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Improving Cloud Computing Adoption in Saudi Business Organizations - A Novice to Expert Case

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----------***ABSTRACT***----------
Cloud computing technologically transformed various areas like businesses, academic, healthcare and government sector. This computing platform offers diversified on-demand provisions for business sector to improve the business performance, lower development, procurement, implementation and maintenance cost. The main objective of the study is to adapt and enhance the Technology Acceptance Model (TAM 3) to validate and verify the results using the proposed enrichments in TAM3 particularly in Saudi Arabia. This study will examine the literature gap to find the key factors that affect the adoption of new technologies in general and will instill some new variable-constructs and paths, which will bring in depth, more credible required information for adoption of cloud computing in Saudi business organizations.
KEYWORDS: *Cloud Computing, Technology Acceptance Model-TAM3, variable-constructs & paths.*

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I. INTRODUCTION

Cloud computing has recently achieved extensive acceptance level worldwide and appreciation from information technology (IT) companies and particularly business organizations. Cloud computing is an improved computing paradigm catering instant computing resources from a well-organized pool of resources. It also supports the payment plan known as 'Pay-as You-Go'. Cloud customers can rent computing resources, like processing power, disk space, memory, network or even an application, as per the consumer's demand (Fernandes *et al.*, 2016).

Cloud Computing Technology is defined as under:

"*Model for enabling pervasive, convenient, on-demand network access to a shared pool of configurable computing resources (networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"* (Hassan *et al.*, 2017)

Cloud computing allows users an efficient, portable and secure use of applications without need of installing the software on their own devices and to access applications anytime from anywhere and from any device which will certainly reduce hardware and software procurement and maintenance cost (Aljowaidi, Arbia and Arabia, 2015), (Tashkandi, A., & Al-Jabri, 2013).

1.1 Problem Statement:

Recent research studies have positively confirmed that the computing future lies in cloud computing technology. Some of the main outcome of research studies are that cloud computing adoption will certainly reduce the computing cost, increases the business productivity, data access with local and remote accessibility, reliability, and flexibility and more importantly, it minimizes the business process response-time and maximizes the throughput (Waqar and Ghazaleh, 2017). This has also been observed that cloud technology has to be used with its full fledge spectrum not as a split part of the cloud model to get maximum benefits out of it. Following will briefly explain some of the relevant research conducted in the adoption of cloud computing:

1.1.1 Research Problem: Business organizations has not adopted the best practices and capacities of cloud computing, which could help in enhancing the adoption of cloud computing. This serious concern still has not been realized and understood by the business organizations, particularly in the developing countries like Saudi Arabia. There is a serious apprehension regarding the users who wish to adopt the cloud computing technology categorized as Novice/Beginners. Literature review has pointed out that these type of users need more skills to adopt the newly introduced technologies. Novice/Beginner users are very low in accepting the cloud computing technology especially when it comes to perform official

tasks using the cloud application. These type of users are not fully conversant with the new cloud platforms and need more motivation in terms of social encouragement, multi-language support and level of perceived satisfaction. Therefore, current research is initiated to focus on these areas of perceived apprehension and will try to bridge this gap between Novice and Expert and conduct a study to find out the key factors, which can address core concerns and will improve the adoption of cloud computing in Saudi business organizations in general relating to the Novice and Expert by focusing different Saudi business organizations and institutions.

1.1.2 Research Goal: The primary goal of research is to create an awareness among different businesses that cloud computing adoption will certainly lessen the IT cost and to give better control and expertise on the application and data stored and accessed on the cloud server/data centers. However, this will only be possible when correct cloud platform with its full capabilities will be chosen for the business. Therefore, current research will focus and study that businesses must adopt the most appropriate cloud platform not only the part of the cloud model or strategy, which could enhance the cloud adoption among the Novices in particular.

1.1.3 Research Target: The primary target of the research is to study the relevant business sectors and collect the data for analysis, which can address the core research problem and perform the most appropriate analysis and come up with appropriate research outcomes. Furthermore, the study outcome should prove and must convey that the cloud computing technology is a parallel business platform, which decrease the IT cost of businesses and give better control on the cloud servers and data centers.

1.1.4 Research Study Rationale: Most of the studies in the recent past have not focused on organizational factors of Novice users. It is very important to identify the key factors of adoption of cloud computing technology to get better self-elaborative understanding of the current research study. This study will mainly focus on the key factors, which can further influence the cloud computing adoption in Saudi business organizations in particular for the Novice users.

II. CLOUD COMPUTING

In last around twenty years' time, cloud computing has been the key area for researchers and for individuals as well to bring out the better and enriched understanding regarding the technology and the usage of the technology (Krogh, 2013). That is why it is being defined in many different ways by different authors as per their experience and study approach.

National Institute of Standards and Technology (NIST), Information Technology Laboratory has explained by using following observations about cloud computing definitions (Alhammadi, Stanier and Eardley, 2015).

