

PILOT STUDY OF BIG DATA ENGINEERING IMPACT TOWARDS CLOUD COMPUTING ADOPTION IN UAE

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Abstract

Abstract- Big Data Engineering (BDE) requirements within Cloud Computing Adoption (CCA) to be used by large employers in the UAE have been extensively studied in the literature review. Research that is available currently is in constant support of the theoretical power that Technology Organizational Environmental (TOE) framework owns in investigating factors in the firm-level that support the technology acceptance theory with mixed theories from TAM, TOE and BDE variables. There has been a new interest in Cloud Computing Adoption (CCA) founded within large organizations in UAE, and that's because of all the new technologies that are surfacing which have very strong relations to CCA and BDE. BDE is responsible for the implementation of CCA into large business organizations. It's a necessity for CCA to develop and transform from basic knowledge to a higher level of corporate results. The motives to construct a forecast model for CCA which involves BDE variables and variables from the other two most involved technology adoption theories which are, TAM, and TOE, the act of inserting BDE related variables helped evolve cloud computing's mixed theory of the approach they should take when implementation takes place. Six independent variables were involved. They were seen as useful, easy to use, cost-effective, security capability, had the intention of using BDE, and needed it. Information obtained from UAE. were studied using binary logistic regression. The outcome described that a model which includes all six independent variables was more statistically dependable for speculating CCA with an accuracy of 90.6%. Separately, however, only usefulness was the variable that can be used to elevate the use of CCA. These results illustrated that CCA could rise if it's accompanied by BDE movements in order to make it more helpful for its purchaser.

Keywords:Cloud Computing Adoption (CCA),Cloud Computing Model (CCM), Applications of Intelligence (AI), Technology Acceptance Models (TAM), Technology Organization Environment (TOE).

Introduction

Reality of Cloud Computing Adoption (CCA) and Big Data Engineering (BDE) now supply a large stream of interest in the IT field. Each day a massive quantity of data is produced from different sources. It supplies end-users with computer system equipment like power and storage, there is no need for direct administration by the user in CCA. As a result, the huge clouds have a variety of functions scattered across multiple places with simple model as shown in Figure 1.0. They use each of the locations as a data center. The user's personal work, data, and other applications can be stored on by any public operating system or browser (Ahmad et al., 2021) .



Figure 1.0: Shown Basic Cloud Computing Model

BDE is one of the important responsibilities for any data-driven organization to gain an edge over its competitors. With the increasing trend of data generation across the world, managing information has become a challenging task for organizations. BDE is not straightforward for processing data (Gonzalez-Jimenez et al., 2021) .

It requires good tools, right experts, and complex algorithms. In order to ensure that organizations are connected to the power of data, companies employ BDE to manage which could become foundational for Data Science creativities. Without BDE, companies will fight to develop a data culture that would delay their overall business processes (Karapiperis et al., 2021)

Cloud computing and big data Engineering can be works on predictive analytics and applications of intelligence (AI), which emphasize on important advantages for companies by building models , or through machine learning, deep learning or computer vision (Chowdhury, 2018), Thus, it has been observed that scholar-practitioners noted that BDE is the driver of CCA used in the evolution of academic research objectives that

are needed to be accepted or rejected (Hashim et al., 2015) In order to examine Claimed by (Liu, 2013), (Hemalatha et al., 2016), (Hemalatha et al., 2016), (Kong et al., 2017), (Chowdhury, 2018), and (Mirkovic, 2021) new model will be created that integration of the model related to BDE and other CCA variables that generated relative adoption of TAM and TOE which will be verified through the survey and collection of data from UAE by using factor analysis and binary logistic regression for data analysis, we will use a statistical method for the analysis such as a binary logistic regression to define the data analysis and create forecasting model because it imposed strong concept to tie BDE and CCA that has a specialty with respect to this model .

