offer solutions to cultural and social issues of knowledge management. According to Mao et al. (2016), an effective KMS provides all users with appropriate channels for knowledge acquisition, creation, documentation, transfer and application with the common goal of meeting the organizational knowledge priorities. This argument can be inferred to mean that an effective KMS eliminates or minimizes major barriers to acceptable knowledge practice as users seek to gain and share knowledge from the multiple sources available to them. North and Kumta (2018) argue that KMS technologies not only enable the process of knowledge acquisition and sharing; it also adds value by anticipating the users' probable needs. In agreement, Inkinen, Kianto and Vanhala (2015) add that KMS technologies enable organizations to support innovation performance because they provide a platform for the strategic management of knowledge, ICT practices and competence. While knowledge is a strategic resource for any business to create and enhance competitive advantage, knowledge management technologies help in the conversion of data and information into valuable knowledge (Dayan, Heisig & Matos, 2017). From this explanation, technologies can be viewed as knowledge management enablers.
Kasemsap (2017) argues that the implication of the term "system" is that a KMS necessarily operates on the basis of fixed and predictable principles because systems have defined goals and boundaries. For example, the goal of a KMS is to facilitate the capture, sharing and application of valuable knowledge in the organizational environment. Additionally, a system is typically controllable since it will determine the input and output. However, Meihami and Meihami (2014); Bharati, Zhang and Chaudhury (2015); Geisler and Wickramasinghe (2015); Botha, Kourie and Snyman (2014) point out that whichever technology an organization implements to support knowledge management it must cover four crucial areas of activity. They are business process management, knowledge application management, content management and web content management. Business process management, according to Meihami and Meihami (2014), outlines the necessary processes that facilitate and support an organization's business practices. Thus, different technologies such as those relating to decision making, finances and human resource management operate within as well as outside the organization to ensure business integration is effectively achieved. According to Bharati, Zhang and Chaudhury (2015), the technologies are linked to practices of knowledge management to enable employees access up-to-date and accurate information that they can use to build knowledge. This explanation supports the arguments by Hislop, Bosua and Helms (2018) earlier that competitive advantage can only be gained through the sharing of unique knowledge among an organization's members and external stakeholders.
Knowledge application management, as explained by Geisler and Wickramasinghe (2015), ensures that the organization provides users with specialist tools and application packages to create and use knowledge. Email and word processing, for instance, are applications that facilitate and hasten the management of workflow, contributing to the ultimate organizational goal. Botha, Kourie and Snyman (2014) gave a practical example of project management, which typically cannot be achieved in the absence of workflow management. A KMS in the context of project management will entail all the aspects of knowledge creation, capture, sharing, transferring and application (Botha, Kourie & Snyman, 2014). On the other hand, Ellison, Gibbs and Weber (2015) explained that content management entails a

KMS's intellectual content and ensures users are able to retrieve knowledge relating to a specific subject. Through content management, users have several strategies to index, organize and archive resources linked to the KMS. Web content management, on the other hand, focuses on the creation of a framework of an effective website that enables users to access the KMS (Donate & de Pablo, 2015). Therefore, web content management ensures that the architecture of the KMS supports the logical arrangement and access to links and content. According to Mao et al. (2016), an area of notable interest in the development of knowledge systems is the user interface, which is essentially the channel or platform through which knowledge users intermingle not only with the knowledge system but also other users.

The user interfaces, which are typically specialist tools and also common application packages, enable users to add content to the knowledge system as well as benefit from it by strengthening their use of knowledge. According to Dayan, Heisig and Matos (2017), the users also gain from the applications and technical knowledge system in the KMS simply by accessing knowledge. There are also other related systems that draw from crucial organizational functions such as human resources, finance and archives. The services a KMS offers its users, as explained by Meihami and Meihami (2014), facilitate not only their access to critical knowledge but also its effective application. The vital role of technologies in knowledge management, therefore, is the effective and efficient support it offers the knowledge community by facilitating the acquisition, creation, documentation, transfer and application with the common goal of meeting the organizational knowledge priorities. However, KMS must also be appropriate for the specific organization in order to efficiently manage knowledge (Meihami & Meihami, 2014). Therefore, it must be implemented in consideration of the organizational context and structure alongside systemic issues. The following was formulated from the above review:

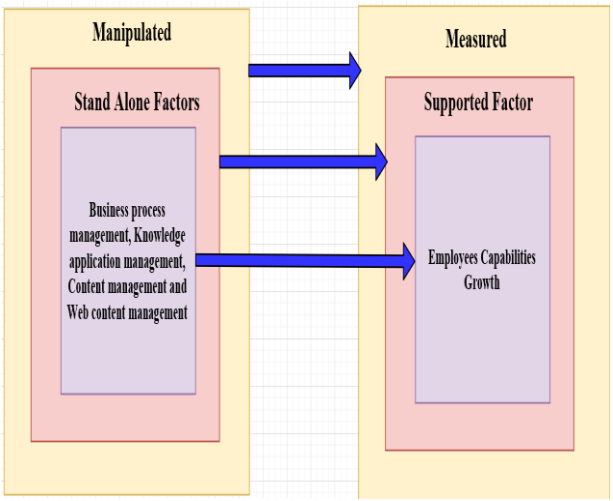

Fig 1: Conceptual Framework on Technologies and Their Support to KM Activities

3. Technologies and Their Support to HR Activities

Armstrong and Taylor (2014) pointed out the major HR activities as including but not limited to strategic planning; providing equal employment opportunities; selection and hiring of employees; orientation and paperwork; development and training; benefits and compensation; managing legal issues; performance appraisal; and security, health and safety. On one hand, Stone et al. (2015) assert that technology, and particularly ICT, has in recent years considerably influenced and impacted upon HR practices and processes. On the other hand, however, they also point out that existing research findings do not conclusively project the extent to which technology has enabled organizations achieve their HR goals. In contrast, Bratton and Gold 2017) argue that ICT has been instrumental in realizing the HR goals including to attract, motivate and retain relevant talent since the advent of the Internet. According to Chelladurai and Kerwin (2017), talent management and technology are the most prominent change drivers in HR practices and processes. Not only the continuous but also rapid changes and technological innovations have transformed the manner in which the HR teams accomplish their everyday work and long-term goals. Guest (2017) used the most abstract definition of information technology to contextualize how technologies are supporting HR activities. They defined information technology as the use of computers and other telecommunication equipment for gathering, storing, retrieving and distributing data and information for purposes of conducting business. From his definition, Guest (2017) expounded on the concept of electronic human resource management (E-HRM), which they explained is a system through which employees, managers and applicants access services and information related to human resources via the organizational intranet, web portal or the Internet.

Going back to the HR goals of attracting, selecting, motivating and retaining relevant talent, Guest (2017) points out that organizations compete and succeed on the grounds of the skills and talent they have in the form of their labour force. Further, Tweedie et al. (2018) argue that technology has not only changed how HR activities are managed with regards to gathering, storing, using and distributing information on employees and applicants; it has also transformed the nature of work, work relationships and work supervision. Beyond HR processes, Lientz and Rea (2016) point out that technology is now mediating the relationships between supervisors and subordinates, and employees and their organizations. According to Kavanagh and Johnson (2017), technologies have moderated the influence and impacts of distance in business such that employees can work and interact with colleagues and also be supervised from any geographical location. Technology has also enabled HR managers to recruit and hire special-skill employees, such as software developers, even from the remotest regions (Marchington et al., 2017). Prior to the Internet, email and social media, linking with potential employees typically meant letters, telephone calls or face time. However, technological advancements of the 21st century has made it almost routine for HR teams to post job openings online and require applicants to use the same platform to submit their applications (Hollenbeck and Jamieson, 2015). Ideally, the HR team will free up considerable amounts of time that they would have needed to go through and analyse both paper resumes and telephone calls.

Stone et al. (2015) argue that the most objective approach to view how technologies are supporting HR activities is from the perspective of globalization. The first move towards attracting and retaining a talented labour force is the recruitment of diverse and qualified applicants. The significance of effective recruitment is that it goes beyond enhancing diversity and skills among the employees to, additionally, ensure customer satisfaction. Over the years, a variety of technologies have been applied to attract applicants. They range from one-way, passive technologies such as web-based job advertisements to the more recent and an interactive technology such as virtual career fairs (Bratton & Gold, 2017). Studies by Lientz and Rea (2016) show that over 90% of multinational enterprises use technology to recruit employees across the world in a process referred to as electronic recruitment or e-recruitment. Through the interactive e-recruitment process, HR teams not only place job advertisements on their websites or social media; they also provide the targeted potential employees with a channel to submit their applications. However, the use of online platforms can also be criticized for its failure to exhaustively consider how well they work for the applicants. Rather, online platforms feature standardized formats that do not make it easy to distinguish fast performers from those that are below average. Poor website design and lengthy and complex instructions can turn off potential applicants (Marchington et al., 2016).