Like, some researchers reviewed many cloud definitions from different research studies and defined cloud computing with better and more understandable definition, which is as under:

> *"A large pool of easily usable and accessible virtualized resources (such as hardware, development platforms and/or services). These resources can be dynamically reconfigured to adjust to a variable load (scale), allowing also for an optimum resource utilization. This pool of resources is typically exploited by a pay-per-use model in which guarantees are offered by the Infrastructure Provider by means of customized Service-Level Agreements (SLAs)"* (Vaquero et al., 2009).

Buyya has defined cloud computing as under:

> *"A type of parallel and distributed system consisting of a collection of inter-connected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resource(s) based on service-level agreements established through negotiation between the service provider and consumers"* (Buyya, 2009).

Moreover, National Institute of Standards and Technology (NIST) called cloud computing as given below:

> *"A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"* (Vaquero et al., 2009).

2.1 Components of Cloud Computing:

Cloud computing is based on following two service platforms, first typically based on the cloud delivery, consists of a front-end platform like thick and thin clients and mobile device and second the back-end platforms like servers and storage over a network i.e. Internet, Intranet, Inter-cloud. Following are main cloud components:

2.1.1 *Cloud Clients:* Cloud customers are computing devices that are utilized by clients to get to the resources utilizing the cloud computing facilities. Customers are additionally classified into three categories, THIN, and THICK kind of users (Hung *et al.*, 2016). Thin clients are without capacity drives sand users so they just show data by utilizing least equipment and lessen IT cost and expanded security, creating less communication and power utilization (Peter Mell and Tim Grance, 2009).

2.1.2 ***Cloud Data Center:*** A data center is a facility equipped with physical or virtual server computer and some other network components, like tele-com and storage systems that host cloud service applications (Badie, Razak and Hussin, 2015).

2.1.3 ***Cloud Distributed Servers:*** Distributed computing contains computers in geographically dispersed locations connected to collaborate on computer-intensive tasks. *Distributed servers* are more than one servers spread over an extensive terrestrial location (Xu, Yuan and Xue, 2014).

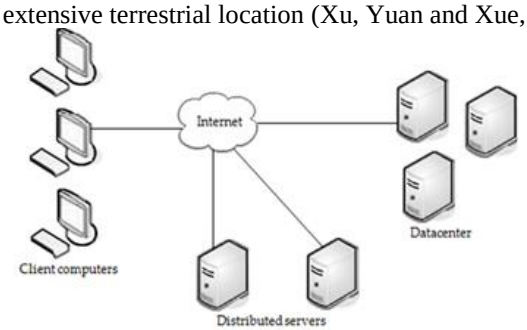

Figure 1: Components of cloud computing **(Pandith, 2014)**

III. CLOUD COMPUTING SERVICE MODELS:

Cloud computing platform is model, which supports a pervasive and appropriate on-demand network assess to share the applications and services over a configured network servers and storage that can be accessed in a much easier way without putting some extra efforts. It has been further explained that cloud computing has important features such as broader network access, availability flexible measured services, swift elasticity and resource pooling (Dwyer, 2016). Some of important benefits of cloud computing are as under (Alsanea and Wainwright, 2014), (Alam and Shakil, 2015):

- Low-level general to technical barriers to join the cloud computing.
- Low costs in terms of purchasing or using new hardware/software.
- Increased access mobility and capability of service.
- Improved security mechanism in using the technology.
- Strong compliance with modern international standards for the technology.
- Cloud services user's provision to users and consumers.
- More reliable software admittance from anywhere at any time.
- Cloud enabled processing power and on-demand storage.

Cloud computing has difference type of models based on the service provided by the cloud provider. Below are some of cloud models:

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

Comparison of the above mentioned service models is illustrated in the table below:

CLOUD SERVICE MODEL COMPARISON				
Service Models	Service Type	Flexibility/ Generality	Difficulty Level	Scale and Example
IaaS	Storage, Network Resources	High	Difficult	Large, Amazon EC2
PaaS	Application Hosting Environment	Middle	Middle	Middle, Google App Engine
SaaS	Application with Specific Function	Low	Easy	Small, Salesforce CRM

Table 1: Cloud Service Models, Tian and Zhao, 2015

3.1 Cloud Computing Deployment Models:

Different cloud models have been developed for cloud deployment to provide efficient services to consumers as per their technical, business and operational requirements. Cloud computing grants different four types of settings where clients can select to arrange their cloud applications. Public, private, hybrid and community are the main disposition patterns of cloud computing (Alghanim, 2017). More detail description of the cloud deployment models is given below:

3.1.1 ***Private Cloud****:* Researchers believe that private cloud is an alternative distribution paradigm for cloud services. Assets, in this paradigm, are fully dedicated for the organization; thus, no anonymous organization can participate in those assets which can be hosted in the enterprise headquarter or outside. Private clouds include Eucalyptus and OpenNebul (Nwobodo, 2015).

