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# **Understanding and Predicting Academic Performance Through Cloud Computing Adoption**

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# **Understanding and Predicting Academic Performance Through Cloud Computing Adoption**

A Research Report submitted

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Accepted by the faculty

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## **Abstract**

The purpose of this study is to investigate the impact of cloud computing adaptation on academic performance and how cloud computing technology directly and indirectly impacting or facilitating the learning environment for students. The research supports the TAM (Technology Acceptance Model) Theory. Data was collected by using an electronic web-based questionnaire completed by 500 online respondents. For data collection, we have to use Partial Least Square (PLS), and Statistical Package examined data for Social Science (SPSS). In which three tests that are Reliability Test, Factor Analysis, and Regression Analyses method were used to analyze the priorities of explanation. A quantitative approach questionnaire has been used to collect the data from online respondents of Karachi. The research shows that cloud computing technology plays a crucial role in the e-learning field. Not only it increases efficiency in academic activities, but it also helps to work effectively. Within no time, students can share, store, and transfer their data information through various electronic devices. This study is initiated to investigate the cloud computing effects on academic activities or e-learning environment. The limitations of this research are sample size, which we have received is 500, which is limited for our study. In the present study, it was unable to approach to all the students of the university as the recent research is conducted only in Karachi city. The survey was undertaken solely by concentrating on how cloud computing affects academic performance. Still, the analysis can also be performed on how cloud computing technology can change the business sector or the corporate sector. We can focus on other variables as well in future researches.

**Keywords:** Cloud Computing, Academic Performance, E-learning.

# **CHAPTER # 1**

# **INTRODUCTION**

## **1.1. Background of the study**

Job attitude and performance of working adults vary across individuals based on their personal needs and wants. Moreover, more and more individuals yearn to fulfill their dreams and desires through their jobs, such as social needs and status recognition. This practice has become the current trend of society to the extent that individuals tend to be more engaged in work than ever to ensure that they meet the minimum standards of living to achieve their targets. With the desire to achieve one's personal needs and wants, the worker has to ensure that the total output and productivity from the paid employment are associated with the real wages offered by the employer. Using Malaysian manufacturing data, Yusof (2008) suggested that there is a long-term relationship between real wages, employment, and productivity in which these three variables are important in labor economics whereby real wages act the main variable out of the three variables. These relationships can be used to explain the concept behind job performance among working adults briefly. Besides that, different organizations have different work environments with distinguishable cultural values, vision, mission, goals, objectives, and targets, regardless of whether they are in the public or private sector. Hence, it is not unusual that similar individuals working in different organizations will have different job performance even when working within the same sector. At the same time, the workplace environment can bring a huge impact on the worker to the extent that it can directly or indirectly affect their attitude and behavior while performing the job. Employers should ensure that a comfortable environment is provided for their employees to work optimally allow them to give their best contribution to the organization. Therefore, the main objective of this study is to investigate what are the major factors that will affect the job performance of working adults in today's society. Job attitude and performance of working adults vary across individuals based on their personal needs and wants.

Moreover, more and more individuals yearn to fulfill their dreams and desires through their jobs, such as social needs and status recognition. This practice has become the current trend of society to the extent that individuals tend to be more engaged in work than ever to ensure that they meet the minimum standards of living to achieve their targets. With the desire to achieve one's personal needs and wants, the worker has to ensure that the total output and productivity from the paid employment are associated with the real wages offered by the employer. Using Malaysian manufacturing data, Yusof (2008) suggested that there is a long-term relationship between real wages, employment, and productivity in which these three variables are important in labor economics, whereby real wages act as the main variable out of the three variables. These relationships can be used to explain the concept behind job performance among working adults briefly. Besides that, different organizations have different work environments with distinguishable cultural values, vision, mission, goals, objectives, and targets, regardless of whether they are in the public or private sector. Hence, it is not unusual that similar individuals working in different organizations will have different job performance even when working within the same sector. At the same time, the workplace environment can bring a huge impact on the worker to the extent that it can directly or indirectly affect their attitude and behavior while performing the job. Employers should ensure that a comfortable environment is provided for their employees to work optimally to allow them to give their best contribution to the organization. Therefore, the main objective of this study is to investigate what are the major factors that will affect the job performance of working adults in today's society. In this competitive era, technology is revolutionizing the world and its population every single day. We are surprised to witness and see the new factors that are introduced towards humanity every day because of IT (Information Technology), one of which is Cloud Computing. Academic

performances do certainly vary on how they are carry forwarded and taken care of. If such methods and terminologies are created, which act as a pathway for this phenomenon, then it not only attains better results but also helps in increasing the positive attaining ratio of academic performance (**Arpaci, 2017**). It is clear that in the current trend of Educational society, sectors constantly seek opportunities to minimize the standards they manage their resources. Cloud computing is an emerging computing phenomenon that ensures to provide opportunities to deliver a vast web of computing services in a way that has not been experienced before. Also, most of the people are familiar with online models such as (**Gmail, WhatsApp, and iCloud**) and all of these models allows the consumer to store their data online as well as create a certain gateway to exchange information more quickly and frequently which is why cloud computing not only helped students and its users to perform better towards their academic but also allows to reduce the hassle to be followed when it comes to information back up and sharing (**Bhatiasevi, V., & Naglis, M. 2016**). Therefore, in this research, we will discuss the impact of cloud computing and educational institutions and identify the key factors that make cloud computing attractive to the educational world or how it impacts it. The main objective is to find out cloud computing's effect on academic performance. The findings indicate that cloud computing provided ease for students and staff both with ease of access and enabling more effective and efficient collaboration within and among the respective groups.

## **1.2. Problem Statement**

The main problem in our culture and society in this modern era is if we analyze the ratio of awareness of such cloud computing platforms that can help you to share information and store it online easily, it is less, and also the reach of people towards it is limited due to being third world country. Bhatiasevi and Naglis (2016) found out that this research on the adoption and usage of

cloud computing in modern education is the first step taken by developing countries. This report highlights how cloud computing influences directly and indirectly towards the academic performance of students. How to attract people towards it and share the knowledge and learning of such IT phenomena. A sample size of 500 Candidates was used in this research model. This report highlights the critical factors of Cloud computing and e-learning and how they impact academic performance while using electronic devices. Arpacı (2017) determined that the usage of cloud computing in the student's life cycle can enhance the information of administration. The center of focus of this research report is to find out is cloud computing and use of it through cellphones attaining positive results on academic performance or not. The results revealed that cloud computing does significantly impact academic performance. The main focus of this research report is to find out what are the significant factors that affect academic performance in both aspects of positivity and negativity.

### **1.3. Research Objective**

The objective of this research is to determine the impact of cloud computing adoption on academic performance.

### **1.4. Research Question**

What is the impact of cloud computing adoption on academic performance?

### **1.5. Significance of the study**

This research identifies the significant relationship which is, directly and indirectly, influencing the academic performance of students and management within the context of cloud computing. In today's era, cloud computing plays an essential role in the life of peoples. Through the

research, a respectable contribution is to be made towards the increasing academic performance of the student and the concept building of cloud computing. The impact is directly related to the IT industry and the education sector. It also helps people to share and store information for their academic life as well as personal life. We believe that this study would have a contribution to the field of IT and education sectors. It provides lots of benefits to the business world as well as the educational world and helps them by providing a better storing and collection of data methods.

### **1.6. Limitations and Delimitations**

According to this research, some limitations are as follows. The research sample size is only 500 respondents, which are not sufficient to justify an entirely reliable or authentic result. Secondly, in our research, we restricted the study to university students only. Other than that, the respondents belong to Karachi only because we had limited time and a limited budget to conduct the study. The research doesn't emphasize business perspective or corporate level as it exclusively focusses on how cloud computing adaptation is necessary and plays a significant role in the academic field or educational level; however, cloud computing is hugely beneficial in a business domain or corporate standards as well, which is not discussed in the research study.