- **Conceptual Model for Study**

- The main component of (Hemalatha et al., 2016; Khayer et al., 2020; Liu, 2013; Rana & Sharma, 2021; Srinivas et al., 2017) study featured that BDE goes about a driver for CCA. Though, the subsequent component contained associations to find a way to build CCA. The goal to use in BDE is viewed as an adjusted adaptation of. (Hewitt & Ross, 2012) which showed the expectation to utilize cloud computing factors. The second factor for BDE has contained with adjusted from (Hood-Clark, 2016) study that sought after the first estimation of the variable through cloud computing needs. Notwithstanding, the scientist considered, a marvel of apparent value that goes about as a variable should have been incorporated inside the new cloud selection level due to its importance for the present investigation. The scientist included the security adequacy variable which was received from (Tony et al., 2020) investigation that has been shown for the present examination in light of the fact that (Liu, 2013) has seen that this variable considered basic in each cloud computing choice. In this manner, it has been found by (Liu, 2013) that preparation considered an complication for CCA, the comparable reaction for the variable has characterized usage through the reception of (Hood-Clark, 2016) study. Figure 1.0 shown the research model.

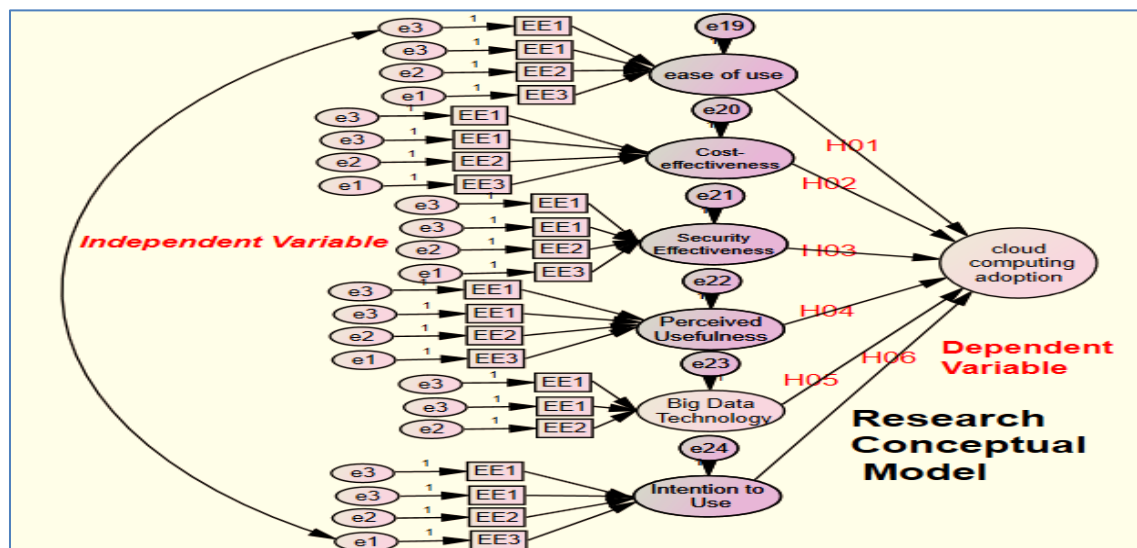


Figure 1.1: Research Conceptual Model.

As corporations around the world 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 the technology or data science team of a company. Tony et al., (2020) said that 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 AI, they need to develop the technology base of their company in the right order first. Companies need to consider where they stand in their companies on cloud adoption, adoption of big data, and eventually AI adoption. BDE and AI adoption should also be studied by potential researchers used binary logistic regression as the data analysis technique. As the world of technology is dominated by machine learning, and logistic regression is generally used as a supervised machine learning technique, the researcher thought that 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 the introduction of 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 will positively or negatively impact the adoption of their products and services and how to enhance them to their needs.

