THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Awareness of Big Data among Employees in Saudi Arabia

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Abstract:
This study aimed to identify the degree of awareness among employees in KSA for Big Data. To achieve the objective of the study, the researcher used the descriptive survey method to the study and distributed a questionnaire; it measures the degree of awareness among employees in KSA for Big Data. It consisted of (21) paragraphs divided into three axes: (Big Data concept, Big Data features, Big Data characteristics, and Big Data challenges). The study results showed that there is awareness of Big Data among employees. Also, the degree of awareness among employees for Big Data was high, with a mean of (3.8) and a standard deviation of (0.50). The study also showed no statistically significant differences in employee awareness of big data and the sector. However, there are statistically significant differences in the degree of awareness of big data due to demographic variables (age, qualification, gender)

Keywords: *Awareness, big data, performance*

1. Introduction

Big data is one of the concepts used in many institutions, companies, and organizations, which works to create a competitive advantage that distinguishes it from others. Moreover, over time, Big Data management and its analysis are more critical than ever. This is due to the possibility of its availability everywhere and stored quickly and inexpensively, and its ability to make decisions. There are many techniques for showing and presenting large volumes of data, processing it, and extracting information from it. The world's interest in big data is increasing today. The government of Saudi Arabia has also abused this type of data and allocated many programs to it in Vision 2030. Because of the importance of big data, its vital role, and the interest of governments and organizations, the question comes to mind: Do individuals realize this? Increasing awareness and publicizing big data has become an urgent necessity, especially in the age of Technological acceleration, and the importance of introducing all new to organizations. Undoubtedly, the degree of consciousness of Employees in the public and private sectors and their awareness of its features is a matter that needs research and study. Mainly the published Arab research on big data still focuses on its theoretical aspects. After reviewing the theoretical literature, previous studies, many articles, and research papers on big data, the researcher found that many of them recommended studying the subject of this research. Al-Shawabkeh's study (2108) recommended that Arab universities pay great attention to the field of big data, its analysis, unconventional data analysis tools, the study of data science, and the science of data mining because they represent the modern trends in Arab universities. The study of Al-Aklaby, 2108 showed that the data is increasing in size day by day and at a tremendous speed, which requires a strategic plan to be developed in universities primarily, starting with increasing awareness and awareness of the importance of managing big data and its benefits. Through the researcher's study and her access to a set of previous studies, she did not find a study - As far as she knows - she talked about the degree of awareness of employees in Saudi Arabia about big data. Hence, the problem of the study is to answer the following research question: What is the degree of awareness of employees in Saudi Arabia about big data?

This study aims to know the degree of awareness of employees in public and private sectors about big data due to the lack of local and regional Arab studies that have dealt with this subject and also clarify the importance of big data and its role in improving performance in light of rapid technological developments (Wichern & Aller). The study is expected to benefit the employees in Saudi Arabia by introducing them to big data and its importance, and the areas of benefit from it in different sectors. The practical importance is evident in the results provided by this study that contribute to clarifying and highlighting the degree of employee awareness of big data. Also, the study will benefit by demonstrating the importance of big data in organizations. Finally, this study may clarify scientific knowledge to researchers and officials in this field.

2. Literature Review

Undoubtedly, awareness is the first step to adopting and using new technologies. For example, when everyone realizes the importance of taking the vaccine, it will be easy to be convinced to obtain it, prevent diseases, and benefit from it. In the same context, we have a distinct concept and technology called Big Data, which helps improve work, problem-solving, and decision-making. Its presence without knowledge of its importance makes organizations and countries delay obtaining its benefits. This part discusses the awareness of big data. Awareness can be defined as knowledge that something exists or understanding of a situation or subject based on information or experience (Cambridge dictionary, 2022). Also, the Oxford dictionary (2022) clarifies the meaning of awareness as knowing something which is relevant and important. In general, awareness refers to being aware, conscious, and awake. The condition or capacity of being aware of things like events, objects, or sensory patterns is known as awareness. In this state of awareness, an observer can verify sensory facts without necessarily assuming cognition. An aware individual must hold information, yet awareness alone does not constitute knowledge. It may also be defined as the characteristic or state of being aware of something. Knowledge gained from the environment without direct instruction is one standard definition of awareness in education. The most common definition of consciousness in psychology is awareness as self-perceptions. The ability to deal with something is awareness's third definition. Some awareness tests are undertaken to determine a person's aptitude for handling particular situations and activities (K Abdul Gafoor, 2012). With regard to measuring the degree of awareness of big data in particular, studies have relied on the method of measurement on questionnaires or personal interviews. These questionnaires or personal interviews relied on various methodologies to determine the questions due to the different perspectives in measuring awareness of big data (general concept, belief, importance, use, tools used, etc.).