### **1.7. Organization of the study**

The first part covers the Introduction. The rest of the research is composed of 4 segments. Segment 2 is the Literature Review. The methodology has been discussed in segment 3. Segment 4 describes the Findings and Data Analysis of the study. The final section discusses the Conclusion, Policy implications, and Limitations of the study.

# **CHAPTER # 2**

# **LITERATURE REVIEW**

## **2.1. Theoretical Background**

Our research paper support TAM theory. The Technology Acceptance Model, first proposed by David (1985) which consists of core variables of user motivation (i.e., perceived usefulness, perceived ease of use). Technology acceptance model which deals more specifically with the forecast of the acceptability of an information system. The purpose of this model is to predict the agreeableness of a tool and to recognize the modification which must be brought to the framework to make it acceptable to users. This model recommends that the acceptability of an information system is controlled by two main factors (i.e., perceived ease of use and perceived usefulness). Perceived ease of use refers to the degree to which an individual believes that the use of a system will be easy. Perceived usefulness is defined as being the degree to which an individual believes that the use of an order will improve his performance. The implications showed that the TAM model remains the right choice for explaining teacher's adoption of digital technology in the education system (David, 1985). This study to give a better understanding of how students are investing their attributes in using their social media for collaborative learning and in examining factors influencing their use through a theory of technology acceptance model (TAM) to improve collaborative learning that will enhance the student's academic performance among students in University of Malaysia (Al-rahmi, Othman & Musa, 2013). Our study expands the Technology Acceptance Model (TAM) to include technical support and perceived self-efficacy, with the expectation that they impact the usage of Moodle (Sanchez & Heuros, 2010).

## **2.2. Empirical Studies**

Arpaci (2017) examined that the Adoption of cloud computing in education can upgrade the administration of information. The successful administration of information is essential to accomplish high academic performance, efficiency, and effectiveness. This study implemented cloud computing in an authentic learning environment to support information management practices and provided the member with training and education. Pre-tests and post-tests were managed on the first and a week ago of the 14-week intercession. This study purpose to investigate the forerunners and outcomes of cloud computing adoption in education to accomplish knowledge management. Perceived usefulness has been used as a dependent variable, and knowledge sharing, knowledge application, and attitude intention to use have been used as an independent variable. The target population of the research is undergraduate students.

The survey data was collected from 221 college students of public universities in Turkey were broke down by utilizing the structural equation model to approve the research mode; students aged ranged from 17 to 29 years old. A survey questionnaire items were carefully designed in an attempt to content validity. Questionnaire items had been tested in prior studies. The technology acceptance model (TAM) was used in this study. SPSS has been used as a statistical technique to test the research model. This investigation examined the positive relationship between independent variables and dependent variables. The result shows that the perceived usefulness is significantly connected with the expectation of knowledge creation, disclosure, storage, and sharing. The desire for knowledge storage and sharing has a stronger relationship with the apparent value. Creativity and preparation and training are mainly connected with the ease of use perception. The finding recommended that instructive organizations may promote the adoption

of cloud computing in training by expanding the awareness of information management practices.

Sabi, Uzoka, Langmia, and Nieh (2016) determined that Cloud computing is an escapable computing paradigm that has upset how pc infrastructure and services are delivered. Current research trends on cloud computing have been focused on the innovation, application, cost, benefit, and security of cloud computing at the hierarchical level inside small and medium-sized ventured. Cloud computing adoption has been used as a dependent variable, and perceived ease of use has been used as an independent variable. We mean to collected data contemporaneously actual usage of cloud computing will be based on prior usage patterns, beliefs, and attitude as well as the social expectation to use or keep utilizing cloud computing. Five academics approved the survey instrument of this study before the pilot study. Who recommended changes in the structure of some of the questions. Our preliminary sample data was collected through a survey by questionnaire. A research design approach that focuses on the quantitative research design has been chosen for this study because it will allow us to effectively measure the responses of a large scale sample across many countries in sub-Saharan Africa cost-effectively and conveniently. They are using SPSS (Statistical program social sciences) as a statistical tool. The pilot study reliability statistics are, therefore, based on 20 completed questionnaires (n=20). Further, the significant relationship between perceived ease of use is correlated with the intent to adopt and use cloud computing. Results from a pilot study, based on the TAM model, through a survey of university lecturers and IS experts, show reliability and validity of the instrument and support its usage for a more extensive study. The findings recommended that potential contributions to research and suggestions for future studies are discussed. The model can also be utilized in future studies on cloud computing adoption in different sectors, such as small businesses (SMEs).

Bhatiasevi and Naglis (2016) determined that this research is one of the first few look into the adoption and usage of cloud computing in advanced education in the context of developing countries, in this case, Thailand. It proposes stretching out the technology acceptance model to integrate subjective standards, perceived convenience, trust, computer self-efficacy, and programming usefulness to understand better the level of influence that every has on the adoption of cloud in an educational setting. The usage behavior has been used as a dependent variable, and subjective norm, computer self-efficacy, perceived convenience, trust, perceived ease of use, and perceived usefulness has been used as an independent variable. The data was collected from two leading in Thailand, Mahidol University International College, and Thammasat University. The structural equation model was used for the research. A survey has been targeted in college/university students who use cloud computing for educational purposes both outside and inside of the classroom. The participants were mostly aged between 20-22 years old (50.38%) and 17-19 years old (44.53%). The more significant part of the students was the sophomore year (40.71%). The secondary school background of the respondents was a mix of Thai secondary school (47.84%). The most liked or most frequently used software is Google docs at (76.08%). All independent variables are positively related to the dependent variable. A two-step approached was used in this study. The survey was conducted by questionnaire. The survey itself took 15 minutes. A total of 393 questionnaires were distributed, and 390 usable questionnaires were used for the analysis. The Quantitative research design approach has been used was employed for this study, which comprised of developing the questionnaire to administer a survey with usage on their user's cloud computing. The study used TAM as the baseline model. The result of which represented that perceived ease of use, perceived usefulness, intention to use, perceived convenience, trust, and software functionality have statistically

positive relationships towards the cloud computing adoption. Future recommendations that research can be an attempt to investigate what other factors essential in the adoption of cloud are computing with an emphasis on PaaS and IaaS.

Calisir et al. (2014) examined that this study aims to decide the factors affecting blue-collar workers' goal to utilize a web-based learning framework in the pre-implementation stage in the automotive industry. For that reason, an all-inclusive technology acceptance model (TAM) is proposed, which included factors, for example, picture, perceived content quality, and recognized system quality as additions to the essential model. Behavioral intention to use has been used as a dependent variable, and Perceived usefulness and perceived ease of use have been used as an independent variable. The data collected from 546 industrial specialists were utilized to test the proposed research model by Using Linear Structural Relations programming LISREL, Version 8.54. In Turkey, 546 workers, who originated from 52 unique companies out of 22 urban areas in Turkey, agreed to be incorporated as subjects in this study from September 2008 to December 2008. The data was collected through the survey method. The questionnaire designed for a web-based learning framework was created with an extensive review of the literature related to the technology acceptance model and E-learning. In this research model, TAM is the basic model, and the following factors are supported to the TAM to developed the research model, image, perceived content quality, perceived system quality, and anxiety. All the independent variables positively effect on the dependent variable. The result of the study demonstrates that perceived usefulness is the most reliable indicator of behavioral intention to use a web-based learning system. Future recommendations are that contribute to a better understanding of the factors affecting the plan to use web-based learning systems through blue-collar workers. The effects of the demographics characters have not been analyzed in this study.