This research shadowed a quantitative, nonexperimental, correlational examination purpose to use BDE, the need for BDE, and the CCA in organizations in the United Arab Emirates (UAE). Utilization of a quantitative strategy supports the use of speculation testing and the generalization of discoveries aimed at the target populace (Paquet, 2013).

Exploratory consider plans and incorporate the gathering of members, either by the irregular arrangement or task by the analyst (Cook, 2016) . The consideration is taken after a nonexperimental plan since the analyst did not gather members. A correlational approach encouraged the evaluation of connections between the factors of intrigue at one point in time (Field, 2013) . The analyst utilized correlational examination (e.g., double calculated relapse examination) to estimate the influence of the six independent factors on the probability of cloud computing selection. The analyst conducted parallel calculated relapse to check the generally prescient capacity of the show and the prescient relationship between independent factors and dependent variable CCA. The collected data was statistically validated using SPSS software through correlation and binary logistic regression modelling. Then, the process continues in simulating the validated data resulting from SPSS for each factor and validate its functionality.

2.2 Factors Foundation

There have been a number of theoretical models developed to examine the use of IT technologies at the organizational level. Saini, 2021 developed the Theory of Reasoned Action (TRA). TAM, DOI, and TOE are the three most widely used theories and factors in cloud computing adoption studies (Crawford & Paglen, 2021) This section provides a summary of each of these three theories. Also featured are mixed theories in the context of cloud computing Theoretical Foundation of Big Data Integrated CCA Model. As shown in Figure1.2. A graphic representation of the factors in this study.

