Chapter 3: Methodology

Introduction

Research is defined as an attempt to acquire new knowledge while answering the questions. It is considered as a primary tool in almost all the subject areas like science, literature, law and arts to expand the already existing knowledge. It is the scientific method of collecting the relevant data on the specific subject. In other words, research is a scientific process of collecting, identifying, selecting, processing and analysing the information about the topic (Festinger, 2010). According to the business dictionary, it is a process used to collect or gather the information or data in making necessary business decisions. The goal of research conducted is the same across all the fields. The primary objectives of any research include: identify and define the problem, formulate the hypothesis, collect, organise and evaluate data, discussing the findings of the study and arriving at a conclusion. Hence, research methodology serves as a blueprint of research. This blueprint roughly explains the methods of investigation followed in the proposed research. In another way, study is a process of scientific enquiry (Festinger, 2010).

This chapter will discuss the methodology followed in the study to find out the results and arrive at a conclusion. It will present the methods adopted by the study to evaluate the impact of Digitalization on Business in Saudi Private Sectors, oil and gas industry. Thus the current study will explain the methods used in interpreting the data genuinely. So, the chapter will include the purpose of the study, research design, research question and hypothesis, population and the sampling strategy, research instrument used, instrument validation and data collection procedures.

1. Purpose of the Study

The current study will understand and analyse the relationship and the impact of digitalisation on the private sectors in Saudi Arabia. Achieving digitalisation has become one of the challenges for Saudi Arabia by 2030. It acts as a strong pillar wherein organisations transform their systems digitally. Digitalisation grows to be a keynote to enhance Saudi Arabia's position shortly. Adapting the emerging technologies, in the field of oil and gas industry, is relatively less

developed and matured when compared with other sectors. The new emerging companies and industries marked the deployment of technologies to fulfil the challenges of the industry, resulting in increased efficiency, safety and cost-saving.

Earlier researches identified and discussed the key components peculiar to the digital world, which include: the ability to visualise the results of the oil and gas industries, effectively interpreting volumes of data, comprehensive maintenance systems with in-built alarming, analysing data using sensors, cybersecurity and futuristic evaluation of digital needs. With the advent of digital technology, human life altered in almost all aspects such as medicine, research and economics. Moreover, oil and gas industries saw the downturns and the prices had fallen to 70% when compared to recent years.

Dubina, Carayannis, & Campbell, (2011) in their study found out the significant challenges faced by the global economy as the digitisation and acceleration of technological development. To increase the economy of the companies, they must adopt the technological acceleration and see their futuristic vision towards achieving digital transformation. Embracing digital technologies increases the value to the organisations. It is found that digital conversion approximately unlocked several trillion for oil and gas industries. It also had environmental benefits, roughly saving CO2 emissions and saving water at the same time. Arab countries marked their rapid progress in digital networking era. And it is also considered as the most significant economic powerhouse (Oxford Business Group, 2018).

The technological changes have primarily shaped the lives of the people and even the world economic forum. Oxford Business Forum, 2018 reviewed the contribution of government and the private sector in the rise of oil and gas industries. Both the areas had primarily increased the business of Arab countries. Thus, the current study will analyse the impact of Digitalisation and how it affects the future business world, especially in Saudi Arabia. Thus, the findings of the survey will help the administrators, business heads, scientists, students and also the researchers carrying out their research in digitalisation.

2. Research Design

It is defined as a systematic plan to study a scientific problem. It is a framework developed to seek answers for the research questions. Research design includes the methods, techniques and other components followed in any research to find out a practical solution for the addressed problem. It is considered as an essential factor to conduct research. All the methods are handled reasonably to come up with the answer related to the research questions. Generally, any research design has four essential traits - neutrality, reliability, validity and generalisation. The research design is of two types namely qualitative and quantitative. A qualitative research design explains the relationship between the collected data and observation, later arrive at conclusions based on the comments. On the other hand, a quantitative research design concludes numbers and statistics. Therefore, having statistical findings is mandatory for quantitative research (Akhtar, 2016). Quantitative research design involves measuring a phenomenon in multiple grades, unlike qualitative.

According to Creswell (2014), quantitative research method involves testing the objectives based on analysing the relationship between the variables identified in the study. These variables are numbered on a scale for further analysis. Creswell mainly discusses two types of quantitative designs- surveys and experiments. The survey design describes the events, trends, opinions and attitudes of the selected population. In this design, the sample of the population is taken into consideration and from the results, the conclusions are drawn and generalised. It is a systematic method of gathering information on the selected topic from a small group. In this type of research, dependent an independent variables define the scope of the study. Therefore the first step of a survey is to give a prior knowledge regarding certain aspects related to the study. Then, the relationship between variables is analysed. And the second is an experimental design that includes experiments providing a specific treatment to a particular group. This survey method is usually preferred for its rapid turnover in the process of data collection.