This study might be combined with qualitative analysis to comprehend and interpret the acceptance of the framework because both qualitative and quantitative aspects may complement each other with regards to user preference.

Ziefle (2002) analyzed that the study focuses on usability, perceived ease of use, and learnability of three different mobile phones (Nokia 3210, Siemens C35i, Motorola P7389). The market for mobile phones has exponentially expanded over the last years and is presently one of the most competitive branches of the technology industry. The dependent variable was measures of effectiveness and efficiency as well as appraisals of the perceived ease of use, according to the standard criteria for ease of use. The first independent variable refers to the complexity of the menu (depth/broadness of the menu tree) and navigation keys (number/usefulness) the Nokia phone had the lowest and the Motorola highest complexity, with the siemens phone going between them. The second independent variable was users' expertise, and learnability 30 novices and 30 specialists comprehended six phone assignments. To evaluate the effects of learnability, tasks were introduced twice. The data was collected with sixty students of different courses, 39 females and 21 males, aged between 22 to 38 years, volunteered to take part in the trial. Members were surveyed about their expertise, according to the questionnaire first, and then randomly assigned to either to Nokia groups, the Siemens group, or the Motorola group. Each group comprised of 20 members, with ten novices and ten specialists. The result shows that the difference between mobile phones concerning effectiveness, efficiency, and learnability was discovered; Nokia users showed the best performance. The remaining two phones didn't differ significantly, although the fact that complicated phone was superior to the telephone of medium unpredictability which had the lower performance. Future recommendations that the man-machine interface to happen too much more prominent significance with the expanding variety

of prospective functionalities. In any event, a specific group of members, highly educated young academics, used to handle different technical gadgets, the high significance of a well-designed interface was demonstrated.

Arpaci (2016) examined that the challenges of mobile phones, for example, reduced transfer speed, computing, and capacity have led manufacturer s and service providers to develop new worth included mobile services. To address these limitations, mobile cloud computing, which offers on-request services include platforms, infrastructure, and programming, has been developed. This study attempts to build a significantly improved research structure based on the technology acceptance model to identify factors that influence students' attitudes towards and intention in utilizing mobile cloud storage service. Attitude intention to use has been used as a dependent variable, and cloud perceived usefulness and perceived ease of use have been used as an independent variable. The data was collected from 262 undergraduate students who were selected for convenience sampling method willingly participated in this study; students aged ranged from 17 to 32 years old. An online survey questionnaire was designed for conducting the questionnaire items had been successfully used in prior studies perceived usefulness and perceived ease of use. The structural equation model (SEM) and the technology acceptance model (TAM) was used in this study. The SPSS AMOS (Version 22.0) has been used as a statistical technique to test the research model. This investigation examined the positive relationship between independent variables and dependent variables. The result shows that the perceived usefulness, trust, and subjective norms have a significantly positive effect on the attitude, which in turn is a critical indicator of social goals. The research model, which clarifies 82% of the function in attitude towards mobile cloud storage services, has reliable prescient

power. The findings have both theoretical and practical implications for academics, educational institutions, and managers.

Shiau and Chau (2016) evaluated a study back in where they focused on studying the impact of cloud computing classrooms on service quality or innovation diffusion theory (IDT). The study focused on testing, comparing, and unified six-well know theories six well-known theories, namely service quality, self-efficacy, the motivational model, the technology acceptance model, the method of reasoned action or method of planned behavior, and innovation diffusion theory, in the context of cloud computing classrooms. This study was conducted using an empirical study framework of an online survey and SEM Techniques, and SEM is suitable for analyzing the complex model in this study, which unites six theories and 16 constructs. The data was collected by a total number of 478 applicants or participants. The analysis revealed the result in a positive gesture that students enjoy sharing homework and exercise results with classmates, which is a means of developing friendships. If using a cloud computing classroom benefits college students, they do not require an external force to push them to use the system. However, college students dislike the work required to master various new applications. A measurement model was used to assess the reliability and validity of the study, indicating the authenticity of this research. They may like to learn new skills from others, like professors, which requires less time and effort. The unified model provides a comprehensive view understanding of the factors affecting the intention to use a cloud computing classroom.

Arpaci, Kilicer, and Bardakci (2015) examined the research that was holding a framework of Effects of security and privacy concerns on the educational use of cloud services. Cloud Computing, as we all know, offers a variety of services such as various platforms, software's and also organizational or infrastructure services. This research aimed to provide an understanding of

how security and privacy concerns have an impact on the educational use of cloud services. They have proposed a research model based on Ajzen's (1991) Theory of Planned Behavior (TPB). Following the TPB, we developed a research model, which posits that attitudes towards using cloud services predict student attitudes predicted by security and privacy perceptions and behavioral intentions. In this study, a group of 200 pre-service teachers was utilized, and a Structural Equation Model collected the results. It was used to assess the model based on the data collected using survey questionnaires. Results showed a clear picture of the proposed model, validating the predictive power of the TPB. The results also indicated that security and privacy have a strongly significant influence on the students' attitudes towards using cloud services in educational settings.

Sharma, Al-Badi, Govindaluri & Al-Kharusi (2016) conducted research that was based upon on Predicting motivators of cloud computing adoption and how they are linked or associated with a perspective of a country that is emerging or moving towards revolution as it is clear that Cloud computing is the latest and modernized approach of network applications with a new information technology approach. This study intends to generate and develop a hybrid model to evaluate and indicate motivators influencing the adoption of cloud computing services by information technology (IT) professionals. The research proposes a new model by extending the Technology Acceptance Model (TAM) with three external constructs, namely computer self-efficacy, trust, and job opportunity. One of the main contributions of this research is the introduction of a new construct, Job Opportunity (JO), for the first time in a technology adoption study. Data were collected from a total number of 101 IT professionals and analyzed using multiple linear regression (MLR) and neural network (NN) modeling. Based on the values generated after the research, the results revealed that these models NN models were found to outperform the MLR

model. The results obtained from MLR showed that computer self-efficacy, perceived usefulness, trust, perceived ease of use, and job opportunity. However, the NN models result showed that the best predictor of cloud computing adoption is a job opportunity, trust, perceived usefulness, self-efficacy, and perceived ease of use. The final results of this study confirm the need to extend the first TAM when studying a recent technology like cloud computing. This study will provide insights into IT service providers, government agencies, academicians, researchers, and IT professionals.

June et al. (2005) conducted research which was based upon as off how the adoption of wireless internet service through mobile technology has influenced or effected the personal innovation and social influences of individuals. Mobility commerce, as known, is the second wave of electronic commerce nowadays. This phenomenon is penetrating various aspects of our life due to the latest improvement in wireless Internet services via mobile. This study attempts to highlight the theoretical understanding of the antecedents of early adoption. More importantly, the study investigates as to what extent individual perceptions toward WIMT is attributed to social influences. Also, it indicates to what extent different opinions are associated to internal motivations. Whether internalization of social impacts and personal tendency to try to affect potential users' intention to adopt WIMT and whether behavioral beliefs such as perceived usefulness and perceived ease of use have primary explanatory power over user intention to take WIMT. This study is a continuing effort in exploring the nature of influences from personal innovativeness and social environment over information systems and technology adoption. It examines the intention to adopt rather than actual adoption. In this research, a system-specific model was used, which was integrating essential elements from TAM. Data were collected from a total number of 388 applicants who were MBA students enrolled in a regional university in

Texas in the academic year of 2002–2003. They were surveyed online and offline during the final week of each semester. Those students were explicitly informed that we were interested primarily in their perceptions about WIMT. An increasing number of facts reported that such wireless mobile technology is helping to synchronize the idea about m-communication, m-collaboration, and m-commerce. The finding indicates that influences from friends and meaningful social connections are also a critical determinant, at least for potential individual adopters.