Doaa Khalil (2021), Nagwa Shoukry (2021), and Younes Shawabkeh (2018) agreed on their scopes to measure awareness of Big Data. By using terms (Big Data concept, Big Data benefits, and Big Data challenges), Yunus Shawabkeh (2018) added another dimension, which is the areas of characteristics from them. In contrast, Najwa Shoukry (2021) differed in identifying the sources of Big Data and infrastructure and Big Data's importance in improving services. Also, Nagwa Shoukry (2021) and Younes 20 Shawabkeh (2018) studied the degree of Big Data among workers in the library in Egypt and Oman. Doaa Khalil (2021) and Younes Shawabkeh (2018) found that the degree of awareness of Big Data was high in administrative and academic circles. It understood the concepts, characteristics, challenges, and areas of Big Data due to the advances in the study countries' scientific level and technical progress. While Najwa Shoukry (2021) found that the level of awareness of the concept of Big Data and its characteristics was moderate, respondents were also able to identify the sources of Big Data, Big Data's importance in improving services, and the infrastructure needed for it well. However, respondents still need more expertise in big data, especially in acquisition and analysis.

A. Rajini (2021) aimed to evaluate the awareness of big data among employees in different industries and then studied how demographic factors influence the degree of awareness of big data. The researcher also studied the role of management in adopting big data and making it an organizational culture. The researcher concluded that employees are aware of big data, but the degree of awareness varies with different age groups. The results also proved that management is essential in adopting and activating big data within organizations. Izhar and Shoid (2016) proposed a framework to assess the awareness level of big data and determine the relationship between big data and knowledge management. The level of Big data awareness in organizations was determined based on three distinct variables, personal experience of big data, usefulness level of big data, and effectiveness level of big data. The proposed framework emphasized the role of Big data awareness in knowledge management. Tennakoon et al. (2020) sought to determine how well-versed Sri Lankan management undergraduates were in Big Data by using three levels of Big Data awareness (experience of big data, usefulness level of big data, and effectiveness level of big data) based on a theoretical framework by Izhar and Shoid (2016). The three levels represent several aspects, namely, knowledge of big data and its definition with an understanding of how it arises and what types of big data exist in organizations, and then users' knowledge of the benefit of big data. Finally, the organization's success in managing data and extracting information from it creates a competitive advantage and contributes to decision-making. The findings showed that the level of usefulness and efficacy significantly influences Big Data awareness. However, the level of experience was found to be an inconsequential predictor of Big Data awareness. Paola F. et al. (2020) used Endsley's model, which is defined as the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status shortly. In Endsley's approach, there are three degrees of situational awareness: perception, understanding, and prediction. An adaptation of the Endsley Model was developed for the needs of the investigation. There is a level zero (0) of "No Awareness to measure Awareness of Big Data." A qualitative technique was used for their study. Twenty-one semi-structured interviews were examined using content analysis. Paola F. et al. (2020) found that most respondents were unfamiliar with Big Data or had little knowledge of it.

Fatih Yakar et al. (2022), Maddalena Favaretto (2020), Saleha Habibullah (2019), and John Minou et al. (2017) also studied the degree of awareness of Big Data in their country in sectors such as health, statistics, and psychology. The results showed that awareness of big data still needs to be improved and that more efforts should be made to adopt this type of data and get the maximum benefit from this type of data. According to Maddalena Favaretto (2020), the respondents needed a more straightforward concept of big data, and many of them confessed they needed help defining the term. A few participants used the classic 'Vs' term to describe big data, albeit they couldn't agree on how many 'Vs' there should be. Most respondents, however, chose a more applicable definition, connecting it to data gathering and processing procedures. Finally, there are still doubts about using big data in the scientific community (John Minou et al.; 2017 & Maddalena Favaretto, 2020). Ali Askar et al. (2020) found that Public administrations seek methods to use big data technologies because they are among the Big data producers and gatherers in many nations. However, there are still very few de facto big data applications in the public sector. Despite countless studies attempting to define "big data," many

public managers are still unsure of what benefits and drawbacks this technology has for public administration. Their results indicate a difference in views between managers in the public sector regarding the definition of big data, and there are doubts about it and its usefulness. This difference clarifies the limited use of big data in the government sector.