Creswell (2014) defines quantitative research design as "an approach for testing objectives by examining the relationship among the variables. The identified variables are measured using the instruments, which indirectly numbers the data. The counted data later will be analysed using statistical procedures. And then the written report will include an introduction, literature, theory,

methods, results, and discussion. Thus the current study will follow the Creswell series in the implementation and interpretation of the data. The first step is to present a table of information regarding the number of respondents and non-respondents. The complete history of the population and sample will be reflected in the table. In the second step, all the responses will be determined and understood in the next level, all the identified independent and dependent variables will be analysed in detail. The fourth step will define the scales, and in the fifth step, statistical representation of the data is presented concerning the hypothesis, and in the last step, the results obtained will be interpreted (Creswell, 2014).

The results of the study offer an interpretation of the influence of digital transformation in Saudi Arabian private sectors. Implementation of the quantitative method in research allows studying specific questions and hypothesis, measure and identify the variables, and then provide statistical analysis of the data collected and then provide an interpretation of the data. Creswell says this type of research is very different and strange form qualitative research design. Therefore, quantitative research design will be suitable to analyse the impact of digitalisation, especially in the private sectors of Saudi Arabia.

3. Research Questions and Hypotheses

In a quantitative study, the researchers use quantitative research questions, hypothesis and objectives to focus on the objectives proposed in the study. Here, the research questions investigates the relationship among the variables. Usually, this kind of study is conducted in the survey studies (Creswell, 2014). The current study will depend on the identification of the variables to analyse the impact of digitalisation in the oil and gas industries. On the other hand, the quantitative hypothesis is the predictions made by the researcher regarding the expected outcomes as expected out of the variables identified (Creswell, 2014).

The hypothesis can be tested using various statistical procedures from which the conclusions are drawn and generalised. Usually, the interpretation of quantitative study experiments in comparison with other groups and deduce the results from it. Creswell states that good quantitative research question and hypothesis follows three basic approaches mainly. In the first

step, the researcher will find out the impact of an independent variable on the dependent variable. Later, the researcher will relate one or more independent variables to the dependent variables. Thus, the variables here will be in co-relation. In the last step, the responses collected from the sample will be named as independent, mediating or dependent variables. At the same time, Creswell identifies two types of hypothesis- null and alternative. A null hypothesis is a traditional method where no relationship between variables is recognized, i.e., no such difference is identified among the variables while the alternative way is nothing but a mere prediction of an expected outcome (Creswell, 2014).

Thus the current study sets out specific hypothesis to analyse the impact of the digital transformation (digitalisation) in the private sectors in Saudi Arabia. The attitude of the companies in the private industries, before and after the change is also discussed and presented. The given below are the research questions and the particular hypothesis:

RQ_1: Does digital transformation impact the business in the Saudi private sector?
Null hypothesis one (H10): Digital transformation does not impact the business in the Saudi private sector.
Alternate hypothesis one (H1a): Digital transformation does impact the business in the Saudi private sector.
RQ_2: Does digital transformation investment in companies has a benefit from a cost recovery perspective?
Null hypothesis two (H20): Digital transformation investment in companies does not has a benefit from a cost recovery perspective.
Alternate hypothesis two (H2a): Digital transformation investment in companies does has a benefit from a cost recovery perspective.
RQ_3: Does digital transformation increase the degree of customers & clients' satisfaction?
Null hypothesis three (H30): Digital transformation does not increase the degree of customers & clients' satisfaction.
Alternate hypothesis three (H3a): Digital transformation does increase the degree of customers & clients' satisfaction.
RQ_4: Does digital transformation lead to structural changes in private sector organisations?

Null hypothesis four (H40): Digital transformation does not lead to structural changes in private sector organisations.
Alternate hypothesis four (H4a): Digital transformation does lead to structural changes in private sector organisations.

Hence, the above-proposed research questions will help in finding out the relationship between dependent and independent variables. These questions act as a roadmap to reach the destination. They explore, understand and discover the loopholes and answer them. In quantitative research, the research questions describe, relate and compare the independent and dependent variables. Therefore, the null hypothesis states that there is no relationship between the group and variables, whereas the alternate interpretation is the expected outcomes of the study.

4. Population and Sampling Strategy

The population is defined as the total number of people selected for the study while sampling is the process of selecting a segment of people from the community. It is usually the process of choosing a sample from data to analyse the characteristics, beliefs and attitudes of the people (Hair, 2003). Quantitative researches usually make generalisations form a group and apply to a larger group than their sample. Often, quantitative investigations wholly rely on probability sampling techniques. The sampling survey is conducted based on the standard questionnaire to evaluate the attitudes, beliefs and opinion of the people.

Creswell (2014) explains the essential aspects of population and sample followed in quantitative research design. The first step is to identify the people and size of the community. Next, determine the sampling technique. Usually, in a survey, cluster sampling or single stage sampling methods are followed. In a cluster sampling, clusters /organisations are identified first followed by sampling. In the single-stage sampling, the researcher directly collects the sample from the population. After, this random sampling method is used to select the individuals randomly.

