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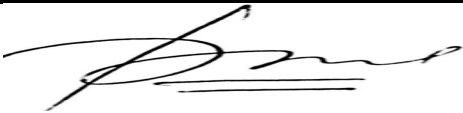
Faculty of Science and Technology

MASTER'S THESIS

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Abstract

Digitalization is a way of companies preparing for the future. Most large established enterprises embark on the digitalization process without a sense of direction. This research will provide a way forward for the digitalization of a company. The research will evaluate the various requirements for digitalization of a business. The process uses the digital capabilities to demonstrate how a traditional enterprise can be transformed into a top performer in its industry as well as the digital economy. The research will examine the organizational requirements for a company to achieve digitalization. The barrier and facilitators in each of the requirements will be evaluated. The research was divided into two parts; the first part included the evaluations of the organizational requirements for digitalization. This part provided the literary background of the requirements highlighting the barriers and facilitator in each case. The background study also evaluated how these requirements affect the digitalization process. The second part: entail the creation of maturity model and spider diagrams for the requirements discussed in part one. This empirical analysis provided and qualitative analysis of the requirements. In the qualitative analysis, a variety of categories were selected to segregate the requirements. The digitalization of an organization was evaluated on the basis of various significant factors. The factors would be essential in affecting the digitalization efforts of an organization by either promoting digitalization or decreasing the success levels of the digitalization efforts. Some of the factors affected the human interaction with the new technology or the work process. The factors were evaluated in the maturity model to show the level of maturity of the organization with regards to digitalization. The factors were also evaluated using the spider diagram based on the significance and the cost incurred in implementation. Leadership was the most vital component while strategy was the most expensive element.

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1. Introduction

The study of digitalization and the effect of information technology on organizations have been subject to various researches since the inception of the internet. Considering the business perspective, the evaluation has always been to determine if the investment was justified. The key question has been; are we getting our money back? The digitalization in the early years of the internet was the introduction of the mainframe. The ambiguity of the initial results led to the debate famously dubbed as the productivity paradox. The debate has been concerned with the determination of whether IT increase the productivity of an organization. The debate also endeavours to evaluate the areas that are significantly impacted by the digitalization of a business process. This debate gained momentum when some studies identified that the IT investment was not beneficial to the company. It was further established that digitalization does not provide value but is rather part of value chain thus its utilization is a delicate process that requires care. Additionally, the value of digitalization was mediated by the organizational capacities and processes. Currently, digitalization has spread widely to every organization it has become an integral component of the modern world that it is fairly hard to imagine an organization without the digital assets. Therefore, the new question has become; "how digitalization provides value?"

For the few past decades we have seen intense technological, economic and social revolution, if we look back and see the industrial revolution, we can see mainly four revolutions; Firstly, In the early 80´s there used to be mechanical production, railroads and steam power, Secondly this mechanical production were transformed into mass production using electric powers and assembly line process in the mid 80´s, Thirdly this mass production were transferred into automated productions using computers and electronics in the mid-19th century, Finally, from the late 19th the use of artificial intelligence, big data, information technology and robotics come into practice (I-SCOOP, 2018; Miller, Michalski, Stevens, & Secretariat, 1998) . I am talking about all this to show how organization are moving and why? Traditional methods were unable to meet the demand of supply, so they require intensive use of technology. This all leads to technological innovation which has changed the performance of human, organizations as well as the shape of the market (Henriette, Feki, & Boughzala, 2016). Today´s organization require the appropriate integration of information technology and big data to achieve their strategy but integrating this two factors is not easy since it is affected by several factors. Data are the most valuable assets of a business; data have the information how the organization operates, and the way they meet the

results; thus, right interpretation of data help organization what is happening with the business of the organization and how this can assist in decision making (Larivière et al., 2017).

Since digitalization have high benefits in any organization, by digitizing operational cost can be reduced by 90 percent through the use of information-intensive processes on the other hand increasing turnover by several times (Parviainen et al., 2017). The removal of existing paper and manual work process by digital tools and software allows to collect real-time data in an organization that help in better handling of work performance, work process, cost drivers and risk factor, this real-time data on digital process performance allows manager to identified the latent errors before they become critical (Markovitch & Willmott, 2014). Everyone knows the importance of digitalization, but most of the companies are struggling for the digital transformation because of many hindrances thus they are deprived of benefits and influence of digitalization. According to (Henriette et al., 2015) a right digital transformation has a business model that are within the digital capabilities and this model must be achieved by the implementation of this digital tools, this tools have severe impact on whole organization mainly on the operation processes, resources management, internal and external users. This all will bring change in behaviours and methods of working which relies on cooperation and intensive interactions (Parviainen et al., 2017).

1.1.   Scope and Research Question

The scope of this thesis is to asset with digitalization, how different technologies must be structured and arrange in order to maximize the value. Similarly, the influence of various factors that will affect digitalization are discussed briefly. This thesis will be dealing with the requirements for digitalization, how digitalization can be accessed in general and demonstration to achieve digitalization.

This research sets out to evaluate the readiness of an organization to digitalization. The research will determine how organizations will be managed to increase the speed of digital adoption. Therefore, the research question will be formulated as below. The research questions were listed in the order of the significance jotting out the requirements for digitalization, the level of readiness and then the barrier and facilitators.

- What are the requirements for digitalization in an organization?
- How ready is your organization for digitalization?
- What are the barriers and the facilitators to the digitalization of an organization?

The first question, in this case, will be the focus question that the research will seek to answer. The question has been a subject of various researches. The aim of the research will be to gather relevant information for the determination of the various requirements of digitalization. The research will also seek to contribute the existing school of knowledge especially in regard to the research question.

1.2.   Limitation of Research

The research will be limited by a variety of factors that will influence the methodology and the access to information in the research. The following are the key limitations that determined the scope of the research.

There has not yet been developed a fixed structure for digitalization. The sample size was limited as there are a few Oil and Gas companies that have embraced digitalization or attained full digitalization. The companies that have undergone digitalization process in its completeness are a few thus not all components of digitalization will be sufficiently evaluated.

The self-reported data is highly dependent on the pre-existing data. The self-reported data will be limited by the fact that the data collected is not independent. The data collected will be limited by various factors such as the responses of questionnaires, focus group or the face value.

1.3.   Methodology

The methodology chapter will highlight how the relevant data for the analysis and the assessment of the readiness of an organization for digitalization. The analysis will first commence with the determination of the research philosophy and the approach to be used in the data collection. The data collection section highlighted the primary methods used for data collection.

Research Philosophy

There are three research philosophies that are used in data collection i.e. non-Positivism, interpretivist and realism. The development of knowledge from the research philosophies are as a result of individuals thought process. The positivistic point according (Saunders et al 2003) is based on the citation on the citation of theoretical stand. The results of the positivistic results are based on the validation that is based on the rules and laws that have been guiding development in the field. This research is based on the evaluation of the various theoretical approach that are applied in digitalization in the Oil and Gas arena.

The expansion of the business world especially with regards to the digitalization of the various aspect of a business will require theoretical research to obtain data. The expansion will be embedded on the complexities that area followed by subjective understanding that is determined by data collected. The positivistic approach is more effective in the deductive method. This research was based on the positivistic process that gathered data from the existing sources.

After considering the research questions, the decision to utilize the inductive approach was imperative. The approach entailed the speculation of data from existing literature and the theories. The most apt and pertinent theories were selected to meet the research objectives. The research model was developed, and the theories further used for process of determining the solutions.

Data Collection

The secondary data collection technique was used and it was easier to collect data from the secondary sources. The information with regards to the research was collected from the secondary sources i.e. articles, whiter papers, academic journals, print media, newspaper, research editorials and internet. The research needs sufficient amount time for the selection of precise and apt pertinent data, as per the demand of the research.

The methodological approach of the research was qualitative and the primary technique for the collection of the theoretical data. The qualitative approach was used in the maturity model and the spider model for data analysis. The content analysis from the literature review of the paper using the digital learning methodologies and tools. The research of the paper was based on a bibliometric research from various literature sources that permitted access to thousands of scientific texts i.e. Elsevier, Springer, Sage and ISI etc.

Structure of Thesis:

The thesis is divided into mainly five sections. First section consists of introduction that set up the theoretical background of thesis that includes methods, limitations and structure.

In the second section, past theories and some technical terms related to digitalization are discussed which includes the elements, drivers, impact and the necessity of digitalization.

The section of the thesis provides a framework for the requirements for digitalization in consideration with some practical scenarios. In the second part of section third, the roles of various elements in digitalization are explained briefly.

The fourth section tries to develop maturity model and build spider diagram. Shortly discussed how maturity models can assist digitalization.

Finally, the last section comes up with general discussion and conclusion.

1.4.   Conclusion

It is evident that from the methodology the research philosophy used was the non-positivistic as the data used in this research was based on theoretical data from secondary data sources such as journals, books, articles and periodicals. The data collection technique was based on a qualitative literature review of existing literature where data collected from existing resources. The literature review was extensively done ensuring that the data was accurate and illustrative of the situation.

2. Literature Review

´Digitization´ and ``Digitalization´ are the most closely correlated term which is frequently used as interchangeably in the broader scope of literature, but these two terms have their explicit meaning when used for the analytical purpose (Brennen & Kreiss, 2014). According to Oxford English Dictionary(OED) digitization refers to "the action or process of digitizing; the conversion of analogue data (esp. in later use images, video, and text) into digital form" while digitalization implies "the adoption or increase in use of digital or computer technology by an organization, industry, country, etc." (Dictionary, 1989).

Digitalization involves the integration of digital data and information technology (IT) in value creation. There is no single definition of digitalization, and different authors have their prospective in defining digitalization depending upon different context. According to (Henriette et al., 2016) digitalization is a social phenomenon (Löwgren & Stolterman, 2004) or cultural progression (Rogers, Sharp, & Preece, 2011) and for the companies, it is a way of creating a business model. (I-SCOOP, 2018) Defines digitalization which involves the use of digital technological and digital data with digital information at the core for transforming the business to improve business and generate revenue. According to (Stolterman & Fors, 2004, p. 688) digitalization can be defined as

"The changes associated with the application of digital technology in all aspects of human society"

Which is achieved by digitation

"The ability to turn existing products or services into digital variants, and thus offer advantages over tangible products" (A. J. Gassmann et al., 2014, p. 5142).

From this, we know digitation is the first step for digitalization.

2.1.   Elements of Digitalization

Data: Data are the main assets of any organization they have information how the organization operates. It has become a trend to store digital data from the last few centuries after the use of a computer. Data can be used on operation and management, monitoring of products. Traditionally, data were stored in files, but nowadays data are stored digitally in a digital database. This digital database trend has increased after the intensive use of information and technology.

The more the size of organization the more will be the data and this big data need to be managed digitally.

Digitation: Digitation for the beginners is simply creating digital attributes of physical things the physical things might be any form like paper documents, images or sound. Digitation doesn't replace the original document completely, but it stores digitally for the further access and computing. Digitation involves the automation of pre-existing manual and file-based processes, which are supported by digitizing of information flow which is in digital format (I-SCOOP, 2018).

According to Stolterman and Fors (2004) digitalization can be defined as "*the changes associated with the application of digital technology in all aspects of human society*" which is achieved by digitation "*the ability to turn existing products or services into digital variants, and thus offer advantages over tangible products*" (A. J. Gassmann et al., 2014). From this, we know digitation is the first step for digitalization.

Company Culture: Most organizations see their customer's experience via the company's cultures. Companies tend to better their operation while ensuring that it is cost-effective due to the increase number of competitors hence the measure of the customers should be based on the satisfaction of their expectation. Digitalization introduces simplicity and flexibility in customer experience. Digitalization would reduce complexities that are associated with attainment of customer experience.

Optimized workflow: The optimization of the workflow is a critical part of digitalization especially in the guiding the organizational digitalization efforts. Companies need to digitize so as to increase innovation and focus on the core businesses of the company. The digitalization and the optimization of the business process will lead to the following benefits:

- Enhanced customer data collection
- Reduction of the employee's costs
- Increase in the sales volume

Customer-Centricity: The end-users are driving innovation in organization depending on their needs. The business will be competitive once they adhere to the customer's expectations. The customers will increase the speed of innovation in an organization but at the same time the disruptive innovations will be short-lived. Companies will need to:

- Comprehend the change process
- Be able to translate the data into the knowledge

- Be able to link the technology to the business values.

2.2.   *Drivers of Digitalization:*

Technological Innovation:

Technology is changing rapidly day by day, which is changing the behaviors of human, organization and the structure of market continuously. The introduction of mobile technologies and internet of things (IOT) embedded properly in organization will enhance the performance. The interaction between consumers and internet have change the way product and service are buy and consume, this has brought "Uberification": the economic activity created by technology companies that fulfill consumer demand via the immediate provisioning of goods and services. In the modern market(Henriette et al., 2016). According to (Hilty, 2011) in compare to when the first PC was sold the service provide by ICT service nowadays have decrease by 1000 times in term of time ,space, material and energy to achieve that services; this can show how technology are moving. Technological innovation has great impact in the strategic of organization, so organization need to cope with this new method in challenging environment to meet the customer demands. Organizations are shifting from IT-OT (information technology to operational technology); by 2021 it is expected that 20% G2000 manufacture is going to be dependent on embedded intelligence to multiply processes and production by 25% using IOT, block chain and cognitive(I-SCOOP, 2018),which show how companies are adopting with the demand of market using technology in organization. According to Moore´s law in every 18-24 months the performance of ICT doubles which show the rate in which information society is coming, and so far it has been predicted accurately(Hilty, 2011) not limited to speed but also improving in memory capability and data flow rates. This information society has led to innovation processes which might be obtained through new hardware or software of technical product or by enhancing new human skills and knowledge. People are constantly taking more and more advantage of data transfer and computing power with limited space, energy and cost which consequently demand new services which rely on technical infrastructure on daily basics which has direct impact on human lives.

Globalization:

The intense use of new technologies like smart mobile devices and global use of social network have created the importance of technological solution in every sectors, this solution has

created both opportunities and threats(Tapscott, 2000). The level of requirements varies from one customer to another customers this is because all the customer doesn't want the same level of interaction with the technology. "Digital natives" customers which are used to access internet 24/7 differ from the traditional approach of customers who involve face to face interaction with clients. There still exists differentiation in customer; digital technology can be used to integrate them. According to (Manyika et al., 2016) "Digital globalization: The new era of global flows" this help in reaching international markets for the companies with business models that are of less capital-intensive, simultaneously it has risk and challenges. The table below shows the globalization in terms of past vs now

Table 1: Globalization past vs Now(Manyika et al., 2016)

20th Century	21st Century
There used to be flow of tangible in the form of goods	Now there is intangible good flowing in the form of information and data
There used to be flow of advanced economies from developed region.	Active participation of emerging economics from all the region.
Capital and labor intensive flows	More knowledge-intensive flows
Transportation was the backbone for physical flow.	Digital infrastructure have become equally important with physical means.
Diffuse of idea was across borders with slow rate.	Instant global access to information
Unidirectional flows of economics, from advanced to emerging economies.	Two way flow of innovation, from both advanced to emerging and reverse.

(Hilty, 2011) ICT is changing the world, development are so rapid by the technology than compare to development by the political decision. The introduction of e-mail, mobile networks and radio frequency has greater impact on economic, social and ecological factors in a global prospectus. Change can be seen everywhere, and digitalization is the main driver which has offer greater impact on society which can be seen throughout the industrial revolution(Schwab, 2017). Digitalization has brought a new way in approaching new markets with better revenue and in the meantime enhancing customer experience.

Economic pressure to create value with standardization and sustainability:

The main objective of an organization is to create profit with customer satisfaction, on the other hand this revenue most be sustainable in terms of profit making and environment friendly.; (Lash & Watson, 2006) company must reduce it carbon foot print with increasing sustainability with minimum cost for higher profits. Some companies like GE, Wal-Mart and Cummins Engine are concerned with the climate change for profitable value-enhancing strategies (Nidumolu, Prahalad, & Rangaswami, 2009). The concept of Green IT (Herzog, Lefèvre, & Pierson, 2015) which is concerned with the energy consumption reduction and sustainable development , this concept has great impact on society and organization. Green IT requires standardization of jobs and services.

Figure 1: Standardizations Stakeholders(Herzog et al., 2015)

ICT used on today's economic have impact on environment in mainly three ways(Hilty, 2011) ´First order´/ ``Primary effect´ impact caused by the physical presence of ICT e.g. Product, use and disposal of product; ´Second order '/´Secondary effects´ effect on environment indirectly by ICT due to power to change while in production and processes; ´Third`/ `Tertiary effects 'involves the long term effect on environment which might be due to consumption patterns of ICT. The way society is using technology and the shaped of technology are changing rapidly. The wide use of mobile device and direct access to consumer has eliminated the intermediate suppliers in value chain.

2.3.   *Impact of Digitalization:*

As discussed above, digitalization is affecting the way organization are working and business atmosphere. In today´s competitive market improper implementation of digitalization results in higher risk, in contrast digitalization has potential to end the existing business opportunities and create new business opportunities by assigning different task to operators in value chain. The wide use of mobile device and direct access to consumer has eliminated the intermediate suppliers in value chain(Parviainen et al., 2017). Digitalization has enhanced business to customer (B2C) interaction efficiently.

(Parviainen et al., 2017) the goal and impacts of digitalization in any organization can be viewed in mainly three different ways, *i. Internal efficiency ii. External opportunities and iii. Disruptive change*
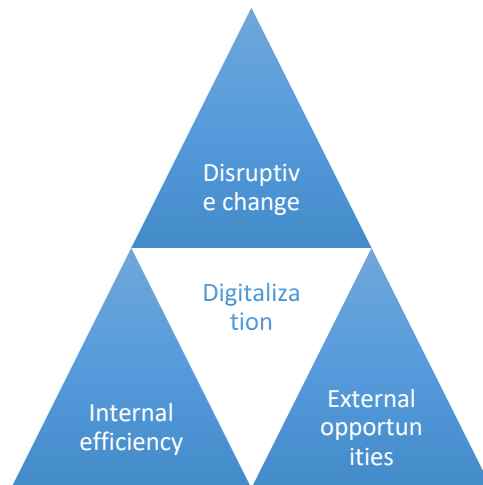
Figure 2: Impact of digitalization(Parviainen et al., 2017)

i.   **Internal efficiency:**

Digitalization helps in improving the business process *efficiency, quality and consistency*, which results in effective internal efficiency of organization; this can be achieve by eliminating the existing manual process and maintain better accuracy. Another important role of digitalization is integrating both structured and unstructured data which provide real time information on operation process and results. The broader view of organization can be achieved by integrating data with external sources. Routine based automation will make employee to acquire new skills which will provide better work satisfaction. Digitalization is concern with better handling of data and keep the backup efficiently and making easy access when needed(Parviainen et al., 2017).