Another critical role of technology in HR activities is in the form of e-selection, which Hollenbeck and Jamieson (2015) describe as the use of technology to appraise the degree to which the knowledge, skills and abilities of applicants suit the job requirements. Thus, technology has changed the approach used by HR teams to contact applicants, existing employees, analyse performance and store files. When it is used properly, technology actually renders HR activities more efficient (Kavanagh & Johnson, 2017). In contrast, it can also be a barrier to effective HR practices in the event that it is used poorly. From this argument, it can be inferred that implementation of relevant and appropriate technologies in HR practice, minimizes challenges of managing human resources while maximizing its benefits.

From the preceding arguments, it is readily seen that communication is one organizational aspect that has benefited the most from technology. HR staff easily gets and stay in touch with the entire organization through email and messaging and text apps. A single email with a conversation or attached can be shared with an entire department simultaneously. However, Tweedie et al. (2018) also note that there is the risk of overreliance on technology as a time-saving initiative. In explanation, they argue that lengthy email is better delivered through face to face meetings with the targeted group whereby questions and answers can also be addressed collectively. However, it can also be argued that technology has made it easier for HR teams to conduct data analysis and employee performance appraisal, which were previously based on obvious principles and personal evaluations (Chelladurai and Kerwin, 2017). For example, HR managers would directly ask employees whether they completed their tasks on time and to the required standards or ask supervisors whether they trusted their subordinates. Through technology, it has become easier to collect data on an employee and break it down to get an overview of them. The HR manager can tell the tasks they perform best and whether they satisfy all the standards set during the last performance appraisal. Further, they can also quantify the percentages by which they fell short of the set target. This has been made possible by software programs designed to take over most of the work that goes into appraising employees (Armstrong & Taylor, 2014).

A notable consequence of technology is that HR managers end up with excessive data. On one hand, for example, security cameras enable HR managers to monitor employees and can help in collecting facts relating to claim such as harassment (Kavanagh & Johnson, 2017). However, the data at some point becomes more than the amount that can be practically and objectively managed. Further, employees might also feel that their privacy is also being infringed upon. Therefore, it is imperative that HR practitioners know the amount of data that should be collected and under what circumstances (Kavanagh & Johnson, 2017). Nonetheless, it is also noted that the HR department needs to secure employee records and confidential information, which was previously done by locking them in filing cabinets. While information security is obviously more of the IT domain, HR also needs to develop sound policies to govern who has access to sensitive information. This calls for collaboration between the HR manager and IT manager in order for the HR department to gain the full benefits of technology. The following conceptual model was formulated from the above findings:

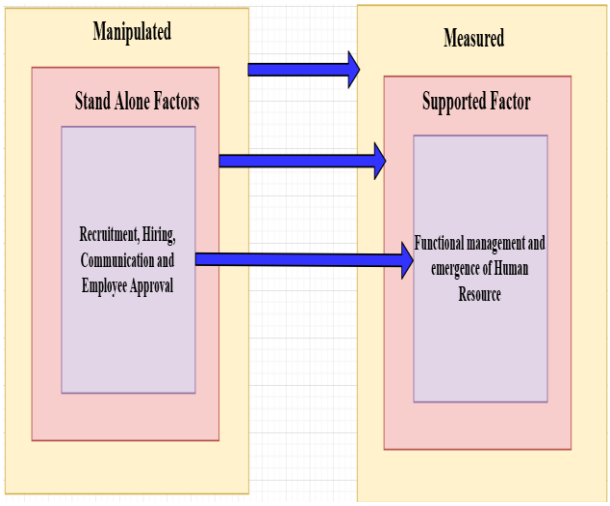

Fig 2: Conceptual Framework on Technologies and Their Support to HR Activities

4. Technologies and Their Support to KM and HR Activities

As earlier explained, technology in the current work is considered as the tools as well as processes, which foster, facilitate and sustain individual and collective activities that aid in sharing, transferring and creating knowledge. According to the literatures that were reviewed during this study, it was noted that technology supports human resource and knowledge management activities in a lot of ways from enhancing an organisation's capability to store, retrieve, transfer, share and create knowledge to enhancing the manner in which organisations shape their culture, methods of recruitment, build trust and openness among members, collaborate within members, and their responsiveness (Svetlik & Stavrou-Costea, 2007; Prieto Pastor et al., 2010; Kianto, A., 2011; Foss et al., 2010). The fast spread of information and communication technology in addition to its wide-ranging uses to business processes has significantly contributed to the

