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Facilitating Conditions in Adopting Big Data Analytics at Medical Aid Organizations in South Africa

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Abstract

Purpose: This study measures the influence of facilitating conditions on employees' attitudes towards the adoption of big data analytics by selected medical aid organizations in Durban. In the health care sector, there are various sources of big data such as patients' medical records, medical examination results, and pharmacy prescriptions. Several organizations take the benefits of big data to improve their performance and productivity. **Research design, data, and methodology:** A survey research strategy was conducted on some selected medical aid organizations. A non-probability sampling and the purposive sampling technique were adopted in this study. The collected data was analysed using version 23 of Statistical Package for Social Science (SPSS) **Results:** the results show that the "facilitating conditions" have a positive influence on employees' attitudes in the adoption of big data analytics **Conclusions:** The findings of this study provide empirical and scientific contributions of the facilitating conditions issues regarding employee attitudes toward big data analytics adoption. The findings of this study will add to the body of knowledge in this field and raise awareness, which will spur further research, particularly in developing countries.

Keywords : Big Data Analytics, Facilitating Conditions, Medical Aid, Employees Perception

JEL Classification Code : M15, O14, O33

1. Introduction

Big data has revolutionized several applications in different industries. Which range from business, web tech companies, universities, to the medical field (Simsek et al., 2019). According to O'Leary (2013), big data can be defined as the technologies used to collect, process, store, share and analyze large volumes of data such as documents, text, pictures and video. Big data has also been described as information generated from video recordings, data from internet-enabled devices (smartphones and tablets), social media, machine data, and structured and unstructured data (Zikopoulos et al., 2012). With the use of big data, business organizations are gradually changing the way their

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businesses operate and compete. Organizations that carefully extract value from their big data always have an added advantage over their competitors (Dai et al., 2019). The availability of this big data offers organizations new possibilities to leverage information (ur Rehman et al., 2019). To examine these large amounts of data, big data analytics is needed to uncover hidden patterns, correlations and other insights. Dai et al. (2019) describe big data analytics as an advanced analytic technique operating on large datasets. Big data analytics can extract valuable information from a stream of data or large datasets (Vela et al., 2020). Globally, big data analytics helps most organizations to discover new business trends, improve decision making, improve profitability and achieve competitive advantage (Pantano et al., 2020). According to statistics, the global big data market will grow by 26% annually and reach $118.52 billion by the end of 2022. Moreover, less than 10% of Korea's 13,186 businesses have adopted big data (Yadegaridehkordi et al., 2018). Likewise, a report from the US indicates that the US healthcare system has generated a lot of data to be analyzed. Big healthcare data consists of diverse, multi-spectral, inadequate, and imprecise observations (such as diagnosis, demographics, treatment, and prevention of illness, injury, and physical and mental impairments) that are gathered from various sources using incongruent sampling (Raghupathi & Raghupathi, 2014; Jubeir et al., 2022).

Investing in big healthcare data analytics can assist the healthcare system to gain insightful information, facilitating sound decisions, minimizing patient risk, and lowering clinical costs (Chen et al., 2012). However, in South Africa, the real state of adoption of big data analytics is still not clear" (Vela et al., 2020). Vela et al. (2020) noted that facilitating conditions such as uninterrupted power supply, high Internet bandwidth and facilitation of periodic training is a major factor influencing the adoption of big data analytics. Likewise, Rogers states that 49% to 87 % of the adoption of new technology can be attributed to facilitating conditions. Venkatesh et al. (2003), describe facilitating conditions as the degree to which an individual believes that organizational and technical infrastructure exists to support the use of a system. Thus, a focus is needed in exploring the influence of facilitating conditions on attitudes in the adoption of big data analytics by medical aid organizations. Hence, the research question that guided this was:
How do the facilitating conditions among the selected medical aid employees influence the attitudes towards the adoption of big data analytics in selected medical aid organizations in Durban?

The following sections below are structured as follows. Section 2 presents reviews of literature on related factors influencing adoption of big data analytics, which includes; performance expectancy, social influence, effort expectancy and behavioural intention. Additionally, a detailed discussion on big data analytics, aim of the study and factors contributing to facilitating condition were presented. Section 3 explains the research methodology adopted. Section 4 presents the results and analysis for this study. Section 5 discusses the findings of the study based on the empirical evidence presented in section 4.

