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Original Article

Logistic Regression Model to Examine the Impact of Big Data Engineering for Cloud Computing Adoption in UAE

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Abstract *- This paper proposed an impact model for Cloud Computing Adoption (CCA), developed based on Big Data Engineering (BDE) factors. There are two established models, namely Technology Acceptance Model (TAM) and Technology Organization-Environment (TOE), to support the CCA prediction with selected variables. Six independent variables are identified to be included as a prediction of CCA: usefulness, ease of use, security effectiveness, cost-effectiveness, intention to use Big Data technology and the need for Big Data technology. This data is collected via a sample size of 250 from large businesses organization in the UAE. In order to analyze the data, binary logistic regression is utilized. Due to technological advancements and changes in the current business climate, it is important to examine BDE's impact on CCA, as well as the longer-term implications of BDE and CCA on organizations. The result of this study shows that six independent variables are statistically significant in predicting CCA. The outcomes are useful for managers considering the adoption of cloud computing. It is important to study because of the technological advancement and changes in the current business landscape, BDE's effect on CCA can be recognized, and the broader high impact of BDE and CCA on large business organizations. Furthermore, large business organizations must produce impactful outcomes for the whole organization to ensure pertinent in the BDE. The result shows that CCA can be predicted independently by all factors except cost-effectiveness.*

Keywords *- Cloud Computing Adoption (CCA), Big Data Engineering (BDE), Technology Acceptance Models (TAM), Technology Organization Environment (TOE)*

1. Introduction

Cloud computing and big data Engineering can be worked on predictive analytics and artificial intelligence based on the utilization of machine learning, deep learning or computer vision [1][2][3]. Thus, it has been observed that scholar-practitioners noted that Big Data Engineering (BDE) is the driver of Cloud Computing Adoption (CCA) used in the evolution of academic research objectives that are needed to be accepted or rejected [4]. To examine claims by [5], [6], [7], [1] and [8], a proposed model will be created that integrate the BDE and other CCA variables based on the Technology Acceptance Model (TAM) and Technology Organization-Environment (TOE). The survey method and data collected from UAE are applied to verify the model based on factor analysis and binary logistic regression. For data analysis, statistical methods are used for the analysis and creation of a forecasting model because it imposed a solid concept to tie BDE and CCA that has a specialty with respect to this model.

2. Literature Review

A solid understanding of how to adopt cloud computing is crucial as the technological world is moving rapidly; AI, deep learning, machine learning, Big Data technology, and cloud computing are all interconnected. Cloud computing is directly linked to infrastructure and an organization's IT strategy [23]. This research has broad practical implications because this research aims to fill the gap in the current literature related to cloud computing adoption driven by Big Data Engineering. In the age of AI, IoT and other emerging technologies, it is more critical than before to investigate how much cloud computing adoption is driven by Big Data technology [10]. Cloud computing is being adopted by many industries and becoming an innovation and growth platform. Business executives must understand what factors influence others in the industry to adopt cloud computing [11].

From the perspective of academic research, some cloud computing innovations may seem too futuristic. There is a knowledge gap associated with cloud computing adoption in academic research. Researchers in academia struggle to identify if the industry has moved beyond the initial phase of cloud computing adoption, where primary concerns are security and cost, to the next phase, where cloud computing and Big Data technologies are integrated [11].

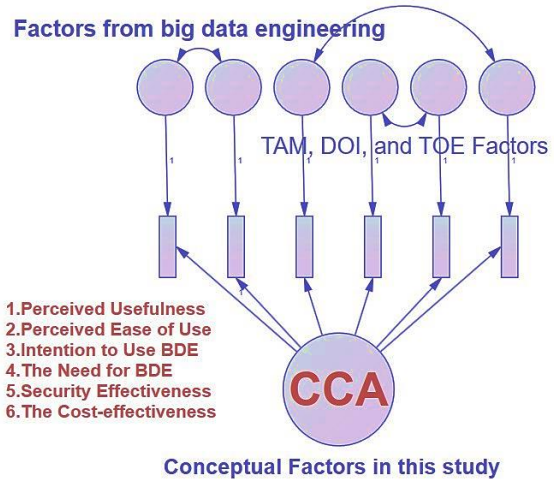

Fig. 1 Graphical representation of CCA with factors

Therefore, relying on only academic research is not enough when researching emerging, innovative technologies. The gap in the literature may not be filled. A holistic view of technologies encompassing industry literature, academic literature, and practitioners' research can offer guidance for these emerging and disruptive technologies [12]. Despite this, no research has explored or analysed the CCA that inspire the implementation of cloud computing in large business organization in the UAE. This study aims to fill this gap by focusing on CCA and BDE to achieve project sustainability.