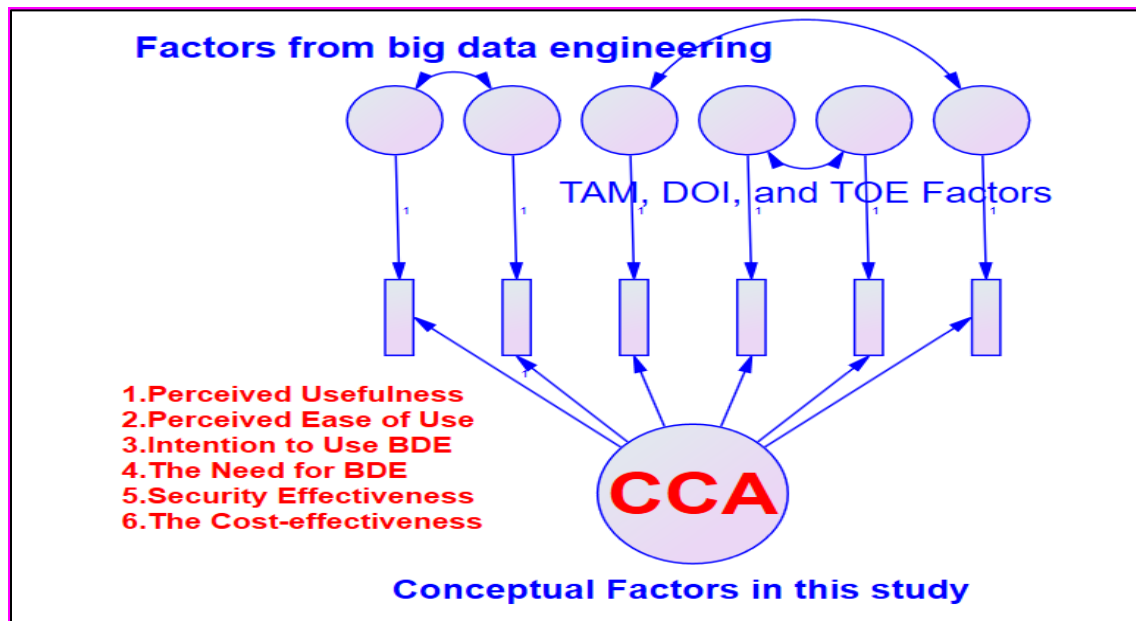


Figure 1.2 Graphical Representative for factors in this study

2.3 Pilot Test

A pilot survey with 30 responders from two firms was undertaken to determine how significant those factors are to cloud adoption. Many academics advocated using a pilot test before conducting a poll. (Khayer et al., 2020) These respondents worked in the IT department and were directly involved in Cloud computing activities on a daily basis. Table 2.1 summarized the average of items that were used. These respondents worked at a large organization in the UAE and were actively involved in Big Data and Cloud on a daily basis. The average of 35 items was summarized in Table 4.1, the items from 23-35 are below than the average. As a result, such questions were removed from the final survey. Items 17-22, on the other hand, are above average and are grouped together in the final questionnaire under system trust. The information trust, on the other hand, is made up of pieces ranging from 23 to 35. All items that scored below the average were eliminated from the final group.

Table 2.1 summarized the average of items that were used

No	Items	N	Min	Max	Mean	Std. Deviation
1	I expect additional benefit in my company by using big data	30	3.00	5.00	4.1818	.73266
2	CCA improve my performance in my job	30	3.00	5.00	4.2273	.61193

3	CCA enhanced my effectiveness in my job	30	3.00	5.00	4.2273	.75162
4	I expect higher flexibility in our IT by using CCA	30	3.00	5.00	4.2273	.75162
5	Using CCA would not lead to technical difficulties in my company	30	3.00	5.00	4.2273	.61193
6	CCA integrates quite easily in our IT infrastructure	30	2.00	5.00	4.2273	.81251
7	I find CCA easy to use	30	3.00	5.00	4.4091	.73414
8	For our employees using CCA does/would not require a lot of mental effort	30	3.00	5.00	4.4091	.59033
9	Assuming I can decide I intend to use by BDE	30	4.00	5.00	4.5909	.50324
10	Given that I have access BDE, I predict that I could use it	30	3.00	5.00	4.4091	.66613
11	I intend to use BDE	30	3.00	5.00	4.4091	.66613
12	BDE would provide significant benefits to my organization	30	3.00	5.00	4.4091	.73414
13	I feel that CCA is secure	30	3.00	5.00	4.3636	.65795
14	I am/would be concerned with the security of the technology used by the CCA	30	2.00	5.00	4.1818	.85280
15	I feel that CCA is more secure than traditional computing method	30	3.00	5.00	4.5909	.59033
16	CCA was not secure three years ago	30	3.00	5.00	4.3636	.65795
17	CCA provides a good value for the cost	30	2.00	5.00	4.3182	.83873
18	The cost of maintenance is lower with CCA than with traditional computing approaches	30	3.00	5.00	4.5909	.59033
19	The cost of maintenance is lower with the CCA than with traditional computing approach's	30	3.00	5.00	4.2273	.75162
20	I would consider CCA to have considerable cost saving over traditional computing method	30	3.00	5.00	4.2273	.61193

21	Using CCA in my organization	30	1.00	2.00	4.5909	.59033
22	CCA provide more authorization and according to the users	30	1.00	2.00	1.3000	.51177
23	CCA provide authorization to access control of stored data according to the entity's privileges/rights of use	30	1.00	2.00	1.5000	.51177
24	CCA ensure the confidentiality of information accessibility	30	1.00	3.00	1.5455	.73855
25	CCA provide services which enable a direct, bidirectional communication	30	1.00	4.00	2.5909	.85407
26	CCA provide services which are useful to the citizen for the intended purpose and facilitate their tasks	30	1.00	3.00	1.8182	.50108
27	BDE ensures that the system is up and running, is fully functional whenever needed and is protected from denial of service	30	2.00	4.00	2.8182	.85280
28	BDE ensures that the system is protected against intrusion threats	30	2.00	4.00	2.8182	.50108
29	BDE provides protection services which allow for non-repudiation, intrusion detection and prevention and legal action	30	1.00	4.00	1.8636	1.03719
30	BDE ensures that there is protection from unauthorized manipulation of data during transmission	30	2.00	4.00	2.5455	.59580
31	BDE cares about the users and is motivated to act in the user's interest and not opportunistically	30	2.00	3.00	2.5909	.50324
32	BDE makes good faith agreements, tells the trust and fulfils promises	22	1.00	3.00	1.8636	.99021
33	CCA provides information in the application of laws, policies and regulations regarding online transactions	30	1.00	3.00	1.4091	.79637