Mayank (2016) examined the factors that determined the adoption of cloud computing in developing countries. The research titled and enlightens the constructed layout of how information technology implementation theories to the cloud computing phenomena in conjunction with academic libraries of India to determine the factors responsible for the adoption of cloud computing. The critical elements of this research as an independent variable was Cloud computing, and the dependent variable was academic performance. It attempts to discover the preparedness of Indian academic libraries in adopting cloud computing. Aiming at this same objective into consideration, a descriptive survey method with appropriate settings and constructive research methods were used in the study as the data collection tools to conduct the research. The significant role in this research was of Library professionals who not engaged but also selected 28 central universities of India who were chosen to participate in this study. To find the core drivers responsible for the adoption of cloud computing in academic libraries, constructs were taken from ten IT adoption theories. The results highlighted the fact that perceived ease of use, usefulness, and ubiquitous availability of the enabling technology are reliable drivers of the adoption of cloud computing technology in the libraries. A high level of correlation was obtained between the cloud computing-perceived attributes and the librarian's intention to use cloud

computing technology. However, the security risk is the biggest issue that has been affecting behavioral purposes. Recommendations were to implement these strategies.

Gangwar et al. (2015) evaluated that the reason for this paper is to incorporate the TAM display and TOE structure for cloud processing reception at the hierarchical level. Distributed computing can be seen as an approach to convey IT empowered benefits as programming, stage, and framework utilizing web innovations. Distributed computing has three distinctive help models: Infrastructure-as-a-System (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS). IaaS is known as the first degree of cloud administrations, which conveys framework administrations to clients over a system (for example web, for example, equipment (for example, capacity and system) and programming (for example, working frameworks and virtualization technologies). The independent variable of the study is Perceived Usefulness, and Perceived ease of use and the dependent variables is the adaption intention of cloud computing technology. A questionnaire-based survey was used to gather data from the organizations that are using cloud computing services in their company. The questionnaire consists of two-part, which are Company Profile and Adoption Variables. The data was collected from 280 companies in the IT, manufacturing, and finance sectors in India. Respondents were approached through e-mail and telephone to know if they are well aware of cloud computing service technology and if their answers are yes, then whether they are willing to adopt cloud computing technology or are they in between the process of adoption. To test the hypotheses in the study, the measurement model was transformed into a structural model in AMOS. Perceived Usefulness has a positive effect on cloud computing adoption, and Perceived Ease of Use has a positive impact on cloud computing adoption and positive impact on Perceived usefulness. The study selects TAM for its vast acceptance in technology adoption literature. The result shows that relative advantages of cloud

computing lead to more noteworthy outcomes, for example, more prominent effectiveness of internal procedures, expanded, representative profitability, improved client support, decreased stock expenses, and improved coordination with exchanging partners. Future researches should consider the findings of the study in other circumstances or situations.

Militaru et al. (2016) examined that the study is used to determine the factors which lead to the cloud computing service adoption in a higher education setting. With intense competition in the market and increasing expectations of students for employment, the universities have to invest in their teaching procedures and their infrastructure to produce compatible graduates in the marketplace. But there is a considerable increment in teaching and learning cost in universities, the solution of the issue is an adaption of cloud computing service in institutes which offers assistance through the internet to the faculty as well as to the students of the institutes with low cost and higher efficiency level. Perceived usefulness and Perceived ease have been used as an independent variable, and the Intention to use cloud computing has been used as a dependent variable. The data was collected by surveying 96 students from University Politehnica of Bucharest in Romania. A Survey using a paper-based questionnaire and some interviews with faculty members was conducted. The research study used cross-sectional survey data. The proposed model empirically studied using the Structural Equation Model (SEM) to analyze data gathered by the survey. The sample consists of engineering students whose age was between 20-26 years old. The sample also shows a higher number of females (54-56%) as compared to males (42-44%). Perceived ease of use has a positive effect on student intention to use cloud computing services in the higher education system, and Perceived ease of use is positively related to student perceptions of the usefulness of cloud computing use. The result of the study shows the impact of student's attitudes towards technology, perceived risk, perceived value, interest self-efficacy,

perceived usefulness, and perceived ease of use on students' intentions to use the cloud computing system in higher. The study is expected to improve the understanding of cloud computing adoption for students as well as for the faculty members. Future researches can be conducted on study programs, university size, type of university, and compare the results with actual results of the current research. We should have a better understanding of why universities adopt or why not adapt the cloud computing service technology to improve teaching and learning ability in institutes.

Yilmaz (2016) conducted that the purpose of the study is to discover the structural relationships between academic self-efficacy (ASE), knowledge sharing behaviors (KSB), and sense of community (SoC) of students of the university in e-learning. The integration of Information and Communication Technologies (ICT) in the learning environment and learning processes and by changes in academic practices, we can see increased student-centered learning and virtual community-based learning. It is said that social media is now used in producing virtual learning communities. The study was carried out with students who joined a Facebook learning community that was made for the computing I course, which was instructed with the blended learning methods. Class-room community and Academic self-efficacy have been used as an independent variable, and knowledge sharing behavior has been used as a dependent variable. The data was collected by the students who joined a Facebook learning community that was formed for the Computing merged with the learning method. The data for the study was gathered from 316 university students in Turkey by applying three self-report instruments, which are the KSB scale, ASE scale (social status, cognitive applications, technical skills), and classroom community (CC) scale (connectedness and learning). The study analyses with the structural equation model (SEM) additionally proved that students KSB is related to their ASE and SoC in

the e-learning community. Class-room community and Academic self-efficacy have a significantly positive impact on knowledge sharing behavior. The results show that the students ASE and SoC positively affect their KSB. And in terms of sub-scales, the connectedness to the community, learning perception. The student's self-efficacy on the cognitive applications in the courses and their social status in the community positively affect KSB. Still, student's self-efficacy perceptions on their technical skills impact KSB positively, but its effect size is minor as compared to the other sub-scales. This research study can allow future studies with practical suggestions involving KSB in virtual learning communities. Understanding the relationships between three structures will support instructors and online environment designers in designing as well as handling virtual learning communities, helping from these communities, and inspiring the students in knowledge sharing processes.

Yuvaraj (2016) examined that the study explains the concepts by the Information Technology (IT) adoption theories to cloud computing in combination with the academic libraries of India to determine the aspects which are responsible for the adoption of cloud computing. Last few years, cloud computing has created a perfect storm as an effect of technological advancements, web technology, and economic uncertainty that has encouraged an ideal platform in which cloud computing can flourish. The cloud computing introduction in libraries has changed the libraries from being "house of knowledge" to "house of access." The storage and delivery services which are offered by the cloud computing service technology have significantly reduced the cost. Cloud computing technology is user-friendly, cost-effective, and more natural interactivity with users. Perceived ease of use and perceived usefulness has been used as an independent variable, and attitude towards cloud computing in libraries has been used as a dependent variable. Four hundred forty-four questionnaires collected the data were sent to 444 library professionals in the

university libraries of India. For the descriptive research survey and constructive research, the method was used. In the study, perceived ease of use has a positive and direct impact on the attitude of the librarians towards the adoption of cloud computing technology. Ease of use has a positive and indirect effects mediated by perceived usefulness and on the opinion of the librarians towards the adoption of cloud technology. The perceived usefulness of cloud computing technologies has a positive and direct impact on attitude towards cloud computing technology. The results show LIS professionals understand the significance of cloud computing and presented a high willingness to adopt cloud computing. Not only did librarians regard the cloud as useful and valuable in academic libraries but also its positive consequences for the LIS professionals for identifying and grabbing new opportunities to serve library users. Future recommendations that cloud computing helps libraries to improve overall performance and make them more applicable to the universities.