Hence digitalization helps in re-structuring internal process by using digital tools and making better working environment.

ii.   External opportunities:

Digitalization is concerned with timely response of new and updated service to customer/client by creating different approach to customer/client satisfaction. Customer always seeks new and better services, digitalization helps in eliminating the existing business domain and create new services providing better satisfaction.

iii.   Disruptive changes:

Digitalization brought change in working environment in company by replacing existing methods. New business roles are created by digitalization. For example, Digital receipt are replaced by manual receipt this has change the role of operator, operator need to have certain skills to produce digital receipt.

If we try to see the impact of digitalization (socio-technical) in global prospective it will be affecting mainly three attributes: Economy, Society and Governance(Sabbagh et al., 2012). Economic impact of digitalization includes growth in economy by increasing job and innovation. Digitalization will be affecting the socio status of society since it will bring change in the quality of life and changing the life style in which basic need are accessed differently. There is no doubt that public sector will be greatly affected by digitalization, we can see this impact in health, education and transportation sector.

2.4.   *The Need of Digitalization:*

Digitalization has impact on various aspects as we can see from above; organization, employee, working environment, and customers are mainly affected. A project properly done consist of several factors which make it complex, hence outsourcing can be important for achieving project in time and planned budget.

i.   Enhance Productivity:

Profit generation is key to any organization. Maximum profit can be achieved by producing goods with less time and effort. Digital tools can be used for efficient production by reducing manual works.

ii.   Cost Effectiveness:

Any product consists of various sub costs like equipment, management, inventory and many more; digital asset management assist in managing this cost effectively and achieve better return of investment (ROI).

iii.   Better record of data and ease of access:

Data are main asset of any organizations they can give real time information of operation and products. This data need to be handle properly. Digital storage has made efficient storage and handling of data. Digital data are easy to access. They can be accessed from anywhere and anytime; this helps in creating virtual working environment.

iv.   Better Security:

Secured digitally stored data and information are accessible to limited user increasing security of data. This help in confidentially data and documents sharing within close group or make limited access to other users as well.

v.   Protection of information:

Information are very important once they are loss it is difficult to restore; resulting in loss of money and time. For example, while taking about writing my report in past it was manual with hand written now we are writing it digitally not only this there are stored in online platform like drop box to store information securely. This shows a trend how digitalization is helping in better protection of information from any risks.

vi.   Recovery from disaster:

Disaster and risk are unpredicted we are surrounded by them, they can happen anytime and anywhere. Digital platform can store the cause of this risks and prevent it from happening again for instance, black box after plan crash helps in providing real information and cause of incident which can be eventually used in preventing same event again.

vii.   Stay in competitive market:

Whatever the size of organizations, it has become a trend of digitizing. This is because of *reduced cost, efficient workflows and satisfied customers.* So digitalization has become key to stay in modern competitive market.

viii.   Environment friendly:

The concept of ``Green IT 'has added more beauty on digitalization which is oriented to environment friendly. This process involves the enhancement of sustainability.

3. Requirements for Digitalization

3.1.   Introduction

To remain competitive organizations, have to constantly improve their processes and react accordingly to the growing and evolving consumer preferences in the changing business environment. Most companies have reached a point of diminishing returns in their business process. Digitalization has begun to change the product offering in organizations (Swanson, 2017). The changes have been identified as the next significant source of competitive advantage for organizations. The background research in this project will determined how the various organizational elements played a vital part in the digitalization of an organization. The background will evaluate the importance of the requirements to the digitalization process.

The digitalization has not been impactful on the process and functioning of an organization. But the current belief from some executives and researchers is that the operations of organizations are about to change. Digitalization has been associated with efficiency especially when the processes that are implemented have the possibility to change and improve the efficiency of an organization. The shift from a paper-based process to the digital-based operations does not guarantee efficiency hence organization must determine the best technology that support their operation. Some industries have been significantly affected by digitalization especially the music industry, banking, finance, and communication.

Digitalization can be seen as a major factor that has a great impact on transforming society and business in a short period or the near future (Parviainen et al., 2017) digitalization having greater influence in society and business many authors have considered digitalization as a part of the second industrial revolution. Digitalization is not limited just to digitizing the existing work processes, and product rather should involve in major fundamental changes. Digitalization involves the process of digitizing in which analogue data are transferred to digital data (Parviainen et al., 2017) while digitalization can be defined as the change brought by the use of digital technology in human society (Stolterman & Fors, 2004). (Brennen & Kreiss, 2014, p. 1) Defines digitalization as

"The adaptation or increasing use of technology and digital tools by any organization, industry or nation, etc."

Digitalization also can be defined as "the capability of any organization in transforming existing services or products to digital variants that will benefit organization in long-term" (O. Gassmann, Frankenberger, & Csik, 2013) (Henriette, Feki, & Boughzala, 2015). To sum up, from above definitions digitalization can be defined as the change brought in working roles, business plan and structure of organization due to adoption of digital tools and technology. (Parviainen et al., 2017) has defined four level of changes in organization due to use of digital tool and technology:

- Process level: the elimination of manual method by the use of digital tools and transferring into streamlining process.
- Organization level: Providing new services and removing old practices; providing the existing services and facilities in new approach.
- Business domain level: switching the roles and value chain in ecosystem

Society level: Changing the structures of society E.g. change in decision making process, type of work.

Digitalization is a continuous process that entails the change of the fundamental business processes to digital processes, based on a sophisticated IT infrastructure, digital application and optimally networked data and systems (Ebert and Duarte, 2016). The digitalization process will digitally map the existing business model leading to the development of new digital products. The new business model will ensure that information, communication, services and process are networked through the developed digital platforms (AOE, 2016).

The digitalization of a business will lead to the fusion of an online and offline, technologies and the radical changes in the entire business. There will be an increase in the automation, optimization and autonomy of processes as well as increasing the flexibility and the individuality of the products and the services offered Digitalization will lead to innovative business models and digital products (AOE, 2016). The key drivers of digitalization are the increased customer expectation and competition in the market.

To promote the digitalization process and make it successful there is the need to create appropriate prerequisite such as:

1. *The Development of the digitalization strategy*

Digitalization efforts commence with the development of a digital strategy. The strategy should outline the digital transformation of the core business and the subsequent development of the new digital business segments in the organization (Ebert and Duarte, 2016). IT departments effect the digitalization drivers in an organization but supported by the specialist departments and the management. The components of the digitalization strategy include:

- Legacy: includes the application databases, SaaS and Other cloud services;
- Experience: it can either be the customer, employee, supplier, partners and public experience;
- Information Management: knowledge, content and data;
- Software platform: IT-infrastructure, software and platform;
- Analytics: optimization, automation and personalization of the business processes.

2. IT Infrastructure

The flexibility and the agility of an organization in digitalization are dependent on the flexibility of the IT infrastructure. The robustness of the IT infrastructure and architecture should support the use of agile methods in dynamic markets and promote quick reaction to the varying market requirements (AOE, 2016). The rapid development of the IT infrastructure is a significant precondition for digitalization and is beneficial to the organization. The agile development technique in IT infrastructural development is recommended for digitalization as illustrated below (AOE, 2016).
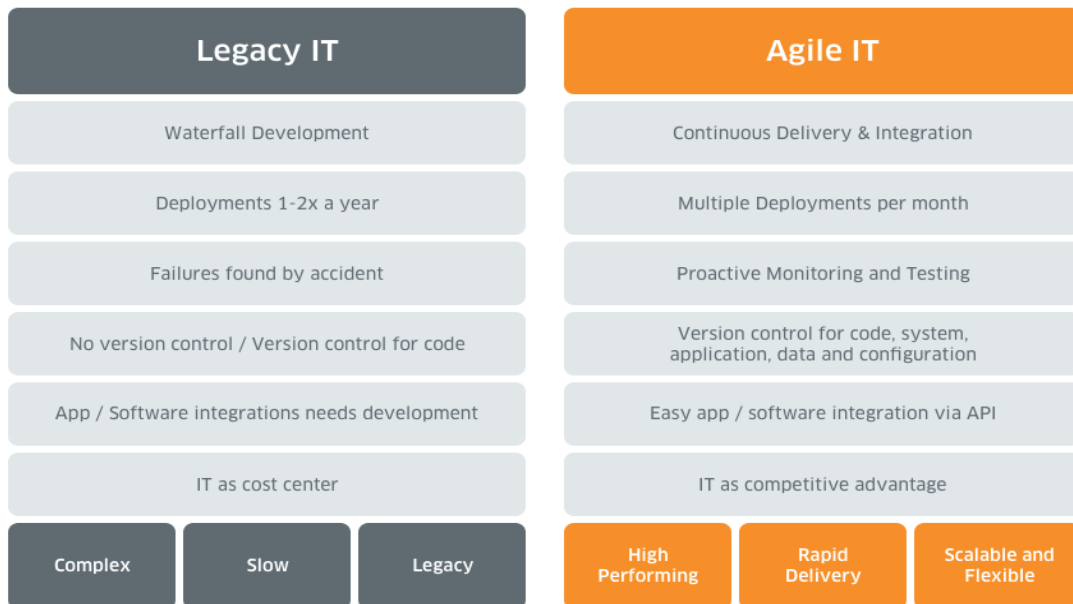
Figure 3 The Comparison of the agile and the legacy IT infrastructure development (AOE, 2016)

Apart from the agile IT approach, the most flexible technique for the modelling of large organizational applications and systems is the Strategic Domain Driven Design. The design entails the development of the core competence and then programmed as a function that can ultimately be linked to other application (Hribar, 2010). The design reduces the programming of new function every time there is change but rather only the links to the existing bounded contexts are created making the IT infrastructure flexible and easy to use. The development of all the professional incursions is done in line with the organizational strategy (Hribar, 2010).

3. *Digital Organization*

The creation of a business digital organization requires the following three variants i.e.

3.1. *Evolution*

The process describes the evolutionary change of an organization to a digital organization. The process has fewer phases but is instead a slow process (AOE, 2016).

3.2. *Revolution*

This entails the abrupt restructuring of the organization. The process is drastic the storming phases in the process can pose problems for the existing business (AOE, 2016).

3.3. *The Digital Unit*

The digital unit can be created as a department or created as an individual, organizational unit such as a subsidiary.

The development of the digital organization makes it easy to test the digital and agile approaches in the sheltered business environment. The digital unit will also protect the existing business of the parent company (Hribar , 2010). Once the agile processes have been successfully tested, it can be seamlessly integrated into the parent company.

4. *The development of digitalization business models*

The digital strategies developed earlier will form the basis for the development of the digital business model (Ebert and Duarte, 2016). Contemporary techniques will be used for the analysis of the challenges and the problems, develop ideas and fine approaches for the resolution of the issues. It is significant that the methods for the adoption of the digital strategy be conveyed to the entire organization. The design thinking, and the Lean Start-up are used for the conveyance of the method (AOE, 2016).

4.1. *Lean Startup*

The Lean Startup approach is a technique for rapid development of various organizational units or products using the leanest possible processes and little capital expenditure. It focuses on a reduced conceptual phase, fastest way of creating prototypes and the shortest time-to-market. The prototype development cycle entails short, iterative product release cycle (AOE, 2016). The approach also allows for quick reaction in the validation of learning based on experience and the customer feedback while reducing the cost

4.2.Design Thinking

This is an approach to finding ideas and problem-solving; it is reliant on the user perception, needs and motivation. The process utilizes a large number of methods focusing on the user orientation, simulation, visualization and iteration will be used (Ebert and Duarte, 2016). Instances of these processes include the interaction process, personas and the touchpoints with the customers while taking into consideration their experiences, emotions and preferences (AOE, 2016). The design thinking problem-solving mechanism is based on the assumption that collaboration between people of different disciplines in a creative environment will bear better results (AOE, 2016).

5. *Agile Methods*

The appropriate methodological competence is a significant point of success for digitalization of an organization. The method will be vital in solving the challenges while developing an efficient mechanism of implementing the digital business models (AOE, 2016). The agile method is used for structures, process and approaches as well as the organizational culture of the organization. The application of the agile method with an iterative approach will hasten the process of prototype creation and bring them to the market (Ebert and Duarte, 2016). The agile approach also allows for quick and flexible reaction to the customer feedback and market changes. The agile method is utilized in project management and software development primarily in processes and structures.

In the upcoming section the requirements for digitalization will be described in three different sectors:

1. *Oil and Gas*

The oil and gas industry is always striving to maximize the viability of the exploration, refinery and retail assets; then it is important that they apply the same for the digital transformation. The integration and harnessing of new technology could boost the efficiency of the oil and gas

industry. The growth in technology in the second digital age will reduce the costs, unlock unparalleled productivity and increase the performance. Therefore, to harness the right technology via digitalization, the following requirements need to be met:

1.1.Real-time critical and industry-specific systems

These systems will support the four core business of oil and gas, i.e. exploration and production, transport and storage, refinery and marketing. The production phase will require the monitoring of the heavy machinery and the connection using the OT systems such as SCADA, MES, PLC and PLM. Business data analytics and predictive maintenance will permit the acquisition of data for effective marketing and management of partners such as transporters, suppliers and customers (Gezdur and Bhattacharjya, 2017).

1.2.Business IT infrastructure and System

The Business IT system forms the digital infrastructure of the company especially for the supporting departments (Gezdur and Bhattacharjya, 2017). The infrastructure will provide transactional platforms for the HR, finance and accounting, purchasing, IT, loyalty programs and payments.

1.3.Digital transformation strategy

The digital transformation in the oil and gas industry will entail the incorporation of partners in consulting and transformation (Choudhry et al., 2016). The industry may outsource digital services such as the managed services that will provide infrastructure and application management, data security, IT project management, collaborations, smart mobility and cloud services (SaaS) (Choudhry et al., 2016).

2. *Transportation*

2.1.Speed and timing as a competitive advantage real-time economy

Speed is often considered as a key differentiator in the current digital business. When well utilizes speed in the transportation sector can be a competitive advantage. Transportation and logistics form a huge element of the supply chain as the processes in this sector are ubiquitous and hyper-connected (Davidsson et al., 2016). The movement in the real-time economy has numerous effects on the organizational structure and business strategy making it a vital point of digitalization in the transport sector.

2.2.Human and connected drivers for faster business

The customer experience and expectation form the driving factor for digitalization in various industries so as in the transport sector. There is the customer, a stakeholder or a logistic partner at the end of the supply chain (Davidsson et al., 2016). The hyper-connectivity in the data and computing sector inherently is accompanied by acceleration and speed in the transport sector. Therefore, humans and connectivity are drivers for the increase in speed in the transportation sector.

2.3. Hyper-connectedness in transport and logistics

The transport industry also entails information management, visibility, data analytics and customer service. The handling, shipping and the treatment of goods are accompanied by information flow and interactions. Currently, there is the blurring of the line between the digital and the physical in the transport sector. The digitalization of the transport sector should take into consideration the following factors:

- Data-Driven marketing

The key objective will be to engage people at the time of interaction and in context especially where it makes sense increasing the output.

- Information management

There is the need to provide the correct information at the right time especially in transportation and logistics sector to avoid affecting the speed of movement of goods.

- Customer service

The need for information and fast response has become higher than ever increasing the requirements for information and communication in the transport industry (Davidsson et al., 2016).

3. Health

Digitalization has enabled the continual extension and build-out of services and data while ensuring the coordination of services that support the population health. Population health includes the strategies developed to ensure companies achieve a positive health outcome for a certain group of people (Cisco, 2016). Digitalization has the capability of affecting the delivery, operation and every aspect of the healthcare.

3.1. Improving patient experience

The attainment of customer care follows a complex and sophisticated path that has multiple touchpoints and data sources. Digitalization has the potential of affecting the care delivery process and operations leading to smarter choices and better utilization of time and other resources that

will allow the caregivers more time to attend to the patients (Cisco, 2016). The digitalization process moves the patient care to the level of intimacy and information.

3.2.Driving the Analytics based medical data

The healthcare industry has incorporated the electronic medical records that have made every player to be involved in projects to secure the patients' data (World Economic Forum, 2016). The healthcare providers are utilizing analytics to evaluate the process that affects the relationships in the data and boost the delivery of care from the analysis of the big data and mass records stored in the organization (World Economic Forum, 2016).

3.3.Securing the medical data

Digitalization efforts in the health sector should be aimed at securing the medical data. Contrary to expectation the healthcare data is the most hacked data in the world. The medical data has been found to be worth more than even credit card information in the black market (World Economic Forum, 2016).

3.4.Telemedicine

Digitalization will be vital in the making the dream of enabling long-distance healthcare. Digitalization will reduce the costs while increasing the social use of video propelling telemedicine into the mainstream. The digitalization efforts will support telemedicine via video connectivity to reduce the hospital stays and rigorous follow-throughs (Cisco, 2016).

3.5.Centralizing of the operations and management

The healthcare sector is still affected by the silo problem that entails multiple departments, resources, data and stakeholders making the patient's journey complex. Digitalization will help in operational excellence, a robust digital backbone that will redesign the process and create a unified approach to the provision of healthcare.

Not only limited to this in the upcoming section, I will present in general how different elements must be structured in order to achieve digitalization:

3.2.   Organization:

In last few decades there has been huge technological, economic and social transformations, this has brought change in the structure of organization. Organizational change has been key factor for most of the organization. Today´s Organization must learn to adopt the modern operating way brought by new technology that requires ´Organizational Change`. Organizations that are on verge of digital transformation must be able to know the way of doing

their business after the digitalization and must change their way of operations. To achieve successful change requires the implementation of effective organizational mechanics.

A simple approach how organization introduce and implement new way of thinking and operations in organization must be clear, in most of the organization the main objectives is digitalization which is the main goal, and it involves in defining and explaining what digitalization involves especially improving performance. Organizations which are digitalized and are on the way of digital transformation have clear road map with clear concepts and techniques of digitalization. The traditional communication-and-train based process now is necessary but it is not adequate enough so three phase implementation is necessary. The three phase of digitalization is discussed below:

Phase One : Awarness & Education
- Developing digital framework and conducting digital assesment programme.
- Make business model for next phase which consists of pilot project.