34	CCA provides services according to the quality protocols, standards and mechanisms for online transactions	30	1.00	3.00	1.4545	.59580
35	CCA provides of guarantees ensuring and verifying the expected outcome of a transaction	30	1.00	4.00	2.2727	.98473

2.4 Trust Item Value

Trust that people conducting the study are looking out for your best interests. As demonstrated in Table 2.2, they also expect conflicts of interest to be reported to them and others. Final Item Values can be trusted.

Table 2.2 shown final Item Values can be trusted.

	Items	N	Min	Max	Mean	Std. Deviation
1	I expect additional benefit in my company by using BDE	30	3.00	5.00	4.1818	.73266
2	CCA improve my performance in my job	30	3.00	5.00	4.2273	.61193
3	CCA enhanced my effectiveness in my job	30	3.00	5.00	4.2273	.75162
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9	Assuming I can decide I intend to use by BDE	30	4.00	5.00	4.5909	.50324
10	Given that I have access BDE, I predict that I could use it	22	3.00	5.00	4.4091	.66613
11	I intend to use BDE	30	3.00	5.00	4.4091	.66613

12	BDE would provide significant benefits to my organization	30	3.00	5.00	4.4091	.73414
13	I feel that CCA is secure	30	3.00	5.00	4.3636	.65795
14	I am/would be concerned with the security of the technology used by the CCA	30	2.00	5.00	4.1818	.85280
15	I feel that CCA is more secure than traditional computing method	30	3.00	5.00	4.5909	.59033
16	CCA was not secure three years ago	30	3.00	5.00	4.3636	.65795
17	CCA provides a good value for the cost	30	2.00	5.00	4.3182	.83873
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19	The cost of maintenance is lower with the CCA than with traditional computing approach's	30	3.00	5.00	4.2273	.75162
20	I would consider CCA to have considerable cost saving over traditional computing method	30	3.00	5.00	4.2273	.61193
21	Using CCA in my organization	30	3.00	5.00	4.5909	.59033

2.5 Reliability Test of Trust System

According to Table 2.3 and 2.4, the reliability test of trust system and trust information indicated that 30 items of system trust were reliable at 0.88%, which is higher than the minimum value of Cronbach's alpha of 70%.

Table 2.3: Reliability Test

Reliability test		
Cronbach's coefficient	Cronbach's coefficient for Z-score Items	Number of items
.859	.887	20

Table 2.4: Reliability Test

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
U1	104.922	86.516	.587	.848
U2	104.574	90.029	.530	.851
U3	104.583	88.520	.640	.848
U4	104.922	86.516	.587	.848
EE1	104.490	92.025	.394	.854
EE2	104.868	89.170	.399	.854
EE3	104.574	90.403	.440	.853
EE4	104.853	90.865	.286	.858
IB1	105.431	89.783	.211	.865
IB2	105.525	88.507	.236	.866
IB3	105.623	89.596	.201	.867
NB1	104.701	90.220	.389	.854
NB2	104.691	91.072	.374	.855
NB3	104.598	91.424	.343	.855
NB4	104.647	93.126	.246	.858
SE1	104.779	90.074	.483	.852
SE2	104.735	90.728	.471	.852
SE3	104.794	90.145	.483	.852
SE4	104.828	88.813	.498	.851
CE1	104.627	90.048	.488	.852
CE2	104.627	90.028	.524	.851
CE3	104.686	90.778	.422	.853
CE4	104.598	90.399	.486	.852

2.6.1 Construction Measures

A quantity is measured by comparing it to a standard to determine its magnitude. Metrology is the science of weights and measurements (Gatti et al., 2019). The construct is an abstract idea, underlying theme, or subject matter that one wants to measure with survey questions. The dimensions of a construct define its cohesiveness. There are a limited number of dimensions for simple structures. A citation for this study can be found in (Karunagaran et al., 2019). Measurables are the items the participant responds to in

a research study. Research measures include survey questions, interview questions, and created settings.