Chiniah et al. (2019). There are quite a lot of cloud service providers offering a variety of services to the local industry, go Cloud in Mauritius. There are famous companies like Amazon, with its AWS (Amazon Web Service) being a leader in cloud services on a universal level. Even though cloud computing adoption is still slow and restricted to specific businesses, which are eager to change. Numerous companies believe that cloud computing can provide a new competitive model that can decrease costs and complexity while, on the other hand, increasing functioning efficiency. In the research, the aim is considering the already known factors for cloud computing adoption or non-adoption by the ICT sector of Mauritius. Finally, choose to practice Hybrid Technology Acceptance Model (TAM) and Technology-Organization Environment Model (TOE) as they complement each other. Perceived ease of use and perceived usefulness has been used as an independent variable, and adoption intention has been used as a

dependent variable. In this study, 93 ICT related companies were surveyed in Mauritius also developed a Cloud Computing Adoption Tool. In this study, a quantitative approach is used to collect primary data from a survey sent to companies in the IT and non-IT business, and a qualitative approach has been used to interpret the result from past researches and existing studies on the Internet. To prove the reliability of the hypothesis in Mauritius and other technologically developing countries, a web-based survey consisting of 43 questions was designed for the respondents. To distribute the survey questionnaire to respondents, mainly two methods were used. First, the study is web-based (survey link was sent by email to people with proper explanation with regards to the work). Secondly, Social media sites like Facebook and LinkedIn were used to collect data from a more significant number of people. Cross-tabulations and Pearson chi-square tests have been used in the research study to verify the relationship between variables. Future research suggested with the survey, we get to know that security is no more the major issue for cloud adoption. In contrast, companies are more interested in the advantages a cloud can deliver to their businesses. Higher power, access to innovative technology, affordability is the variables with the most top scores.

Mavodza (2013) examined that in this paper, it is discussed that in the modern information environment, it is not possible to avoid cloud computing service in it. In the past, we use to store data by using hardware and software to access it later, but after cloud computing service, we can easily access it from various locations. As the information sources are snowballing to store all of them in a library environment is difficult, so that cloud service helps in to store some information there as well. The independent variable is cloud computing, and the dependent variables are academic libraries. The data was conducted from the librarians and its visitors to analyze the final result of the topic in Abu Dhabi (United Arab Emirates). The examination of current

literature about the subject was performed. Nowadays, libraries are using cloud computing services to store their data and access it later. There is a web presence facility for the users, and also for the library environment, cloud computing reduces the storing capacity challenges for them. Libraries use Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) to provide facilities to its users as well as it is also beneficial for the library environment. There is a positive relationship between Cloud Computing and Academic Libraries. The result shows that librarians should know the modern ways which offer access to data and applications in the easiest way possible. The librarians should also have some knowledge about information security, ownership, privacy, control of data, copyright guidance, licensing, fair use of information, digital rights management just to be secure from the problems which may occur in the future. To avoid the risk factors and dangers like cyber-security crimes, it is good to have policies, procedures, fiscal policies, and personnel data in a private cloud, which is more concerned about security related issues. It is suitable for the future of library practice and services to ensure from the security-related matters and to have modern technology for the upcoming generation, which is more convenient for the library environment as well as for the visitors.

Abdullah et al. (2016) discovered the student's relationship between predictor's learning, perceived ease of use and perceived usefulness with intention behavior to use an e-learning by proposing the idea that reveals the impact of learning via the cloud-computing system, student purpose to involve and learn utilize cloud-computing medium domain. The researcher engaged 107 usable responses and tested them by employing structural equation modeling (SEM) techniques. Student's relationship between predictor learning, perceived ease of use, and perceived usefulness is found a significant relationship by offering the concept that discloses the

impact of learning via cloud-computing student purpose to involve and learn utilize cloud-computing medium domain. A conclusion suggests new prospects for growth and proposes to get diversity in marketing in learning via cloud-computing system students' acceptance and learning via cloud-computing system student intention.

Bora and Ahmed (2013) inspected the influences of student's intention to use Facebook, perceived ease of use, and perceived usefulness on actual cloud-computing learning adoption for Facebook in forecasting student's acceptance utilizes Facebook student batches. Data of 214 respondents were designated to analyze the hypothesis and attained results. The researcher employed structural equation modeling (SEM) on AMOS software to the examination of the theory. The influences of student's intention to use Facebook perceived ease of use and perceived usefulness on actual cloud-computing learning adoption for Facebook in forecasting student's acceptance utilize Facebook student batches exhibited positive and significant outcomes. The research delivers colleges, universities, and educational institutes the methods to make stronger in prediction regarding student's acceptance of learning via Facebook, a social media platform, and providing admission implication to student's future intentions utilize Facebook student batches.

Slavin et al. (2011) discovered the student's association among construct's learning, perceived ease of use and perceived usefulness with intention behavior to utilize learning through cloud-computing medium by recommending the awareness that exposes the influence of learning through cloud-computing medium, student determination to implicate and study by using learning through cloud-computing medium. The researcher collected 111 usable responses and verified by using structural equation modeling (SEM) techniques. Student's association among construct's learning, perceived ease of use, and perceived usefulness are found significant

association by proposing the idea that reveals the influence of learning through cloud-computing medium, student purpose to involve, and study by utilizing learning through cloud-computing medium. A finding suggests new visions for developing and recommends growing diversity in educational centers in learning through cloud-computing medium student's acceptance and learning through cloud-computing medium student's intention.

Schneberger et al. (2008) determined and conducted the study on what Factors are to exist that Influence the Performance of Computer-Based Assessments, which acts as an Extension of the Technology Acceptance Model, *Journal of Computer Information Systems*. This research consisted of various aspects of exploratory analysis that was conducted on computer-based training and assessment, which were of different types. The revised TAM model used in this study was known to be an authentic model for investigation and could be used in understanding some of the factors that can enhance the performance of computer-based Assessments. The goal or aim was to create and perform an initial test of a unique model on the influence of individual and technical characteristics on learning outcomes through their effect on in-class lectures and outside-class computer training phases of knowledge and skills acquisition and testing. The research question followed the parameters of the factors that had an impact on the performance of computer-based assessments. Thirty-six questions were posed to a group of a total of 400 students with direct and current experience using computer-based training and computer-based assessments for course credit. The findings suggest there is a strong potential for students as well as corporate benefits in training using traditional lectures and computer-based training and assessment tools.

Al-Rahmi and Zeki (2016) conducted research that was aimed at a framework that specified the parameters of social media to be used for e-learning of the Quran and Hadith. As social media is

currently considered as the easiest and quickest way to disburse knowledge and create awareness to ensure away is designed to encourage collaborative learning and social interaction. Through this evaluation, different factors were explored, which could enhance collaborative learning in education and educating the Quran and Hadith in the context and framework of social media to be used. In this study, structural equation modeling (SEM) was utilized to analyze and predict the data collected. A total number of 340 applicants were requested to participate in this study. The study indicated direct and indirect significant impact and exposure of these variables on collaborative learning of the Quran and Hadith through the usage of social media, which leads to a better performance ratio of learners.