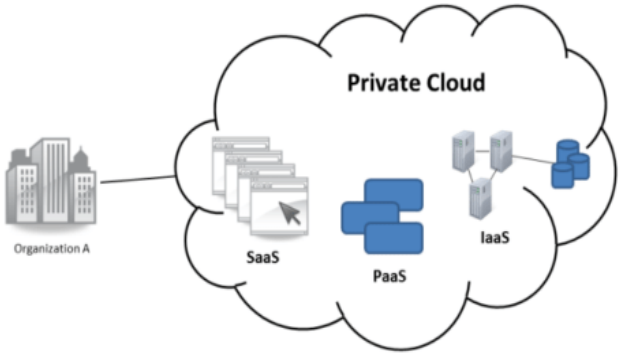

Figure 2: (https://www.cisco.com) Accessed on 12-10-2017

3.1.2 ***Community Cloud****:* Community cloud in collaborative computing where infrastructure is shared among group of organizations from a common perspective to serve and provide the security, compliance, jurisdiction, etc. managed internally by the cloud provider or an outsourced cloud service and hosted locally or remotely (Nwobodo, 2015). Alternative study has been made, which has given a precise definition of the community cloud is as under:

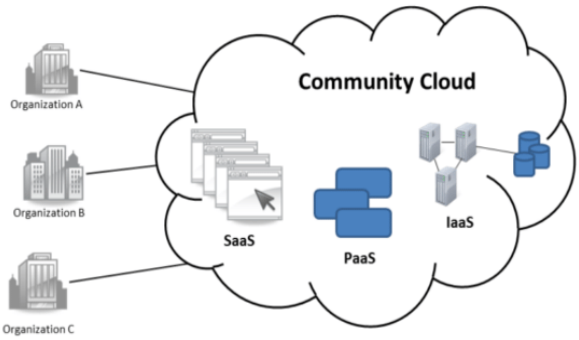

Figure 3: (https://www.cisco.com) Accessed on 12-10-2017

3.1.3 ***Public Cloud:*** Margaret Rouse believes that cloud suppliers cater all cloud assets like CPU, RAM, storage, network, software and application and many others and make them accessible to everyone in the public. Some of these services are carted at no cost whereas some of which are carted based on the how much the plan is utilized. "Amazon Elastic Compute Cloud (EC2), IBM's Blue Cloud, Sun Cloud, Google AppEngine and Windows Azure Services Platform are some of public cloud instances" (Waqar and Ghazaleh, 2017).

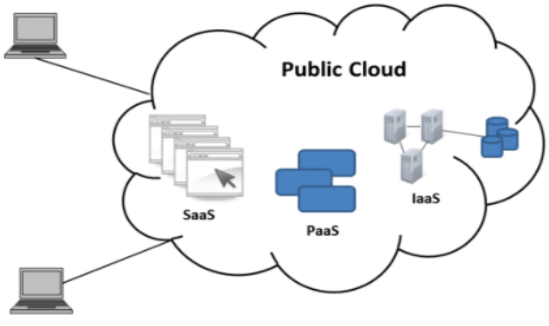

Figure 4: (https://www.cisco.com) Accessed on 12-10-2017

3.1.4 ***Hybrid Cloud:*** It is an arrangement of a private cloud setup and hosted locally in an organization data center and public cloud setup leased from one of the providers of public cloud accompanied by adaptation between the two setups (Saudi's Report, 2015). Amazon Web Services (AWS) is used to

orchestrate the links between private and public cloud. An example for hybrid cloud setup for data backup and archiving is Amazon Simple Storage Service (Amazon S3) (Wang, 2017).

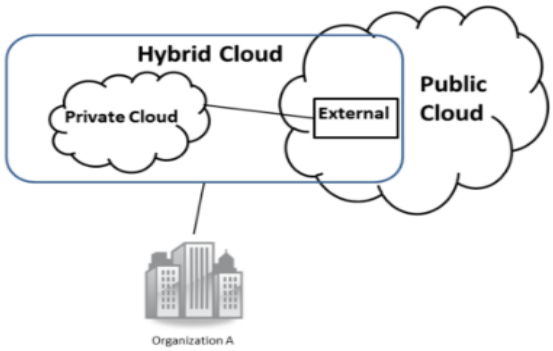

Figure 5: (https://www.cisco.com) Accessed on 12-10-2017

IV. CLOUD COMPUTING SITUATION IN SAUDI ARABIA:

In the current past, business associations around the globe are adopting cloud computing to get its expanded advantages for the business growth in current and future perspective. Saudi Arabia is among the greater part of the nations that use ICT, as it were, in their business affiliations and now Saudi Arabia is one of the fundamental appropriated processing adopters in the Arab world (Saudi's Report, 2015), (Alsanea and Wainwright, 2014). Some of other cloud service providers in Saudi Arabia are following:

- *Mobily:* Provides VMware-based services to customers (AlBar & Hoque, 2015).
- *AWAL:* HP, IBM, Cisco, Dell partners (AlBar & Hoque, 2015).
- *Saudi Telecom Company - STC:* Oracle partner to provide PaaS and SaaS (AlBar & Hoque, 2015).