3. Research Methodology

3.1. Research Model and Hypotheses

This study aims to identify if there is Awareness of Big Data among employees in Saudi Arabia. Also, define the degree of Awareness of Big Data according to its concept, characteristics, benefits, and challenges and explain if there are significant differences in the degree of awareness due to sector variables.

- H1: There are statistically significant differences at the significance level (0.05) in the degree of awareness of big data among employees due to demographic factors.
- H2: There are statistically significant differences at the significance level (0.05) in the awareness of big data concept among employees due to demographic factors.
- H3: There are statistically significant differences at the significance level (0.05) in the awareness of big data characteristics among employees due to demographic factors.
- H4: There are statistically significant differences at the significance level (0.05) in the awareness of big data challenges among employees due to demographic factors.
- H5: There are statistically significant differences at the significance level (0.05) in the awareness of big data benefits among employees due to demographic factors.

This research used descriptive methods to suit the objectives of the current study. As per Dr. Y.P. Aggarwal (2008), a descriptive research survey focuses on acquiring data on current circumstances or conditions to describe and interpret them. This research methodology incorporates correct analysis, interpretation, comparisons, trend detection, and correlations rather than just gathering and tabulating facts.

Figure 1: Research Model

3.2. Instrument and Measurement

To collect quantitative data, the researcher conducts a questionnaire. This study attempts to measure the degree of Big Data awareness among employees. The method was developed regarding the literature related to the topic of Big Data according to Doaa Khalil (2021), Najwa Shoukry (2021), and Younes Shawabkeh (2018). The questions were selected and modified following the goals of this study. The questionnaire consisted of two parts: The first: Includes the personal and functional characteristics of the study members, which are: (gender, specialization, educational qualification, experience, and sector). The second is related to the degree of Awareness of big data. It includes 21 paragraphs that measure the degree of Awareness among workers in Saudi Arabia about big data, distributed over four areas: Awareness of the concept of Big Data and its characteristics, challenges, and areas to benefit from. The five-point Likert scale was used to answer the questionnaire's paragraphs in the second section as follows: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree, to measure employees' Awareness of Big Data.

3.3. Sampling and Population

The study population comprises all governmental, private, and semi-governmental employees. The number of employees reached 9,785,712, according to the latest statistics from the Ministry of Human Resources and the General Authority for Statistics (2022). The target sample is (203) employees in Saudi Arabia working in private or public sectors, which is the minimum number of necessary Samples to meet a confidence level of 85% of the real value within (+/_)5. They are aged between 20 and <50. They have scientific qualifications from elementary to high education in various disciplines with work experience from 1 year to more than 17 years.

4. Results

For statistical processing purposes, the Statistical Package for Social Sciences (SPSS) was used to process data. It was entered into the computer to extract frequencies, arithmetic averages, and standard deviations according to the requirements of the study. The mean and standard deviations were calculated to determine the degree of employee awareness of big data, its characteristics, challenges, and areas of benefit from it. In order to detect the differences between the arithmetic averages of the responses of the study members according to the variables of gender, specialization, qualification, and experience, a quadruple analysis of variance test was used, which can now be used to analyze two-level variables such as gender and variables with levels that exceed two classes such as educational qualification and experience. Finally, a t-test was used for the sector variable.

4.1. Results Related to the Answer to the First Question: Is There Awareness of Big Data Among Employees?

According to Likert's five-factor division of answers and based on the study of Younis Shawabkeh (2018), Duaa Khalil (2020), and Najwa Shukri (2020). Three levels were identified to know whether there is awareness of big data based on arithmetic means of answer for all fields. These levels are as follows:

- (1–2.33) no awareness,
- (2.34–3.67) medium awareness, and
- (3.68–5) high awareness

According to the results of table 1, the average score for all fields is (3.8), indicating awareness among employees in Saudi Arabia.