Phase Two: Pilot Projects
- "Learn and do" approach, conduct just in time training for pilot teams
- Implementation of results of pilot projects, development and implementation of new digitalization projects depending upon need and visibality.
- Develop business model for next level which is ready to implement in organization.

Phase Three: Integration into day-to-day operations
- Make clear road map and forceasting of plans, timeline, measures and goals.
- Bring change in work process for effectiveness which helps in acquireing , formalizing , integrating of digitalization
- Compare the result with KPI

Figure 4: Three Phases in implementation of Digitalization(Holland & JIM CROMPTON, 2013)

The main objective in organization change is taking organization from one way of operation and transition to new way of organization operating environment. This process might seem simple but in practice it involves complex process. Organization consists of various `moving

parts´ that make the transition phase complex. This moving part of organization consists of work processes, technology, vision etc. During digital transformation organization must define what are the changes and where the company will place after changes. These mean organizations need to think beyond the boundaries and make rational decisions. Most of the managers and employees struggle to identify the required level of organizational change. Effective organization change involves in identifying the core elements, Organization must be understanding from a systems point of view. Managers nowadays must focus on i. organization must be run effectively to achieve the business to be done on today´s market, ii. Be well prepared to change the organization and achieve tomorrow's business.

Major Moving Parts in Organization:

In any organization there are various drivers in change process that need to be taken in account while advancing to next level, (Holland & JIM CROMPTON, 2013) defines four main components that are actively involved in every changes:

i.   **Vision:**

Vision is the main driver of any organization. It describes where the organization is standing and where the organization will be in future. The vision of organization describes an image how organization will be functioning on specific period of time.

ii.   **Work Processes:**

Vision describes what to achieve while work process define how this vision can be achieved. The activities need to carry on daily basic for effective product and service. Work process involves daily activities that need to be conduct on routines basics in order to achieves organization´s services and product provide by the vision of organization.

iii.   **Facilities, equipment and technology:**

It includes the organization´s tools, technology and software that the organization members used during the work process. They need to be change with the changing organization work process and vision.

iv.   **Performance Management System:**

Performance management system involves assigning appropriate workers to the work process and providing right tool to achieve the fulfill of the vision of organization. A performance management system comprises of allocating task, conducting training, collecting feedback and evaluation of performance and reimbursement.
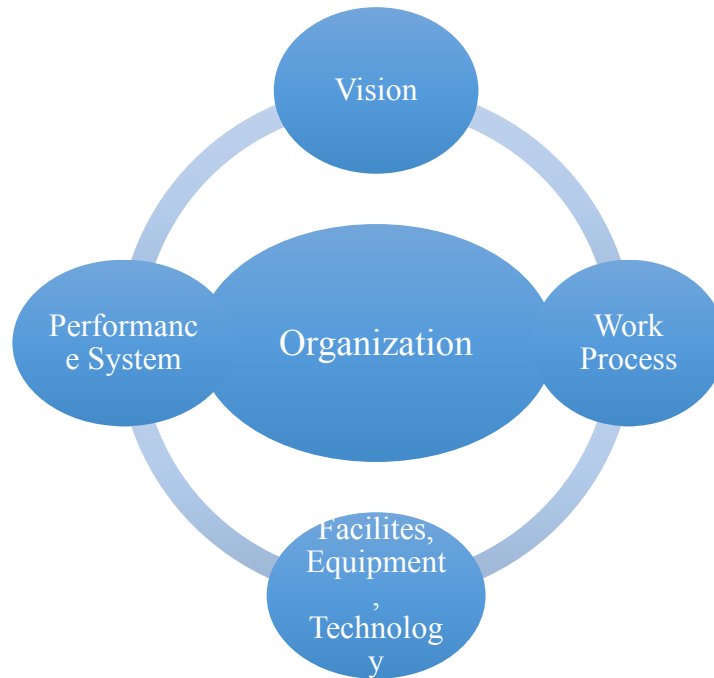
Figure 5: Major moving parts in an organization (Holland & JIM CROMPTON, 2013)

Requirements for Change Management:

To change way of business by any organization involves mainly the changes in above moving parts. This change might be in term of physical change or alternation of existing moving parts within the organization. (Holland & JIM CROMPTON, 2013) for successful organization change, change formula are needed which mainly consists of:

i.   Introducing an exciting and new vison

An organization which is fully digitalized must know how the digital tool and operations will help in achieving the vision of organization in future. In case of manufacturing projects clear understanding of lean solutions and the necessity of new approach. The vision by most of the oil and gas companies is to maximize the production along with reduce health and safety risks.

ii.   Work process must be alternate creatively:

A digitalized organization must successfully identify the existing work process and build a new platform with better infrastructure that will bring improvement in work process. The introduction of more advanced technologies for seismic, drilling and production data then existing in oil and gas industries have bring change in work process.

iii.   Integrating robust and influential facilities, equipment and technology (FET)

If an organization wish to digitalize, old technology must be altered and bring new technology into action that will support the altered work process. The concept of smart oil, digital oilfield, i-fields have significantly increase the oil production.

iv.   Alternating and restructuring the roles of employees

Successful change requires a well-organized management to ensure that all the moving parts are ready and well positioned in order to perform business in a better way. As the introduction of smart concepts for better oil recovery, employers in organization must be trained with the new system and must altered their responsibilities.

Check where an Organization stand:

There are challenges and opportunities in the transition phase but knowing where the organization is positioned is key factor on implementing change management. The effective implementation of the above mentioned moving parts will enhance the productivity of organization and better understanding of the future business model.

i.   Check if the way of company´s vision doing business after the use of digital means are fully developed and documented. This involves the clear understanding and well communication of digital vision by appropriate manager and employees several times. Every member of organization must know the new approach of working.

ii.   Check if the work processes have been changed after the introduction of digital tools, new way of operating have been fully introduced and understood. The role of old tools if they are completely eliminated or are still supportive to existing process.

iii.   Check if the new facilities, equipment and technology that are digital is actively involved in the work process. The way of using new equipment and technology have been written and well documented. The removal of past operating instructions and the equipment.

iv.   Check if the performance is achieved from all the employee and manager after the implementation of digital tools. This can be achieved by effective training for the appropriate person provided with the new facilities, equipment and tools.

Digital Organization of the future(DOOFT):

The DOOFT are the part of digital business ecosystems which consists of interconnected business units that have a shared value and goals; that will help in creating value and advantage in the whole ecosystem in the world of competitive market. Because of this small medium enterprises(SMEs) are in the way to digitalized and organized to put themselves in the form of digital organizations of the future (Chew, 2015). DOOTF will focus on service innovation to generate value on the dynamic market to fulfill the latent needs (Giordano & Wenger, 2008). DOOTF will be mainly represented by mainly two types of configuration; Firstly, tightly coupled organizations with global access but governed by traditional employment-based authority: Secondly, loosely coupled which are referred as so called meta-organization. Anyway, the motivate of this both types of organization are to create value. But how DOOTF will create this value, below the approach for value creation by DOOTF will be discussed (Chew, 2015):

Value Co-Creation Defined:

The first steps in value creation analysis is defining the source and target of the value creation in the same time defining the level of value creation analysis. Generally, there are two types of value: use value and exchange value, use value consists of service or quality of product while exchange value consists of amount that is paid by end users in order to get this quality of product or service. The principal of value creation is: always use value must be greater than the exchange value(Lepak, Smith, & Taylor, 2007). Value creation involves the two-way approach value provider and value receiver; value is created by the value receiver when the product or service is in use. While level of value analysis, here focused on organizational level it mainly consists of the level of organization, knowledge creation, innovation, managerial skills that helps in analyzing the value.

Managing the Digital Business Ecosystem:

Nowadays IT and organization are intensively related because of wide used of digital technology. The extensive use of social media is changing the nature and pattern of managing the organization. Value creation in future market will be focused in work pattern in DOOTF with the assistance of information technology.(Yoo, Boland Jr, Lyytinen, & Majchrzak, 2012)

Architectures and Dynamics for value-creating:

Through the help of IT and digital technology, alongside with business strategy builds a platform of value-creation. The focuses of this architecture is reconfiguration of the roles,

relationship and capabilities of all the participants involves in value creation(Normann & Ramirez, 1993), The approach of value creation by IKEA can be taken as a perfect example of business model, which involves the value creation that fit with the capability of organization and meets the customer expectation (Chew, 2015).

Resource Scoring by Dynamic Capabilities:

Value nowadays and in future will be created by the join collaboration through online platform. The capabilities of DOOTF will be defined by their architecture and boundaries (i.e. open or close) they choose (Lusch, Vargo, & O'brien, 2007). Dynamic capability (Teece, 2007) allows the organization to identify the specialized assets by continuous shaping/reshaping, configuring/reconfiguration and aligning assets to generate new products and services to meet the dynamic demands of latent customers in the competitive market(Katkalo, Pitelis, & Teece, 2010). This phenomenon is same for generating cross-border markets in global context.

Leadership for Organizational Fluidity:

In the dynamic environment of value creation strategies, organizations and dynamic capabilities are closely interrelated, this factor depends upon the ability of manager to manage the conflict between efficiency and flexibility. The sustainable value creation in the dynamic environments demands the DOOTF organization and leader's potential to restructure its available resource portfolios and alongside coordinating with its partners (Coff, 2010), In order to maximize revenue.

The role of Digital CIO:

The advancement of organization to digitalization through DOOTF and take advantage in digital business ecosystem demands increased strategic innovation responsibilities in the leadership of CIO. In future DOOTF demands a strategic leader and innovative capable of making road map for the digital business ecosystem in order to take advantage in the competitive market.

3.3.   Infrastructure:

Mega data center has been the main backbone for digitalization. Digital transformation nowadays is mainly ignited by big data, cloud computing, mobile computing and advancement in data mining technologies. We have spent mainly three eras on big date: the era of information, the era of social and the era of big data(Collin et al., 2015). The intensive growth in digitalization is demanding supportive digital infrastructure which are data centers and related services. The demand of data center across the world is increasing rapidly and various organizations are

investing huge amounts on building such type of data center infrastructure to fulfill the requirements of their clients and increasing demands of business need. In the modern technology driven world there has been a huge competition in building data center infrastructure for organizations to differentiate themselves from the competitive market.

"Intelligent infrastructure paves the way for smarter, more integrated systems that keep economies running and contribute to economic success, efficiency savings, and economics of scales."(Global, 2016, p. 4)

The availability of cheap storage and flexible payment per use on processing capabilities, brought by industrialization of data centers and data processing has led to way to big data revolution. Big data are top trending that affect the modern business and technology nowadays. Big data are mainly characterized by three attributes, volume, velocity and variety(Collin et al., 2015). Big data are connected to various attributes of the industries. Big data along with use of analytical tools and decision support system will have greater impact in organization and the managerial decision-making. There is no doubt that Big data will have greater impact in our society in the near future which will affect the way people lives their everyday, lifestyle, the way they work, and the ways home are connected (Smart homes).

Emerging new technologies have shaped the digitalization, this technology includes both operations technology and information technology. Technology that were in imaginary a decade ago are working remotely and dream technologies are working; for instance, the concept of auto pilot vehicles. Similarly, oil and gas industry are restructured by new technology in compare to past, the recent trends like *sequence stratigraphy, the new principles of data interpreting and building reservoir models* have brought change in the shape(Dolson et al., 1999) followed by the wide use *azimuth seismic data* have which use electronics tools for computing. The concept of *horizontal drilling* and *hydraulic fracturing* have increase the value of unconventional resources by converging them recently although these concepts were well known individually long time ago(Fitzgerald & Mason, 2015).

Elements of Digital Infrastructure:

In the digital era, public and private sector are taking enormous benefits of digitalization and this is expected to continue. To take full advantage of digitalization it requires the synergy combination of various elements. The transformation of industries by digitalization has brought new capabilities, products and services in compare to traditional industries. The speed,

quality and extent of connectivity will be an important factor in economic decision making and business in the near future(Kahin, 2016). Digital infrastructure have been developed in different ways but there key traits are common: friendly business environment, enough digital infrastructure, technology-literature end-users, the sprit for entrepreneurship(Anthopoulos, Siozos, & Tsoukalas, 2007).
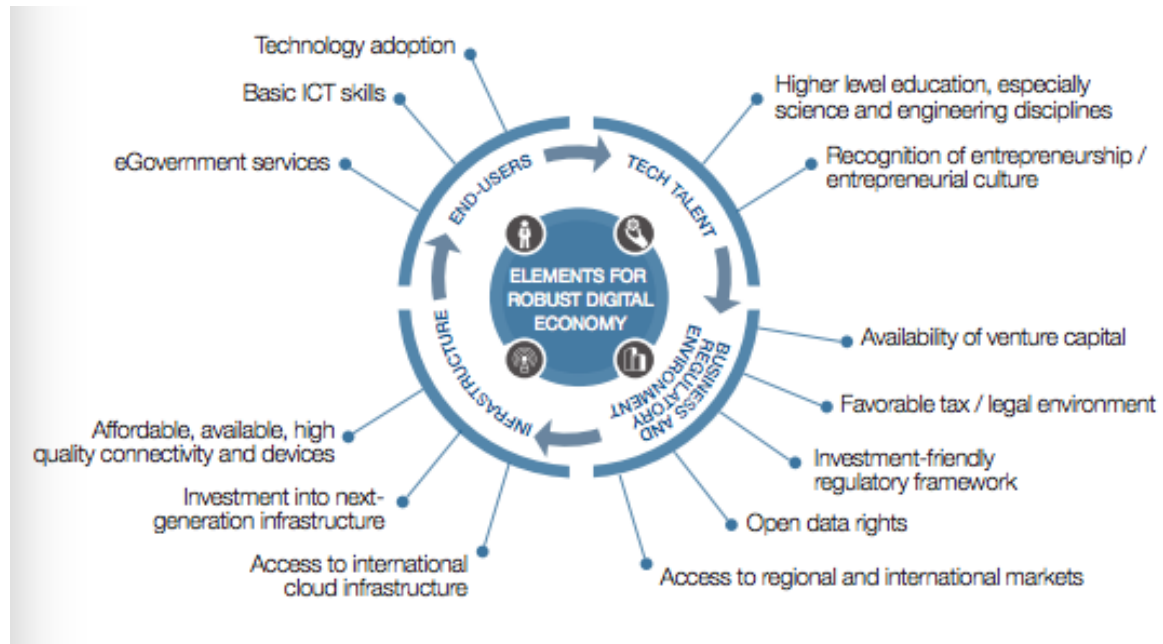
Figure 6: Major Elements needed for Digital Sector(Brennen & Kreiss, 2014)

Beside of this there are various invisible infrastructure involve in digitalization(Henningsson & Henriksen, 2009): which consists of availability , allocation and utilization of physical infrastructure.

The wide use of instrumentation and emerging trends has demand the need of digital platform. It is challenging to predict the future trends, but energy industry demands the correct definition and investment in emerging technologies. There trend of development of new technologies will continue which will take automation, optimization and integration to a new height through integrated asset management, hence accelerating the business. (Holland & JIM CROMPTON, 2013) has listed some digital infrastructures that assist in integrated asset management which will connect people and the involving partners:

Smart Equipment:

Smart technology is leading every sector, smart equipment can be combine to make a platform that will enhance the business. These platforms can be used in connecting people from

different organizations and work remotely. The upstream in oil and gas industries is still lagging the proper use of smart equipment, proper use of smart equipment will enhance the process reliability and optimization of predictive analysis.

Robust surveillance and intelligent alarming system:

This technology will enable to look behind expectation in term of operating conditions and implement proactive operation plans before problems are encountered.

Highly instrumented facilities:

The wide use of sensors has highly fascinated modern organization in obtaining real time data. The proper analysis of this data will provide information on production and process service. But there still exist challenge in making proper decision and proper analysis of data.

Full-cycle interpretation systems:

The main purpose of this system is to reduce uncertainty by data gathering and interpretation. This system will provide dynamic and real time opportunity to iterate steps which have been previously interpretive. For the utilization of such technology there requires the greater integration of multiple discipline like engineering, science and technology and requires staff with integrated skills.

Predictive, integrated simulation:

Simulation tools have become an essential tool for better decisions, integrated asset model when combined with decision support system helps in analyzing the past decisions. The main focus of such models is knowledge gathering and exchanging rather than focusing only on data capturing and exchanging. So, such type of simulation tool will build a platform for knowledge gathering and knowledge sharing hub.

Increased integration between technical disciplines:

Digitalization requires the integration of many sectors. The integration of different sector will help in proper management of resources and enhance the performance as well. Petroleum sector requires the better integration of operations, HES, finance, supply chain management, supply chain management, legal requirements and many more. IT can be an important tool in managing and integrating various sectors. It is expected that Internet of Things (IOT) and autonomous cloud computing will be affecting the way people work in near future(Gubbi, Buyya, Marusic, & Palaniswami, 2013).

Social computing and Virtual reality:

Organization are increasingly showing their high interest in social computing, this will lead organization from social informatics to social intelligence(Wang, Carley, Zeng, & Mao, 2007). Virtual reality will be adding more value in upstream of oil and gas so virtual reality has become an emerging trend with high interest. Social computing and virtual reality will add more digital value in digital transformation(Holland & JIM CROMPTON, 2013).

