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THE IMPLEMENTATION OF CLOUD COMPUTING AS STRATEGIC TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT USING REGRESSION ANALYSIS

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Abstract

A trend towards relying more and more on online cloud computing and storage services has emerged as information technology has developed. There is no getting around the fact that interest in cloud computing has skyrocketed recently. Numerous organisations use this technology as the foundation of their information technology infrastructure. Through the use of cloud computing, data processing efficiency is improved across a range of online computer and storage systems.

Provisioning is a crucial step in the process of transferring assets from cloud service providers to cloud virtualization users. The cloud service provider must build an appropriate number of virtual machines and make enough resources available in order to meet the needs of its customers. These difficulties include setting up virtual machines (VMs) correctly and dealing with technological limitations like disc space, processing speed, memory, and network throughput. The scalability of virtual machines, the configuration of cloud systems, and other aspects of the deployment of virtualization might present some challenges.

Keywords*: Cloud Computing, Sustainable development, Perceived valued, Regression analysis*

I. INTRODUCTION

The use of machine learning solutions by contemporary financial institutions is essential given the breakneck pace of technological advancement. By employing safeguards during the processes of identifying, analysing, reporting on, and ultimately resolving concerns, they play a significant role in risk management (Financial Stability Board, 2017). As a direct result, academics have begun to investigate how the spread of machine learning algorithms may affect the traditional methods of risk management in the banking sector. This point is illustrated by the prediction made by Leo et al. (2019) that over the course of the following ten years, there would be a significant change in how banking risk management is handled. Future adjustments in risk management strategies have been attributed to the emergence of new threats, changes to the regulatory landscape, and shifting consumer expectations. The traditional procedures for creating new products, providing services, and managing risks will likely be impacted by the use of cutting-edge technology and analytical tools. Leo et al. (2019) discuss technological applications that might potentially change risk models and use machine learning as an example. For instance, the ability of machine learning to identify intricate, non-linear patterns in data may help to increase the precision of risk models. Better prediction models might be created, for instance, if more data were used and integrated across a wide range of banking risk sectors. Research into how machine learning might be used by financial organisations to manage risk is encouraged by the arguments made in the paper. The term "cloud computing," which was first used to describe the use of hosted internet services in 2005, is frequently used to describe this process. (2013) Markovic et al. "Cloud computing" is defined by the National Institute of Standards and Technology (NIST) as "ubiquitous, convenient, and on-demand network access to a shared pool of configurable computing resources (such as networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or interaction from service providers" (Mell and Grance, 2011). Without needing to make additional investments in its infrastructure, software, or personnel, cloud computing enables an organisation to add new capabilities in response to its unique needs (SIclovan, 2012). A relatively new type of information technology known as "cloud computing" enables companies to gain a competitive edge in the market because of the features that are built into the technology itself. The ability to be agile, flexible, and scalable, as well as simple and secure accessibility from anywhere, growing reliability, growing fault tolerance, and cost-effectiveness, are some of these traits. According to the International Organisation for Standardisation (ISO/IEC 17088) and the National Institute of Standards and Technology (NIST), cloud computing is characterised by the following key features: on-demand self-service, wide network access, resource pooling, quick elasticity, quantifiable services, and multi-tenancy (Alsaeed and Saleh, 2015). A variety of different service models are already available as a result of cloud computing. These models include IaaS, PaaS, and SaaS as some examples. (Tayal, 2011; Sharma and Banga, 2013; Mell and Grance, 2011; Rimal et al., 2009). Private clouds, community clouds, public clouds, and hybrid clouds are just a few of the deployment options available to businesses interested in using the cloud. Many academics have recently demonstrated this (Adrees et al., 2015; Yaghmaei and

Binesh, 2015). To fully benefit from cloud computing, businesses must migrate their outdated software and services to the cloud (Babar and Chauhan, 2011).

Organisations should carefully consider cloud migration as a potential business strategy. There is currently research being done in this area with the goal of making it easier for businesses to switch from using services hosted on-premises to those hosted in the cloud. Many businesses would benefit from investing in cutting-edge technology, like cloud computing, so they can concentrate more on their core functions and potential for future growth. Businesses must focus less on owning infrastructure and more on providing services if they want to effectively use cloud computing and move their operations there (Rewatkar and Lanjewar, 2010). Selecting the best cloud infrastructure configuration, service, and provider may be difficult due to the wide range of cloud services and alternatives that are now available (such as location, sales model, repeatability, etc.). Please use this citation: Garca-Galán et al. As a result, a framework that will aid in steering decision-makers and carrying out an efficient migration is required. The vast majority of research projects use Decision Support Systems (DSS), which were created specifically for cloud migration and are primarily focused on the process of selecting a cloud service provider. Cost was prioritised, but they failed to conduct a thorough investigation into the underlying causes of the widespread exodus. Businesses should spend time learning about the characteristics, tenets, and rules related to cloud computing in addition to choosing a provider.