Various hypothetical models have been created to look at the use of IT advancements at the hierarchical level. One of them is the Theory of Reasoned Action (TRA) created by [13]. The TAM, Diffusion of Innovation (DOI), and TOE are the three greatest broadly utilized theories and factors [24]. This portion contains a short-term clarification of TAM, DOI, and TOE. In addition, included are changed speculations regarding CCA with a theoretical Foundation of Big Data engineering with the CCA Model. As displayed in Fig. 1 graphical description of variables.

3. Methodology

The non-experimental study phenomenon is aware of manipulation within the necessary research variables that allow relationship measurements for their natural settings [15]. Leveraging a non-experimental correlational approach has examined the evaluation of the relationship between cloud computing adoption and independent variables [16]. The researcher has adopted a random sampling method for selecting IT professionals or managers working in the UAE to serve as participants in various surveys. However, by decreasing capacity based on selected bias level for the construction of sample mean, random sampling has caused the population to increase and target [17].

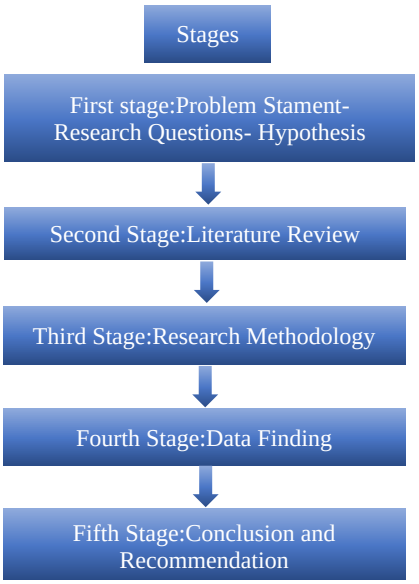

Fig. 2 Research process

Fig. 2 depicts the research process for this study. The first stage includes identifying problem statements, identifying objectives, and defining the scope of the study; stage 2 reviews the problem through a literature review; stage 3 conducts an online survey and data collection; stage 4 data analysis; and stage 5 concludes with recommendations and proceeds to stage 5. Many factors play a very vital role in the research design.

Successful measurement of these factors will assist the researcher in testing research hypotheses. Sekaran [18], [19], [25] is of the opinion that there are two kinds of factors. The first kind is comprised of factors which are objective and present a precise measurement. The second kind is comprised of subjective factors. The second type of variables contained strategies that could help reveal individuals' subjective emotions. One of these strategies is to transform the human impacts, such as motivation, satisfaction, attitude and acceptance, into characteristic behavior that can be observed to make their measurement possible. In addition, when a certain concept gets operationally defined, it can be measured [18].

In other words, the researchers have to look at the behavioral facets or features that the concept possesses and transform them into observable characteristics that will eventually help in measuring the concept. This activity is, however, costly and time-consuming. An alternative approach would be for the researcher to seek answers through a survey, which will determine individuals' responses to certain items linked to the concept to be measured on a certain scale.