2. Literature Review

2.1. Related Factors Influencing Adoption of Big Data Analytics

This section reviews related factors influencing the adoption of big data analytics. These factors include performance expectancy, social influence, behavioral intention to use and perceived risk. These factors are found in the theory of UTAUT (Unified Theory of Acceptance and Use of Technology). According to Akbar (2013), UTAUT is a prominent model in technology acceptance studies. The UTAUT model holds that Performance Expectancy, perceived social influence, facilitating condition and perceived price value are direct determinants of employees' perception on the attitudes towards the adoption of big data analytics by selected medical aid organizations (Taiwo & Downe, 2013).

Performance expectancy denotes the extent to which the user is positive that using a particular technology will improve their performance in a job (Davis, 1985). In other words, it is the degree to which a person believes that using an information system will enhance their productivity.

Social influence refers to the belief that a user thinks that important people encourage the use of a system (Cabrera-Sanchez & Villarejo-Ramos, 2019). Venkatesh et al. (2003) describe social influence as the level to which others influence someone to use a system or technology. In other words, the concept of social influence measures the effect of what others believe about a new system.

Effort expectancy can be defined as the belief that when one uses a system it will be easy (Cabrera-Sanchez & Villarejo-Ramos, 2019). According to Venkatesh et al. (2003), effort expectancy refers as an individual belief that they can use the system with ease. This implies that the degree to which big data analytics will be adopted depends on its easiness to use. Effort Expectancy is more significant in the early stages of usage (Agarwal & Prasad, 1997).

Behavioral intention to use can be described as an "intention to achieve some specified future behavior and is a key predictor of an individual's actual use of technology" (Cabrera-Sanchez & Villarejo-Ramos, 2019). According to Brock and Khan (2017) behavioral intention to use is an

important step towards the actual adoption of any new technology or system. According to Javanmard et al. (2014) "This behavioral construct has been operationalised in empirical work in three ways, namely, new product ownership in a given category, purchase intention, and the relative time of adoption for a particular product"

While these related factors influencing the adoption of big data analytics have been discussed above, it is essential to note that the facilitating conditions (availability of the technical and organizational infrastructure required to use a system) are a vital necessity that should be considered. According to Peñarroja et al. (2019), the facilitating conditions is the availability of technical and organizational infrastructure to sustain the usage of an innovation/system (technology). Furthermore, it is also the degree to which an individual has the appropriate knowledge and resources to use the system (Venkatesh et al., 2012).

2.2. Big Data Analytics

Big data analytics is the use of advanced analytic techniques to explore, combine and cross-reference large datasets that include structured, semi-structured and unstructured data, from different sources, and in different sizes from terabytes to zettabytes (Dai et al., 2019). Most organizations now use big data analytics to make data-driven decisions which helps to improve business-related outcomes. The benefits may include improved operational efficiency, effective marketing, customer personalization, and new revenue opportunities (Cunningham, 2021). Industries such as Amazon, eBay, Groupon, and Etsy are typical model of the implementation of big data in e-commerce (Dai et al., 2019). According to Vela et al. (2020), while the insurance industry is increasing its capacity to analyze and get more value from the large data set called big data, the automotive industry is already utilizing big data analytics to guide the design of vehicles by collecting data on performance and aerodynamics. The capability to analyze these large datasets, to understand and evaluate risks is another benefit the insurance industry is gaining (Vela et al., 2020). Likewise, the government who are well known for creating a huge amount of data from the public sectors are gradually adopting big data strategies (Okuyucu & Yavuz, 2020). Studies have shown that government agencies including health care systems can improve their services and mission by using big data to predict outcomes (Cox & Ellsworth, 1997; Muni Kumar & Manjula, 2014). For example in South Africa, the healthcare systems have benefited from the adoption of big data analytics which includes early detection of diseases, early detection of healthcare fraud, and low costs of risks (Vela et al., 2020). According to Singh and Gupta (2019), different sources of data ranging from electronic health records, insurance claims to monitoring devices have made it easier for the health care sector including medical aid organizations to handle the enormous amount of data. This further buttressed the importance of big data analytics to any organizations. However, it is essential that medical aid organization provide the technical and organizational infrastructure (i.e., facilitating conditions) required to adopt and use big data analytics. According to Mahardika et al. (2019) facilitating conditions could be said to play a critical role and have direct impact on the use of any system. Vela et al. (2020) maintain that facilitating conditions could act as an adoption enabler if available resources and facilities are adequate, and accordingly individuals may exhibit positive attitudes toward the use of big data analytics. Thus, it is important to explore the influence of facilitating conditions on attitudes in the adoption of big data analytics by medical aid organizations.