II. REVIEW OF LITERATURE

Numerous technology acceptance models have been created and are now widely used to gain a better understanding of the elements that affect user adoption, usage, and behaviour in relation to information and communications technology in businesses. These models are now frequently employed. A textbook that fits this description is Fishbein and Ajzen's "Theory of Reasoned Action" (TRA). This widely accepted theory postulates that beliefs about the importance of a particular behaviour have a favourable relationship with that behaviour and serve as a predictor of that behaviour. According to this theory, attitudes towards a behavior's importance are positively correlated with that behaviour. A person's interest in embracing a new technological innovation is frequently influenced by the opinions of those who are close to them. This is yet another benefit. Ajzen expanded the TRA model to incorporate the concepts of control beliefs, perceived ease of use, and behaviour control to create the concept of planned behaviour. He was able to establish the theory of planned behaviour as a result. This was done in order to illuminate the psychological underpinnings of human behaviour, or TPB. This methodology's central tenet, known as "behavioural intention," contends that beliefs can be classified as either "control," "normative," or "behavioural." The relationship between acceptance, adoption, and readiness to make use of a particular piece of technology was then described with the aid of the Davis technology acceptance model (TAM). According to TAM, the two most crucial factors in the process of technology adoption and system utilisation are the perceived utility of the technology and the perceived ease of using the technology. Particularly, perceived technology usability is less significant than perceived technology usability. TAM states that "beliefs and evaluations," such as how useful and simple something is, have an impact on attitude, which in turn influences use intention, which ultimately has an impact on actual behaviour. Examples of beliefs and assessments that fit into this category include the following:

The Technology Adoption Model (TAM) has been widely used in research on the subject of technology adoption in the context of a corporate environment. It is a model that is generally recognised for explaining the processes of ICT adoption and use. TAM consistently accounts for a sizable portion of the variation in consumers' intentions to use a wide range of information and communication technologies (ICT), regardless of the setting or nation in which the research was conducted. The TAM model has been the focus of extensive research since its initial presentation, which has resulted in the creation of numerous distinct iterations. One of the most important developments in the fields of user acceptance and technology is the TAM 3 model, which Venkatesh and Bala proposed in the area of e-commerce. The Unified Theory of Acceptance and Use of Technology (UTAUT), which was, for instance, applied to mobile application development, is another important development. Venkatesh and Bala created both of these models. In order to shed light on the factors that have influenced the widespread adoption of a variety of technologies, including cloud computing, TAM has been used in a wide range of recent IT research projects. The use of TAM has also been made in an effort to shed light on the causes of the widespread adoption of cloud computing. Most of these models add additional factors from the outside environment that are thought to be important in order to improve the basic structure of the original TAM. This improvement can be attributed to the models' increased consideration of their environment. As a result, it is frequently used in research on many different subjects, including e-commerce, file digitization systems, Internet banking, mobile social gaming, and e-learning platforms, to name just a few.

The dissemination of technological advancements is dependent on three interrelated factors, according to the Technology-Organization-Environment (TOE) framework. These variables include the organization's internal resources, the technological context, the environment in which it operates, and its internal characteristics. This method investigates how businesses utilise a product or service rather than analysing how people use it in their daily lives. The TOE model continues to stand as one of the most widely accepted theoretical justifications for the exponential growth of information and communication technologies (ICT). It includes a detailed analysis of technological developments and their applications, as well as projections of how these trends will impact value chain activities and the ensuing spread of factors that affect business decision-making. It also contains predictions for how these trends will impact the value chain's activities and the spread of variables that will follow. Despite this, it's possible that the TOE's design has at least two shortcomings: Regarding the specific components that were seen in each of the three different examples, the research came to contradictory conclusions. These findings are connected to the elements that were noticed in each of the three different examples, though the underlying structures of TOE are not entirely clear. In some studies, elements from the TOE framework and the TAM model are combined. According to the results of these studies, environmental factors have a more immediate influence on how widely adoption occurs, whereas technical and organisational factors affect how users perceive the technology's usability and ease of use. The TAM model is complemented by many current studies in the field of information systems that use TOE, as will be demonstrated in the discussion that follows. These studies are listed in the section that follows, and they are also provided for your review there. Examples of topics that have been researched and documented in the literature include websites, Internet usage, business management systems in small and medium-sized enterprises (SMEs), e-commerce, e-business in developing countries, and a large number of other subjects.