Stakeholders in Digital Infrastructure:

The digital trend is changing the economics and society nowadays and it will continue like this in the future. The current digitalization of the economy and society has created a platform for innovation and maximize efficiency and enhance the service. Moreover, a consistent and successful digital transition is necessary for sustainable improvement Digitalization will restructure and bring new business models by changing the way individual's interaction with each other and the society. Such approach by digitalization demands *new policy, security, consumer policy, competition, skill, jobs and innovation;* Failure to address this issue will lead to inefficient economy(Brennen & Kreiss, 2014).
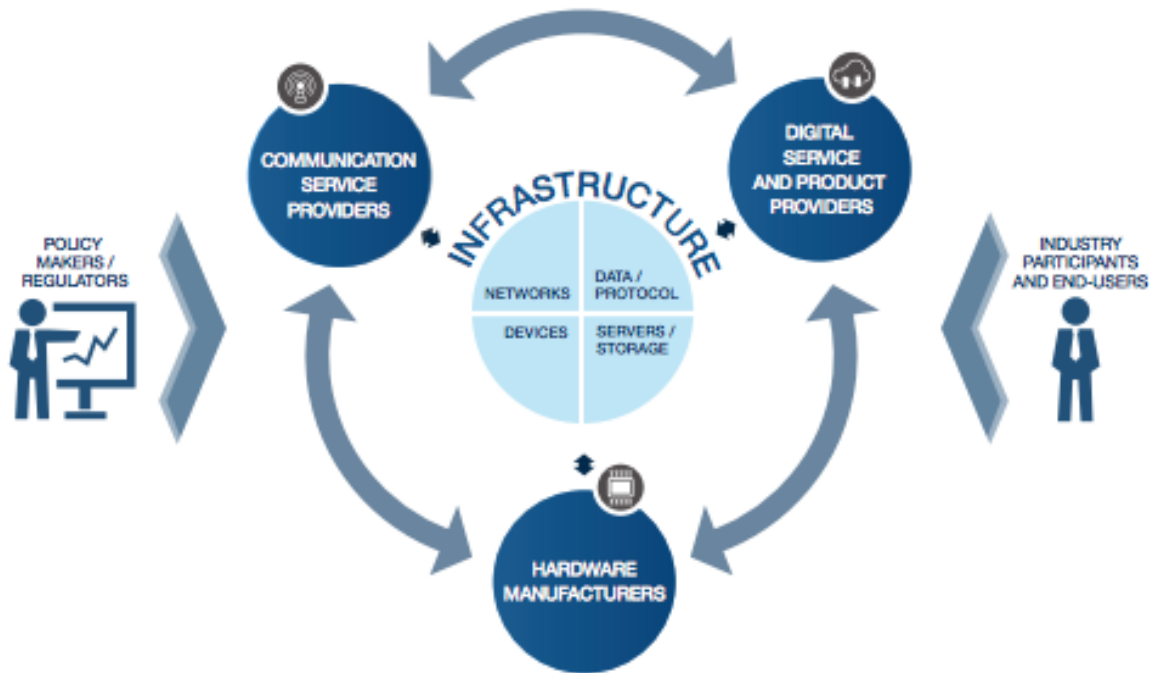
Figure 7:Stakeholders involve in Digital Infrastructure(Brennen & Kreiss, 2014)

There are many stakeholders that are actively and passively involved in digitalization, (Brennen & Kreiss, 2014) there are mainly three majors stakeholders in digitalization. First Digital Service and Product Providers, Second Hardware Manufactures and Third Communication

Service Providers. As more business and people are becoming online they demand new ways to fulfill their needs like *cloud services, machine to machine communications (M2M), and Internet of Things (IOT)* need to be developed to handle the exponentially growing volume of digital traffic. To build a better infrastructure it requires proper planning, innovation and investment, it will help in providing better customer experience, cost saving, improve productivity and increase in demand. Digital service provider has huge potential to bring revolution in the field of economic and social impact. The extent and nature of the digitalization may vary from organization and region but organization need the advanced infrastructure to cope with fast growing digital trends.

Policy makers, industry participant and all other stakeholders most work collectively to achieve following things(Borgman, 2010):

- Commit to plans that will support in growing the long-term digital economy.
- Removing obstacles that are encounter in the process of expansion of digital infrastructure.
- Make and encourage modern policies that will assist investment and innovation opportunities in the internet ecosystem.

Ways to Achieve Digital Infrastructure:

Different stakeholder plays different role in making platform for digital infrastructure. Integrated performance planning(IPP) of various elements is key factor on achieving successful digital infrastructure. (Carayannis, Popescu, Sipp, & Stewart, 2006) describe some roles of stakeholders that support digital infrastructure:

Commitment to the plan and works that focuses on long-term digital economy. Government, business, policy makers and involving stakeholders should have long-term vision and actions that will help in building digital services and digital economy. Establish efficient and secured flow of data regionally and globally.

Make a way for the expansion of digital infrastructure removing all the obstacles. Building technological and business models in digital infrastructure that will encourage innovation. Encouraging stakeholders to make business models that will help in better utilization of digital infrastructure and digital services.

Bring modification in policies and regulations that will focus on innovation and investment in the internet ecosystem. A visionary strategic planning is essential to   by the related actors

like government and businesses etc. to ensure digitalization and economy growth. Build policy and regulations that will support innovation and investment throughout the ICT value chain.

Attributes of digital infrastructure:

Every business firm need to transform and place them self-digital in their business strategy. But every firm are struggling from where to start themselves and find their position in near future. As infrastructure are build it is necessary to understand that they are matured enough and are in right way. Digital infrastructure has change the structure of private and public sector. (Koutsikouri, Lindgren, & Henfridsson, 2017) a well-functioning digital infrastructure provides service oriented innovation in any industry, this will help to create a way for future growth by attracting more users and enrolling new partners. As the world is accelerating on the pace of digitalization, it is necessary to measure the impact of digitalization for better decision and investment opportunities. Digitalization increase the economic benefits obtained from connectivity and increase the job opportunities consequently reducing the unemployment rate(Sabbagh et al., 2012), has defined six key attributes that help in measuring digital infrastructure in digitalization:

- Ubiquity: It consist of degree of platform that help in accessing consumers and enterprise digital service and applications globally and regionally.
- Affordability: It consists of how digital service are priced and arranged so that they are access to as many people as possible.
- Reliability: It determines how reliable the infrastructure is in terms of digital service.
- Speed: It determines the extent of how digital services are providing in real time within the available infrastructure.
- Usability: System are complex, digital service provider must build a platform that are easy to use in internet ecosystem.
- Skill: Building digital infrastructures only doesn't create value they must be ease of use and employs must have enough skills.

3.4.   *Innovation:*

Many organizations are creating the environment of digital market by adding some new roles and eliminating the traditional roles to make digital orientation. The requirements of digital business, characters and task are growing intensively. To be prepared for digital future is not an

easy task it demands different roles and responsibility in different level(Kiron, Kane, Palmer, Phillips, & Buckley, 2016). Organization foundation is key in the process of innovation (Van Den Bosch, Volberda, & De Boer, 1999), for the full utilization of intensive resources and new technologies an organization requires innovative ideas. The increasing use of new technology have increase complexity creating new opportunities and challenge for organization, which consequently demands new managerial practice and change in organizational structure. This shows that technological innovation and organization are intertwined(Scherer, 1986). Digitalization has greater impact in today´s society even the physical assets are being digitalized. Some examples consist of connected car and digital television and soon in coming future the concept of digitized IKEA furniture; digital innovations add new features like media on demand and abundant facility available through multiple digital platform(Lund, 2015).

Innovation only is almost the main them of everything, like it might in product, service or any other things. Everyone wants change and come up with new ideas. Innovation can be simply defined as the *idea, practice or object* that is comes with new thing by adopting units. (Zaltman, Duncan, & Holbek, 1973) similarly describe innovation as the process in which new ideas, practices and objects are invented and established. While process innovation is concerned with *invention, development and implementation* of new generative ideas (Gehman, Trevino, & Garud, 2013). (Slappendel, 1996) has a slightly different view to innovation, which involves *design and development, adoption and diffusion.* Modern innovation differs from the tradition one in the way that Research and Development (R&D) are outsourced while the tradition way of innovation involved the internal R&D. In past innovation were limited and generally concerned with the use of IT innovations that drivers organization and business (Swanson, 1994), while IT innovation nowadays has broader view which take in account consumer and end user in markets (Walsham, 2012).

Basically, the term "digital innovation" refers to the creation innovative ideas and adoption of new digital technology that meets the organization vision and fulfill the needs of customer. The main drivers for digital innovation are digital technology and digitalization (Yoo et al., 2012) that requires communication technology and digital tools compared to traditional non-digital product(Henfridsson & Bygstad, 2013). The way digital innovation differs from other innovation prospective is the architecture and generativity of digital tool and technology (Lund, 2015; Yoo et al., 2012). This architecture consists of modular and multilayers, the level of standardization in

the interfaces between these layers, make possible to recombine and reconfigure that create digital innovation. This layered feature of digital technology facilitates generativity which creates unlimited opportunities and make environment for digital innovation. In the meantime, this architecture and generativity brings several challenges to organize the digital innovation processes(Lund, 2015; Yoo et al., 2012).

Digital innovation is complex process which need to take account of different actor, since different architectural levels of digital technology requires different level of knowledge. Organization need to collaborate and create new ideas with available resources. This collaboration consists of set of activities that is concerned with bringing new ideas to combine different technology in the mean time doing business in the digital world where business roles are being changed rapidly(Lund, 2015; Svahn & Henfridsson, 2012). Digital innovation demands new way of organizing and setting different activities.

The management of digital innovation is of major interest nowadays in the field of information system (IS). There are two major issues related to this, the first one is the heterogeneous actors created by digital technology. The issues with heterogeneous actor is that how to manage different actor in digital innovation that have different and conflicting ideas, knowledge and interests. The second one is concerned with interconnected, complex and uncertain digital innovation process from which flexible digital innovations can be developed(Lund, 2015; Thomsen & Åkesson, 2013).

The effect of Technology in digital Innovation:

The rise of digital technology has its own paradigmatic shift in the history. Digital technologies significantly had effect on *people, industries, society and organization* in the past and it is expected to continue in future as well. If we look and see the past and present, we can see mainly three main paradigm shifts; *industrialization, urbanization and digitalization.* Industrialization bring significant change which was the result of technological innovation, this was followed by urbanization that involved change in living style of humans, finally the digital technologies has brought digitalization which have greater impact on socio-technical structure. This change were encountered in different structures, basically they demand change in job-skill. The digital technology has significantly increase complexity in problem-solving activities that have significantly replace manual human performance. However, it is expected that robotics innovations can significantly reduce human intervention in work process(Levy & Murnane, 2007).

Digital innovation has changed the work process, as technology has improved the collection and analysis of information which demands suitable capacity for human beings.(Thomas, Kass, & Davarzani, 2014) has point out the component of digital that will affect the work process:

- *Stream of Ubiquitous data:*

   The combination of physical and virtual sensor with networks of high capacity makes it possible to store huge amount of data, which can be further used in analysis process.

- *The advancement in analytics and modelling:*

   The development of technology will facilitate the transformation of information into required scale that can be process and improved further.

- *Rich digital Representation:*

   Physical objects are translated into digital data form facilitated by various software will drive robots, programming tools and 3D printers.

- *Cognitive augmentation:*

   Technology on the basics of routine knowledge work and observation will work on automated assistants.

- *Physical augmentation:*

   The advancement of robot will make them capable to adopt in complex work process, so that they can be replace human in certain work process.

- *Collaborative augmentation:*

   Software will directly assist in improve work process by enhancing the way employee communicate and creating new product

From these trends we can see that technology are rapidly shifting to "*Intelligent Digital Process*" which will change the key aspects in the work process. This will specific demand in work, what, who, when, how and where need to be defined when the work is executed. Following table shows work design under the regulation of "*Intelligent Digital Process*"(Thomas et al., 2014)

Table 2:Work design under the regulation of "Intelligent Digital Process"(Thomas et al., 2014)

Intelligent Digital	
1. Who is responsible in decision making during work process in organization?	Employees and Managers who are closely related to work and have greater information and analyses.

2. What decision need to be made?	Decisions must be real-time that are well enough capable to adopt with the changing conditions.
3. How the work is structured?	Work process must be structured through continuous process of experiments and assigning the appropriate task to the structure.
4. Where the work should be located?	Intelligent digital process have remote work i.e. that are controlled through remotely using mobile networks and boundary less organization i.e. work distributed over geographic become much more common.
5. What are the managerial skills and work skills required?	Data interpretation, experiment and testing are necessary skills for employee and manager must have good judgment and must focus on value creation.

The requirements for digital Innovation:

There are not so hard and fast requirements for digital innovation, since different people have different approach. The approach that is best suited for one might not be suitable for another one. However, there are some work practices and enterprise that will contribute on innovation process. Some approach by (Thomas et al., 2014), that contribute digital work process and digital enterprise are discussed in upcoming paragraph. This work process and enterprise are key for digital innovation.

It is expected that with the intelligent digital process in future it will demand different work practice. The edge center decision is most favorable work practice; this will eliminate the traditional centralized decision-making process replaced by decentralized decision process in which decision-making idea are generated from the edges where the intimate knowledge is located.

When empowered by intelligent tools this knowledge is combine with big data stream that assist more in decision making related to *pricing, inventory and some time in product design* at different level. The decentralized decision making increase the autonomy power of employee; this will facilitate, better and precious decision making in the changing market conditions. This will result in higher customer satisfaction.

The use of digital technologies will assist companies to respond with the changing business in real time dynamically. This will enhance real time adoption with changing market. The extensive connections lead by digital tools between *people, place, system and things* commonly known as "internet of everything" will create an environment in which digital information flows dynamically. This information carries ideas about the location of people and system, how the task is being carried and what the people and system are doing. The intelligent assistant will use this knowledge to make smart decision and help human when they are unable to handle big data, such type of decision making will enhance operational flexibility and productivity.

The enhancement of digital technology with new software, robotics, sensors and analytical tools will create a new way of human to work in intelligent machines system. Human will be able to fit themselves remotely in machine operation process through mobile and networks. Moreover, the concept of Artificial intelligence (AI) will bring sever change in human work process. Flexible robots will be directly involved in work process that are well enough to adopt with the shared environment.

Digital modelling and simulation tools will significantly reduce design iteration process making them process cheap. Work process will be restructured; such restructured work process has early feedback system that have quick response to any risk. This will increase fluidity in work process by improvement and experiments.

Digital innovation requires three key attributes to change *skills, roles and culture*. This view must me changed from seeking digital to being digital. This requires right tool to be used in appropriate way, for a better business decision, digital enterprise must empower employee at all level with appropriate tools and data. Organization must be able to make better real time decision rather than focusing on centralized planning and execution. The consequence of this shift is up-front planning rather than frequently re-planning to new data and conditions. Making such type of planning and decision will reduce uncertainty in all level.

There are four core elements for developing and utilizing the right talent, this will play critical role in digitalization. Firstly, the capability for experiments; Secondly, the capability to learn continuously and adapt; Thirdly, the ability to choose right judgment and finally, the ability to collaborate in team. Being digital means employees are able to learn the data continuously and adopt, perform experiment if needed. Intelligent digital process will have greater effect if employees are interested to use data in product improvement rather than just following the existing procedures.

Management mindset play critical role in digitalization. Management shift is required, Managers must be both well-educated and proficient if they are facilitating employees with available data. Managers must be encouraging experimental procedures that will translate strategic direction into operational action. The transition on management prospective to being digital requires tight control offering operators and designers autonomy, this will lead to value finding rather than rule following by creating data driven culture.

To be innovative organization must find a way to "being digital" rather than "looking digital". The benefits of being digital are well known, the shift from looking digital to being digital requires the use of new tools and technology in different way, empowering right talents and developing right management mind sets. Digital transformation requires deep shift which requires good foundation of digital tools. Organization making good foundation of digital tools will become digital rapidly, effectively and efficiently.

3.5.   *Human factor*

The human factor, with emphasis on the user- is the scientific comprehension of the interaction among humans and other components of a system while defining the profession that applies these relationships (National Research Council, 2011). Human factors thus are concerned with the application of the human behaviour, limitations, abilities and other characteristics to the design of a system, environment, activity, equipment, and technology (National Research Council, 2011). The human factors stipulate the training programs and the instructional materials that can support the performance of the technology or equipment that is used in an organizational. The focus of the human factors is especially on the interaction of the workforce with the tasks, technology, environment, and equipment in use in an organization. The objectives of the human factors are to optimize the human and system efficiency and effectiveness, health, comfort, safety and quality of life (Kwon & Park, 2017). There has been a widespread evaluation of the effect of

the human factor on digitalization. The pace of digitalization is remarkably high as most companies invest in digital strategies hence there is need to evaluate the people, i.e., employees or customers that are linked to the business and technology used therein. The common practice has been to allocate more resources in the building of the strategy than the experience of the individuals on to which the success of the digitalization process rest. There are human factors that determine the digitalization of business.

Skill levels and the state of capital good

The skill levels of the worker in a business and the state of the capital goods are significant determinants for the digitalization of a business (Hall & Khan, 2003). The workers and the capital good are essential in the implementation of the new technology in an organization. If digitalization requires complex skills or its time-consuming or costly then the level of competence required for the implementation will slow the adoption process (Pirzada & Khan, 2013). The overall level of skills available in an enterprise is significant in determining the adoption of a new technology. The technical capacity of an organization is important in any industry for the adoption of new technology (Hall & Khan, 2003).

The digitalization of a business is dependent on the transferability of skills across various work situations (Omidi & Khoshtinat, 2016). The skills required should be employable skills especially with the application of the new technology. For skills to be referred to as employable they are necessary for getting, keeping and doing a job (Pirzada & Khan, 2013). The following factors will determine the digitalization of a business.

3.5.1.1.   *Computer Skills*

Computer skills define the abilities necessary for all the employees, as well as the members of the society. The skills will be substantial in the selection and application of the ICT systems that are used in business processes (Omidi & Khoshtinat, 2016). The abilities will allow the use of generic software tools and specialized tools in the new digitalized environment. Computer mastery will allow for flexibility and adaption to change in the new infrastructure (Omidi & Khoshtinat, 2016).

3.5.1.2.   *Internet skills*

Define the competencies required for the use of the business opportunities that can be accessed through the internet-based applications (Omidi & Khoshtinat, 2016). The experience in internet entails the application of internet skill for efficient information retrieval and effective

separation of information. The abilities have been used in the establishment and provisions of effectual, proficient function and information supervision and system protection. Other than the use internet these abilities will permit the contribution to the arrangement, plan, and accomplishment of internet application (Omidi & Khoshtinat, 2016).

3.5.1.3.   *Communication skills*

Communication skills are a key element in human interactions. Virtuosity in communication is essential in a business to facilitate the acquisition of high-level specialized knowledge that can be used for fostering relationships, help in decision making and thinking, boosting of the esteem and promoting peace in the community (Pirzada & Khan, 2013).

3.5.1.4.   *Advanced Digital skills*

Digital prowess contributes to the use of various technology to increment the productivity of an organization. The digital skills increase the performance of the users while increasing the level of understanding of the worker in the new technologies that will be applied in the business (Omidi & Khoshtinat, 2016).