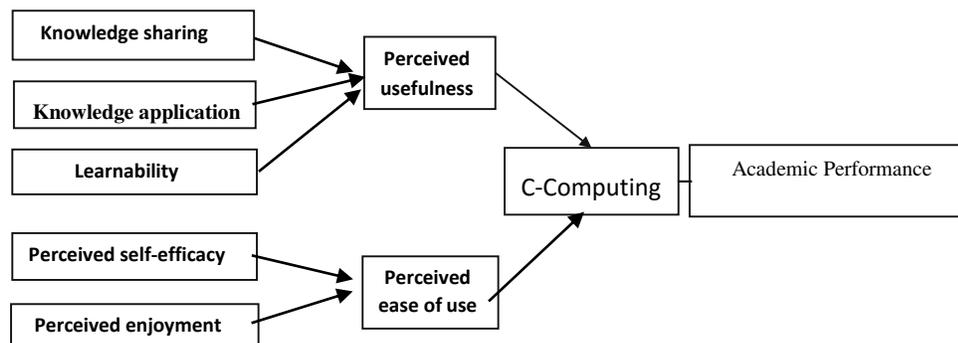
Gupta, Seetharaman, and Raj (2013) conducted that today in this technology industry, cloud computing is the new buzzword for millions of people around the globe. Cloud computing has become the new digital age technology to transfer and store data at various devices just by using the internet. However, there are many more benefits to the services for multiple industries like the education industry, businesses, and multinational corporations as well. In this research paper, the focus is on how cloud computing is beneficial for small companies like Small and Medium Enterprise (SMEs). This research paper shows five factors which are influencing the cloud computing usage by the business community and whose business requirements and needs are unlike from large enterprises. Independent variables cost Reduction, Ease of use and Convenience, Reliability, Sharing and Collaboration, and Security, and Privacy. The Dependent variable is the adoption of cloud computing by SMEs or SMBs. A pilot survey is used by conducting personal interviews of 30 respondents to have holistic feedback about SME's usage and adaptation of cloud computing technology. The pilot survey was created by making relevant questions in which each of the five main variables identified from the literature survey. The

study included qualitative and quantitative questions both for latent constructs and was based on the feedback. The data was investigated by using SEM (Structural Equations Modeling), Then the PLS (Partial Least Square) technique was used to validate the measurements and to test the hypotheses. All the independent variables positively impact on the dependent variable. The result shows that ease of use and convenience is the major favorable factor, and after that comes the security and privacy factor, and then comes the cost reduction factor. The fourth factor is reliability, which is unfavorable because SMEs don't rely on cloud computing services. SMEs don't want to use cloud computing service technology for sharing data and choose their old methods for sharing data and working together with their stakeholders. The findings of the research paper are multi-folds. Signify that there is tremendous scope for further research in this area, which involves a further investigation into these new variables.

Hsu and Lin (2015) examined that in this study, it is discussed that cloud computing services provide enterprise clients numerous benefits like reduced costs, easy maintenance, easy re-provisioning of resources to increased profits. But there is less information about the adaptation behavior of such services in enterprises. This research study put on the technology–organization–environment framework to examine the factors of cloud computing service which are related to adoption behavior. The IV for this study are Relative advantage, Ease of use, Compatibility, Trial ability, Observability, Security, and DV is an adaptation of cloud computing services technology. The data were collected from 102 valid enterprises in Taiwan. Questionnaires were sent to the president of each company along with a cover letter explaining the study objectives and a stamped return envelope assuring respondent confidentiality. Before showing the central survey, pre-test and pilot tests both were conducted to validate the instrument. The result of ANOVA analysis discovered that the difference between the two

groups is not statistically significant. To analyze the result for the study, both the measurement and structural models were tested by using partial least squares (PLS), a fundamental modeling technique well suited for complex predictive models. Ease of use is positively related to a firm's intention to adopt cloud computing services. The result indicates that organizational factors (financial costs and satisfaction with existing IS), technological factors (relative advantage, observability, and security), and environmental factors (competition intensity) all are positively associated with intention to adopt cloud computing services technology accounting for 52% of the variance. Future research should examine whether these attributes impact the purpose of receiving. Furthermore, future studies may research influential factors in different cloud services deployment models (e.g., private, public, and hybrid).

### 2.3. Conceptual Framework



## **2.4. Model Hypothesis**

H1: Knowledge sharing is positively and significantly related to perceived-usefulness.

H2: Knowledge application is positively and significantly related to perceived- usefulness.

H3: Learnability is positively and significantly related to perceived– usefulness.

H4: Self-efficacy is positively and significantly related to perceived ease of use.

H5: Perceived enjoyment is positively and significantly related to perceived-ease-of-use.

H6: Perceived-usefulness is positively and significantly related to the adoption of cloud computing.

H7: Perceived-ease-of-use is positively and significantly related to the adoption of cloud computing.

H8: Cloud computing adoption is positively and significantly related to students 'academic performance.

# **Chapter # 3**

## **Methodology**

### **3.1. Research Purpose**

In this study, we are using explanatory research. Explanatory research defines the meaning of research that has already been conducted by previous researchers, and we aim to add value to their research (Raza et al., 2020). The purpose of our study was to determine how cloud computing is placing a direct or indirect impact on the academic life of students.

### **3.2. Research Approach**

This research is based on a quantitative research model. The survey tool that is utilized in this study was a questionnaire method, and it was used to collect relevant data require, which derived the conclusion and result analytics (Qazi et al., 2020).

### **3.3. Research Design**

This research is based on co-relational design. The co-relational study determines a relationship between any two or more than two variables (Raza et al., 2020). The purpose of this study is to identify the relationship between the independent variable and the dependent variable. A questionnaire tool is used to gather data because it takes less time to collect data, and it's easily quantifiable.

### **3.4. Sampling Technique**

In our study, we used convenience sampling, which is a non-probability sampling technique. A convenience sample technique is in which we target people who are easy to reach. Convenience sampling is a non-probability sampling technique where subjects are selected because they

provide convenient accessibility and proximity to the researcher (Ali et al., 2018; Raza et al.,2020).

### **3.5. Target Audience**

In this study, the target population is the university students who used cloud computing adoption in our academic learning and performed well, which refers the entire group to which we are interested in generalizing to identify the relation between dependent and independent variables.

### **3.6. Sample Size**

For this research, we have collected the complete responses from 500 people. The sample size of the study is based on students using cloud computing technology in their respective fields. The sample size is based on the recommended sample size i.e., a poor sample size to be 50, the good sample size to be 300, the very good sample size to be 500, and an excellent sample size of 1000 for factor analysis (Raza et al., 2020).

### **3.7. Statistical Technique**

In this study, we use partial least square (PLS)and statistical package for the social sciences (SPSS) for the test of our data (Qazi et al., 2020). It includes regression, factor analysis, and reliability tests. The reliability test means that our instrument (questionnaire) will be reliable in the long term or not. The regression model helps us to identify the relationship between our independent and dependent variables. It also examines the direct and indirect relationships among all the variables (Raza et al., 2017). Factor analysis is a procedure in which the information of variables is communicated through the possible effects, which help to discover which one is the most critical and affected variable.

### **3.8. Questionnaire and Measurement Instrument**

The data are collected using a questionnaire that was based on 5 points Likert scale, which is (5) Strongly Agree, (4) Agree, (3) Neutral, (2) Disagree, (1) Strongly Disagree. The questionnaire was adapted from past studies. Our questionnaire is comprising of close-ended questions for data collection. The information is collected from university students (Male and Female). The field of professionals authenticates/validates the questionnaire. The item of the personal trait was adapted from the NEO Five-Factor Inventory (NEO-FFI) Costa & McCrae (1992). The items of academic motivation were taken by the motivation scale of the Learning and Study Strategies Inventory (LASSI), Cano (2006).

### **3.9. Ethical Consideration**

The information which is required for the respective researches voluntarily collected from the respondents through an online questionnaire for the research study. The identity of the respondents and the information provided by them will remain confidential and will not harm the dignity of the respondents in any way (Raza et al., 2020). In the research, any kind of misleading and misrepresentation of the information or facts will be avoided.