During interviews and surveys, it is critical that the questions relate directly to the study questions (der Put et al., 2017) . Consequently, constructs are wide notions or study topics. In general, constructs are things that have theoretical significance. These don't need to be concrete, and they don't have to be visible. An example is intelligence or life satisfaction. Mainly existing measures were used. The table 2.4 summarizes the research variables' measurement items and the first and second order constructs.

Table 2.4 summarized the research variables' measurement items

2 nd Order Constructs	1 st Order Construction	Item Number (25)
INDIVIDUAL CONTEXT AND FACTORS	Cloud Computing Adoption (CCA)	2
	Perceived Usefulness (U1, U2,3, U4)	4
	Perceived Ease of Use (E1, E2, E3,4)	4
	Intention to Use Big Data Technology (IB1, IB2, IB3, IB4)	4
	The Need for Big Data Technology (NB1, NB2, NB3)	3
	Security Effectiveness (SE1, SE2, SE3, SE4)	4
	The Cost-effectiveness (CE1, CE2, CE3, CE4)	4

2.3 Background of UAE (Case Study)



Figure 1.3: United Arab Emirates (UAE) as case study.

Source: Alsuwaidi et al., 2021

The Cooperation Council for the Arab States of the Gulf (GCC) has a good year so far, on the back of widespread diversification and socio-economic developments. Based on market performance, the Abu Dhabi Index stood out with registered gains (year to date) of 12.9 per cent, although Dubai's index was down 17.7 per cent – largely led by declines in real estate stocks. The second half of 2018 started on a positive note for GCC stock markets, with major banks in the region posting solid growth in earnings for Q2, with their profitability boosted by rising interest rates, an uptick in economic activity and increased government spending. In the UAE, most of the 10 companies by market capitalisation have remained the same, with Abu Dhabi's ADNOC Distribution the only new entrant. (Shreyas et al., 2020), (Hoffmann & Börner, 2021) However, the ranking order has changed, with the biggest change seen by Dubai's Emaar Properties, which fell by 12 spots in the wider Gulf Business Top 100 GCC Companies list.

TOP 10 UAE companies by market cap , in ranking 1, First Abu Dhabi Bank, Sector: Banking and Financial Services with Market capitalization: \$43.62bn , second ranking Emirates Telecommunications Group Co with Market capitalization: \$38.36bn with Sector: Telecommunication in ranking three DP world Ltd Market capitalization: \$16.89bnSector: Transportation with ranking four Emirates Islamic Bank with Market capitalization: \$14.79bn and Sector: Banking and investment services, ranking five Emirates NBD Bank Market capitalisation: \$13.88bn with Sector: Banking and investment services , ranking six Abu Dhabi Commercial Bank Market capitalization: \$11.11bnSector: Banking and investment services, ranking seven Emaar Properties with Market capitalization: \$9.63bn and Sector: Real estate with ranking eight Dubai Islamic Bank Market capitalization: \$9.37bn and Sector: Banking and investment services, ranking 9 Abu Dhabi National Oil Company for Distribution Market capitalization: \$8.34bnSector: Energy – Fossil Fuels and ranking ten. Emaar Malls with Market capitalization: \$6.87bn and Sector: Real estate (Suwaidi et al., 2021).