Fields	Mean	Standard deviation	Grade of awareness
Concept	3،836	0،601	high
Characteristics	3،642	0،640	medium
Benefits	3،991	0،686	high
Challenges	3،731	0،641	high
Overall	3،800	0،502	high

Table 1: The Quantitative Degree of Employees' Estimates in Saudi Arabia for Fields of Awareness of Big Data

4.2. Results Related to the Answer to the Second Question: What Is The Degree of Awareness of Big Data, Its Concept, Its Characteristics, Challenges, and Benefits?

The arithmetic means and standard deviations of employees' responses in the Kingdom of Saudi Arabia were extracted to answer the part related to the degree of awareness in the questionnaire. Results show that the quantitative degree of employees' estimates in Saudi Arabia for fields of awareness of big data was high, with a mean of (3.8) and a standard deviation of (0.50). This result means that the degree of awareness of big data among employees in Saudi Arabia is high. These results agree with Younes Shawabkeh's (2018) and Doaa Khalil's (2020) results. This rise in awareness may be due to digital transformation initiatives in Saudi Arabia, which aim to automate services in all sectors. The arithmetic averages of the big data awareness domains ranged from (3.99 - 3.64). Three of the fields were highly rated. They are, respectively: Benefits, Concepts, and Challenges. The last one is Characteristics which came in fourth place with a medium score. Each of these factors will be reviewed separately based on the information in 2, 3, 4, and 5. Below is an analysis of each area separately.

Concept					
# of Questions	**Rank**	**Question**	**mean**	**Standard Deviation**	**Grade**
3	1	Big data is a very important source of information if analyzed	4،305	0،787	high
2	2	Big data sources are complex, which requires special technological methods to extract information from them	3،719	0،898	high
4	3	Big data is generated by user	3،674	0،961	medium
1	4	Big data is of a size that exceeds the ability of a regular database to collect and manage	3،645	0،902	medium
Overall			3،836	0،601	high

Table 2: The Quantitative Degree of the Estimates of Workers in Saudi Arabia in the Field of Awareness of the Concept of Big Data

Characteristics					
# of Questions	**Rank**	**Question**	**mean**	**Standard Deviation**	**Grade**
3	1	Big data is characterized by diversity and consists of many types of data from multiple sources and various forms	4،064	0،839	high
1	2	Big data has a great value	4،044	0،908	high
2	3	Big data is characterized by its large size and the availability of huge amounts of data	3،813	0،908	high
5	4	Big data is accurate or correct to ensure the reliability of the information extracted from it	3،379	1،028	medium
4	5	Big data is created very fast	2،911	1،030	medium
Overall			3،642	0،641	medium

Table 3: The Quantitative Degree of the Estimates of Workers in Saudi Arabia in the Field of Awareness of the Characteristics of Big Data

Challenges					
# of Questions	**Rank**	**Question**	**mean**	**Standard Deviation**	**Grade**
6	1	Big data needs constant security scanning to avoid getting into a data breach	4،217	0،828	high
3	2	Big data requires great technical capabilities	3،946	0،874	high
1	3	Big data cannot be analyzed by traditional software	3،734	0،948	high
2	4	Big data has large number of data types and sizes make it more difficult to deal with	3،635	0،931	medium
5	5	Big data causes user confusion due to a large amount of information.	3،478	1،045	medium
4	6	Big data is difficult to identify relevant data when using big data	3،379	1،009	medium
Overall			3،732	0،641	high

*Table 4: The Quantitative Degree of the Estimates of Workers in Saudi Arabia in the Field of Awareness of the Challenge**s** of Big Data*

Benefits					
# of Questions	Rank	Question	mean	Standard deviation	Grade
2	1	Big data helps provide knowledge to the decision maker.	4،172	0،823	high
1	2	Big data helps me predict future decisions.	4،044	0،804	high
4	3	Big data helps me plan sound goals for me	3،990	0،850	high
5	4	Big data has enabled me to rationalize the budgets of administrative units in my institution towards new areas	3،965	0،810	high
6	5	Big data helps me to evaluate my accomplishments towards the tasks assigned to me	3،896	0،864	high
3	6	Big data helps me get the work done.	3،881	0،941	high
Overall			3،991	0،686	high