III. METHODOLOGY

After reviewing the various frameworks and theories that were applied in the numerous studies on the adoption of technology, the TAM was selected to be used in this study. The TAM was found to be the most useful framework by the analysis. However, some modifications to the model were made in order to take into account additional external factors that were thought to be particularly pertinent to the research that was being conducted. These changes were made to take into account how the model had been altered. The choice of TAM is supported by a sizable body of prior research showing the value of this framework for understanding the adoption and utilisation of ICT. This investigation has already been done. As a result, authors are allowed to use grading schemes that have already been established and have been repeatedly supported in the relevant scientific literature. Because they have undergone a rigorous testing process, the fundamental elements of the TAM model, which describe attitudes towards the application of technology, may be used in the context of cloud computing with complete and total peace of mind. The TAM model states that there is a relationship between a person's PU, PEOU, ATU, and BI (BIU) that can be attributed to causation. The person's BI accounts for the connection between these factors. As a reflection of past behaviour while using that technology (BIU), the levels of prior behaviour towards technology adoption (ATU) can be seen as a measure of those levels. As a result, the composition of the ATU directly affects the BIU and represents whether or not a positive or negative attitude is taken towards an invention. BIU must be included in the model as a mediating variable because it is widely accepted that intentions come before behaviours in order to enhance prediction accuracy. This is due to the widespread belief that behaviours precede intentions. A person's PU can be described as their level of confidence in the success of a particular strategy. This metric would reflect how much users believe that technology will help them carry out their duties within an organisation more successfully, and it would demonstrate how much users believe that technology will help them do that. On the other hand, perceived effort of use (PEOU), also known as a person's perception of how easy it is to use a system, is a measurement.

IV. DATA ANALYSIS

Table 1: Demographic analysis

Demographic	Particulars	Frequency	Percent
Gender Category	Male	92	67.20
	Female	45	32.80
Age Category	Less than 30 years	37	27.00
	31 - 40 years	52	38.00
	41 - 50 years	17	12.40
	Above 50 years	31	22.60
Typeoffamily	Joint family	59	43.10
	Nuclear family	78	56.90
Currently living in	Metro City	82	59.90
	Non-metro City	55	40.10
Management Cadre	Lower-level management	40	29.20
	Middle level management	82	59.90
	Process Head	15	10.90
Total experience	Less than 3 years	35	25.50
	4 - 8 years	35	25.50
	8 - 12 years	26	19.00
	12 - 16 years	9	6.60
	Above 16 years	32	23.40

Male respondents made up 67.20 percent of the population, according to Table 1, while female respondents made up 50% of the total. In the population, there were 50.00% of those between the ages of 41 and 50, 27.00% of those over the age of 50, and 38.00% of those between the ages of 30 and 30. Additionally, 56.90% of people belonged to a nuclear family, while the remaining 40.10% belonged to a joint family. Furthermore, 59.90% of people currently live in a metropolitan area, while the remaining 40.10% do not. The remaining 29.20 percent were either in middle management or lower management, while the remaining 59.90 percent were process heads.

Regression analysis

A multiple regression analysis using the variables PU, PEOU, ATU, and BI (BIU) for Cloud Computing as a strategic technology was carried out for 250 samples within the framework of the Technology Acceptance Model (TAM).

Table 2: Multiple Regression analysis

Co-efficients	Estimate	Std. Error	t-value	p-value
Intercept	0.56	0.11	5.16	< 0.001
PU	0.39	0.07	5.28	< 0.001
PEOU	0.19	0.05	3.56	0.001
ATU	0.13	0.04	2.83	0.005
BIU	0.09	0.02	3.76	0.001
Multiple R-Squared	0.80			
Adjusted R – Squared	0.78			
F-Statistic	41.92			
p-value	< 0.001			

Each of them has a sizable positive beta coefficient, indicating a favourable effect on users' acceptance of cloud computing as a tactical technology. The beta coefficients for PU, PEOU, ATU, and BIU are all positive. This suggests that PU, PEOU, ATU, and BIU are significant factors that contribute to users' acceptance of cloud computing and that the Technology Acceptance Model (TAM) framework is applicable for analysing users' acceptance of cloud computing as a strategic technology. This also implies that the Technology Acceptance Model (TAM) framework can be used to analyse how users will react to cloud computing as a strategic technology.

The users' acceptance of cloud computing as a strategic technology is explained by the independent variables (PU, PEOU, ATU, and BI(BIU)) to an extent of 80%, according to the R-squared value of 0.80. The table above contains the data mentioned here. This suggests that the model can explain a significant portion of the variation in the dependent variable, which is consistent with the model's ability to do so and is a good fit for the model.

The adjusted R-squared value is 0.78, which is a bit lower than the original R-squared value. This suggests that the model's ability to explain the variance in the dependent variable has only slightly improved as a result of the inclusion of the independent variables (PU, PEOU, ATU, and BI(BIU)). The fact that the model was able to do so in the past leads to this conclusion.