3.5.1.5.   *Digital skills implementation strategy*

The digital skills are used in the identification of the effective ways of implementation of the digital systems. The skills can either be individual or collective linked to the following main interconnected areas of authority education, government, job training, community programs and public awareness (Lin, Hsieh & Yang 2015). These areas are related to the various segment of the population especially in the expression of attitudes and needs. Human factors are vital as they play a significant role in operation in the implementation of the digital system in an organization (Martinsons & Chong, 1999).

3.5.1.6.   *Education*

Education is a characteristic of life and forms a central point in the digital literacy strategy. The importance of education in the digitalization of a company is a consultative agreement such that literacy starts at the post-secondary level (Pirzada & Khan, 2013, p. 127). The importance of education in the implementation of a new digital system is in permitting an easy transition. The workers will transition easily from one system to the other (Pirzada & Khan, 2013).

3.5.1.7.   *Training*

Training entails the process of imparting the skills and abilities required to participate in a knowledge-based digital economy effectively. The skills learnt in the process will be the ability to

find, understand, create, evaluate, organize and share information in the constantly changing digital world (Sakol, 2013). The digitalization of an organization will require constant learning and relearning (Pirzada & Khan, 2013). Once the digital changes have been implemented in the organization it is imperative that the employees are equipped to constantly develop digital skills (Pirzada & Khan, 2013). The skills will continuously augment and sustain the organization.

3.5.1.8.   *Government*

Digitalization is not only a concern of an organization or an individual but rather a collective concern of the society. Thus, the government either federal, provincial or territorial has various roles in the support of digital literacy in the workforce. Moreover, the government in their various jurisdictions are a strategic drivers and resource providers for the digital progress (Pirzada & Khan, 2013). The government is tasked with the creation of digital awareness and skills through the electronic government programs. The government can also promote the acquisition of the digital skills through public and community service workshops, incorporation in syllabus and seminars (Pirzada & Khan, 2013). As the public shifts into digital platforms and the political dialogues and conversations have gone online then citizens and businesses that lack in digital knowledge are at peril of becoming disenfranchised (Pirzada & Khan, 2013). The governments will always work to provide a workforce that is digitally competent to promote digitalization of organization and most of the production processes (Pirzada & Khan, 2013).

3.5.1.9.   *Public awareness and community programs*

The recognition of the digital resources as an integral part of the production process will encourage digital literacy initiatives. The digital literacy initiative will equipment the workforce with the knowledge required for optimum utilization of the digital assets (Sargent, Hyland & Sawang, 2012 p. 74). The training programs and the infrastructure for knowledge provision will not be fully utilized if the public is not made aware of the benefits and efficacy. Public campaign is used to create awareness in the digital training sphere. The primary challenge in the digital literacy training will be the elimination of the attitudes (Pirzada & Khan, 2013, p. 128). Since the main obstacle is the change of attitude and behaviour for those not directly involved in the technology. The campaign can be carried through a cross-media campaign that will utilize analogue and digital media resources. The analogue resources ensure that the transition into the digital is smooth rather than an abrupt change that will scare most people. The transition process

should be gradual ensuring that the employees can conform to these changes (Pirzada & Khan, 2013).

Management Support and Resistance to change

Management support is an essential element in the determining of a business intention to adopt a new technology. The management will encourage the adoption of a new technology if it leads to better user performance, positively affect the user perception and improves the adoption of other technologies (Sargent, et al., 2012). Researches have shown that effective upper management is a strong enabler for the implementation of a new technology. Management support is an internal facilitating condition for the adoption of a new technology. The management support influences the employees' perception of the new technology (Gambatese & Hallowell, 2011). The management will determine the pace of implementation of the new technology in an organization. Regardless of the employees view of the new system the management can incorporate the new system into the organization and slowly discarding the old system effectively influencing the technology uptake (Sargent, et al., 2012). This kind of influence on the digitalization of a company is known as direct control. Additionally, the management can influence the influence of the technology indirectly through the manipulation of the institution structures. The policies and structure in the organization may be changed leaving the employees without an option but accept the new technology (Gambatese & Hallowell, 2011).

It is also evident that most organizational changes are faced with a lot of resistance. The introduction of new technology can be faced with a lot of resistance if the transition to this new system will be time-consuming. The employees will also be resistant to changes that will affect their jobs (Fan, 2016). Resistance to change usually develop at the early stages of the project and sometimes it may go unnoticed. The average length of the service of the employees will also determine the rate of resistance to change. However, in an organization where the labour is skilled the resistance to change will be minimal and the employees will continually experience change without substantial deviation from the operation of the business (Sargent et al., 2012).

Customer commitment and relationships

The stability and security of a customer base is a significant factor that influences the adoption of new technology in an organization. The investment into a new technology requires the assurance that there will be an income to allow for the repayment of this investment. The customer commitment is an assurance primarily in the reduction of the inherent risks in the adoption decision

(Hall & Khan, 2003). The digitalization of an organization process will reduce the operational cost, increase the market power of the organization and the stability of the firm's relationship with the customers. The relationship with the customer will guarantee the presence of future demand. The customer demand is significant in some industries than others for instance for an automaker to digitalize there is the need to be assured of constant customers (Hall & Khan, 2003).

The adoption of new technology in an organization is often costly due to the purchase of new systems and equipment. Some of these technologies require employees training further increasing the cost of implementing new technology. In case, there are network effects then the complementary systems will require updating or replacement (Hall & Khan, 2003). Some technologies would require the shutdown of the business processes hence additional cost will be incurred from the lost output (Hall & Khan, 2003). Thus, when the demand is uncertain, then business will be sceptic about the digitalization of the production process. Uncertainty in demand will prolong the time of recovery hence making the investment in digitalization not worthwhile. However, when the demand is certain, then the organization can accurately predict the demand which is an incentive for the adoption of new technology (Hall & Khan, 2003).

3.6.   Leadership

Most organization are embracing digitalization which has posed a momentous challenge to the leadership of these organizations. The business leader and senior professionals have become aware of the need for the digitalization of the business processes. The current mantra of the business world is 'adapt or die' primarily when considering technology. Whether it's a new software, automation, business intelligence or artificial intelligence, the rapid convergence of technology and business always has been associated with competitiveness, sometime in extreme cases, survival. In businesses, survival entails the development of nimble, automation, adaptable process driven by data and communication. Failure to follow these evolutionary steps it will prove detrimental to any company. Research has shown that by the end of the next decade about 40 percent of the current S&P 500 companies would have disappeared (Ioannou, 2014). This extinction will be due to the disruption nature of technology. Even with technology being responsible for causing a multitude of these changes it is imperative that will understand who is driving technology. In as much as technology has been considered as an agent of business change it does not develop in vacuum hence it is driven by humans hence neglecting the human element of technology will spell doom to a business.

Professor Edward D. Hess affirmed that "Embracing digital requires a new mind-set…The ability to adopt a new mind-set and change the ways of operating is excruciating for many people (Uzialko, 2017)." This form the entry point of leadership in digitalization. Leadership in the business shapes the organizational culture in a variety of ways, but significantly the leaders serve as examples in the digitalization of an organization. The adoption of an attitude of acceptance by any organization towards change and technological innovation, the leadership in the organization should truly embrace the technology and practice whatever they will be advocating for (Uzialko, 2017). The technological development of an organization should be more than just investment but a complete integration (Uzialko, 2017). Leaders should understand that technology has become an essential element of an organization thus its operation has also become a symbiotic relationship with the employees. An effective technology is one that is easily embraced by the employees rather than staying unintelligible or intimidating tor the humans who are needed for the leveraging of the technology (Uzialko, 2017). Leaders have to understand that ultimately, it trickles down to what the team will get from the technology. The selected technology should make the employees more informed and agile in the execution of the organizational strategies. The digitalization of the processes in an organization is a team effort hence leadership plays vital role in seeing this through.

Influential factor on Digital Governance

The digital governance is increasingly becoming and essential component of the corporate management and becoming a core competency. Digital governance in an organization describes the authority and the decision-making elements in digital decision making, communication approaches, decision making organization system and processes, control and coordination system and the decision evaluation system (Thomas, Boring, Hugo & Hallbert, 2017). The system is primarily a sum of all the digital-related activities and efforts that have been adapted by an organization to increase the value of the digital system while reducing the risks involved. The digital governance system covers the following key elements of the system

- Risk management
- Delivery of digital value
- Resource management
- Strategical alignment of the digital functions
- Measurement of performance

The digital decision-making process is a vital process as it involves the setting of the direction, prioritizing the organization investment and definition of the principles and standards (Thomas, Boring, Hugo, & Hallbert, 2017). According to Weill and Ross (2004) there are five vital element of the digital governance that are significant in decision making i.e. digital architecture, business application requirements, digital infrastructure, digital principles and digital investments and priorities. These activities are vital when evaluating the importance of a digital system and its effect on the organization (Weill & Ross, 2004). For any organization environment to be fully digitized there are critical elements that require consideration based on the Socio-Technical system (STS) framework i.e. Organization, People, technology and task (Zhao, Shen & Collier, 2014). There is the need to incorporate other factors so as to fully analyse the STS framework in the prioritizing of the digital governance (Zhao, Shen, & Collier , 2014). The external factor is significant in the determination of the system to be adapted and the adaption process. Digital governance in an organization is an essential element especially when a new technology is being incorporated in the organization (Zhao, Shen, & Collier , 2014).

Strategic Alignment of the Organization with digitalization

The strategic connection between digitalization and business stipulate that the organizational strategy, objectives and the goals are harmonized to ensure that digitalization is affected in time. The alignment of objectives and digitalization is a fundamental concern of the management (Digital Retail Consulting Group, 2017). The strategic connection between digitalization and the business operation. The adoption of new technology in most companies brings a scope of continuous digital enhancement as opposed to business themes. Most of the technological companies fail to advance their corporate agenda compared to their counterparts in the business arena.

The primary target of digitalization is to enable companies to increase their strategic goals of making their influence in the corporate environment. Making digital companies gain their competitive advantage in the market is something that deserves upgrading (Daub & Wiesinger, 2015). Linking business moderation and digitalization is something that is overdue. When digital companies become strategically enhanced in the business arena, they become strategically and comparatively advantageous. Competitive advantage comes as a result of the need to generate more revenues and map the whole society in a better way. Companies get recognition from their ability to make their ideas into financial benefits (Fan, 2016). Over the past 30 years, digital

companies have been on the verge of trying to merge their businesses into the main street and Wall Street business. Digitalization with time continues to map itself in the day to day operations of every business. The business and digital platform owners share information to enhance development their contributions (Hall & Khan, 2003).

According to Kwon and Park, the idea of a business plan is a perfect pitch in the professional business arena, especially in the investment request stages. Thanks to digitalization, so many things have become contemporarily adopted in the business environment. Concepts actualize into money with the appropriate concern and energy. The link between the technological plan and the business plan indicates the perfect relationship between technology and business ideologies (Kwon & Park, 2017). On the other hand, according to Kwon and Park, the link between a business plan and the technological plan remains the backbone of the interrelationship between the two. As much as the two remain reliant on every basis, the concepts are unique with respect to the information under consideration. The whole idea of planning, sophistication, uncertainty, influence, organizational size all rely on the efficiency between the business development and digitalization advancement (Kwon & Park, 2017).

The approach of leadership in the digital enterprise platforms is a top to down model of leadership. The whole idea is to make the employees toil hard enough to come up with ideas that keep them relevant in the game. The executive's monitor progress based on the productivity of the junior employees. It's only common that the lower ranking employees are, the younger generations of the company. The whole industry lies with a group of individuals that come up with new ideas at ages that over time remain considered junior. The only challenge of is the acceptance of the general society. However, the whole idea is to create accurate perceptions that give operational advantages of the operational markets. The idea of making a bottom to top strategy is to give a competitive advantage in the perception and leadership of the market (Thomas, Boring, Hugo, & Hallbert, 2017).

Harmonizing digitalization and businesses is the gateway to success and the days to come. Art is fast rising and giving people the opportunity to invest in the interpersonal and recreational activities that offer them options to gain their motivational advantages at their interpersonal and professional platforms (Kwon & Park, 2017).

Executive Digital Leadership

The management-led, top-down approach is an effective way of driving digitalization in organizations. Employees will engage in various ways of pushing and effecting changes in an organization under strong leadership. The top management will implement the changes in the company based on the decision based on the rapid changes in the market conditions. The top management will be responsible for the perception and the determination of the employees. The leadership in the organization will be responsible for the creation of a strong vision for the digitalization of the organization (Hall & Khan, 2003). The leadership will be responsible for the achievement of the digital transformation in any organization as bottom-up cannot be functional as a decision cannot cross the divisions. The top management will be better placed to drive change beyond these boundaries of divisions. The leaders will engage and make changes through the various tool of management to enable digitalization and then communicate the changes to the employees. The executive can result in corporate governance and system transformation that will permit the digital transformation of an organization. The executive will instigate the appropriate organizational culture and talent development, technical leadership and necessary investment.

Weill and Ross (2004) have agreed that the role of the CEO and the CIO is significant especially considering the fact that they ensure the harmonizing of the IT and the business strategy in an organization. The leadership of an organization is vital as they create a comprehension of the importance of digitizing an organization (Kwon & Park, 2017). The leadership in an organization will fulfil the responsibility of maximizing the value of digitizing the business process. The CEO will connect the technological strategy with the business strategy of the organization. The technical leadership will guide the business executives in generating the greatest value of the digital changes. The sharing between the leadership will have a positive impact on the link between digitalization and business. This sharing of knowledge will also ensure that the strategic objectives of the company are well connected with the technology being used. There are two different styles that can be used in the management of digitalization. The transactional leadership will be vital for the management of the mutual attitude that exists between the leaders and the employees. The transformational leadership will define how the leaders affect the employees. In the transformational leadership, the leaders will broaden the understanding of the organization objectives and boast the performance of the employees. The transformation leadership will affect

the organizational culture and enhance the working environment. The improvement of the culture and the motivation affect the organization in its entirety.

Organizational Capacity for digitalization.

Transformation in a business context is associated with the fundamental change in the business process. Digital transformation entails the changes in the digital strategy, business model, and culture and business model. Digitalization entails a combination of the approaches to changes and innovation in the organization due to the implementation of a variety of digital processes. Digitalization in an organization is dependent on the company, the industry and leaders. Most researches have insisted that technology is a mean and not the purpose. Digitalization should not be narrowed to cover only the digital innovations such as mobile technology, business intelligence or analytical solutions but should be viewed in a broader sense. To measure the capacity of an organization for digitalization we need to evaluate the digital transformation in different angles. Digitalization has been defined by various industry leaders and the ability for a company to accommodate digitalization can be determined from these definitions such as outlined below.

Table 3: The Definition of digitalization (Digital Retail Consulting Group, 2017)

Source	Definition
PWC	Digitalization is a series of processes that apply the expectations of the digital customer and the ability of the organizational management to model the processes to be in line with the strategies of the organization.
World Economic Forum	These are activities that transform the organization via the leveraging of the business while improving the digital skills and performance
IBM	The integration of the digital physical elements to transform the business model and establish a new direction in the organization.
Bain & Company	Is the redefining of the digital enterprise in an organization and improve the digital foundation of the business so as to reverse the laws of the game?

3.7.   Expertise

The digital capabilities of a company are a prerequisite to compete in the long term. Most companies that are trying to digitize have not set a clear path for achieving digitalization. These organizations are still unclear about the best way to set up their digital tools. Most of these organizations have to develop the tools and the talent needed to digitize. Most organizations lack the expertise and the critical resources required to facilitate the transition. The right talent, for instance, are in short supply (Digital Retail Consulting Group, 2017). The distinctive expertise needed for the successful digitalization. The digitalization of an organizational process entails the incorporation of product managers that are tech-savvy and literate in cutting-edge technologies that will shape the consumer decision journey. The digitalization of a company may entail the use of analysts for the business intelligence part of the organization, content-mangers to ensure that the data appeals to the target audience (Daub & Wiesinger, 2015). The technology-service company are better placed to have more of the professionals needed for digitalization as they have a diverse career path and personal development path. Digitalization is essential in every organization, however, the development of the expertise required locally in the organization (Andersson & Tuddenham, 2014). In competing favourably an organization requires to adopt a dynamic approach in the accessing of the digital expertise from outside the organization (Daub & Wiesinger, 2015).

Digitalization in a transportation company the key goal will be to scale up rapidly. The leaders in this industry strive to bridge the gap that exists in the various technological areas, especially in the service management. In transportation, the IT department should be well equipped to manage the digitalization projects and also oversee a full digitalization initiative (Digital Retail Consulting Group, 2017). There is the need for sustained efforts in hiring, developing and retaining the necessary talents. For a travel company to best compete, there is the need to embrace a dynamic approach for the assessment of the digital capabilities, especially from the external environment. Mostly, the company will require to be able to balance the speed of the operation of the IT department. Slow integration of the system while changing the legacy transactional characteristics of the company. It is significant that the companies evaluate their digital objectives, the capability of effecting the changes practically and the operating models needed. In doing this, the company will be able to scale up nascent digital initiatives drastically and sustainably. These efforts will accelerate the use of emerging technologies while aligning the fragmented activities that are of

interest to the organization. In travel agencies, the changes should be in-line with those of the individual business groups primarily in the development of the vendor relationships that can easily evolve without the variation in the customers' needs.

3.7.1. Sourcing for digitalization

As determined earlier there is an inadequacy in the expertise required for the digitalization of an organization. The transportation service sector is among the fast-moving business where digitalization is necessary, and the finding of the essential tools and talent has become a vital but challenging aspect of digitalization. There are various reason why sourcing for digital expertise is more difficult than the conventional sourcing. The diagram below creates an important illustration of the situation

Traditional sourcing	Digital sourcing
The focus is on cost.	The focus is on talent.
Project scope and development is fixed.	Project scope and development is ever changing.
IT functions are siloed and solutions are autonomous.	IT functions are integrated and solutions are shared.
Large systems integrators dominate an established market.	Small niche players dominate a fragmented market.
Companies pursue long-term contracts with complex service-level agreements.	Companies pursue short-term contracts with flexible deal mechanisms.