development of human resource and knowledge management (Lee & Roth, 2009). The applications being spoke about include internal communications, training and development, and customer relationships (Andreeva & Kianto, 2011).
In such dynamic industries such as the gas and oil industry wherein the process of knowledge management and human resource activities are constantly evolving, scholars dealing with the development of these two aspects (HR and KM) stress on roles such as capturing, storing, codifying, distributing knowledge and training…Etc as the main roles played by technology today. In such an industry, technology is more than just a physical or mechanical artefact or element; rather it is the infrastructure of systems and devices, which ease the development and distribution of human resource activities and knowledge management. The next paragraph will discuss how technologies are supporting cultural KM relations in order for the reader to understand the conceptual model that was development from the support.
According to the preliminary review that was carried out, technologies are supporting cultural KM relations in the following ways: (1) increasing organisational/employee responsiveness, (2) enhancing entrepreneurship, (3) easing collaboration, (4) increasing trust and openness among organisational members, and (5) creating a community oriented organisation (Brewer & Brewer, 2010; Evans, 2012; Runar Edvardsson, 2008; Zheng et al., 2010; Donate & de Pablo, 2015).

4.1. Increasing Organisational/Employee Responsiveness

Technology today helps in creating and supporting a culture of inquiry within organizations. This helps in diagnosing problems that the organization might be facing through identifying and establishing the direction of knowledge management (Brewer & Brewer, 2010). Technology has paved the ways for timely responses to such demands as professional development and training, which means that knowledge creation and sharing is being achieved at a much faster rate.

4.2. Enhancing Entrepreneurship

In the current report, entrepreneurship was conceptualized as a personal trait and organizational process, which helps in the creation and discovery of innovative ideas and knowledge. An individual with an entrepreneurial spirit has be ability of identifying, explaining and justifying innovative ideas that create fresh knowledge and value to the organization. Technology has helped organizations to pioneers of knowledge and promoting their skills as a substitute to focusing on what people already know (Evans, 2012).

4.3. Easing Collaboration

From the preliminary review that was conducted, collaboration can be considered as the interaction between organizational members, which essentially involves sharing special knowledge and ideas, which create new organizational capabilities. Technologies has eased collaboration to enhancing factors such as coaching and mentoring, which lead to individual development and improved performance (Brewer & Brewer, 2010; Evans, 2012; Runar Edvardsson, 2008). For the oil and gas industry, Inkpen and Moffett (2011) describe teamwork as the collaborative actions among organizational members and other stakeholders. It is rooted in a relationship of reciprocal trust between persons sharing the same goals within an organisation such as members of different departments of an oil and gas company.

4.4. Increasing Trust and Openness Among Organisational Members

Trust is an important aspect within any organisation because it eases the process of identifying and solving problems within the organization. A culture that is based on trust has proven to be an efficient and strong catalyst to such issues as organizational change (Runar Edvardsson, 2008). Provided the conditions and normal that demand inter-professional and interpersonal knowledge-related activities, the issue of openness and trust among each and every organizational member is a significant issue (Runar Edvardsson, 2008).

4.5. Creating a Community Oriented Organisation

This is the manner in which organizational members share their knowledge and skills among each other. This is a situation where organizational members form a work surrounding that makes it easy for them to build and share their ideas and knowledge (Zheng et al., 2010). Even though the knowledge base of such an environment it not limited or formed by its boundaries, technology opens the door for inter-dependency among the members because of its ability to allow people to easily communicate and exchange ideas (Donate & de Pablo, 2015). The following conceptual framework was formulated from the above findings:

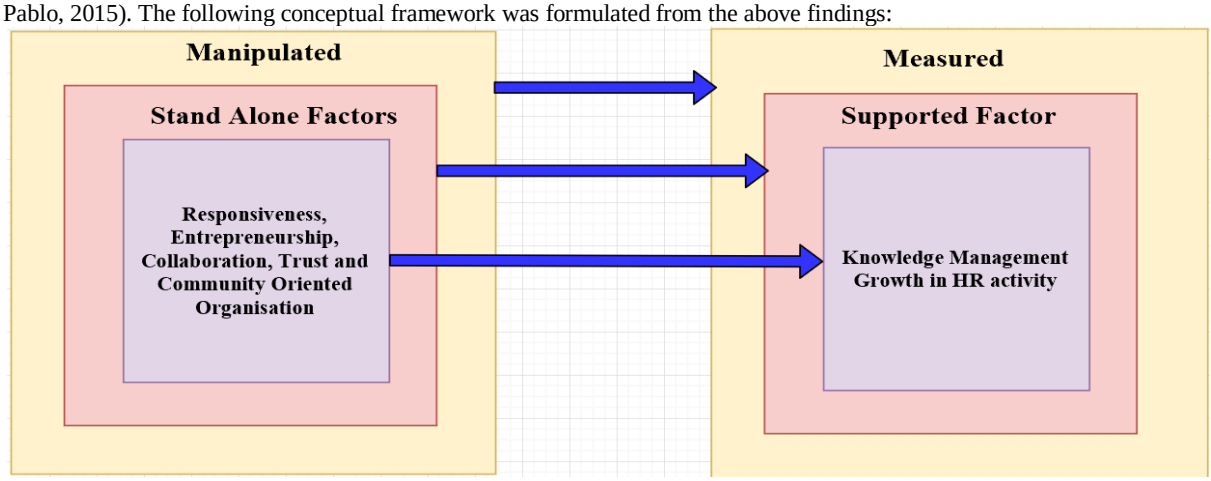

Fig 3: Conceptual Framework on Technologies and Their Support to KM and HR Activities

4.6. Summary

In summary, cultural KM defines the organizational environment awareness to knowledge management (Zheng et al., 2010). The literatures that were used in coming up with the above finding indicate that to effectively implement an effective environment, organisation and all of its members should actively take part in developing a culture, which embraces the idea of a community that works together by sharing knowledge. This is because effective knowledge management as achieved through developing trust among organizational members in addition to providing professional development and training among the members. The following conceptual framework was formulated from the above findings:

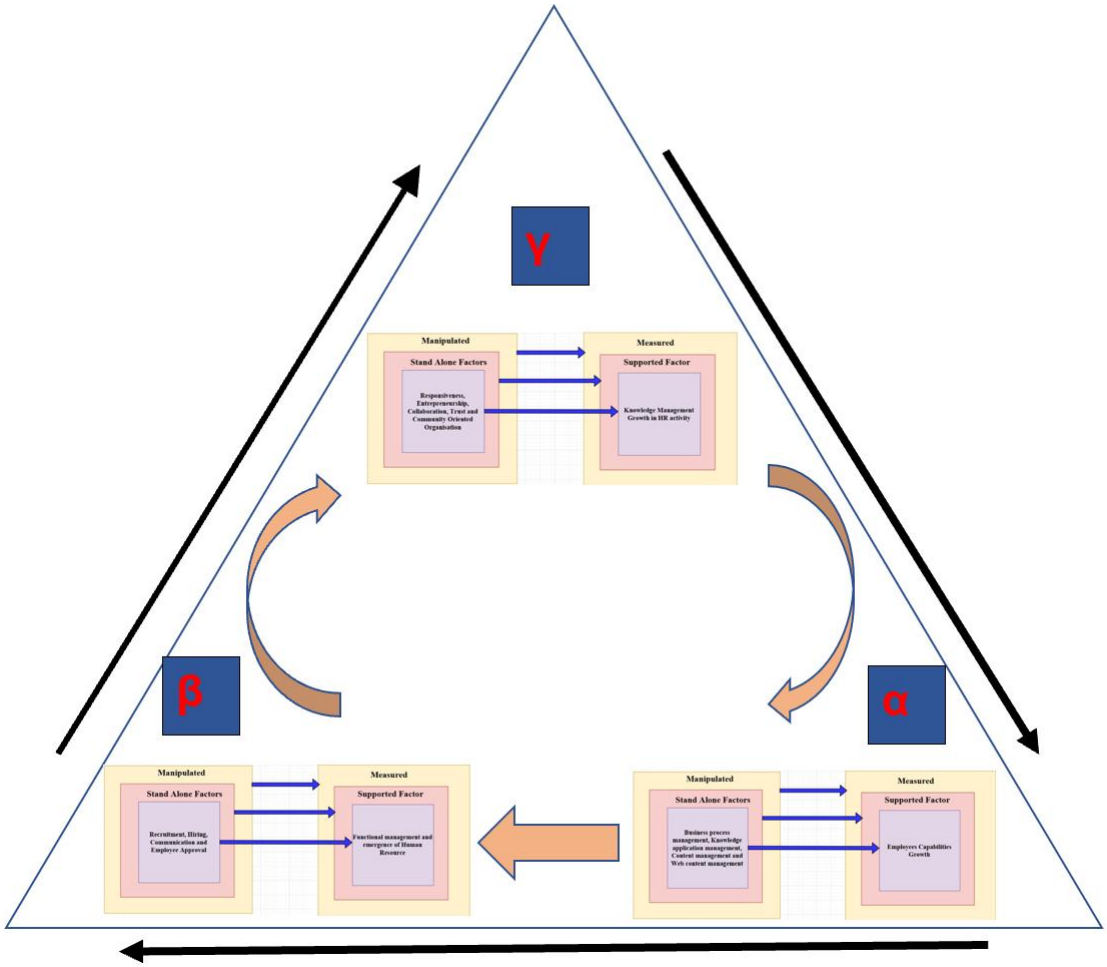

Fig 4: Conceptual Framework on KM and HR Activities

5. Discussion and Conclusion

5.1. Importance of the Developed of framework/Model for HR and KM

According to the findings of the current research, the importance of developing framework/Model for HR and KM can summarized into three major points: (1) there are there unique meanings of the term KM strategy, including a) approaches to KM – these are the ways of managing knowledge, which echo specific conceptualizations rooted in the knowledge, b) knowledge strategies, which strive to achieve a competitive edge rooted in knowledge, and c) KM implementation strategies, which offer guidelines for planning and implementing KM initiatives; (2) the use normal correlation of technologies to knowledge processes in past studies has not adequate enough to explain their links to business strategy – the current research has attempted to associate these technologies with KM initiatives rooted in specific knowledge strategies as well as approaches to KM; and (3) technologies applied in KM can be used together in many different levels. A majority of these technologies are normally applied as elements of the greater system, whereas others are applied as fully functional technologies. Those that serve small purposes in the greater system can also work on a wide range of other functions to enhance the efficiency of the entire system.

5.2. Theoretical and Practical Contributions and Implications

The leading theoretical contribution of this research is the framework that was developed that link technologies, HR, KM and strategy in the oil and gas industry. Conceptual models were developed in the first three sections of the research after the introduction section, which describe the leading concepts related to KM in addition to their correlations. This paved the way for coming up with the final Framework/Model development for HR and KM technologies. The technologies have also been grouped in line with their type of support strategy in the model that was developed.

For the research implications, the findings put forward that a contingency approach, which centres on KM initiatives, might be helpful when it comes to explaining the manner in which KM technologies can support. This is because, it was earlier noted that past KM initiatives tend to follow a set approach to KM, which might or might not support specific knowledge strategies (Saito et al., 2007).

3.5. Limitations of the Research

The study had to major limitations that can lead to the questioning of the reliability and validity of the entire research. The first limitation is that the study only made use of secondary data to come up with its findings, which was cross-sectional in nature. Critics such as Devaraj and Kohli (2003) have questioned the reliability of such data when it comes to studies related to information and communication technology because it is hard to note the payoff of IT when using instantaneous data. Performance can be recorded at a later time, which the current research might have missed. Nonetheless, in order to overcome this limitation, the current research only made use of peer reviewed studies who reliability and validity had already been confirmed.
The second limitation is that this research failed to address such knowledge processes as creation, transfer, sharing and application. Such processes are still vital to human activities, even in the organizational context, even though they might not be consciously addressed or not. Nonetheless, the current research attempted to evade this limitation by addressing the conscious managerial activities that helped in establishing the effectiveness of organizational knowledge management.

5.4. Recommendations for Further Research

The suggestions for further research are motivated by the limitations of this research. Further studies need to be carried out on the same topic using longitudinal data so as to measure the efficiency or performance over time.
Also, further research needs to focus on knowledge processes so as to ensure the findings also taking into consideration different human activities, which are vital to knowledge creation. Such a research can collect primary data through surveys and interviews so as to increase the reliability and validity of the research.

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