4.1 Technology Acceptance Model – A Historical Perspective

Based on the review of current research studies, literature showed that the studies taken place in the recent times have studied only few aspects of the customer satisfaction and service quality in the telecommunication sector on any country, likewise Saudi Arabia. Literature GAP has been identified in these studies in a comprehensive comparison, which studies the profitability of the concerned segments were not addressed in a larger prospect.

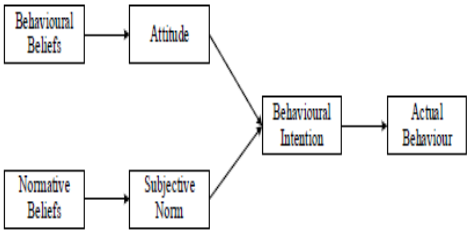

Figure 6: Theory of Reasoned Action (TRA), 1980

In early 1970s, technology was taking place in different walk of life and system failure was one of the most serious concern for business organizations, which in reality affects the user intention and behavior to adopt and accept the technology. Fred Davis recommended Technology Acceptance Model (TAM) in his PhD thesis in 1985. He proposed and suggested that "Any technology and system use is response that can be explained or predicted by user motivation, which, in turn, is directly influenced by an external stimulus consisting of the actual system features and capabilities" (Davis, 2009).

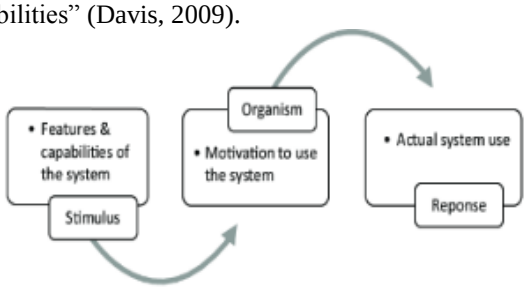

Figure 7: Conceptual Model of TAM, 1985

Following are some of the main developmental convergences with reference to the TAM:

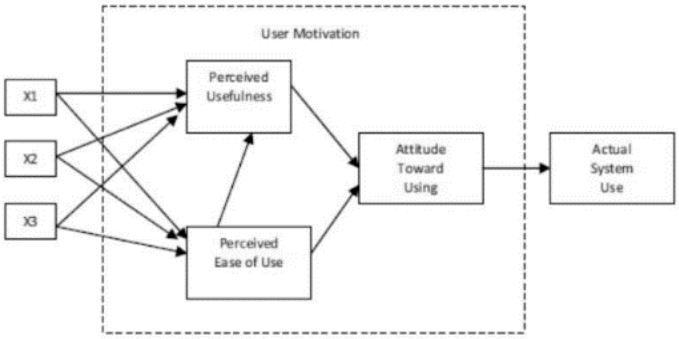

Figure 8: Original TAM (Davis, 1986)

The Technology Acceptance Model (TAM) is generally described as an Information based System hypothesis, which demonstrates that at what level computer or computing can be accepted and utilized in the modern and changing innovative technology based platforms. TAM addresses these user's behaviors at deeper level, as newly proposed model changes the user's perception level of using the newer platform and it affects the convenience level in using the new technology or the platform. Following are the two very basic points of TAM to examine the technology acceptance level of the user (Davis, 2009):

- ***Perceived Usefulness (PU):*** Perceived Usefulness is described by author of the TAM model "as the degree to which a person believes that using a particular system would enhance his or her job performance".
- ***Perceived Ease-of-Use (PEOU):*** Perceived Ease of Use is defined by author of TAM model "as the degree to which a person believes that using a particular system would be free from effort".

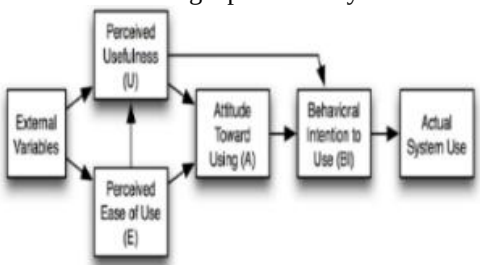

Figure 9: Revised version of TAM (Davis and Warshaw, 1989)

This most updated description of Technology Acceptance Model was examined & finalized based on different study findings and outcomes associated with perceived usefulness and perceived ease of use in place of attitude will prove better in terms of observations and findings. These multiple research studies certified that behavioral intention has direct influence on both perceived usefulness and perceived ease of use (Bharadwaj and Lal, 2012). Venkatesh and Davis in 1996 as shown figure below:

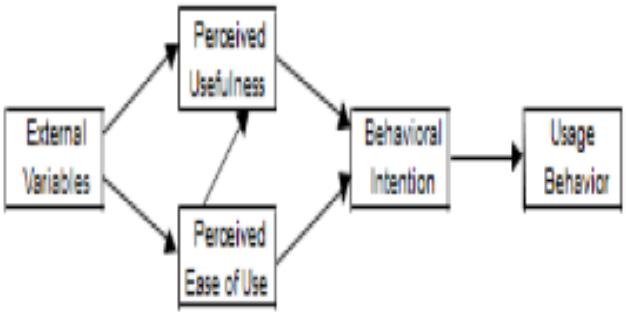

Figure 10: Final version of TAM (Venkatesh and Davis, 1996)

4.2 ***TAM - Limitations:*** As this first TAM model was broadly used in different research studies to examine the acceptance level of any new technology because mostly it was generally used in general testing environments. Some of other important reported after examining the TAM weaknesses are as under:

- Critical GAP in the TAM structure related to intentional behavior intention where behavior is considered as goal of the user (Tarhini, 2013).