2.3. Aim of the Study

While many organizations across the globe are deploying big data analytics projects to improve the quality of the decision-making process, planning and forecasting, big data analytics is not widely adopted in South Africa (Vela et al., 2020). In addition, there is not much literature exploring the attitude towards the adoption of big data analytics in South Africa (Vela et al., 2020). Specifically, there is very little literature that addresses the issue of facilitating conditions when looking at employees' attitudes towards the adoption of big data analytics which represents a gap in the literature. Facilitating conditions are the availability of technical and organizational infrastructure to sustain the usage of an innovation/system (technology) (Venkatesh et al., 2012). Thus, figure 1 shows a pictorial representation of the factors contributing to facilitating conditions.

The hypothesis of the study:

H1: Facilitating conditions has a positive influence on employees' attitudes towards the adoption of big data analytics.

H0: Facilitating conditions has a negative influence on employees' attitudes towards the adoption of big data analytics.

2.4. Factors Contributing to Facilitating Conditions

The section briefly discusses the contributing factors in Figure 1 under infrastructure and personnel. Infrastructure can be defined as the set of fundamental facilities and

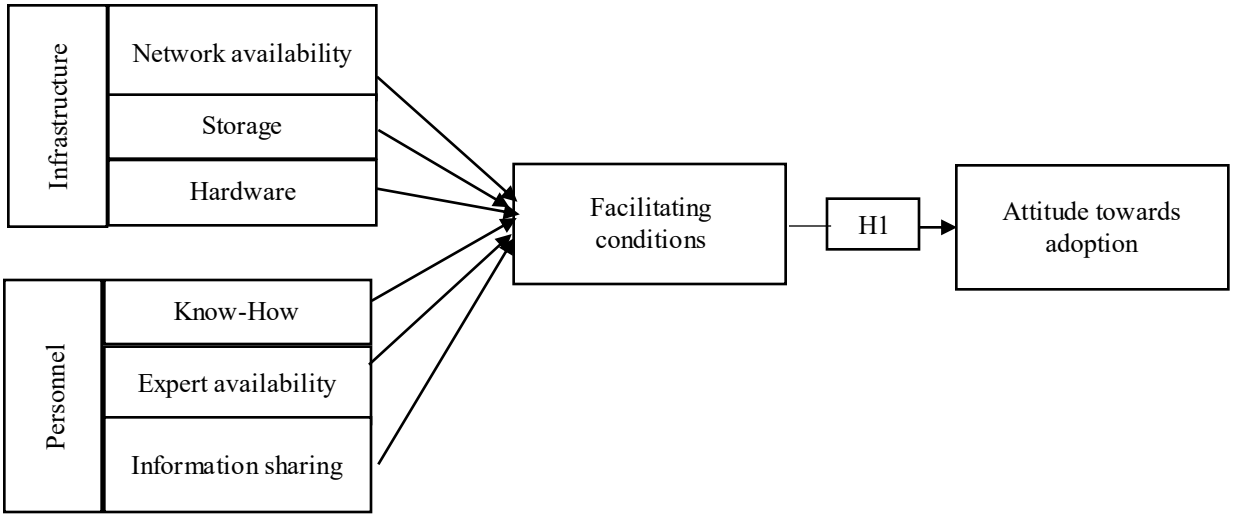

Figure 1: Factors contributing to facilitating conditions (Authors' own)

systems that support the sustainable functionality of any organizations. These facilities include network availability, storage system and hardware. Hence, as presented in figure 1, network availability refers to how an individual evaluates if the company has the necessary network system to adopt big data analytics. While storage refers to how employees evaluate if the organizations have the necessary storage system required for big data analytics. Likewise, hardware focuses on how employees evaluate if the organizations have the necessary hardware required for big data analytics organizations.