# **Chapter # 4**

## **Data analysis**

## 4.1. Data Analysis

### 4.1.1. Demographic Analysis

<b>Table 1: Respondent's Profile (N=sample size)</b>		
<b>Demographic Items</b>	<b>Frequency</b>	<b>Percentile</b>
<b>Gender</b>		
Male	277	55.40%
Female	223	44.60%
<b>Age</b>		
Below 20	275	55%
21-25	139	27%
26-30	56	11.20%
More than 30	30	6%
<b>Education level</b>		
Undergraduate	275	55%
Graduate	139	28%
Postgraduate	56	11.20%
Others	30	6.00%
<b>Social media usage</b>		
Less than 30 minutes	220	44%
30-60 minutes	205	41%
Above 60 minutes	75	15%

Source: Author estimation

The details of demographic profiles are presented in Table 1. As seen from demographics characteristics, 55% of respondents were undergraduate, 28% were graduate, 11.20% were postgraduates, and 6% were alumni. In terms of gender, 55.40% of respondents were male, while 44.60% were female. Hence almost equally distributed. The respondent's age group category showed that 55% were falling in the age bracket of below 20, whereas 27% were falling in 21-25 age, 11.20% were falling in 26-30 age, and the rest 6% were falling above 30 age. The respondents of social media usage, 44% usage of fewer than 30 minutes, 41% usage of 30-60 minutes, and 15% usage of more than 60 minutes.

### 4.1.2. Reliability Analysis

Reliability analysis basically a measurement tool that shows the consistency of data. By using a reliability instrument, we can get similar results at different times for the same individuals. Also, the value of reliability is must be between 0 to 1.0, broadly. Additionally, reliability analysis is to find out through Cronbach's Alpha, and it is the coefficient of reliability, which shows how much each item is positively correlated by one another.

<b>Construct</b>	<b>Cronbach's <math>\alpha</math></b>	<b>Items</b>
<b>AP</b>	<b>0.659</b>	<b>5</b>
<b>CCA</b>	<b>0.945</b>	<b>4</b>
<b>KA</b>	<b>0.738</b>	<b>3</b>
<b>KS</b>	<b>0.722</b>	<b>4</b>
<b>L</b>	<b>0.733</b>	<b>5</b>
<b>PE</b>	<b>0.664</b>	<b>3</b>
<b>PEOU</b>	<b>0.725</b>	<b>3</b>
<b>PSE</b>	<b>0.805</b>	<b>3</b>
<b>PU</b>	<b>0.724</b>	<b>3</b>

*Note: AP: academic performance, CCA: cloud computing adoption, KA: knowledge application  
KS: knowledge sharing, L: learnability, PE: perceived enjoyment, PEOU: perceived ease of use  
PSE: perceived self-efficacy, PU: perceived usefulness*

Table no. 2 shows the reliability analysis of all variables. According to Uma Sekaran (2003), the closer the reliability coefficient Cronbach's Alpha gets 1.0, the better the reliability. According to Tabachnick and Fidell (2007), Cronbach's Alpha should be more than 0.55. The overall reliability of 9 loaded items is 0.921 means 92.1%, which shows that the data is reliable.

The first variable is AP has 5 items, and the value of alpha of these items is 0.659. In the second variable, CCA has 4 items, and the value of alpha is 0.945. In the third variable, KA has 3 items, and the value of alpha is 0.738. In the fourth variable, KS has 4 items, and the value of alpha is 0.722. In the fifth variable, L has 5 items, and the value of alpha has 0.733. In the sixth variable,

PE has 3 items and the value of alpha has 0.664. In the seventh variable, PEOU has 3 items, and the value of alpha is 0.725. In the eighth variable, PSE has 3 items, and the value of alpha is 0.805. In the ninth variable, PU has 3 items, and the value of alpha is 0.724. The reliability of the scale is the overall indicator of reliability statistics.

### 4.1.3. Factor Analysis

Factor analysis is also known as “Data Reduction.” Basically, it’s work to highlight the unobserved variables, which are known as Latent variables reflected on observed variables, which are known as Manifest variables.

**Table 3: Factor Analysis**

	AP	CCA	KA	KS	L	PE	PEOU	PSE	PU
AP1	0.867								
AP2	0.831								
AP3	0.706								
AP4	0.713								
AP5	0.884								
CCA1		0.908							
CCA2		0.876							
CCA3		0.959							
CCA4		0.942							
KA1			0.854						
KA2			0.847						
KA3			0.719						
KS1				0.844					
KS2				0.764					
KS3				0.732					
KS4				0.771					
L1					0.750				
L2					0.813				
L3					0.777				
L4					0.789				
L5					0.706				
PE1						0.971			
PE2						0.825			
PE3						0.975			
PEOU1							0.741		
PEOU2							0.737		
PEOU3							0.889		
PSE1								0.972	

<b>PSE2</b>	<b>0.813</b>
<b>PSE3</b>	<b>0.976</b>
<b>PU1</b>	<b>0.815</b>
<b>PU2</b>	<b>0.867</b>
<b>PU3</b>	<b>0.782</b>

*Note: AP: academic performance, CCA: cloud computing adoption, KA: knowledge application  
KS: knowledge sharing, L: learnability, PE: perceived enjoyment, PEOU: perceived ease of use  
PSE: perceived self-efficacy, PU: perceived usefulness*

Table 3 shows similar dimensions, and their correlation values are in a grouped value form.

So, according to the above ranges of weak, moderate, and high correlation, table 3 shows that all nine variables have a high correlation with their respective items as the value is greater than or equals to 0.7.

Table 3 shows the reliability analysis. The total items are 33, and the 9 factors are made. Factor 1, which is an AP comprised of 5 items with factor loading ranging from 0.867 to 0.884 and factor 9, which is a PU comprised from 3 items with factor loading ranging from 0.815 to 0.782.

#### 4.1.4. Regression Analysis

Regression analysis is a statistical technique used to measure the impact or relationship of variables among each other. It also defined as when one variable is dependent on others is a regression model (Raza et al., 2019).

<b>Hypothesis</b>	<b>Regression Path</b>	<b>Effect type</b>	<b>B-Coefficients</b>	<b>P Values</b>	<b>Remarks</b>
<b>H1</b>	<b>KS -&gt; PU</b>	Direct effect	0.463	0.000	Supported
<b>H2</b>	<b>KA -&gt; PU</b>	Direct effect	0.280	0.000	Supported
<b>H3</b>	<b>L -&gt; PU</b>	Direct effect	0.547	0.000	Supported
<b>H4</b>	<b>PSE -&gt; PEOU</b>	Direct effect	0.747	0.000	Supported
<b>H5</b>	<b>PE -&gt; PEOU</b>	Direct effect	0.830	0.000	Supported
<b>H6</b>	<b>PU -&gt; CCA</b>	Direct effect	0.917	0.000	Supported
<b>H7</b>	<b>PEOU -&gt; CCA</b>	Direct effect	0.809	0.000	Supported
<b>H8</b>	<b>CCA -&gt; AP</b>	Direct effect	0.934	0.000	Supported

*Note: AP: academic performance, CCA: cloud computing adoption, KA: knowledge application*

*KS: knowledge sharing, L: learnability, PE: perceived enjoyment, PEOU: perceived ease of use*

*PSE: perceived self-efficacy, PU: perceived usefulness*

The above regression table mainly consists of two values, which are Beta value and P-value. The beta value shows the relationship between the dependent variable on each independent variable. According to some conditions, if the beta value is negative, it tells that the relation between the dependent and independent variables is inversely proportional. Oppositely, if the beta value is positive, then the relationship between dependent and independent variables is directly proportional. Moreover, the P-value shows significant and insignificant among variables.

As shown in the regression table, all dependent and independent variables are directly proportional because all the beta values are positive. Knowledge sharing-> perceived usefulness has a significant and direct effect. Knowledge application-> perceived usefulness has a significant and direct impact. Learnability-> perceived usefulness has a significant and direct impact. Perceived self-efficacy->perceived ease of use has a significant and direct effect.