- Lack of a detailed methodology to identify key elements of Perceived Usefulness and Perceived Ease of Use (Rahbi, 2017).
- Group, social and cultural elements were ignored in key decision making in relation with the impact of one's emotions (Sidek, 2015), (Rahbi, 2017).
- Over dependence on only deterministic theoretical framework by not bearing in mind about self-regulation research procedures (Chiu, Chen and Chen, 2017).
- Classification of mandatory and voluntary situations were not met as were supposed to be addressed (Chiu, Chen and Chen, 2017).

Most of the researcher have been criticized TAM but at the same time, it was mostly used as one of the top most model for evaluating and analyzing the behavioral intention. There were some other research studies to further extend the original TAM by adapting to the newly implied amendments in the system in the modern environment of information technology to level of chaos based on the confusing environment or otherwise (Kanat and Ozkan, 2009).

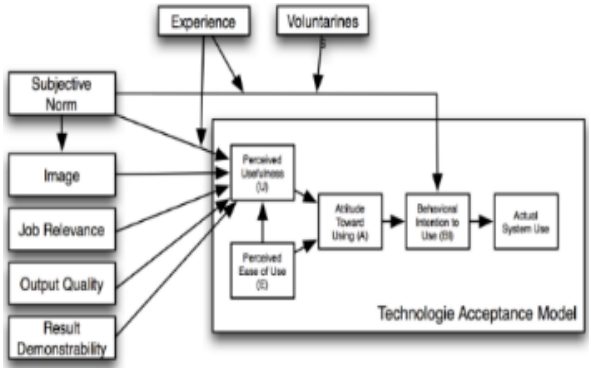

Figure 11: TAM 2 (Venkatesh and Davis, 2000)

- ***Subjective Norm:*** Subjective norm is defined "as an individual's perception of whether people important to the individual think the behavior should be performed" (Venkatesh, 2000).
- ***Image:*** It is known as "The degree to which use of an innovation is perceived to enhance one's image or status in one's social system" (Venkatesh, 2000).
- ***Job Relevance:*** It refers to "the capabilities of a system to enhance and individual's job performance" (Venkatesh, 2000).
- ***Output Quality:*** Which denotes to "the degree to which an individual believes that the system performs his or her job tasks well" (Venkatesh, 2000).
- ***Result Demonstrability*:** Which degree to "which the results of adopting/using the IS innovation are observable and communicable to others" (Venkatesh, 2000).

In 2008, they merged both models into one and proposed an enhanced and integrated technology acceptance model, named as Technology Acceptance Model3. They added further constructs into the TAM3, like individual differences, system characteristics, social influence and facilitating conditions, the most fundamental and key elements of perceived usefulness and perceived ease of use. In 2008, Venkatesh and Bala (2008) suggested a most modified and almost up to some extend complete form of TAM with a better attention on effect of intermediations on technology acceptance and more practical and fruitful use of information technology to handle with the mostly recognized flaws by some of the researchers (Venkatesh, 2000). The adapted and modified proposed model as an extension to original TAM and named as TAM3.

V. RESEARCH STUDY MODEL RATIONALE:

In the past all segments, the innovation appropriation speculations and models were disclosed and analyzed to pick a reasonable and demonstrated model for the proposed region of the investigation, which could support to accomplish the principle inquire about targets of the examination to address at various levels of the exploration questions? Now of discourse, it is likewise relevant to specify that the vast majority of the innovation acknowledgment models used to upgrade the selection level, particularly in reception of the distributed computing advances in Saudi business associations are recorded here:

- Technology Acceptance Model (TAM)
- Technology-Organization-Environment Framework (TOE)
- Unified Theory of Acceptance and Use of Technology (UTAUT)
- Diffusion of Innovations (DOI)

Nevertheless, paying little heed to each one of those positive improvement in these models, the vast majority of these exploration models since the origin were reprimanded by the analysts due to numerous general to genuine

level concerns and restrictions that were accounted for in a large portion of the examination thinks about. A portion of the distinguished concerns and constraints are as under:

- Weak level of expectation of study results.
- Absence of distinguishing the purchaser sentiments that would be proper just in a particular conduct.
- Lack of impact impression of shopper control and social factors on conduct.
- Lack of central results of predefined causes and inability to address imperative data framework's appropriation variable develops.
- Incapable of adjusting the cloud advancements in differing variable circumstances.