Personnel refers to the right expertise and the extent to which he or she has the appropriate knowledge and resources to make use of big data analytics. These include know-how, expert availability and information sharing. As illustrated in Figure 1, know-how refers to how employees examine the top management if they have the necessary knowledge about big data analytics. Experts' availability refers to how employees assess the availability of experts that will use the system. While information sharing refers to how employee evaluates the information sharing process in the adoption of big data analytics.

3. Methodology

A key requirement of a good study lies in the correct choice of research methodology (Ragab & Arisha, 2018). A review of the literature informs you of the methods and procedures used by others to those you suggest (Kumar, 2019). Consequently, the literature on technology adoption has informed the methodology used in this study. The utilization of secondary data served to supplement the primary data. In order to find pertinent publications that address enabling factors, big data analytics, and big data adoption, related publications were sourced from a number of search engines, including Scopus, Google Scholar, and EBSCO. 38 publications were used in this study out of 50 collected. The methodology is the basic procedures or techniques used to classify, process, evaluate, and analyze information on a given topic (Kumar, 2018). This study was conducted in the Republic of South Africa, and two medical aid organizations named as company A and B were selected for this study. To maintain ethical standards, researchers sought and obtained ethical clearance from the University of KwaZulu Natal.

The study opted for a quantitative research approach. Quantitative research uses deductive inference, wherein researchers begin with a hypothesis and then gather data that can be used to evaluate if there is empirical evidence to support that hypothesis. When compared to a qualitative approach, the quantitative approach has various advantages, such as the ability to generalize; thanks to the application of scientific methods for data collection and analysis. Utilizing this kind of study approach may also result in the benefit of replication, since the foundation of this research approach is the testing of hypotheses (Lichtman, 2013; Eyisi, 2016). The sample size for this study was 59 from the two organizations.

A non-probability sampling and the purposive sampling technique were adopted in this study. This study opted only for permanent employees from the two organizations. As part of the inclusion criteria, the organizations had to have at least basic Information Technology infrastructure. The response rate is 96.6%, and version 23 of Statistical Package for Social Science (SPSS) was used to analyze the collected data. Simple descriptions of the sample and observations are provided by descriptive statistics. Descriptive statistics meaningfully and simply describe and convey the important

elements of the data collected (Fialho & Zyngier, 2014). When appropriate, means and standard deviations were used, and frequencies were depicted in tables. The mean is the sum of a set of numbers divided by the total number of numbers in the set (Von Hippel, 2005). Inferential statistics are used to evaluate the strength of correlations between independent and dependent variables (Lowry, 2014). The following tests were employed in this study: The Wilcoxon Signed Ranks test is a non-parametric test that is used to see if the average value differs significantly from a value of three (the central score). This is used for questions with the Likert scale. It is also used to compare two different variables' distributions. Regression analysis is a type of linear regression that involves one or more independent variables and calculates the coefficients of the linear equation to best predict the value of the dependent variable. A one-sample t-test is used to determine if a mean score varied substantially from a scalar value (Colman & Pulford, 2006; Cai et al., 2000).

3.1. Questionnaire Design

The questionnaire consists of two sections, namely A and B. Section A consists of six questions to measure facilitating conditions with regards to attitudes towards the adoption of big data analytics. Section B of the questionnaire aims to evaluate employee attitudes towards the adoption of big data analytics. UTAUT and similar studies on the adoption of innovation inform the selection of the measures used in this study. Both constructs were assessed using a five-point Likert scale that ranged from strongly agree to strongly disagree.

4. Results and Analysis

In this section, the findings and analysis of this study are discussed. The facilitating conditions construct is assessed through six criteria namely, the company has the necessary network system to adopt big data analytics, the company has the necessary storage system required for big data analytics, the company has the right expertise required for big data analytics, the top management team has the necessary knowledge about big data analytics, and the company has a requirement to share data between departments within the company. Furthermore, the attitude towards the adoption is measured through four criteria namely, I believe it is a good idea to adopt big data analytics, I believe that big data analytics will allow the company to access more accurate information, the adoption of big data analytics by the company would be a positive decision, and I believe that big data analytics will enhance the company's decision making.

4.1. Attitude Towards the Adoption

Firstly, the reliability of this dependent variable Attitude towards adoption proved to be successful as depicted in Table 1. Secondly, to measure the attitudes of the employees towards the adoption of big data analytics, means, standard deviation and p-value were used.