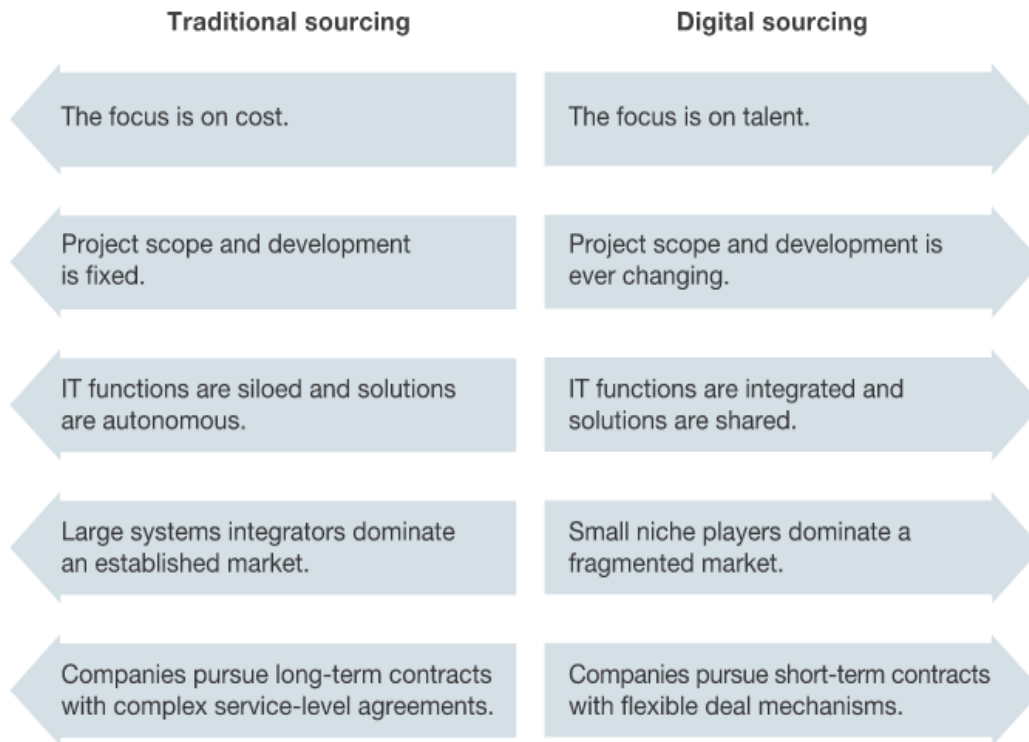*Figure 8: The difference between digital and traditional sourcing (Daub & Wiesinger, 2015).*

3.7.2. The importance of talent over cost

Conventionally, organizations have realized there is a competitive advantage in technologies that will support a certain business need at the lowest cost. For instance, a travel company may use a simple spreadsheet, i.e. Excel for the analysis of data which will limit its

capabilities instead of rolling out an expensive more sophisticated system for data analysis. The changes that current state of conditions is that the talent for implementing the new technology is more valuable than the having a cheap technology. The traveling companies should invest more in the technology that despite the fact that it can lead to an increase in the cost of digitalization (Digital Retail Consulting Group 2017). The investment in the technology can be more beneficial than investing in a cheaper technology. The travel company will be in a position to predict the changes in the customer's demand with a lot of accuracies when they invest in the relevant expertise as the will be advised into adopting the best and most advanced technology. When the expertise level is raised the travel, company will be able to integrate various data sources especially when the company hires an analyst who will interpret the data that has been gathered. The top-talent will be crucial for the travel business to be able to adapt a cutting technology for the system to ensure that corporation with other companies always at per with the market needs.

3.7.3. Changing scope of digitalization

Companies are undergoing conventional transformations especially digitalization they tend to have a sequence approach to implementing the changes through the incorporation of skills and tools. The talent and the technology are inter-twined primarily in the case where the technology is rigid and cannot be rolled to the customers before the digitalization efforts are complete (Digital Retail Consulting Group 2017). In digitalization, these efforts are usually insufficient hence the process of implementing the digital projects in a company will be iterative and would require a continual clarification of the objectives and the updates of the internal requirements (Gambatese and Hallowell 2011). The critical benefit of digitalization is that business can capitalize on the chances that are presented for the end-to-end customer-centric innovation. The targets of the project will constantly be refined and updated. Using this approach, the travel company, for instance, will have to update its online offerings incorporating new functionalities. The functionalities may be introduced stepwise so that feedback can be collected from the clients so that the online offerings can be revised based on the comments and feedback from the client (Kwon and Park 2017, p. 12589).

3.7.4. Integration and Accountability

Companies may utilize a bank's funding to implement digitalization but outsource the services in the search for talent and resources. The cost of implementing the project may be within the budget especially when some of the functions are attained through various vendors. These

multiple suppliers will operate under multiple contracts (Kwon and Park 2017, p. 12589). The deviation from the central sourcing strategy will lead to variation in the compatibility, productivity and the security when new features are introduced in the production environment. Businesses require ensuring accountability in the digital transformation especially of the company or department managing the digitalization project should be accountable. Accountability ensures that the delivery of the project is sustainable and within schedule.

3.8.   Systems

The current workplace has witnessed a change due to the implementation of the current technology. The new technology has changed the production, multiplication, distribution and the storage of goods produced especially oil and gas refining. The variation in the communication process has altered the entire process. The exchange of information over a long distance especially in line with production will be vital (Daub and Wiesinger 2015). The new technology allows an organization to have a vast geographical coverage that will be independent of the time and space due to the technology applied in the organization. The new technology will incorporate computer technologies that are important in the supervision of various industrial processes in the oil and gas industry. The electronic, conferencing and social media that are adopted by an organization will be vital in connecting employees in the various production segment of the organization such as oil and gas drilling department, pipeline and transportation department and the oil refining department in the organization (Ioannou 2014). The communication media will allow the seamless operation of the organization systems.

The internal communication in an organization will provide the business-oriented information that is vital for all the company employees to effect the change as it will affect the distribution, storage and the retrieval of the information stored in the organization. The electronic format of communication has enhanced the number of individuals reached in the organization. The current social communication system is different from the formal communication systems that are used in the integration of the internal groups of the employees. The communication will permit the growth of the employees' closeness via the connection with the company workforces. The new technology when applied in an organization it will allow the collaboration and sharing of knowledge and expertise that will cut the cost of the organization and in turn assist the employees in the utilization of the company resources efficiently.

Digitalization and organizational systems

It has become imperative for organizations to undergo digital innovations and engagement. The digital channels are vital in the creation of the digital channels that will be utilized in the engagement of the primary stakeholders while maintaining relevance and drive in the process. Most organizations are overlooking the need for digitalization (Doorley and Helio 2015). The real imperative is the need for an organization to pursue digitalization so as to incorporate disruptive innovation in its business model while gaining competitive advantage in the industry. The absence of innovation strategies the companies will lose their competitive advantage. The loss of the competitive advantage in the commoditized world is detrimental in this commoditized world. Digitalization does not permit waste of time as there a lot of customer pressure due to their new expectations (Digital Retail Consulting Group 2017). When an organization fails to keep up with the pace, they risk losing relevance.

The challenges to most businesses are tackling the implications of digitalization especially the loss of control over customer relationship, threats of commoditization, increased competition and the need to associate with suppliers digitally. Digitalization in an organization takes a structured approach to the assessment of the digital maturity of an organization based on the maturity and the level of technology (Digital Retail Consulting Group 2017). To adequately deal with the challenges associated with digitalization businesses need to develop an end-to-end response to the comprehensive digitalization strategy. The strategy developed should span beyond the marketing department of the organization and should cover ubiquitous cross-channel connectivity ensuring continuous engagement with the customers, employees, suppliers and investors (Swanson, 2017).

3.9.   Work process

The digitalization of the organizational processes is evidence that current organizations recognize the productivity gains and the operational efficiencies for better integration of digitalization information into the organization. Even with the current changes in technology such as cloud-based application and smartphones most organizations are increasingly finding it difficult to digitize. For instance, the amount of paper in oil and gas industry is on the rise rather than decreasing. The digitalization of business processes needs enormous changes to occur in the process. This change will be difficult to achieve in an organization. Most organizations can attain digitalization via.

Evolution of managed services

The digitalization process in an organization can be gauged via the monitoring of the process flow. The process flow in the business will be determined by the various inputs, outputs and how they are processed to provide the product. In organizations such as the oil and gas industry, the output phase can be managed by managed print service, management of product movement and in travel organization the phase will incorporate fleet management. When an organization utilizes a management document service the document lifecycle can be addressed, and the flow of information monitored in the business processes.

The process flow management has evolved especially with the migration of the document-intensive processes, i.e. from an input, throughput and output to more integrated digital workflows. The experience in the use of the processes will provide clear insights in process leverage involving intelligence capture, indexing and the extraction of the data for the incorporation into the digital workflow (Digital Retail Consulting Group 2017). The best instance of digitalization is the management of travel data in a flee management company. Where the primary data can be pulled out and be plugged in directly into the claims processing applications. The process will better integrate the digital information into the organizational process while permitting the analyst focus on the data collection process. The data management process in various industries has changed and requires being upgraded via the digitalization of the process (Gambatese and Hallowell 2011). The advantages of the digitized process in the organizational process while permitting process optimization analysis. The optimization of the process will assist in the redesign of the workflow and achievement of the more integrated digitalization (Daub and Wiesinger 2015). The optimized process will permit the pitfalls associated with processes in the oil and gas industry. Additionally, the optimization will apply the best practices that are associated with digitalization efforts and reduce organizational resistance to change (Omidi and Khoshtinat 2016).

Digitalization Approach

The incorporation of the digitalization aspects in an organization can be approached differently by organization depending on the level of experience the organizations have had with the technologies being incorporated. Experienced organizations will effectively and efficiently integrate the digitized information into the organizational process. The companies that have not had contact with the technology earlier will experience difficulties in the incorporation of the technology.

The organizational benefits of digitalization are more than the productivity gains and cost savings. The customer and the employees will benefit from the access to the updated information with a faster turnaround time to manage customers. Digitalization enables mobile access to information that is key in the serving of the customers. The digitalization process will assist in the monitoring of the input, throughput and the output.

3.10.   Partners

Digitalization has increased the potential of unlocking the new levels of efficiency in the corporate performance in an organization. The digitalization efforts in an organization will increase the quality, speed, and the relevance of the information in the organization. The changes in the business due to digitalization is a representation of paradigm shift. There is a change in how various partners in the industry perceive the performance management. Experts are re-evaluating the comprehension of the various role and responsibilities of parties involved in digitalization. The process boundaries are being pushed back with the understanding of the existing technological barriers. The increase and acceptance will allow the management to monitor the corporate performance of the system.

The first point of change in digitalization is Big Data and Predictive Analytics. Moreover, the digitalization efforts in any industry are data-driven and are used in the decision-making process. The change will be promoted by the growth in the relevance of the fact-based business while combining the possibility of improving the utilization of scenarios. The integration of business process across corporate borders is challenging. The digitalization is a quintessential advantage for the corporate performance management.

Similarly, the changes are affecting many organizations as there is the incorporation of new approaches, roles and responsibilities that occur. Digitalization will present the company with enormous challenges especially when the effect the relation of the company to its partners, transformation of products, service and business processes. The common weakness of digital transformation entails

- Process flows not being digitized end-to-end
- The digitalization initiatives are focussed on the isolation of the partial elements of the process
- Media failure that prevents the comprehensive digitalization, transparency and management of the process.

- Investment in the overhauling of the system

3.11.   Strategy

Digitalization of a business entails the introduction of a new digital technology that at times may not be new but are utilized for the new effect. The digital technologies underlying these competitive thrusts can vary from existing to new technologies. The technologies have increased the amount of information being accessed in the organization. The data sources range from proprietary big data to the new public databases that provide open data (Hirt and Willmott 2014). As the digitalization of an organization gains momentum, there are profound changes that are required in the strategic context. The digitalization in the organization will alter the structure of the competition, performance in the parent industry and how the business is being conducted. A travel agency CEO accepts the fact that the industry is undergoing changes that occur once every century. Therefore, to avoid this disruption then the leader in the industry will require to challenge their assumptions and test their strategies against pressure (Hirt and Willmott 2014).

Opportunities and threats

Digitalization has decreased the entry barriers in various industries tumbling the existing barriers between sectors to tumble. The ease of use of the digital assets has disaggregated value chain increasing competition from all sector (Hirt and Willmott 2014). The new market entrants often scale up drastically at a lower cost over the legacy players leading to their returns also growing rapidly as they tend to attract more customers to their networks (Hall and Khan, 2003, p. 11). The digital capabilities will influence the value creation by the companies especially in the context of the industry. The shift is not monolithic but has a well-defined path (Hirt and Willmott 2014). The advanced incumbents will then commence adjusting the changes; thus it will accelerate the rate of customer assimilation to attain the same level of digitalization. Eventually, the radical has now become normal, and unprepared incumbents run the risk of being the next blockbuster. The strategy for the leader will entail:

Promoting the interactions with the customers, stakeholder, suppliers and employees.

Most businesses, consumers and transactions are increasingly adopting the digital channel. The digital channel is desired as it increases access to a multitude of data (Hirt and Willmott 2014). The message is vital as it provides information about the location of the consumers and the demographics associated with specific products. The digital channel reduces the costs of transactions and keeps transparent records of the transactions that are used for resolving disputes.

The enhancement of the management decisions especially via the use of big data or internet of things.

The improvement of the decision-making process will enhance the performance of the business permitting finer marketing allocations and mitigation operational risks via monitoring of the status of the equipment.

The enabling of new business or operating models

The new business or operation models can be used to disintermediate the current business customers-suppliers-relations (Hirt and Willmott 2014).

Digitalization will vary the industry landscape by introducing new competitors in the landscapes. Thus, nowadays even a business capability is considered a threat even before even the competitors can be identified. These digital forces will lead to challenges and opportunities for the business (Hirt and Willmott 2014).

The forces that will affect the digital strategies of a business include

Increased pressure on prices and margins

The digitalization of the business process will create the transparency hence permit the comparison of the prices, product performance and service levels. The unlimited options present themselves to the consumers with elasticity on different brands, retailers and service providers. Competition picks a new stage with service providers getting to understand the demands of their clients based on their delivery requests (Digital Retail Consulting Group 2017). For instance, the banks in a bid to secure their competitive advantage over their rivals, have prioritized mobile platforms to suit the efficiency of their service delivery. The online platform is a game changer in the service delivery platforms (Hirt and Willmott 2014).

Competitive advantage

Digital dynamism creates alternatives to the old-fashioned marketing platforms that require physical platforms and offices in local regions to provide access. Digitalization brings competition to a new level (Hall and Khan 2003). Insurance companies and telecommunication companies have the opportunity to tap information on client preferences without much physical engagement. Battle lines get redrawn with newer strategies taking the frontline. The unique point of the entire thing is that there are limited referencing points to refer. Japanese based firm Rakuten has engaged in an inclusive and progressive process of securing clients and service delivery online (Hirt and

Willmott 2014). Google wallet and Twitter retail offerings are examples of the indication of online platform success.

The dynamics of 'the winner takes it all'

Digitalization provides the reduction of costs in terms of both labour and transactions. From a practical point of look, the online-based companies generate up to three times the revenue per employee as compared to the physical interaction-based businesses. In some cases, digitalization enhances efficiency and improves in terms of popularity given the information-intensive models employed in delivery networks. In some scenarios, the income materializes in a shorter span as compared to the regular operating companies that have to span over multiple numbers of years to create an impact and gain mileage (Hirt and Willmott 2014).

Data and talent remain decisive in the digital platforms. The current insurance firms that dig their data online do have more information as compared to the traditional model-based insurance firms. Having more information means that they can perform more accurate diagnosis in terms of risks as compared to their traditional counterparts (Digital Retail Consulting Group 2017). Digitalization offers magnetic engineer friendly and investor comfortable options given their elasticity and freelance nature of the business operation. For instance, successful start-ups depend on the winner takes it all strategy. Telecommunication platforms for instance. Have the perfect portrayal of the situation. The current preference overlaps on the influence of others and may run others out of the business venture.

Plug and play models of business

Value chains do integrate at the same rate that digitalization force transaction cost reduction. There is value adding brands that subscribe into the space of digitalization. Amazon, for instance, keeps growing with the implementation of different businesses outlooks integrated to give one outcome (Hirt and Willmott 2014). It is a more complicated model that Amazon employs. The company manages to link service providers and retailers and, in the process, take responsibility for the trades in the platforms. It is important to note that according to Forbes, the highest ranking and richest man gets his wealth from the online platform Amazon. Jeff Bezos, currently the richest man in the world (according to Forbes) receives his net worth from exploiting the digitalization gap created between demand and supply (Hirt and Willmott 2014).

Talent mismatch growth.

Automation can replace more labour in the banking sector with its development over time. Take, for instance; it is evident that more than half of the bank protocols could be automated to success without having a physical human influence to complete the transactions. Getting a loan, opening an account or buying a car could possibly be automated (Daub and Wiesinger 2015). Call centre workers are on the verge of getting replaced using smarter machines like the IBM's Watsons. Mach8in10.0eas today, have the ability to diagnose disease in the medical field with much more accuracy than human beings (Digital Retail Consulting Group 2017). The rush to secure people with skills on artificial intelligence is on the rise. The dependence on the information has become the key to success to some businesses. Companies have become sceptical on hiring workers; instead, they are advancing on digitalization to replace the human workforce to the reliability of automated systems and cost-effectiveness.

Globalization

Residents in the United States have a tendency of doing their shopping in the United Kingdom. The e-shopping platforms presented by digitalization offers the enthusiasts an opportunity to connect with the fashion trends of the United Kingdom. The example is a classic example of how digitalization is reshaping the global markets (Hirt and Willmott 2014).

Evolving nature of business

In the music industry, for instance, models shifted from selling CDs and tapes to the Mp3s. Today, the subscription platforms like YouTube and Spotify (Hirt and Willmott 2014). The music example is an indication of the possibilities that present themselves in this wing. Developments come with every rising dawn given the uniqueness depending on the relativity of existing developers in the industry. Automation levels in the vehicle industry enhanced by Google show many possibilities in terms of location and directions. The automation capabilities present unlimited options for businesses growth with their unique approaches in the digital world (Hirt and Willmott 2014).