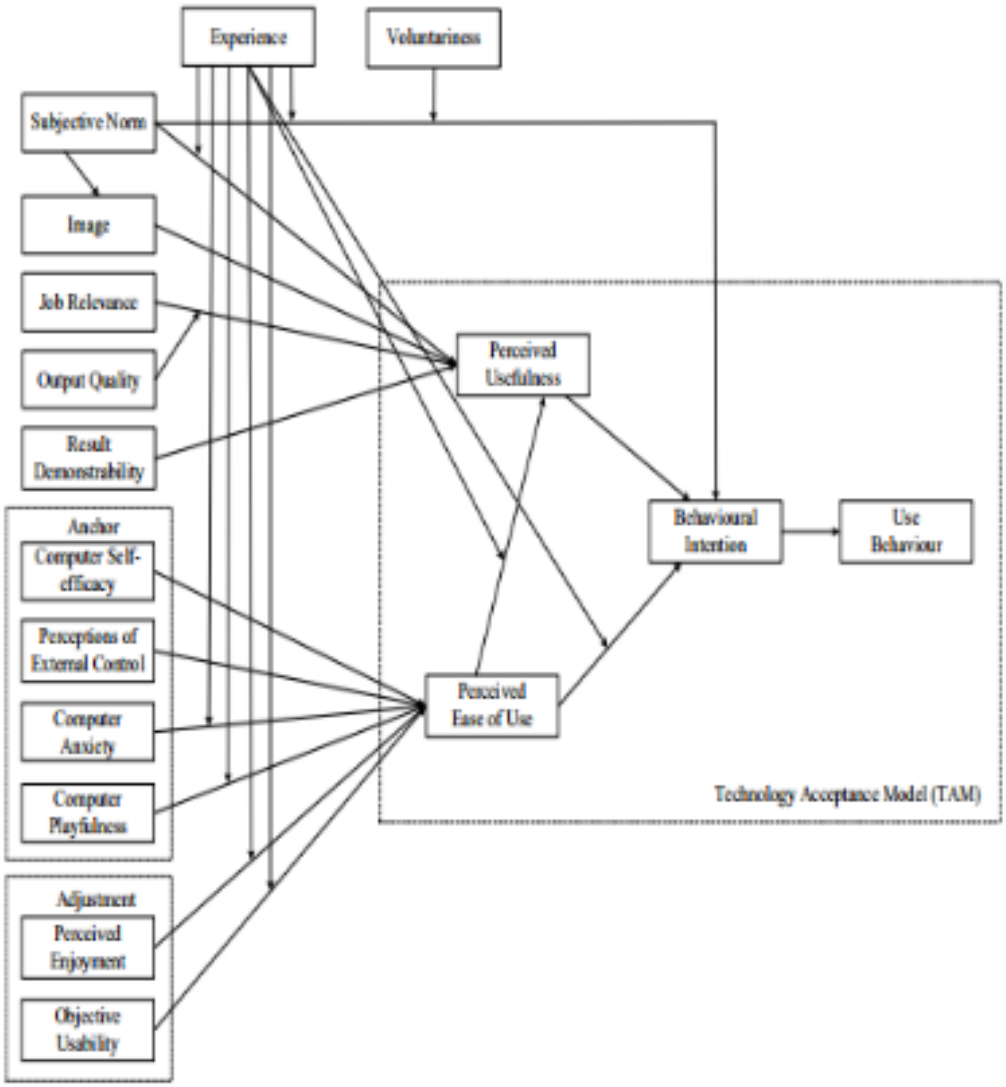

Figure 12: Technology Acceptance Model - TAM 3 (Venkatesh and Bala, 2008)

5.1 Extension of TAM3 for the Study: This has been observed through the literature review that there is space of extending the TAM3 to Novice and Expert level. This extended model will give better insight of the adoption of cloud computing particularly with reference to the Novices. For this purpose, an application has been developed and diverse participants have been selected like students, teachers and general staff, who are not good in interacting with the computer and internet.

5.2 Practical Session for Novice to Expert: This practical session was planned for around two hour's duration. Where first thirty minutes were used to give a brief introduction of the practical session including live demonstration of the application to help, guide and facilitate Novice/Beginner participants in performing the tasks during the entire practical session. This session took around one hour in a computer lab. Participants performed tasks on a purpose-based built application available at the link http://www.zasoft.org/products/JIC/myHome.aspx.

5.3 Proposed Model for the Study: Researcher has proposed a small model for analyzing the Novice to Expert ratio. Both external variables have been used to influence the perceived ease of use and perceived usefulness directly and indirectly. Following is the proposed model for the study:

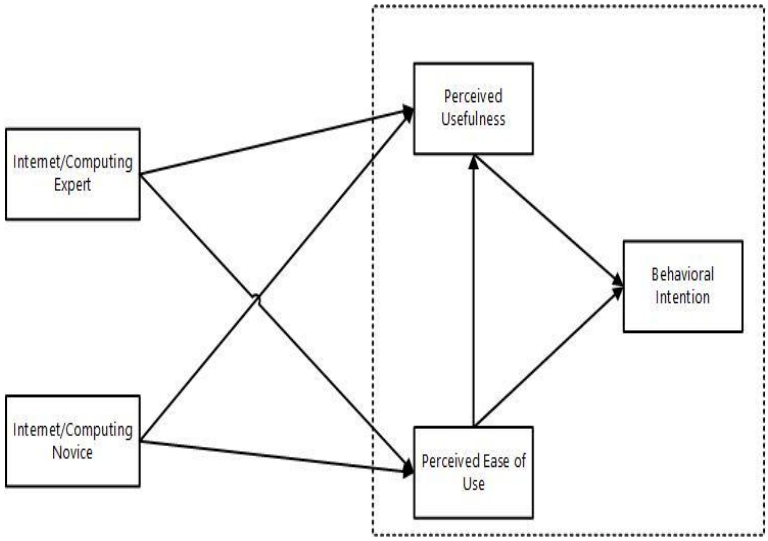

Figure 13: Proposed Model for Research Study

5.4 Data Analysis: Data collected has proven some sort of important contributions as per the proposed research model for the study: Below is the detail:

5.4.1 Measurement Models Assessment: Essentially, an important aspect in PLS model evaluation is the presentation of measurement model results, which focuses on ascertaining of individual item reliability, internal consistency reliability, convergent validity and discriminant validity of the study measures. Which are to normally used to exemplify each construct of the research model (Low, Chen and Wu, 2011), (Kothari, 2004), (Saunders, Lewis and Thornhill, 2008).

5.4.2 Internal Consistency: Internal consistency unwavering quality alludes to "the degree to which estimations are repeatable when diverse people play out the estimations, on various events, under various conditions, with as far as anyone knows elective instruments which measure a similar thing" (Drost, 2011). Cronbach's alpha coefficient and composite unwavering quality coefficient are the most usually utilized estimators of the internal consistency dependability of an instrument by hierarchical scientists (Lo, Ramayah and Kui, 2013). In this investigation, composite unwavering quality coefficient was determined the inward consistency dependability of measures for the accompanying reasons. Initially, composite dependability coefficient gives a considerably less one-sided gauge of unwavering quality than Cronbach's alpha coefficient on the grounds that the later expect all things contribute similarly to its develop without thinking about the real commitment of individual loadings. Furthermore, Cronbach's alpha may over or under-evaluate the scale unwavering quality. The composite dependability considers that markers have diverse loadings and can be deciphered similarly as Cronbach's (that is, regardless of which specific unwavering quality coefficient is utilized, an internal consistency dependability esteem over .70 is viewed as palatable for a sufficient model, while an incentive underneath .60 shows an absence of dependability). Appropriately, the elucidation of internal consistency dependability utilizing composite unwavering quality coefficient depended on benchmark given by specialists, for example, Bagozzi and Yi (1988), Henseler et al. (2009), and also Hair et al. (2014), who suggested that the composite dependability coefficient ought to be more prominent or equivalent to .70. Table 4.6 presents the composite unwavering quality coefficient of each dormant build. As displayed in Table below, the composite unwavering quality coefficient of each dormant develops went from .717 to .865. With each surpassing the base worthy level of .70, proposing the composite dependability coefficient of each idle build has surpassed the benchmark, all things considered it showed sufficient inward consistency dependability of the measures utilized in this examination (Bagozzi, Yi and Phillips, 1991), (Hair, Gabriel and Patel, 2014).

5.4.3 Convergent Validity: Convergent validity is a parameter, which is mostly used to measure the model construct's theoretical relation along with the discriminant validity, which is subtype of construct validity. According to Churchill (1979), "a fundamental principle in science is that any particular construct or trait should be measurable by at least two, and preferably more,

different methods" (Churchill, 1979). Hence, this is the idea behind establishing a convergent validity. Convergent validity therefore, refers to the extent to which a measure correlates highly with other alternative measures of the same construct in terms of performance (Churchill, 1979). To establish convergent validity in the present study, the Average Variance Extracted (AVE) of each latent construct was examined using criterium recommended by Fornell and Larcker (1981). Methodologically, convergent validity is demonstrated if the AVE of each latent construct is .50 or more (Henseler, Ringle and Sarsted, 2014). Following this benchmark for establishing, convergent validity, it can be seen in Table 4 that the AVE value for each latent construct exhibited high loadings (> .50), suggesting that adequate convergent validity.

First Order	Items	Factor Loadings	Average Extracted Value AVE	Composite Reliability CR	Cronbach's α
Behavioral Intention (BI)	BI1	0.7583	0.5046	0.7532	0.5138
	BI2	0.7662			
	BI3	0.7424			
Perceived Usefulness (PU)	PU1	0.7101	0.5401	0.8732	0.8541
	PU2	0.7201			
	PU3	0.801			
	PU4	0.7301			
Perceived Eases of Use (PEU)	PEU 1	0.7223	0.5743	0.8542	0.8432
	PEU 2	0.7341			
	PEU 3	0.8101			
	PEU 4	0.7701			

Table 2: Table Composite Reliability Coefficient

5.4.4 Discriminant Validity: Discriminant validity in fact assess the study measurements, which are not supposed to be related or otherwise to test the correlations evidence that the items on the two test are discriminate, as state by Campbell Fiske (1959). To establish discriminant validity in this study, Fornell and Larcker's (1981) criterion was implemented by paralleling the correlations amongst the latent constructs with square roots of average variance assessed and showed in Table 4.23. Furthermore, as a rule of thumb for establishing discriminant validity, Fornell and Larcker (1981) suggested that the AVE square root should surpass the correlations between latent constructs (Fornell and Larcker, 1981).