Table 1: Reliability Statistics

Cronbach's Alpha	N of items
.968	4

As depicted in Tables 2 and 3, (Mean=3.70, Standard Deviation=.886), t (56) = 5.982, p<.0005, there is a significant agreement that employees believe that the adoption of big data analytics is a good idea. Employees believe that big data analytics will allow the company to access more accurate information, Mean=3.86, Standard Deviation=.934, t (56) = 6.947, p<.0005. Moreover, employees believe that the adoption of big data analytics by the company would be a positive decision (Mean=3.70, Standard Deviation=.925), t (56) = 5.727, p<.0005. Employees believe that big data analytics will enhance the company's decision-making (Mean=3.77, Standard Deviation=.887), t (56) = 6.572, p<.0005.

A one-sample t-test on the composite measures was used to determine the significance of agreement or disagreement concerning this dependent variable. As depicted in Table 4, the dependent variable Attitude towards adoption is a significant agreement t (56) =6.605, p<.0005.

4.2. Facilitating Conditions

This construct aims to determine the facilitating conditions that influence the employees' attitudes towards the adoption of big data analytics. The views of the respondents regarding each criterion are presented.

The result indicates that there is a significant acceptance that employees feel that the company has the requisite network system for adopting big data analytics (Mean= 3.38 Standard Deviation=.822), t(55) =-3.416, p=.001. This indicates that the employees believe that the organization has the requisite network system to facilitate the adoption of big data analytics. The result indicates that there is a significant acceptance that respondents conclude that the company has the requisite network system for big data analytics to be implemented (Mean=3.49 Standard deviation=.735), t (56) = -5.046, p<.0005. This shows that

Table 2: One-Sample Statistics Attitudes Towards Adoption

	N	Mean	Std. Deviation	Std. Error Mean
12.1.I believe it is a good idea to adopt big data analytics	57	3.70	.886	.117
12.2.I believe that big data analytics will allow the company to acce ss more accurate information	57	3.86	.934	.124
12.3. The adoption of big data analytics by the company would be a positive decision	57	3.70	.925	.123
12.4. I believe that big data analytics will enhance the company's decision making	57	3.77	.887	.117

Table 3: One-Sample Test Attitudes Towards Adoption

Attitudes Towards adoption	Test Value = 3					
	95% Confidence Interval of the Difference					
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
12.1.I believe it is a good idea to adopt big data analytics	5.982	56	.000	.702	.47	.94
12.2.I believe that big data analytics will allow the company to access more accurate information	6.947	56	.000	.860	.61	1.11
12.3. The adoption of big data analytics by the company would be a positive decision	5.727	56	.000	.702	.46	.95
12.4. I believe that big data analytics will enhance the company's decision making	6.572	56	.000	.772	.54	1.01

Table 4: One-Sample Test ATT

Attitudes Towards adoption	Test Value = 3					
	95% Confidence Interval of the Difference					
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
ATT	6.605	56	.000	.702	.5287	.9889

employees agree that the organization has the storage system needed for big data analytics to be implemented. The result indicates that there is a significant agreement that employees believe the organization has the requisite hardware required for the adoption of big data analytics (Mean=3.35 Standard Deviation=.744), t (56) = 3.561, p<.001. The finding suggests that there is a significant agreement among respondents that the organization has the requisite hardware for big data analytics adoption (Mean=3.21 Standard Deviation=.881), t (56) = 1.804, p=.077.

The finding suggests that there is a disagreement among respondents that the top management has the required knowledge of big data analytics, Mean=2.91, t (56) = -.617, p=.540. Respondents were split on this question and employees disagreed that the top management had the requisite knowledge of big data analytics. The result, t (56) = 4.912, p<.0005, indicates that there is a significant agreement that respondents feel that the organization has the requirement to exchange information within the company departments.

To test for significant agreement or disagreement on this variable, a one-sample t-test was performed. The result, t (56) = 3.483, p=.001, shows that facilitating conditions is a significant agreement. The reliability of the independent variable performance expectancy proved to be successful as depicted in Table 6.