Table 5: The Quantitative Degree of the Estimates of Workers in Saudi Arabia in the Field of Awareness of the Benefits of Big Data

4.2.1. Field Awareness of the Concept of Big Data

The arithmetic means and standard deviations of employees' responses in the Kingdom of Saudi Arabia were extracted to answer the part related to awareness of the concept of big data. Results show that the quantitative degree of the estimates of workers in Saudi Arabia in the field of awareness of the concept of big data was high, with an arithmetic mean (3.83) and a standard deviation (0.60). High scores for domain items indicate that employees are highly aware of the concept of big data, especially about it being a significant source of information if analyzed. Its sources are complex, requiring special technological methods to extract information. The paragraph that ranked last in this field, with a medium rating and with an arithmetic mean (3.64) and standard deviation (.90), is "Big data is of a size that exceeds the ability of a regular database to collect and manage," meaning that big data is stored in particular databases of great size and capabilities. The low scores for this paragraph may be because the meaning was not apparent to the employees, or they were divided about how to save and store this type of data.

4.2.2. Field of Awareness of Big Data Characteristics

The arithmetic means and standard deviations of employees' responses in the Kingdom of Saudi Arabia were extracted to answer the part related to the field of awareness of Big Data Characteristics. Results show that the quantitative degree of the estimates of workers in Saudi Arabia in the field of awareness of Big Data Characteristics was medium, with an arithmetic mean (3.6) and a standard deviation (0.64). This means that employees' awareness of the characteristics of big data is relatively low, especially in the essential characteristics that (Laney, 2001) has set (volume, velocity, and diversity). Paragraph No. (3) ranked first with a high grade, mean (4.06), and standard deviation (0.83). As for the low items, they were number (5) and (4), respectively, with a mean of (3.37), (2.9), and standard deviations of (1.02) and (1.03). Employees are unaware enough of the accuracy and speed of the generation of big data.

4.2.3. Field of Awareness of Big Data Challenges

The arithmetic means and standard deviations of employees' responses in the Kingdom of Saudi Arabia were extracted to answer the part related to the field of awareness of big data Challenges. Results show that the quantitative degree of the estimates of workers in Saudi Arabia in the field of awareness of big data Challenges was high, with an arithmetic mean (3.7) and a standard deviation (0.64). The scores of the domain paragraphs ranged between (4.2-3.37). These scores indicate that employees' awareness of the challenges of big data is high. Especially as it requires continuous monitoring to prevent detection, needs special technical capabilities, and cannot be analyzed by traditional methods. On the other hand, two paragraphs obtained average ratings and occupied the last two positions, which are paragraphs 5 and 4, which state, "Big data causes user confusion due to a large amount of information" and "Big data is difficult to identify relevant data when using big data." This result means that the size of big data and the diversity of its forms are still not clearly understood. Also, the workers did not clearly understand the meaning of the 4th paragraph, which refers to the difficulty of choosing from similar data from multiple sources.

4.2.4. Field of Awareness of Big Data Benefits

The arithmetic means and standard deviations of employees' responses in the Kingdom of Saudi Arabia were extracted to answer the part related to the field of awareness of big data Benefits. Results show that the quantitative degree of the estimates of workers in Saudi Arabia in the field of awareness of Big Data Benefits was high, with an arithmetic mean (3.99) and a standard deviation (0.68). The scores of the domain paragraphs ranged between (4.17-3.88). It ranked first among the four fields, which is expected because this field is the closest to the field of employees' work and specializations and is related to how to benefit from the analysis of Big data in organizations. It is clear from the results that paragraph No(2) ranked first with an arithmetic mean (of 4.17) and a standard deviation of (.82), and paragraph. No(1) ranked second with an arithmetic mean of (4.04) and a standard deviation of (.80). This rise is due to the strength of the data and the valuable information it provides that contributes to decision-making. On the other hand, paragraph (6) got the penultimate rank with an arithmetic mean (3.89) and a standard deviation (.86), followed by paragraph (3) with an arithmetic mean (3.88) and a standard deviation (.94), perhaps because employees did not realize the nature of the relationship between big data and performance.