3.12.   Internal Marketing

Communication is an elementary component in the establishment of the connection, especially in digitalization. Internal marketing is a form of communication that is used in the promotion of the digitalization in an organization. The communication forms can vary

considerably especially in an organization in the promotion of the digitalization. There are various communication media that are used in communicating in an organization. The communication can be between individuals or groups which can also be immediate or delayed depending on the form of communication being used. Communication is an active two-way process that can be defined as

"It is something that we do, something that we make, and something that we work on when we receive it from others" (Dimbleby and Burton 1998, p. 3).

Communication can be experienced at various level and extent hence the experience can be divided into four categories. The intrapersonal communication that occurs when we think we are communicating with ourselves (Doorley and Helio 2015). Communication between peoples in a similar solution interpersonal communication. Group communication entails the communication between various groups of people either within the group or between groups. The last form of communication is the mass communication where similar information is passed to a large audience (Dimbleby and Burton 1998).

The basic communication theory will be utilized in this internal marketing in an organization. The fundamentals of communication can be defined as

"The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point" (Doorley and Helio 2015, p. 9)

The organizational communication is not straightforward; especially it is divided into vertical or horizontal. The communication can be based on various information technology solutions and the variations of the communicating culture. Currently, the process of sending and receiving information is significant in interaction, integration, customization, synergy and cross-organizational cooperation especially in the case of digitalization (Doorley and Helio 2015).

Corporate communication

Corporate communication is a vital digitalization tool. Corporate communication attaches the various components of an organization in a structured way. The stakeholders use corporate communication in the stipulation of the targets and definition of the path of achieving the goals of the organization especially in terms of digitalization (Doorley and Helio 2015).

The organizational communication can be conceptualized in three ways, i.e. it can be a specialist task area that is affected by communication department in an organization.

Communication can also provide vital information about the organization. The effectiveness of communication will be vital in the description and explanation of the organization. The extended corporate communication strategy will entail the audience responses as a result of the organization communication (Doorley and Helio 2015). The communication strategy intends to provide the resource that will be vital in the digitalization of the business process of an organization. The audience will determine the structure of the message and the communication channels. The other determinant of the message structure will be audience's attitude towards the corporation and the digitalization process. Additionally, the variables will entail the analysis and evaluation of the success level of the communication in relation to digitalization in a corporation (Doorley and Helio 2015).

The current complex organizational communication requires an integrated approach in promoting digitalization to the various audiences with the industry and in the organization. The complexity of the communication will be based on the changing needs and requirements that stem from contemporary society and the global business (Doorley and Helio 2015). The corporate communication framework is vital in the management of communication. The communication will include various public relations and marketing communication such as issue management, public affairs, investor relations, advertising, sales promotions, direct marketing, media relations, community relations, internal communication and publicity and sponsorship (Doorley and Helio 2015). Internal communication is vital in the promotion of digitalization and other disciplines especially in the internal market of the organization.

Internal communication is a management function, as it will permit the corporate communication controls for the internal and external communication in the organization (Doorley and Helio 2015). The communication will be aligned with the functions of the organization as well as the digitalization efforts of the organization (Daub and Wiesinger 2015). The corporate communication illustrates the complexity that is associated with the incorporation of various digitalization efforts.

Internal Stakeholder Communication

The view of the stakeholders of a company is vital in the contribution to its success. The primary stakeholders are the investors, shareholder, employees, customers and other members of the community. Corporate communications are used strategically utilized for the management, maintenance and protection of the organizational reputation. The stakeholders' group have various

needs and interest especially in digitalization of a company. The exchanges in the stakeholders will create a strong reputation. Cornelissen (2011), demonstrated that communication in an organization is vital

> *"Employees are a crucial stakeholder group for any organization. Organizations need to communicate with their employees to strengthen employee morale and their identification with the organization and to ensure that employees know how to accomplish their own, specialized tasks. Organizations require employees to cooperate with one another to achieve the company's goals"* (Cornelissen 2011 p. 163).

The corporate communication is vital for the changes in the management in an organization by ensuring communication between the employees to present the digitalization status in the organization. In case of poor management of the changes in the organization, rumours can be used to cause resistance to the change (Hirt and Willmott 2014). The employees in an organization have a variety of expectation of the employer hence the changes in the process flow caused by digitalization will result in a business environment. The changes in the environment will cause changes in the relation of the employees with the strategic goals, resources, mentality, working practice and organizational culture (Doorley and Helio 2015). The internal marketing of the digitalization efforts will play a central role in supporting the changes in the business process.

4. Assessment of Digitalization

4.1.   Introduction

Most companies endeavor to assess and justify the various investment efforts undertaken in line with digitalization. The evaluation will be carried out through the measurement of the business value of the company and comparing it with similar system in the same sector. The maturity model and the spider diagram will be used in the evaluation of the business while offering a baseline for comparison. The maturity model is a robust tool that is used in the definition of the efficiency, manageability and the measurement of the monitored environment (Hribar , 2010). Many companies have invested heavily in the renewal of the business processes and the improvement of the systems so as to assure competiveness in a rather competitive business atmosphere. The new system especially information management there will be the adjustment of the market and environment. The company will adapt a proactive action that will permit faster alignment that will permit faster change in the business market (Hribar , 2010).

The timing and the precision of the business decision is essential in the survival of the company. Precise business decision is mainly made when there is reliability, accuracy and punctuality of the information required in the decision-making process (Schumacher, Erol and Sihn 2016). A key area where most businesses are investing heavily is digitalization The Return on Investment of digitalization is a complex term that take into account a plethora of conditions. The digitalization of the business process as well as the access to relevant and updated information. The benefit of digitalization cannot be identified easily to an organization. The complexity of the measurement techniques increases when trying to gauge the influence of digitalization on a business (Schumacher, Erol, & Sihn, 2016).

Maturity model has been used in the evaluation processes such as performance and knowledge management, software development and data management. Some of the maturity models are general hence can also be easily utilized for the evaluation of the digitalization of a business (Hribar , 2010). The advantage of the maturity model is that it is easily understood and provides tools for comparing the various companies in the oil and gas industry.

The assessment will be essential in the determining the maturity level of the digitalization efforts of a business. A company would realize the highest benefit from digitalization if its maturity is close to that of the business. Digitalization in the oil and gas industry is used for improving the

production process reducing the cost involved in the retrieval of these natural resources. The maturity level of digitalization will be vital in the moving of the company to the next level in terms of competition.

4.2.   *Maturity Model*

Companies are investing huge amount to gain competitive advantage to reduce overall cost in product and services by improving their business process and upgrading their information systems. They need to adopt with the changing environment that demands proactive actions and make capable for themselves to expanded their business market both in local and global prospective(Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012). In the last few decades the influence of digital tools and technology has play greater role in changing business models and taking advantage in competitive market.

Precious and in-time decision in business are important for any organizations to exist in the market. Decisions are further supported my reliable and accurate information's. How this information can be further used in making decision; use of appropriate tools to advance in next level of business is key point. Maturity model can be useful tool for this purpose (Hribar Rajterič, 2010). Maturity models were generally focused on domain like *Software Development, Knowledge Management, Performance Management and Data Management* but they are capable in defining the level of digitalization in any organization through some modifications. The beauty in maturity model is that they are easy to understand and helps in positioning of organization compares to competitors and compare different level within organization. Better advantage from digitalization can be achieved by the matured maturity level in digitalization within the organization. The current level of maturity level in digitalization must be better known clearly in order to advance in next level.

Maturity model are used in defining, explaining and evaluating growth during the lifecycles of any business. The basic fact is that everything change over time and models are developed on the basics of these facts so that this change can be regulated and predicated(Hribar Rajterič, 2010). Study in maturity model shows that, different maturity models are developed in different areas of business and this models are constantly updated and modified by different authors on the basics of their past experiences(Helgesson, Höst, & Weyns, 2012). The basics for maturity model was *Capability maturity model* (CMM) which was based in the *Maturity Thesis* for the software development process at Software Engineering Institute at Carnegie Mellon University in the USA

(Humphrey, 1989; Team, 2006) (Hribar Rajterič, 2010). Generally, a maturity model consists of model and questions which are used in accessing the level of maturity. The *Key Process Areas* in each maturity level must be well defined, this process and level may vary from the problem domain in the models. This Key Processes Area are steps which an organization need to achieve to gain certain height of maturity and skipping of maturity levels is not possible(Raffo & Wakeland, 2008). Different people have different approach in accessing the maturity level.

Digitalization and Maturity model:

The seamless application of the various digitalization elements in an organization poses a lot of challenges when not effectively implemented. The benefits that are associated with digitalization cannot be fully quantified. Thus, the comprehension of the investment of an organization in digitalization will be quantified through the use of the maturity model to determine the benefits of the digitalization.

The use of maturity model for the digitalization is vital in this process as it will depict the route to be taken to assist the organization to continue functioning properly so as to align the digital functionalities of an organization with the efforts taken. The level of maturity in organizations differ with some requiring to be more mature than the others (Hribar 2010, p. 50). The business with a higher maturity requirement have digitalization as a fundamental part of its operation hence would require making it a priority. The companies with digitalization at the center of their efforts are not digital or technological companies hence their efforts are distributed to other aspects of the business (Hirt and Willmott 2014). The approach utilized in maturity model is based on the fulfilment of the needs of the whole organization.

In digitalization, the maturity model will assist in the comprehension of the various ways needed for the improvement of the organization efforts. The maturity model also answers the following question

- What is the current digital state of the company with respect to the digitalization?
- Who are the most affected by the digitalization efforts in the organization?
- Who require the services of the elements of digitalization?

Maturity model construction for Digitalization

The methodology used in the maturity model construction will be based on a variety of the existing models. Literary there is little than has been done in terms of the development of a maturity model. Most of the documentation do not contain maturity model that is theoretically sound, robust and acceptable for the oil and gas industry. A brief literature review points to the fact that a handful of authors have developed a maturity model that is applicable in the manufacturing sector. Although these models were workable for the different situation that the authors were presented with they could not be easily integrated into the construction of the maturity model of the oil and gas industry. The common factors in the models were inception, elaboration, construction, deployment and maintenance (De Carolis, Anna, Macchi, Negri and Terzi 2017).

The inception stage entails the problem and participant's identification; it can be expanded to include planning and scoping goals (De Carolis et al. 2017). The elaboration stage involves design strategy formulation, and the architecture of the model will be determined. The construction phases the tool for the evaluation of the maturity of the business will be constructed, and the procedure for the deployment laid down. The management of the process will also be defined (Solis 2018). The last stage is the deployment of phase, which will entail validation of the maturity model and the assessment tools. When the model is acceptable in the deployment will enter the maintenance phase. The maintenance phase will entail the management of the changes and the updating of the model.

The Assessment of Digitalization using the Maturity Model

This section will entail the evaluation of the digital readiness of an oil and Gas Company using the DREAMY model (Digital Readiness Assessment Maturity) The model was used as a framework for the deployment of the model and gauging the maturity of the oil and gas company for digitalization (De Carolis et al. 2017)

Design the Maturity Model

The definition of the model architecture was fundamental in the identification of the relevant processes in oil and gas industry (De Carolis et al. 2017). These activities will be performed on the processes and the application of the strategies for digitalization. The structuring of the oil and gas processes will first require the consideration of the company production strategy. The company will be able to build a competitive advantage via the use of the ideal management

of the client's requirements in the comprehension stage (De Carolis et al. 2017). The company requires to organize its forecasting and the prediction of demand in stock management processes. The objective of the maturity model will be to focus on the maturity level of the processes in an oil and gas. The architecture of the maturity model will be modular and scalable to enable the gas company to adopt to the changes in the needs of the customer; thus the assessment of the company will utilize a different strategy (De Carolis et al. 2017).

The oil and gas architecture require to be general hence the strategy for digitalization will be grouped into the following areas

- Design and Engineering
- Production and management
- Quality management
- Maintenance management
- Logistics and transport management

The process areas are considered self-contained modules hence the processes can easily be adjusted or eliminated completely without affecting the other components. Failure on one of the phase will not affect the macro-structure foundation. The poses will interpose the digital structure horizontally.

Maturity Levels

The definition of the architecture will increase the need for the definition for the maturity levels requirements. The objective of the exercise was to evaluate the readiness for the digitalization of the oil and gas company. The readiness will be defined by a set of maturity levels which will evaluate the capabilities of the company to digitize (De Carolis, Macchi, Negri, & Terzi, 2017). The maturity levels are based on the principles of CMMI framework. The CMMI framework is robust as it identifies the capabilities of a company at each level. The CMMI maturity mode for digitalization will provide a generic model for the digitalization of the processes of a company. The table below illustrate the various levels of maturity in an organization.

The maturity levels of the organization will also entail various elements of production. The maturity levels in an organization will be measured either as vertical or horizontal and can be carried out inter or intra-companies (De Carolis, Macchi, Negri, & Terzi, 2017, p. 17). The table below illustrate the various factors of production that will be affected by digitalization. The integration of the elements will allow the characterizing of the human and machine interaction.

The interaction of the humans and the machine is an important factor in the oil and gas companies (Domingues, Sampaio and Arezes 2016). The integration of the systems will also permit interoperability of the elements to produce an enterprise system.
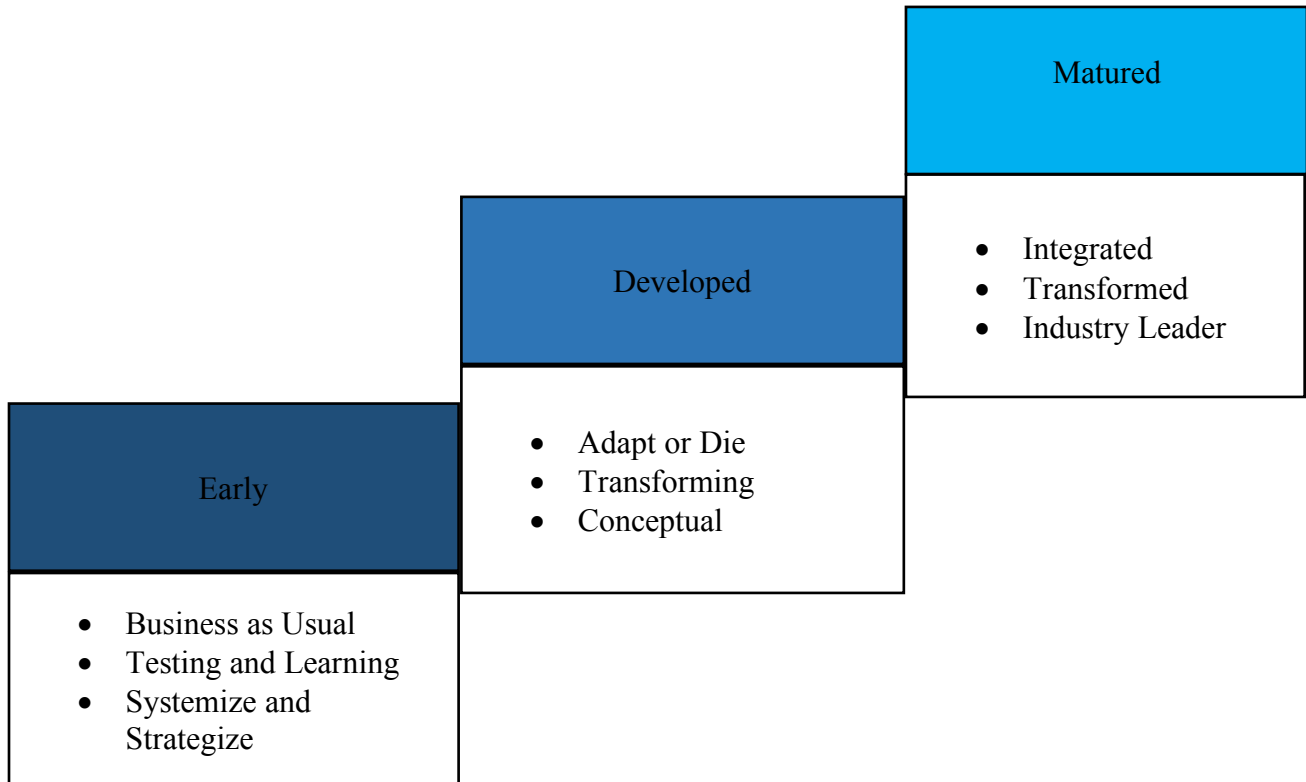
Table 4: The levels of maturity model

Maturity Level	Description
Initial	This case describes a process that is poorly controlled, the process management in this case is reactive and does not possess the necessary organizational and digital tools for the construction of the required infrastructure that will permit usability, consistency, repeatability and extensibility for the digitalization solution
Managed	There is partial planning and implementation of the processes. The process management is weak as the company lacks enabling technologies. The choice in the maturity levels are guided by the objectives of the digitalization efforts. Organizations at this level experience partial maturity in the management of the digitalization efforts.
Defined	The process in this stage are well-defined due to planning and implementation of advanced digitalization practices and the management procedures. The key factors to consider is that the constraints in the implementation of the digitalization responsibilities of the company. The planning and the implementation of the various processes will lead to the identification of the existing gaps in the system.
Integrated and Interoperable	The process in the organization at this stage are based on integration and the interoperability of the applications and the change in the information. The integration will be affected at the point of intersection between the new system and the existing. A company at this stage is able to ensure that their retention of the good quality of the initial system.
Digital Orientation	The digitalization process is digital-oriented hence will require the use of solid technology. The integration of the system and the operability will result in the increase in speed, security and robustness in the exchange of

	information. There is also the need for the collaboration of the company functions and decision making.

The maturity model of the digitalization process

The maturity model is used in defining, explaining and evaluating growth during the lifecycles of any business. The basic fact is that everything change over time and models are developed on the basis of these facts so that this change can be regulated and predicated (Hribar Rajterič, 2010). The use of maturity model for the digitalization is vital in this process as it will depict the route to be taken to assist the organization to continue functioning properly to align the digital functionalities of an organization with the efforts taken. The level of maturity in organizations differ with some requiring to be more mature than the others (Hribar 2010). Table 5 illustrates the general expectation of the level of maturity of an organization based on the digitalization efforts.

Table 5: The maturity model for the digitalization of a company

Matured
• Integrated • Transformed • Industry Leader

Developed
• Adapt or Die • Transforming • Conceptual

Early
• Business as Usual • Testing and Learning • Systemize and Strategize

3.6. Early

3.6.1. Business as Usual

The organizations in this section operate normally, as the business is unaware of the risks and the opportunities that are associated with the digitalization of the production process (Solis, 2018). Organizations have the following characteristics:

- Lack of urgency as there is no need for change in the organization;
- The organizational culture is risk-averse;
- The digital framework is not a formal directive in the organization.