To test for the influence of the independent variable on the dependent variable-ATT, a regression analysis was performed, and the result revealed that: The independent variable Facilitating condition accounts for 60, 3%

Table 5: One-Sample Test FC

Facilitating Conditions	Test Value = 3					
	95% Confidence Interval of the Difference					
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
10.1. The company has the necessary network system to adopt big data analytics	3.416	55	.001	.375	.15	.60
10.2. The company has the necessary storage system required for big data analytics	5.046	56	.000	.491	.30	.69
10.3. The company has the necessary hardware required for big data analytics	3.561	56	.001	.351	.15	.55
10.4. The company has the right expertise required for big data analytics	1.804	56	.077	.211	-.02	.44
10.5. The top management team has the necessary knowledge about big data analytics	-.617	56	.540	-.088	-.37	.20
10.6. The company has a requirement to share data between departments within the company	4.912	56	.000	.509	.30	.72

Table 6: Reliability Statistics FC

Cronbach's Alpha	N of items
.882	6

Table 7: Research Model Summary[b]

R	R Square	Adjusted R Square	Std. Error of the Estimate
.777[a]	.603	.596	.55137

a. Predictors: (Constant), FC
b. Dependent Variable: ATT

(R^2= .603) of the variance in attitude (ATT), F (1, 55) = 83.549, p<.0005. FACILITATING CONDITION is a significant strong predictor of ATTITUDE (ß=1.006, p<.0005).

5. Discussion

This study aims to assess the influence of facilitating conditions on the attitudes towards the adoption of big data analytics. Facilitating conditions refer to the available resources that encourage the adoption of innovation (Venkatesh et al., 2012). Verkijika (2018) asserts that facilitating conditions are significant predictors of the behavioral intention to adopt m-commerce applications. The result of this study shows that facilitating conditions are a significantly strong predictor of the dependent variable attitudes towards the adoption. Thus, it is concluded that facilitating conditions positively influence the employees' attitudes towards the adoption of big data analytics. This finding corroborates the study by Bag et al. (2021) that found that the workforce skills and tangible resources are the two most important factors in the adoption of big data analytics-artificial intelligence. The study provided a clearer picture of the institutional pressures and resources required for South African automotive and related industrial enterprises to adopt big data analytics-artificial intelligence. Additionally, the finding is consistent with a study by Walker and Brown (2019) that discovered that organizational factors such as human resource expertise influence the adoption of big data analytics in a significant South African telecommunications organisation.

The finding of this study suggests that the study's respondents' attitudes towards the adoption of big data are influenced by the factors of the facilitating condition such as network availability, storage, hardware, expert availability, and information sharing.

Hypothesis 1 is, therefore, accepted and Hypothesis 0 is rejected. The finding of this study is in line with the study by Zhou et al. (2019) that concluded that facilitating conditions had the strongest influence on Use Behaviour to adopt and use of Hospital electronic information management systems (HEIMS). Furthermore, Verma & Bhattacharyya (2017) identified factors such as IT assets as playing a significant role in the adoption of big data analytics by organisations. This study supports the study by Cabrera-Sánchez and Villarejo-Ramos (2019) that found a positive effect of facilitating conditions on the usage behavior of big data analytics.

Moreover, the finding is aligned with the study Peñarroja et al. (2019) that found that facilitating conditions had a positive impact on the effectiveness of a Virtual Community of Practice in Spain.

Table 8: ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	25.400	1	25.400	83.549	.000[a]
Residual	16.721	55	.304		
Total	42.121	56			

a. Predictors: (Constant), FC
b. Dependent Variable: ATT

Table 9: Coefficients[a] ATT

Model	Unstandardized coefficients		Standardized coefficients	t	Sig	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	.430	.371		1.157	.252		
FC	1.006	.110	.777	9.140	.000	1.000	1.000

a. Dependent Variable: ATT

6. Conclusion

To measure the influence of facilitating conditions on the adoption of big data analytics by selected medical aid organisations in South Africa, this study measured six criteria, namely, network availability, storage, hardware, know-How, expert availability and information sharing. The literature on the adoption of innovation and big data analytics informed the selection of the six criteria. This study asserts that facilitating conditions are a strong predictor of the attitudes towards the adoption of big data analytics. As a result, attitudes toward big data analytics adoption are being positively influenced by facilitating conditions. Employees strongly believe that network availability, storage, hardware, know-How, expert availability, and information sharing will facilitate the adoption of big data analytics.