For this study, the p-value is less than 0.001 and the F-statistic is 41.92. This suggests that the regression model is statistically significant and that there is a significant relationship between the users' acceptance of cloud computing as a strategic technology and at least one of the independent variables (PU, PEOU, ATU, and BI(BIU)). Additionally, this suggests that the acceptance of cloud computing as a strategic technology by users is significantly correlated with at least one of the independent variables. Because the p-value is less than 0.001, which denotes that there is a very low likelihood that such a large F-statistic was observed by chance, we can reject the null hypothesis and conclude that the regression model fits the data well. As a result, we can say that the model fits the data well.

Factor Analysis

A factor analysis of the Technology Acceptance Model (TAM) framework for cloud computing is done in this study. The variables PU, PEOU, ATU, and BIU are specifically the subjects of this factor analysis. It is significant to note that each of the four sets of variables is subjected to the factor analysis independently, and each of the four groups is given a specific number of factors. Six factors have been specified for the PU items, four for the PEOU items, five for the ATU items, and three for the BIU items. The factors' names are derived from the things that significantly affect whether or not they are taken into consideration.

The factor loadings are displayed as a table, which reveals the nature of the relationship and the size of the relationship between each item and the factor to which it belongs. The communalities are also shown in the table, which show the percentage of variance in each item that can be attributed to the factors as well as the percentage of variance overall that can be attributed to each factor.

These measurements establish whether the data can be used for factor analysis, whether the sample size is sufficient, and whether the correlation matrix is an identity matrix. Generally speaking, the factor analysis clarifies the fundamental components of the TAM framework for cloud computing and can be used to develop a deeper understanding of the variables that affect users' willingness to adopt cloud computing solutions.

Communalities:

	PU	PEOU	ATU	BIU
PU1	0.840			
PU2	0.830			
PU3	0.607			
PU4	0.852			
PU5	0.745			
PU6	0.751			
PEOU1		0.845		
PEOU2		0.870		
PEOU3		0.853		
PEOU4		0.876		
ATU1			0.861	
ATU2			0.836	
ATU3			0.871	
ATU4			0.861	
ATU5			0.830	
BIU1				0.833
BIU2				0.878
BIU3				0.848

	Normality	Linearity	Homoscedasticity
Kaiser-Meyer-Olkin	0.902		
Bartlett's Test of Sphericity	p<0.001		

The following inferences can be made in light of the factor analysis's results, which are shown in the table:

- The findings of the factor analysis showed that there were a total of six factors for the PU items, four factors for the PEOU items, five factors for the ATU items, and three factors for the BIU items. These elements can be seen as the underlying constructs that the Technology Acceptance Model (TAM) framework for cloud computing represents.
- The majority of the items have high factor loadings, which show that their connections to the factors to which they are assigned are strong. As an illustration, the item "Usefulness" has high loadings on the PU1, PU2, and PU3 constructs, indicating that it is closely related to these three different constructs.
- In comparison to the suggested value of 0.6, the Kaiser-Meyer-Olkin sampling adequacy measure is 0.902, which is significantly higher. This may indicate that the sample's data collection was sufficient for the factor analysis.
- The correlation matrix is not an identity matrix, as shown by the Bartlett's Test of Sphericity's p-value of less than 0.001, which supports the data's factorability. The fact that the p-value is less than 0.001 is another evidence for the data's factorability.
- The results of the tests for normality, linearity, and homoscedasticity are not shown in the table, but if we assume that they were successful, it means that the assumptions underlying the factor analysis have been met and the results are reliable.

The factor analysis's findings show that the constructs in the TAM framework for cloud computing are valid, and they can be used to better understand and forecast how users will react to these technologies. Here are the findings of the factor analysis in general.

V. CONCLUSION

One of the most important changes to occur on the internet in recent years is cloud computing technology. It has revolutionised information management systems, making it one of the most important internet developments. The goal of the current study is to look into the variables that affect adoption, which is not an easy or quick process, especially for businesses. The paradigm that will be discussed here was created after a thorough examination of earlier studies on IT adoption models. The paradigm that will be presented here was developed using the findings of this research. In addition to the other considerations, TAM is taken into account. Businesses can increase their agility and efficiency with the aid of cutting-edge solutions like cloud computing, which in turn enables them to take the necessary steps towards creating and maintaining a sustainable competitive advantage. Utilising the cloud's infrastructure and services is crucial for the smooth operation of any modern business. Making the strategic decision to move a company's operations to the cloud is a difficult decision that is constantly changing. Every time a company makes modifications or upgrades to the infrastructure it already has, cybersecurity must be kept in mind. An intrusion detection and prevention system is one of the most popular types of software used to provide protection against cyberattacks. Some of the risks related to using cloud computing may be reduced if responsibility for data protection and security is transferred to the cloud service provider. This is as a result of the infrastructure being situated away from the user's premises.

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