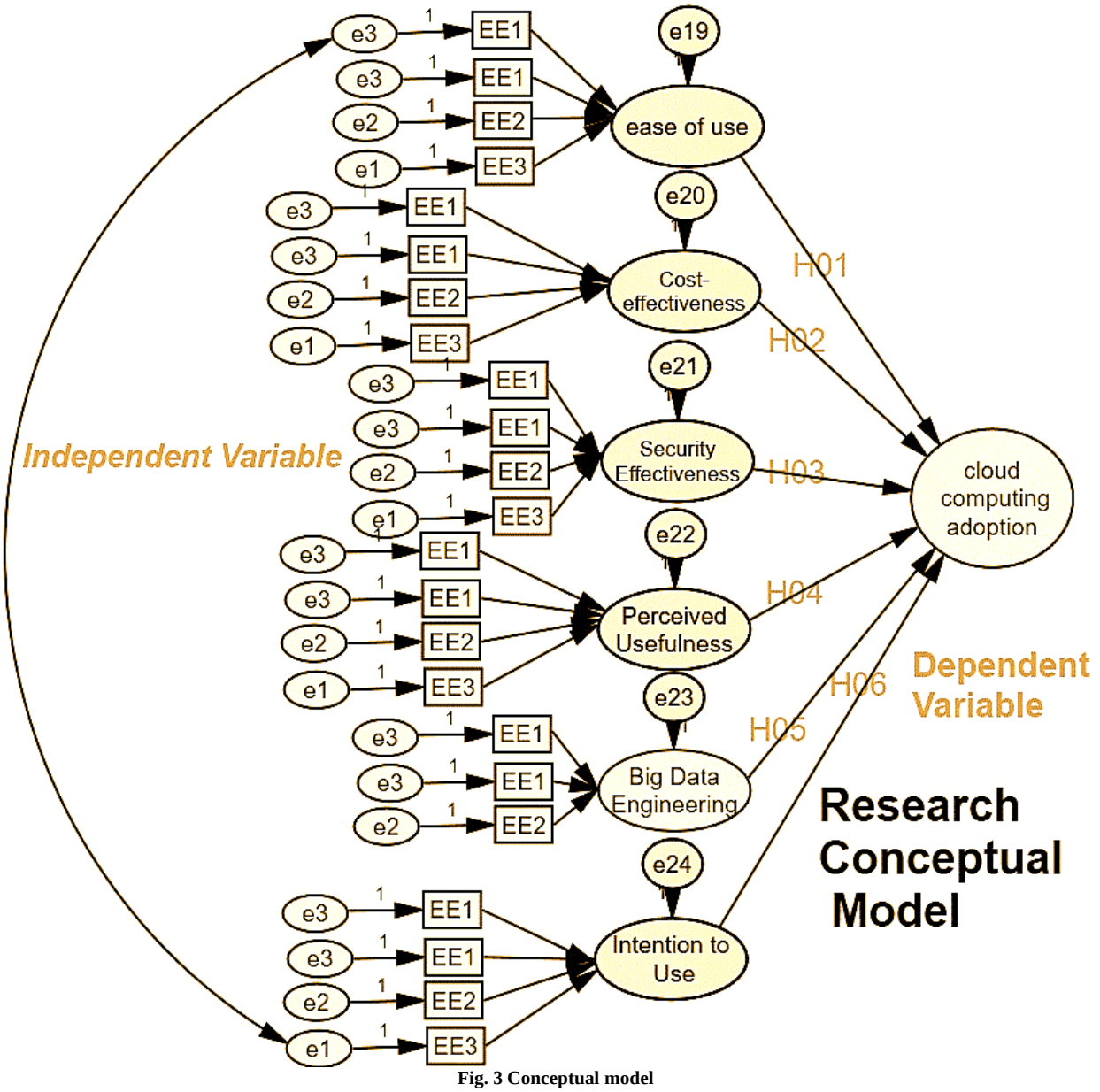

Fig. 3 Conceptual model

Fig. 3 shows the conceptual model for cloud computing adoption in which six independent variables, together and individually, are significantly predictive of the dependent variable, which considers the CCA. Fig. 3 shows six factors for CCA and one primary hypothesis with six sub-hypotheses.

4. Result and Discussion

A Cronbach's alpha coefficient of at least 0.7 was the benchmark for acceptable reliability [21]. Table 1 presents Cronbach's alpha reliability coefficients for the composite scores. All measures of reliability Cronbach's alpha coefficients ranged from 0.70 to 0.84, indicating acceptable to good reliability. To determine how well the things on the subscale work together to describe the component, a reliability review was performed [22].

The calculated Cronbach's alpha of reliability coefficients for binary logistic regression aimed to investigate if CCA is predicted of the variables as in Table 1. The results of the analysis, $\chi 2$ (6) = 13.634, p = 0.034, indicated that the model was statistically significant. This finding suggested that the model comprised of the six independent variables adequately predicted whether participants' organizations CCA.

4.1. Summary of Hypotheses Testing

Table 2 and Table 3 present a summary of the hypothesis testing results.

Table 1. Cronbach's Alpha of reliability for the composite scores

Independent variables	No. of Items	α
Perceived Ease of Use (EE)	4	0.84
Intention to Use Big Data Technology (IB)	4	0.70
The Need for Big Data Technology (NB)	3	0.80
Perceived Usefulness (U)	4	0.77
Security Effectiveness (SE)	4	0.74
The Cost-Effectiveness (CE)	3	0.78

Table 2. Variables to predict CCA

Variables in the Equation						
		B	**S.E.**	**Wald**	**Sig.**	**Exp(B)**
Step1[a]	**EE**	0.062	0.353	0.031	0.002	0.940
	U	0.999	0.333	8.998	0.003	2.717
	IB	0.249	0.152	2.674	0.002	0.780
	NB	0.047	0.324	0.021	0.004	0.954
	SE	0.308	0.458	0.453	0.003	0.735
	CE	-0.271	0.429	0.399	0.528	0.763
	C	0.618	1.897	0.106	0.745	1.855
a. variable (s) entered in step 1: Perceived Ease of Use (EE), Perceived Usefulness (U), Intention to Use Big Data Technology (IB), The Need for Big Data Technology (NB), Security Effectiveness (SE), The Cost-effectiveness (CE), Constant (C).						