3.6.2. Testing and Learning

The organization is under the influence of an employee that notices change is required or that other businesses are doing things differently (Solis, 2018). This step is characterized by the following features:

- Action controlled by the change agents hence it is not organized or centralize;
- Changes in this stage are experimental;
- The company invests in research;
- The company operation is still in silos;
- The customers' data exist in silos

3.6.3. Systemize and Strategize

The executive start to trigger strategic investment in the organization based on the results of the test and learn phase (Solis, 2018). The change agents have the bigger picture and efforts are geared towards the attainment of digitalization:

- Change programs are intentional;
- The stakeholders are aimed at attaining digital literacy;
- Team are created to optimize efforts and resource;

3.7. Developed

3.7.1. Adopt or Die

The organizations in this stage are notable momentum. The organization start recognizing and appreciating digitalization (Solis, 2018). The business operations and stages are resilient with efforts in support of digitalization are explored.

There is accountability in the transformational strategy while expanding the footprint that will modify the processes and the models needed for digitalization (Cisco, 2016).

3.7.2. Transforming

Change and digitalization process is being integrated into the company's corporate structure. Digitalization has become a constant undertaking in the organizations in this phase of maturity (Solis, 2018). The efforts have changed the enterprise, creating new operating standards and models that influence every element in the organizations such as employees, technology, and work process (Hribar, 2010).

3.7.3. Conceptual

Digitalization has been achieved by certain projects as flagship projects towards attaining complete transformation (Gezdur and Bhattacharjya, 2017). No cross-departmental corporate strategy has been attained at this stage.

3.8. Matured

3.8.1. Integrated

The digitalization has incorporated the digital processes in the organizational operations (Solis, 2018). The digital media has been integrated into the business models where the digitalization strategies have been developed and implemented. The fundamental processes, services and products are digitized (De Carolis et al., 2017).

3.8.2. Transformed

The organizations in this stage of maturity have all the systems, processes, operations, products and services digitized. New approaches are constantly emerging via the digitized core processes, services and products (De Carolis et al., 2017). The control and monitoring efforts are being instigated in the new models to ensure that the corporate culture has undergone a permanent change.

3.8.3. Industry leader

The organizations in this phase are at the apex of the digitalization pyramid. The organizations are enjoying the advantages associated with digitalization such (De Carolis et al., 2017):

- Reduced operational and production cost.
- Flexibility and increase in the rate of service delivery
- Quality product and services offered.
- Competitive advantage over their counterparts.

3.9.Maturity model in consideration with several factors for digitalization

The maturity model of any company undergoing digitalization would be a very robust indicator of the transformation. To determine the general maturity model in a company, there was the need to collected data to identify the three steps in each phase of maturity for the digitalization factors. The key source of information for the expected steps was literature review and information from the company. The initial data collection was collecting data from the variously related literature that portrays expected maturity model in digitalization. The other step to collect the information presented in table 6 was the discussion with company representatives in Draga As. The talking was not structured, but they provided insights on the steps to be followed.

The digitalization factors identified earlier can also be employed in determining the maturity of an organization with respect to digitalization as illustrated in table 6 below.

Table 6: Maturity level in consideration with several factor

	Early	Developed	Matured
Human Factors	• Unplanned • Repeated efforts • Reactive	• Planned • Systematic • Engaged	• Proactive and preventive • Leading edge • Constantly Improvement
Leadership	• Integrity • Learner • Emotional Intelligence	• Basic Leadership • Relationship and advanced people skill • Change agent	• Adaptive Leadership • Idea and change champion • Business acumen
Expertise	• Basic Exposure • Casual understanding	• Formative experience • Operational management	• Active collaboration • Optimal understanding

	• Incidental trained	• Proactive use of knowledge	• Predictive analytics
Systems	• Inadequate Resources • Systems poorly understood • Restricted communication	• Resource adequate for current and emerging requirements • Clear inter-team communication • Innovation by necessity	• Collaborative communication • Strategic innovation • Clear product and customer requirement
Work process	• Poorly defined • Not coordinated • Not documented	• Process defined • Coordination in most process • Processes document	• Agile Development • Frequent deliveries • Strategic reporting
Partners	• Chaotic partner strategy • No digital partner management • No investment in partners growth	• Partner strategy is demand dependent • Behavior is incentive dependent • Limited investment is occasional	• Heavy investment in the principal vendors • Strong leadership and good customers • Brand presence in the market

		partner accounts	
Strategy	- Poorly articulated - Unclear objective - Objectives have not been shared	- Clear Objectives - Strategy provides differentiation - Broadly shared	- The objectives have been shared and embraced in the organization - Provides distinctive positioning - Metrics are tracked and acted on constantly
Internal marketing	- Market not understood - Randomness and limitation in the use of the market - Anecdotal view of the market	- Market assessment is periodic - Multiple marketing channel - Nascent brands for learning	- Segmentation of the market - Strategic use of the channels - Strong brands for learning

Digitalization, Maturity Models Analysis

Companies adapt digitalization and systems and similarly develop a digitalization maturity model. Oil and Gas companies are developing their maturity models to assess their own maturity and that of the customers. The maturity model developed can also include the partners. The maturity assessment is often used for marketing purposes (Domingues, Sampaio, & Arezes, 2016).

The assessment can also be used to advise the customers on how they can move to the higher levels especially in terms of conformity to digitalization. When evaluated the consultancies will provide maturity level for digitalization which is backed by the digital providers and vendors hence they can sometimes be biased. The common practice should be that the oil and gas company should ensure that external experts assess maturity levels. When the company does not boast of clear and well-developed expertise in the digital sphere, it will be vital for it to use external consultants to prevent overspend. There are various approaches that can be taken into account when carrying out digitalization in a company such as the evaluation of the performance management, knowledge management and market trend and research.

The maturity models in the technology sphere are especially poorly documented, or others are incomplete hence there is no standard for the effective application of the various maturity model for the characterization of the various digital processes. Thus, maturity model developed above illustrate a framework that can be considered for digitalization in oil and gas companies. The framework captures the essential elements that need to be considered when deciding the maturity model. Our model is based on various documented models in the industry. The essences of the elements are to act as indicators for the successful digitalization of an oil and gas company.
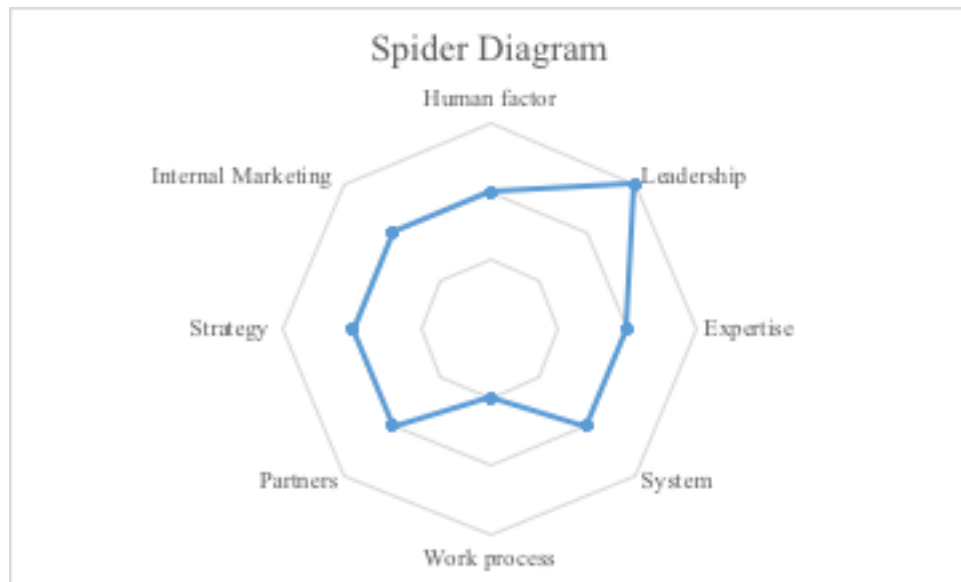
4.4 Spider Diagram

The spider diagram is used for the planning of the various activities that will be considered during the digitalization of an oil and gas company. The ideas in the spider diagram will be creative. The spider diagram will provide ideas that are different from those of a mind map. The spider diagram will relate the above consideration in the oil and gas industry with digitalization. The advantages that will be recorded in the spider diagram recorded will be ease and speed of making the decision. The spider diagram will provide the ideas and the factors that will be vital in the digitalization of the various processes of the oil and gas industry (Dau and Andrew 2008).

Recently the oil and gas industry has witnessed the increased use of the digital tools that have increase productivity in this industry considerably (Digital Retail Consulting Group, 2017). The new technology will be vital in the increase of the revenues and the output of the company. The adoption of digital technologies will make the company focus primarily on comprehending the reservoir resources and the potential of the reservoir. The digitalization of the process in the oil and gas industry will assist in the improvement of the health and safety (Dau and Andrew

2008). The digitalization of the company will also assist in the boosting of the marginal operational efficiencies at the oil fields.

The rapid progress in technology has offered the oil and gas company the chance to reduce the cost of the high-cost, dangerous and error-prone tasks involved in the industry. Once a company adapts these activities, it will have gained the opportunity to accelerate its efforts in attaining seamless operation. The companies that will employ automation will substantially improve their bottom line.

Figure 9:Spider Diagram illustrating the importance of different factors in Digitalization

The spider diagram was used to categorize the importance of each of the requirements of digitalization in any organization. Leadership is the most significant element in digitalization, as the management will steer the organization in the right direction and ensure that there is no resistance to the digital transformation in the organization. Similarly, human factor was equally important as the digital transformation will substantially affect the employees and the customers (Dau and Andrew 2008). The new technology requires to take into account the welfare of the employees and the satisfaction of the customers making the human factor a very vital digitalization requirement. The work process will be least important element as it will be greatly altered in the digitalization process.

The spider diagram also evaluated the requirements of digitalization with regards to the expenses during the digitalization process. The organization strategy was the most vital and costly endeavor in digitalization. Oil and Gas Companies would spend more to ensure that the digitalization efforts are in line with the company strategies. The company strategies will stipulate the implementation of the digitalization process (Dau and Andrew 2008). The other vital elements during digitalization are the expertise and the work process. The company will spend more in acquiring or outsourcing the necessary skills for the implementation of the technology i.e. Big Data will require data scientist and database administrators etc. In cases, where an organization has no prior technical background more will be spent to digitalize the company. An organization with a robust management will spent less in supervising the digitalization process making leadership the least costly requirement (Dau and Andrew 2008).

The benchmarking in the spider diagram will illustrate the relationship of various variables that will be vital in the effecting of the digitalization of the oil and gas company. Regardless of the location, the oil and gas companies have multiple issues that affect their operation especially in the efforts to achieve sustained production efficiency improvements. The digitalization of the oil and gas company will play a major role in the addressing of the industry challenges (Dau and Andrew 2008).

The oil and gas companies have complex operations which increase the volume of product and the complexity of the location, e.g. arctic, Deepwater and offshore. The sites will require the use of reliable remote and digitized operations and logistics so as to optimize the efficiency. The mature assets in the company with a decline in production will lead to the decrease in the profitability of the organization.

The oil and gas industry does not tolerate health, safety and environmental incidents especially due to the increased regulations. The incidents, in this case, will significantly affect the profitability of the company. The digitalization of the processes will enhance the mitigation of the catastrophic events and the management of the remote operations.

The industry is also characterized by talent and experience gap due to the shift in the demography over the years. The lack of expertise in the industry has made necessary for digitalization so as to fill the knowledge and experience gap in the industry. The development will drive the effort to maintain the routine.

Demonstration of use of maturity model in industry:

In the following section the use of maturity model in three different sectors is discussed shortly:

Oil and Gas

Matured

The maturity model in the oil and gas industry is complex but would require that the leadership is matured so that all the events can be coordinated properly. The leadership in the oil and gas industry should include all the departments of the company (Choudhry et al., 2016). The administrative department should be able to coordinate the activities of the production, transport and storage and the refining. The administrative department should be at the helm of the digitalization program in the company (De Carolis et al., 2017). The leadership should be in compliances with digital transformation strategy.

Developed

Most of the other digitalization factors are usually expected to be developed. The engineering and the production department should attain some form of mechanization. The strategy, human factors, internal marketing and the level of expertise should be driven by the leadership in the oil and gas industry (Choudhry et al., 2016). The strategies developed should favor the marketing of the digitalization efforts to all the stakeholders. The training should enhance the expertise of the employees and reduce the resistance from the human factors in the oil and gas industry (Solis, 2018). The introduction of the HRM and CRM program will be vital in human factors management. The use of business analytics will be to manage the data and ensure that each customer is considered for their needs. These factors will be in line with the real-time critical and industry specific requirements.

Early

The systems and the work process will be only elements of digitalization to be present in the early stages of digitalization. The initial work process is majorly mechanized hence the use of SCADA system for data acquisition in the production. The work process and the systems are the key elements of digitalization. The digitalization efforts at this stage will be aimed at attaining the business IT infrastructure and system requirement in oil and gas industry.

Transportation

Matured

The leadership and the system in the transportation industry should be in the matured stage as the leadership will be in line with the human and connected driver requirement that is needed for a faster business. The leadership will ensure that transport and logistics drive the development of a business. The transport management system will help the business gain an advantage in the economy.

Developed

The partnership, strategy, human factor, level of expertise and system. These factors are non-human; therefore, they will affect the speed and the competitive advantage real-time in the economy. These factors will also allow the hyper-connectedness in the transport and the logistics sector.

Early

The expertise is the only expected factor to be in the early stages. The drivers are expected to be highly trained but will require to be incorporated in the digital media of the transport and logistic industry.

Health

Matured

In all the three sectors i.e. oil and gas, transportation and health, the leadership should be matured. The matured leadership is required as the executive will ensure the coordination of the efforts that are required in digitalization (Dau and Andrew, 2008). The matured leadership is adaptive, ideas and change champion and business oriented. The leadership should be able to embrace new ideas and adjust accordingly especially during the implementation of digital media and processes (De Carolis et al., 2017).

Developed

Most of the other digitalization factors are expected to be developed to some extent due to a matured leadership. The level of expertise, system, partners, strategy, internal marketing and human factor are expected to be developed (Solis, 2018). The non-human elements when not developed will be chaotic hence it will be expensive to streamline these factors before embarking

on the digitalization efforts. The human factors when not developed will be resistant to the change in the work process (Dau and Andrew, 2008).

Early

The work process, especially in the health sector, is expected to be in the early stages without notable digital media. The processes in the sector are highly mechanized hence the application of the digital media will improve efficiency in the production phase (Solis, 2018). The transportation and the health sectors should be at the building a digital organization stage which is basically in the transition phase (Ebert and Duarte, 2016). The sector may contain digital elements such as CRM, HRM and big data due to the sensitivity of the data managed. Thus the highest digitalization expense is expected when transforming the business process.

5. Discussion & Conclusion:

5.1.   Discussion

The research has demonstrated the various requirement subject to the digitalization process. The requirements were also evaluated based on the selected industries. Maturity model was developed to indicate the various steps that an organization go through when undergoing a digital transformation. A matured organization is at the apex of the completion while the developed organization is undergoing transition. The organization in the early phase of digitalization requires a lot of changes to be able to attain digitalization

Outcome of writing

This research has been able to achieve several remarkable conclusions. The research has evaluated the preparedness of three industries for digitalization, i.e. oil and gas, transportation and health. The research was able first to create a vital difference between digitalization and digitization. Digitalization is transformative process while digitization is the state of a company being transformed digitally. The digitalization process is affected by eight factors that were referred to as the factors of digitalization. The key factor among these was the leadership as it significantly affected the other factors.

Knowledge gained

The research was crucial in imparting vital knowledge with regards to digital transformations in companies. The transformation process especially digital in an organization would affect all the elements of the organization. The coverage of the transformation requires good leadership to be effectively managed. It was also evident from the research that the oil and gas industry was the least digitized while the health industry had more digital media hence the transformation would not be rigorous as in the other two sectors.

Challenges during the work

The key challenges in the research process were the limitation in literature written in the attainment of digitalization in the three sectors. The inadequacy in the literature led to the initial lack of a guideline, but with time this was reversed. There were also the limitations in terms of the management and allocation leading to delays.

Further Work

Several key areas would require to research further in digitalization. The first areas are what elements compose the present day digitalization. The interlink between digitalization and digitization should also be extensively explored to eliminate the cases of confusion experienced.

5.2   Conclusion

The research has illustrated that digitalization process will be vital in the most organization without considering the challenges. The current digital innovation will go a long way in improving the operation of any organization. The research considered digitalization in oil and gas industry where the digital revolution is taking place. The use of the intelligent oil field has enabled the remote management of various field so that they can be connected and used. The digitalization in the oil and gas industry will also permit the conversion of the flood of data into better business and operation decisions. Digitalization will accord the company capabilities for the manipulation of data, analysis and presentation. The digitalization of these process will act as a support tool for decision making. The effect of digitalization will decrease the challenges in the oil and gas company.

The evaluation of digitalization entailed a robust literature review that illustrated that the digitalization of an organization can be affected by a variety of factors. The factors formed the basis for the research. Digitalization in oil and gas industry is a relatively new concept but it will help increase the yield per reservoir due to the reduction in wastage. The key aspect of the qualitative evaluation of the factors was carried out using maturity model and spider diagram. The maturity model presented the level of digitalization in an organization; quantifying of the organization was either at the early stage of digitalization, developing stage of digitalization or mature stage of digitalization. The maturity level of the organization will depict the level of digital resource utilization in the organization. The spider diagram was used to evaluate the cost incurred and the importance of the digitalization factors. The diagram illustrated that leadership is the most significant factor as leaders will mobilize the employees to ensure resource allocation and management. The strategy of the digitalization efforts was the most expensive element as it entailed the utilization of resources to ensure that the strategic components of digitalization are in-line with the organizational strategy.

The research has demonstrated the various requirement subject to the digitalization process. The requirements were also evaluated based on the selected industries. Maturity model was developed to indicate the various steps that an organization go through when undergoing a digital transformation. A matured organization is at the apex of the completion while the developed organization is undergoing transition. The organization in the early phase of digitalization requires a lot of changes to be able to attain digitalization.

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