Construct/Variable	BI	PU	PEU
Behavioral Intention (BI)	**0.76**		
Perceived Usefulness (PU)	0.23	**0.77**	
Perceived Ease of Use (PEU)	0.35	-0.02	**0.83**

Table 3: Discriminant Validity Analysis

VI. ANALYSIS OF PRACTICAL SESSION:

6.1 Novice and Expert Ratio Calculation: Novice is the participant's category, whose aptitude to adopt in any new technology is very low. For this purpose, participants were asked to write some comments in the three text fields. Therefore, it could be evaluated that how much time they have taken while performing these tasks. It was obvious that beginners will take maximum time, intermediate will take lesser time and the experts will take minimum time to complete the task. The basic purpose of using NOVICE method is performing the NEM (Novice Expert Ratio Method) for making an appropriate comparison between three categories and to assess the time based weightage of the question in demographic section of the questionnaire, where behavioral intention can be identified for each

participant. As suggested by some of the authors in the past "it is to compare the time required by a novice user to the time required by an expert user" (MacDorman *et al.*, 2011).

Thus, NE ratio(R) can be considered by the following equation:

$$Ri = Tn / Te \quad (1)$$

Where Ri stands for NE ratio for step i where i=1 to n for the given tasks and Tn is the average time in minutes/seconds taken by the novice users and Te is the average time in minutes/seconds taken by the expert users. After the calculation of NE ratio for the given task the higher NE ratio was inspected purposely to simplify, why the novice users took more time than the experts did. Copy paste not allowed as participants have to type in the input boxes. Total 12 participants attended the practical session and their calculated performance in the practical session is as under:

Tasks	Task Description	Time Allocated	Novice	Expert	NEM
Task 1	http://www.zasoft.org/products/JIC/myHome.aspx	2-4 Minutes	5	2	2.50
Task 2	Click to **New User** to register in the Application	4 Minutes	5	3	1.67
Task 3	Perform the verification as you receive an email	4 Minutes	3	1	3.00
Task 4	Process the Login	2 Minutes	4	1	4.00
Task 5	Click Purchase Products to initiate the purchase process	2 Minutes	3	2	1.50
Task 6	Fill comments about the product	4 Minutes	6	3	2.00
Task 7	Give comments about the price	4 Minutes	5	2	2.50
Task 8	Write about yourself and your experience in this activity	4 Minutes	6	4	1.50
Task 9	Rate the product level [1o 5]	1 Minutes	2	1	2.00
Task 10	Exit the Application	2 Minutes	2	1	2.00

Table 4: Novice/Beginner to Expert Practical Session Results

As per the above mentioned table, it is clear that time allocated was as per the task requirement for users but the result shows that the Novice/Beginner took more time in contrast to the expert users. Survey participants were asked to perform the practical tasks accordingly. Data has been collected on the key factors to assess the perceived behavioral intention of Novice and Expert users. Some useful information has been obtained by explaining the participants about the activity, which they are going to perform. Table below shows that total 12 respondents' statistical analysis with reference to Time Percent, Relative Percent, Simple Percent and Cumulative Percent is elaborated as the variation between Novice and Expert users:

Novice to Expert: Statistical Data Analysis of Practical Session

Categories	Time %	Relative %	Percent %	Cumulative %
Task 1	2.50	0.11	11%	3.76%
Task 2	1.67	0.07	7%	18.38%
Task 3	3.00	0.13	13%	31.62%
Task 4	4.00	0.18	18%	49.26%
Task 5	1.50	0.07	7%	55.88%
Task 6	2.00	0.09	9%	64.71%
Task 7	2.50	0.11	11%	75.74%
Task 8	1.50	0.07	7%	82.35%
Task 9	2.00	0.09	9%	91.18%
Task 10	2.00	0.09	9%	100.00%
	23	**1.00**	**100%**	

Table 5: Detail of Novice to Expert Ratio Calculation

VII. CONCLUSION

The above argument, perceptions about adoption of cloud computing based on the literature review incorporate diverse views and interpretations. Literature review has proven that there is variance between both Novice and Expert in adoption of cloud computing technology adoption with different hypothetical perceptions, research complications, variables and measurements tools. Particular research structure only focusing on the two factors with reference to the TAM implementation as this enrichment shows better understanding of the Novice and Expert regarding different research problems and objectives, gap analysis and the target market, which are students, faculty and other general staff. It is pertinent to mention here that this will enhance the adoption of cloud computing at both levels and a continuous process of going through will bridge the gap between Novice and Expert. This will also help and guide the future research prospect to further extend it to the next level for better identification, understanding and to contribute the industry etc. in terms of adoption of cloud computing at specifically Novice level.

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