4.3. Results Related to the Answer to the Third Question: Are There Differences in Employee Awareness of Big Data Due to Different Sectors and Demographic Factors?

To answer the first hypothesis (H1): There are statistically significant differences at the significance level (0.05) in the degree of awareness of big data among employees due to demographic factors, a multi-way analysis of variance "ANOVA" was used. Looking at the division of demographic factors in sectors in Saudi Arabia, we find statistically significant differences at the significance level of 0.05 in the degree of awareness of big data due to the variable of qualification and age in the government sector. This result is not surprising because most respondents had a university education and above. Also, there are differences at the significance level of 0.05 in the degree of awareness of big data due to gender in the semi-governmental sector. This result proves the hypothesis correct.

To answer the second hypothesis (H2): There are statistically significant differences at the significance level (0.05) in the awareness of Big Data concept among employees due to demographic factors, a multi-way analysis of variance "ANOVA" was used. Looking at the division of demographic factors in sectors in Saudi Arabia, we find statistically significant differences at the significance level of 0.05 in the awareness of Big Data concept due to the variable gender and age in the government sector. Also, there are differences at the significance level of 0.05 in the awareness of big data concept due to gender in the semi-governmental sector. This result proves the hypothesis correct.

To answer the third hypothesis (H3): There are statistically significant differences at the significance level (0.05) in employee awareness of big data characteristics due to demographic factors, a multi-way analysis of variance "ANOVA'' was used. Looking at the division of demographic factors in sectors in Saudi Arabia, we find statistically significant differences at the significance level of 0.05 in the awareness of Big Data characteristics due to the variable qualification, age, and work experiences in the government sector. This result means that specialization, qualification, and experience contribute to the awareness of employees about the characteristics of big data. Also, there are differences at the significance level of 0.05 in the awareness of Big Data characteristics due to the variables gender and age in semi-government sectors. This result proves the hypothesis correct.

To answer the fourth hypothesis (H4): There are statistically significant differences at the significance level (0.05) in the awareness of Big data challenges among employees due to demographic factors, a multi-way analysis of variance "ANOVA" was used. Looking at the division of demographic factors in sectors in Saudi Arabia, we did not find statistically significant differences at the significance level of 0.05 in the awareness of Big Data challenges due to demographic factors, which means rejecting the H4 hypothesis.

To answer the fifth hypothesis (H5): There are statistically significant differences at the significance level (0.05) in the awareness of big data benefits among employees due to demographic factors, a multi-way analysis of variance "ANOVA" was used. Looking at the division of demographic factors in sectors in Saudi Arabia, we find statistically significant differences at the significance level of 0.05 in the awareness of Big Data benefits due to the variable specialization and age in the private sector. Also, there are differences at the significance level of 0.05 in the awareness of Big Data benefits due to qualifications and work experiences in the government sector. This result means that specialization, qualification, and experience contribute to the awareness of employees about the benefits of big data. This type of data is frequently used among specialists and those with higher degrees and is cared for by those with experience. This result proves the hypothesis correct.

5. Conclusion

The current study highlights the Awareness of Big Data and its impacts on performance Among Employees in Saudi Arabia. The study measured awareness of the concept of big data, its characteristics, benefits, and challenges. Therefore, this study proposed a descriptive research method. The study was conducted through a questionnaire with a minor sample of employees in Saudi Arabia. The current study's findings have shown that there is awareness of Big Data among employees in Saudi Arabia. Also, the degree of awareness of Big Data is high (3.8). The arithmetic averages of the big data awareness domains ranged from (3.99 - 3.64). Three of the fields were highly rated. They are, respectively: Benefits, Concepts, and Challenges. The last one is Characteristics which came in fourth place with a medium score. Finally, there are no statistically significant differences at the significance level (0.05) in the degree of awareness of big data among employees due to the sector variable. At the same time, there are statistically significant differences at the significance level (0.05) in the degree of awareness of big data among employees due to demographic factors.

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