Perceived enjoyment-> perceived ease of use has a significant and direct impact. Perceived usefulness-> cloud computing adoption has a significant and direct impact. Perceived ease of use-> cloud computing adoption has a significant and direct effect. Cloud computing adoption-> academic performance has a significant and direct impact.

## **4.2. Discussion**

### **KS -> PU**

The result of the regression analysis reported in the table shows that in the first hypothesis, there is a positive relationship between knowledge sharing and perceived usefulness gain ( $b=0.463, p=0.000$ ), and it is supported from the previous study (Arpaci, I.2017). It means if there is a higher expectation for knowledge sharing, there will be higher perceived usefulness. It also indicated that knowledge sharing is significantly associated with perceived ease of use, which has a significant effect on attitudes towards using cloud computing service.

### **KA -> PU**

The result of the second hypothesis suggested that there is a significant relationship between knowledge application and perceived usefulness ( $b=0.280, p=0.000$ ), and it is supported by the previous study (Arpaci, I.2017). It means cloud computing services may reduce the need for coordination, specifically when students have group projects to do simultaneously on the same document. Thereby these services enable more efficient management of knowledge through timely and flexible routing of files and documents.

**L -> PU**

The result of the third hypothesis shows that there is a significant relationship between learnability and perceived usefulness ( $b=0.547$ ,  $p=0.000$ ), and it is supported from previous study Ali, Z., Gongbing, B., & Mehreen, A. (2018). Learnability is a vital knowledge factor in the KIP system (McIver et al. 2013). Learnability can be defined as the level of difficulty faced by individuals attempting to obtain the information and know-how related to work (McIver and Lepisto 2017). Eagleton (2015) studied the factors contributing to the learning of the students, and the use of teaching and learning technology minimizes the potential issues of learnability and provides valuable information to anatomy and physiology students.

**PSE -> PEOU**

The result of the fourth hypothesis also shows that there is a significant relationship between perceived self-efficacy and perceived ease of use ( $b=0.747$ ,  $p=0.000$ ). It is supported by previous study Ali, Z., Gongbing, B., & Mehreen, A. (2018). Perceived-self efficacy refers to a theory that individuals can produce particular outcomes (Bandura, 1994). Senemoglu (2004) explained how perceived self-efficacy human beings think, assess, and reflect themselves. Individuals with a higher degree of perceived self-efficacy often choose the problematic tasks, set higher expectations, and are likely to use more information technology (Luarn and Lin 2005) and then aim to achieve their goals accordingly (Popa and Podea 2013). Cheng (2011) reported that a technology participant has a significant impact on their learning ability.

**PE -> PEOU**

The result of the fifth hypothesis shows that there is a significant relationship between perceived enjoyment and perceived ease of use ( $b=0.830$ ,  $p=0.000$ ). It is supported by the previous study

(Ali, Z., Gongbing, B., & Mehreen, A. (2018). Perceived enjoyment comes from the intrinsic motivation-specific framework. According to Davis et al. (1992), perceived enjoyment defined the level at which the implementation of the use of a particular method is understood to be enjoyable in its specific way, apart from any consequences that may follow from the use of a technique. Brown and Venkatesh (2005) indicated that the primary reasons for implementing technology and use are enjoyment and satisfaction.

### **PU -> CCA**

The result of the sixth hypothesis shows that there is a significant relationship between perceived usefulness and cloud computing ( $b=0.917$ ,  $p=0.000$ ), and it is supported from the previous study Calisir, F., Altin Gumussoy, C., Bayraktaroglu, A. E., & Karaali, D. (2014). Perceived usefulness refers to the degree to which the person believes that using a particular system would his performance. So the improvement in performance can be considered a vital part of usefulness perception. As the user thinks that the system improves his performance, then they may have some intention to use the system.

### **PU -> CCA**

The result of the seventh hypothesis shows that there is a significant relationship between perceived ease of use and cloud computing ( $b=0.809$ ,  $p=0.000$ ) and it is supported from the previous study Calisir et al. (2014). Perceived ease of use refers to the degree to which a person believes that using a particular system would be free of effort. Nowadays, employees or students want easiness in every walk of life that is what they also wish to in their learning and working patterns. If the system usage is natural, then for potential users learning time is minimized. It can be an essential factor for users to use a cloud computing service.

**CCA -> AP**

The result of the eighth hypothesis shows that there is a significant relationship between cloud computing and academic performance ( $b=0.934$ ,  $p=0.000$ ). Thomas (2011) proposed that by accessing data servers from anywhere at any time, cloud computing allows students to perform various tasks to boost their overall efficiency. Praveena and Betsy (2009) endorsed the introduction of the cloud at universities as an emerging technology. Batista et al. (2016) recently suggested that the cloud environment is helping to improve service system performance. Zafar et al. (2014) indicated that game-based learning in education increases student motivation and academic performance. Therefore, to enhance student success, educators should also enable their students to implement new creative information technology to produce better outcomes without investing IT infrastructure.

# **Chapter # 5**

## **Conclusion and Recommendations**

## **5.1. Conclusion**

The purpose of this research is to determine the impact of cloud computing adoption on academic performance or academic learning. The respective research supports TAM theory (Technology Acceptance Model). The main focus is to identify the key factors that affect academic culture in both aspects positively and negatively. The study shows how cloud computing technology helps the students to store, share, and transfer their data through different devices within almost a few minutes. This report underlines how to cloud computing adaptation influences directly and indirectly on the academic performance of students, but it only focuses on learning of University Students only in Karachi. A total of 500 online questionnaires were filled by the students, and from which we found 500 questionnaires appropriate for the accurate result. Partial Least Square Model (PLS) and Statistical Package for Social Sciences is used to evaluate the relationships. SPSS software is used to test the conducted data for the result.

The result shows that Knowledge Sharing has a significant and positive relationship with Perceived Usefulness, Knowledge Application has a significant and positive relation with Perceived Usefulness, and Learnability has a significant and positive relation with Perceived Usefulness. Self-Efficacy has a significant and positive relationship with Perceived Ease of Use, and Perceived Enjoyment has a significant and positive relationship with Perceived Ease of Use. Perceived Usefulness and Perceived Ease of Use has a significant and positive relationship with the adoption of Cloud Computing. Cloud Computing adoption has a significant and positive relation with Academic Performance. All the Independent Variables positively impact the Dependent Variable and show a significant relationship, which confirms that Cloud Computing adaptation plays an extremely vital role in the Academic Performances of the students in their respective learning field.

The research would have a significant contribution to the IT field and Education Sectors.

## **5.2. Managerial implications / Policy Makers/ Recommendations**

In the future, the researchers can conduct the study on Cloud Computing adaptation and Security Issues related to the academic field as trust is the critical factor for the students as well as for every individual who is associated with the institution. Researchers can also determine the impact of Cloud Computing adaptation on Business Activities. Furthermore, the study only shows the behavior of students of Karachi; they can also focus on students all over Pakistan with the same topic. Future studies can comprise other cities and institutions. The data information should not be limited. Try to eliminate the negative outcomes in the future.

## **5.3. Future Recommendation**

Our research was based on a few but vital factors that can help in understanding academic performance through cloud computing. However, if we expand our view and observe academic performance more closely, we would have other factors affecting academic performance through cloud computing as well. Hence, future researchers should discover more variables related to understanding academic performance through cloud computing. One limitation our research faced was in the collection of data. We could only collect data from students in Karachi; therefore, we recommended that the students in other cities of Pakistan should also be included in the data collection. In addition to this, the sample size for our research was 500, so future researchers can take a larger sample size than this to evaluate these variables. Moreover, a different tool, e.g., focus group, interview, open-ended surveys, etc. can also be utilized to gather the data from the chosen sample size.

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