Research Contributions

The current study attempted to explore the factors influence the CCA acceptance in large business organization in UAE and the link between TAM and TOE and big data engineering intention to use CCA in UAE and thus it opened the door for the possibility of more research. 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 understood CCA that have been received in numerous projects or advances have exhibited stage that assembles development and relative development. At the period of AI, IoT, Big Data and cloud alongside other CCA viewed as increasingly basic to examine the determining techniques for BDE and relations between BDE and CCA. (Crawford & Paglen, 2021; Hood-Clark, 2016; Liu, 2013). It is essential for business administrators to comprehend factors that determined the cloud computing Adoption (Skafi et al., 2020),(Ageed et al., 2021) and (Tony et al., 2020) .
- The present study contributed to the literature concerning big data and cloud informatics and IT particularly to the professional model of BDE acceptance in the context of UAE companies. Different specialist companies have executed their reaction on CCA and BDE answers for business associations which expected to comprehend that what makes their clients driven for the reception of CCA.
- The most significant contribution of the current study is that BDE knowledge. The study's model is an extension of CCA model comprising of external factors and Behavioural Intention to use CCA. The findings are expected to improve the

theoretical knowledge on the topic, particularly its relation to data-scientist. In this way, it has been certain by (Memon et al., 2019) that BDE has driven to deliver a lot of complex information gathering for cloud computing framework. In any case, it is required for the check of 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.

- Attempted to know the link between BDE and CCA very important for scientists, the module of this exploration has acquired new conceivable outcomes for the reception innovation that is engaged with the joining of various advancements with various selection speculations. Previously, this examination was hard to investigate the reaction of the Big Data innovation which was guaranteed by (Hemalatha et al., 2016; Khayer et al., 2020; Liu, 2013; Srinivas et al., 2017) .
- An enhancement and extension of the CCA model by including BDE variables .as per (Hemalatha et al., 2016) BDE has driven CCA to an alternate degree of learning and picking up a preferred position for better results.
- Knowledge contribution are recognized with validation of model by experts' interview, the new model has given hypothetical youthful of huge information and cloud innning which is important to research prescient supposition as for cloud computing for the joining of innovation-related factors This exploration has added new information concerning CCA that is engaged with BDE, and IT experts or chiefs.

Conclusion

Researchers in academia and communities of practice are at the crossroads of the transition of technology. With the support of disruptive, evolving, and creative technologies, several businesses have had success with their goods and services in transforming industries. However, with this explosion of the technological revolution, many businesses with limited capital are struggling. Through researching two of the most influential 21st century technologies: cloud computing and BDE, this researcher attempted to close the knowledge gap between academia and practitioners. As the world of technology is moving at a rapid pace and AI, deep learning, machine learning, BDE, and cloud computing are all interconnected, it is important to have a link. Solid understanding of how cloud computing can be adopted. Cloud computing is specifically related to the IT policy of the technology and an enterprise. In order to construct a predictive cloud computing adoption model with cloud computing adoption as the dependent variable, the researcher used six independent variables (perceived usefulness, perceived ease of use, security effectiveness, cost-effectiveness, intention to use BDE, and the need for BDE). The model was statistically important. This outcome supports the argument by (Chandrasekaran et al., 2015; der Put et al., 2017;

Hood-Clark, 2016; Liu, 2013; Smith et al., 2016) that BDE is driving the CCA in business organizations. This research showed that perceived usefulness was the most important variable for the CCA for the individual variables, also matches (Chandrasekaran et al., 2015; der Put et al., 2017; Hood-Clark, 2016; Liu, 2013; Smith et al., 2016) hypothesis, to increase the CCA; Cloud computing, basically the need to improve the utility of cloud computing, would shift from low-level technology to high-level business solutions. In short, by providing empirical evidence and theoretical support to the practitioner's argument (Chandrasekaran et al., 2015; der Put et al., 2017; Hood-Clark, 2016; Liu, 2013; Smith et al., 2016) that BDE was driving CCA, this study added considerable value to the body of information regarding CCA; in essence, opening new avenues for potential research involving technology adoption of converged digital technology solution models.

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