To enhance customer relationships, the adoption and use of Big Data Analytics in companies can be a very valuable tool. The results of this study provide empirical and scientific contributions to aid better understanding of the facilitating conditions issues regarding the attitudes of employees on the adoption of big data analytics. The results of this study will strengthen the literature in this field and generate significant awareness that will initiate further research, especially in developing countries. This study's usage of just two medical aid organizations is regarded as a limitation. The study advises future research to employ a larger population. The study also recommends that similar studies be conducted on additional influencing factors such social influence, perceived risks, price value, and behavioral intention to use.

References

Agarwal, R., & Prasad, J. (1997). The Role of Innovation Characteristics and Perceived Voluntariness in the Acceptance of Information Technoin the Acceptance of Information Technologies. *Decision Sciences, 28*(3), 557-582.

Akbar, F. (2013). *What affects students' acceptance and use of technology?* Honours thesis, Dietrich College, Carnegie Mellon University, Pennsylvania, USA.

Anshari, M., Almunawar, M. N., Lim, S. A., & Al-Mudimigh, A. (2019). Customer relationship management and big data enabled: Personalization & customization of services. *Applied Computing and Informatics*, *15*(2), 94-101.

Bag, S., Pretorius, J. H. C., Gupta, S., & Dwivedi, Y. K. (2021). Role of institutional pressures and resources in the adoption of big data analytics powered artificial intelligence, sustainable manufacturing practices and circular economy capabilities. *Technological Forecasting and Social Change*, *163*(2021), 120420. https://doi.org/10.1016/j.techfore.2020.120420

Brock, V., & Khan, H. U. (2017). Big data analytics: does organizational factor matters impact technology acceptance? *Journal of Big Data, 4*(21), 1-28.

Cabrera-Sanchez, J.-P., & Villarejo-Ramos, A. F. (2019). Factors affecting the adoption of big data analytics in companies. *Revista de Administração de Empresas, 59*(6), 415-429.

Chen, H., Chiang, R. H., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS Quarterly*, *36*(4), 1165-1188.

Cox, M., & Ellsworth, D. (1997). Managing big data for scientific visualization. Paper presented at the *ACM Siggraph*. *97*(1), 21-38.

Cunningham, E. (2021). Artificial intelligence-based decision-making algorithms, sustainable organizational performance, and automated production systems in big data-driven smart urban economy. *Journal of Self-Governance and Management Economics*, *9*(1), 31-41.

Dai, H.-N., Wang, H., Xu, G., Wan, J., & Imran, M. (2019). Big data analytics for manufacturing internet of things: opportunities, challenges and enabling technologies. *Enterprise Information Systems, 14*(9-10), 1279-1303.

Dai, H.-N., Wong, R. C.-W., Wang, H., Zheng, Z., & Vasilakos, A. V. (2019). Big data analytics for large-scale wireless networks: Challenges and opportunities. *ACM Computing Surveys (CSUR), 52*(5), 1-36.

Eyisi, D. (2016). The usefulness of qualitative and quantitative approaches and methods in researching problem-solving ability in science education curriculum. *Journal of education and practice*, *7*(15), 91-100.

Javanmard, H., Iranmanesh, A., & Bastaki, S. B. (2014). New Clothing Adoption in an Islamic Market. *The Journal of Industrial Distribution & Business, 5*(4), 13-22.

Jubeir, M. B., Ismail, M. A., Kasim, S., & Amnur, H. (2020). Big healthcare data: Survey of challenges and privacy. *JOIV: International Journal on Informatics Visualization*, *4*(4), 184-190.

Kumar, R. (2018). *Research methodology: A step-by-step guide for beginners* (2nd ed.). London, United Kingdom: Sage publication.

Mahardika, H., Thomas, D., Ewing, M. T., & Japutra, A. (2019). Experience and facilitating conditions as impediments to consumers' new technology adoption. *The International Review of Retail, Distribution and Consumer Research, 29*(1), 79-98.

Muni Kumar, N., & Manjula, R. (2014). Role of Big data analytics in rural health care-A step towards svasth bharath. *International Journal of Computer Science and Information Technologies*, *5*(6), 7172-7178.