The objectives of the sampling are producing the estimates of parameters, reduction of cost, reduce analytical and computing requirements, must have characteristics an in the population,

reliability, sampling is inevitable, required for the higher study. Sampling design or sketch is the technique used to choose participants from the available inhabitants. There are two types of sampling techniques such as probability sampling and non-probability sampling technique. Selection of the sampling method depends on the nature of the research study.

The population size of the current study includes all the people working in Saudi Arabian companies, which will be above 350. And the sample of the survey is 50 participants, who are employed in the oil & gas sectors. The random sampling method is adopted in the current study wherein each has an equal opportunity and probability of being selected. The study assumes the convenient sampling method in which respondents are chosen based on convenience and availability. Convenience sampling is defined as a process of data collection from a population that is easily accessible to the researcher. Convenience sampling allows the researcher to complete interviews or get responses in a cost-effective way; however they may be criticised from selection bias because of the difference of the target population (Rahi, 2017). This study collects data from the private sectors of the oil and gas industry in Saudi Arabia region. The study makes use of the employees working in non-government areas. After the selection of the sample, the questionnaires are distributed to the participants as hard copies, emails & online poll such as Survey Monkey. Thus, the quantitative data will be collected from the employees.

5. Research Instrument

The word instrument is a general word used by the researchers for an instrument device. For collecting data, the researchers use different types of methods like survey, interviews, questionnaires and others. Instrumentation deals with the instrument used to collect data. Tools can be of three kinds- designed, modified and intact. These instruments are used appropriately to gather the data relevant for the study. Interviews, questionnaires, surveys and observation are the most commonly used tools in collecting data. The most used quantitative research technique is the survey (Trigueros, 2017). Polls are of different types namely telephone survey, online survey, in-person surveys and mobile surveys. Nowadays instruments have been designed through online studies using online survey products like Surveymonkey and Zoomerang (Creswell, 2014).

Using these methods and tools, the researchers can create surveys quickly using templates. After creating the models, they are posted on the websites or mailed them for filling the responses. The results of the online poll are generated using special software and delivered to the researcher in the form of statistical data or graphic representation. From here, the results are downloaded for further analysis. Survey Monkey is one such tool to create a survey from scratch or a template. The researcher should follow these steps to create and send survey: create a study; add questions and pages; apply logic; customise the design; and preview and submit the survey (Survey Monkey, 2018). Quantitative survey monkey data presents the numerical data in the form of cold, hard facts. Thus, adapting the survey monkey tool will be a suitable one for quantitative research.

6. Instrument Validation

It becomes mandatory for any research to explain the validity of the instrument when it is being used from the past. Validity is defined as the extent to which a device measures the performance of the instrument. It involves collecting and analysing the data to assess the accuracy of the instrument. There are numerous methods or ways of testing and evaluating the validity of quantitative instruments. One of them includes pilot testing. Heale & Twycross, 2015, defined validity as the extent to which the concept is precisely measured in a quantitative study. It checks if all the content concerning the variable is covered. Their research explains three types of validity- content validity, construct validity and criterion validity. Content validity checks the content aspect concerning the variables. Construct validity refers to the ability to withdraw the inferences from the test scores related to the concept being studied. And criterion validity checks the inter-relationship between variables and instruments. The survey questionnaire is used to measure respondents' response. The current study will infer the conclusions from the test scores conducted in the study, as the survey monkey test is performed for the employees.

7. Data Collection Procedures

For the current study, the data is collected through the online survey monkey. The researcher prepares a few templates related to the topic and posts it on the websites or e-mail to participants. The number of participants selected for the survey is 50. So, the data for the study is collected via email service, and the results are generated in the form of statistical information or graphic

representation. The results are obtained with the help of computer software. The simple random technique is used to collect the data. Here, the individuals get the equal opportunity to participate in the study. The overall data collection method went through three distinct steps: includes designing of the instrument, sample size and implementation of the survey via using online services. As the nature of the study is quantitative and follows positivism, the investigation seems to be appropriate.

8. Data Analysis

As the study has adopted the tool of online survey monkey, the results are automatically highlighted and withdrawn in the form of tables and charts. The data analysis is performed in a step process-presenting the number of people in the sample, the method used to determine the responses, provide a summary of dependent and independent variables, presenting the tool used to collect the data, identify the statistical representation of data and finally perform the data in the form of tables, figures along with the statistical interpretation (Creswell, 2014). Thus the current quantitative research will follow the Creswell series to present the data. As the study is quantitative, this process will be satisfactory.

9. Conclusion

This study accomplishes a systematic review on research paradigms, sampling and instrument development process. Different beliefs of different researchers are also discussed in the study. The research methods were also explored in the survey, with a particular focus on the quantitative research design proposed by Creswell. Therefore, the current study follows Creswell's quantitative research design. This chapter also presents how the survey collects data, interpret and analyse data, derive conclusions based on the findings.

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