Table 3. Hypotheses testing result

No.	Hypotheses	Results
$H0_1$	Ease of use, usefulness, security effectiveness, cost-effectiveness, intention to use Big Data technology, and the need for BDE CCA cannot predict CCA	Rejected
HA_1	Ease of use, usefulness, security effectiveness, cost-effectiveness, intention to use BDE, and the need for BDE can predict CCA	Accepted
$H0_2$	Ease of use cannot predict CCA	Accepted
HA_2	Ease of use can predict CCA	Accepted
$H0_3$	Usefulness cannot predict CCA	Rejected
HA_3	Usefulness can predict CCA	Accepted
$H0_4$	Intention to use BDE cannot predict CCA	Accepted
HA_4	Intention to use BDE can predict CCA	Accepted
$H0_5$	The need for BDE cannot predict CCA	Rejected
HA_5	The need for BDE can predict CCA	Accepted
$H0_6$	Security effectiveness cannot predict CCA	Rejected
HA_6	Security effectiveness can predict CCA	Accepted
$H0_7$	The cost-effectiveness cannot predict CCA	Accepted
HA_7	The cost-effectiveness can predict CCA	Rejected

Based on Table 2 and Table 3, the model, which included six independent variables, was statistically significant. The model predicted whether participants' firms would embrace cloud computing with 90.6% accuracy and accounted for 9.4% of the variance in cloud computing adoption. The model's only not statistically significant predictor was cost-effectiveness (B = -0.271, p =0.399). As the most factors score increased, the likelihood of cloud computing adoption increased.

4.2. Research Contributions

The most significant contribution of the present study is that to the CCA and BDE theoretical as the following:

Attempted to explore the factors influencing the CCA acceptance in UAE by understanding CCA that has been received in numerous projects or advances have exhibited stage that assembles development and relative development. In the period of AI, IoT, Big Data, and cloud alongside other CCA viewed as increasingly essential to examine the determining techniques for BDE and relations between BDE and CCA.

A specific contribution was made to knowledge concerning big data and cloud informatics and IT to the professional model of BDE acceptance in the context of UAE companies offering CCA and BDE solutions to business associations that were looking to know what motivates their customers to accept them.

The most significant contribution of the current study is BDE knowledge. The study's model is an extension of the CCA model comprising external factors and Behavioral Intention to use CCA. The findings are evidence to improve the theoretical knowledge on the topic; in any case, it is required to check the new enhancement model that was tried BDE through UAE companies. IT experts or administrators have been included straightforwardly in arranging and executing cloud computing to yield BDE.

As scientists are very interested in discovering the link between BDE and CCA, this research module has generated new possibilities for the reception innovation that has to do with the joining of various advancements with various selection theories. BDE's reaction to this examination was complicated previously.

An enhancement and extension of the CCA model by including BDE variables .as BDE have driven CCA to an alternate degree of learning and picking up a preferred position for better results.

Knowledge contributions are recognized with validation of the model by experts' interviews; the new model has given hypothetical enormous information and cloud inning, which is important to research prescient supposition for

cloud computing to join innovation-related factors. This exploration has added new information concerning CCA engagement with BDE and IT experts or chiefs.

5. Conclusion

As corporations worldwide experience pressure to separate themselves from their rivals, AI has become a new niche. A key problem for business executives is how AI blends into a company's technology or data science team. For businesses to start working on AI, they first need to do machine learning, which requires providing a stable data infrastructure and a robust computing infrastructure for the enterprise. Therefore, for businesses to move forward in the direction of AI and take full advantage of it, they need to first develop their company's technology base in the right order. Companies need to consider where they stand in their companies on cloud adoption, adoption of big data, and, eventually, AI adoption.

As the world of technology is dominated by machine learning, and logistic regression is generally used as a supervised technique, the researcher thought it would add value to the field to design a predictive analytics model (the cloud adoption model). This model will serve as a framework for introducing future complex technologies, and data science professionals and academic researchers can enhance the model's accuracy by modifying independent variables. If a practitioner wishes to decide if their clients can accept their goods or services, they should adapt the adoption model of this study to their needs and assess what variables impact the adoption of their products and services and how to enhance them to their needs.

One of the drawbacks of this study was that approximately 80% of the sample was taken from IT decision-makers holding the position of Chief Information Officer, Chief Operating Officer, VP of IT, IT Director, IT Manager, Program Manager or Supervisor in UAE, but the survey did not question whether or not they were interested in the cloud adoption strategy of their organizations. It would not have been easy to classify policymakers interested in implementing cloud computing due to the complex nature of cloud technology and the rapid speed of various cloud applications. An updated sample showing real cloud computing decision-makers in the sample, the organizations may have improved the study and may have provided more valuable information about actual cloud adopters.

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