Okuyucu, A., & Yavuz, N. (2020). Big data maturity models for the public sector: a review of state and organizational level models. *Transforming Government: People, Process and Policy, 14*(4*), 681-699.*

Pantano, E., Giglio, S., & Dennis, C. (2020). Integrating Big Data Analytics Into Retail Services Marketing Management: The Case of a Large Shopping Center in London, UK. In S. Dadwal (Ed.), *Handbook of Research on Innovations in Technology and Marketing for the Connected Consumer* (pp. 205-222), London, United Kingdom: IGI Global. https://doi.org /10.4018/978-1-7998-0131-3.ch010

Peñarroja, V., Sánchez, J., Gamero, N., Orengo, V., & Zornoza, A. M. (2019). The influence of organisational facilitating conditions and technology acceptance factors on the effectiveness of virtual communities of practice. *Behaviour & Information Technology, 38*(8), 845-857.

Ragab, M. A., & Arisha, A. (2018). Research methodology in business: A starter's guide. *Management and Organizational Studies*, *5*(1), 1-14.

Raghupathi, W., & Raghupathi, V. (2014). Big data analytics in healthcare: promise and potential. *Health information science and systems*, *2*(1), 1-10.

Simsek, Z., Vaara, E., Paruchuri, S., Nadkarni, S., & Shaw, J. D. (2019). New ways of seeing big data. *Academy of Management Journal, 62*(4), 971-978.

Singh, C. S., & Gupta, D. (2019). Handling Enormous Informationin Healthcare: A Study on Big Data Analysis in Healthcare Applications. *Journal of Innovation in Computer Science and Engineering, 9*(1), 24-28.

Taiwo, A. A., & Downe, A. G. (2013). the theory of user acceptance and use of technology (utaut): a meta-analytic review of empirical findings. *Journal of Theoretical & Applied Information Technology, 49*(1), 48-58.

Rehman, M. H., Yaqoob, I., Salah, K., Imran, M., Jayaraman, P. P., & Perera, C. (2019). The role of big data analytics in industrial Internet of Things. *Future Generation Computer Systems*, *99*(2019), 247-259. doi.org/10.1016/j.future.2019.04.020

Vela, V., Subramaniam, P. R., Ofusori, L., & Venugopal, C. (2020). The Influence of Performance Expectancy on Employees' Attitude towards the Adoption of Big Data Analytics by Selected Medical Aid Organisations in South Africa. *International Journal of Advanced Science and Technology, 29*(3), 7466-7480.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, *27*(3), 425-478.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS quarterly, 36*(1), 157-178.

Verkijika, S. F. (2018). Factors influencing the adoption of mobile commerce applications in Cameroon. *Telematics and Informatics*, *35*(6), 665-1674.

Verma, S., & Bhattacharyya, S. S. (2017). Perceived strategic value-based adoption of big data analytics in emerging economy. *Journal of Enterprise Information Management*. *30*(3), 354-382.

Von Hippel, P. T. (2005). Mean, median, and skew: Correcting a textbook rule. *Journal of statistics Education*, *13*(2), 1-13.

Walker, R. S., & Brown, I. (2019). Big data analytics adoption: A case study in a large South African telecommunications organisation. *South African Journal of Information Management*, *21*(1), 1-10.

Yadegaridehkordi, E., Hourmand, M., Nilashi, M., Shuib, L., Ahani, A., & Ibrahim, O. (2018). Influence of big data adoption on manufacturing companies' performance: An integrated DEMATEL-ANFIS approach. *Technological forecasting and social change*, *137*(2018), 199-210. https://doi:10.1016/j.techfore.2018.07.043

Zikopoulos, P., Parasuraman, K., Deutsch, T., Giles, J., & Corrigan, D. (2012). *Harness the power of big data The IBM big data platform* (pp. 3-247), New York, USA: McGraw-Hill Professional.

Zhou, L. L., Owusu-Marfo, J., Antwi, H. A., Antwi, M. O., Kachie, A. D. T., & Ampon-Wireko, S. (2019). Assessment of the social influence and facilitating conditions that support nurses' adoption of hospital electronic information management systems (HEIMS) in Ghana using the unified theory of

acceptance and use of technology (UTAUT) model. *BMC medical informatics and decision making*, *19*(1), 1-9.