

AN EXPLORATORY STUDY ON CRITICAL SUCCESS FACTORS IN CLOUD COMPUTING ADOPTION IN BANKING SECTOR OF NEPAL

Dipak Adhikari¹ and R N Thakur²

¹ PG Scholar, Lord Buddha Education Foundation, Kathmandu, Nepal

² Assistant Professor (IT), Lord Buddha Education Foundation, Kathmandu, Nepal

ABSTRACT

Cloud computing (CC) is newly developed information technology (IT) related model to access the on-demand shared network pool of the resources (e.g., data storage, database, data banking or repository, applications, and relevant services) that can be instantly and efficiently released and shared with minimal interaction with the management or the service provider. The study was carried out to explore the critical success factor in CC to adopt it in the bank sectors in Nepal. Another objective of the study was to find out some challenges to adopt to the CC in the banking sector of Nepal. Self-administered questionnaire was designed and handed over to the college students and banking staffs in the Kathmandu valley, Nepal to collect primary data. Furthermore, the data were entered in SPSS version 25 and Excel both and descriptive statistics was applied. The finding of the present research study was 114 male and 22 females from the student respondents from the various colleges. Whereas 27 represented male and 11 represented females from various bank's respondents in Kathmandu valley Nepal. The study found that there were various age group of student's respondents and bank's respondents whereas 97 respondents existed in 20-30 years from students followed by 18 respondents existed in 31-40 from the bank in the Kathmandu valley Nepal. Furthermore, the present study explored that there were 21 respondents from the bank revealed that there were 0-5-year work experienced in the bank, followed by 16 respondents from the bank revealed that 6-10 years experienced in the bank.

The research showed that maximum students (55, 40.4%) were neutral about shifting of the banking sector of Nepal into the cloud computing would help the banking sector secure more money and increase investment whereas 15 (39.5%) bankers agreed upon that shifting of the banking sector of Nepal into the cloud computing would help the banking sector secure more money and increase investment.

Keywords

Cloud Computing, Statistical Package for Social Science (SPSS), Excel, Bank, questionnaire, quantitative.

1 INTRODUCTION

1.1 Background

Cloud computing (CC) is newly developed information technology (IT) related model to access the on-demand shared network pool of the resources (e.g., data storage, database, data banking or repository, applications, and relevant services) that can be instantly and efficiently released and shared with minimal interaction with the management or the service provider. In any organization, virtualization plays a vital role because it helps pool the relevant resources from the distant or nearby server from which it was shared, independent of its location. These days, CC has been gaining momentum in every sphere of the organization all over the world due to its significantly reduced hardware requirements and dependency and efficient performance in the information system (IS) management and flow (Kautish et al 2008, 2013, 2016, 2018, 2019,). Data being shared to the public

domain are usually centralized in the server and the cloud is implemented via advanced security provisions that prevent the data breaching and theft. (Zissis and Lekkas, 2012)

The United States National Institute for Standards and Technology (NIST) defined the CC as the model for ubiquitous, convenient, on-demand access to a shared network of resources (e.g., networks, virtual servers, data storage, applications and services) that can be released with the least cloud provider interaction. (Asadi et al., 2016; Hassan et al., 2017; Rieger et al., 2013; Senyo et al., 2018)

Currently, following service models are being widely adopted in the CC environment:

- i. Infrastructure as a Service (IaaS) model: It helps the consumer's process, store or bank the data, establish the network, and computing.
- ii. Platform as a Service (PaaS) model: It helps the consumers switch into the cloud environment, applications already developed or hired, and develop own programming architectures.
- iii. Software as a Service (SaaS) model: It enables the consumers use the applications on a cloud environment. (Amron et al., 2017; Armbrust et al., 2010; Awosan, 2014; Gangwar and Date 2016; Liana et al., 2014; Low et al., 2011; Owusu-Tucker and Stacey, 2018; Palos-Sanchez et al., 2017; Priyadarshinee et al., 2017; Raymond, 2018; Saleh et al., 2017; Sallehudin and Ismail, 2015; Sudhakar and Rani, 2014; Yan, 2017; Yoo and Kim, 2018; Zissis and Lekkas, 2012)

Four strategic models to switch into the CC environment have been devised:

- i. Private cloud: This cloud architecture is operated by and for a private organization.
- ii. Community cloud: This cloud environment is sharable by multiple organizations and community for specific purpose such as security arrangements.
- iii. Public cloud: The owner of this cloud infrastructure remains the cloud service provider or seller and it makes the service open to the common people or group of industries.
- iv. Hybrid cloud: It is principally similar to the public cloud and is the medley of above-mentioned clouds. (Amron et al., 2017; Armbrust et al., 2010; Awadallah, 2016; Awosan, 2014; Sallehudin and Ismail, 2015; Sudhakar and Rani, 2014; Yoo and Kim, 2018; Zissis and Lekkas, 2012)

Salient features of the CC are as follows:

- i. Flexibility: The cloud users can immediately compute resources without interaction with the management team.
- ii. Scalability of infrastructure: New IS related services can be added or obsolete feature can be removed from the network.
- iii. Accessibility to the broad network: The IS related services are accessible via the networking over heterogeneous platforms such as cell phones, laptops, desktops, etc.
- iv. Location non-specificity: The customers usually possess no control or idea about the exact location of the resources being provided to them.
- v. Trustworthiness: The CC is especially useful for the continuation of the business activities and for the recovery from the potential information disaster.
- vi. Cost-effectiveness
- vii. Sustainability: This is obtained from the judicious resource optimization and utilization, augmented efficiency and neutrality of the organic system including carbon.

Cloud computing can address and solve many of the diagnosed deficiencies of the traditional architectures but simultaneously may pose other unclassified shortcomings as well. Customer's trust and confidence in a cloud environment are mainly governed by the cloud deployment model being chosen, integrity of data and applications. Cloud computing keeps centralization of data security, segmentation of data processing. Data security helps to maintain confidentiality, integrity and design secure cloud systems. Cloud computing is based on the principle of sharable resources (i.e., multiple users can use the same resources at a same time from various locations) at the network level, host level, and application level. Cloud infrastructures can also be modelled in distinctly secured interfaces and are known as the federated clouds. Federated clouds are in fact a configuration of

single clouds permitting data exchange and computing resources via predefined interfaces. A cloud environment is indeed a virtual networking to establish and depict the relationship among the resources being shared and the cloud users. It's a dynamic interface among the cloud resource providers and its targeted beneficiary users allowing the freedom that they need not be in the same security infrastructure. The cloud users can be tracked from their attributes rather than the predefined ones. (Zissis and Lekkas, 2012)

The emerging CC technology is bringing about radical transformation in the incumbent IT environment by providing uniquely renowned services to meet the upcoming generation's requirements. It helps the service users utilize the infrastructures such as virtual servers, networks, storage domains, operating environments and software provided by the service providers in an affordable manner. Dramatic expansion of the CC technology in the Information Communication Technology (ICT), and financial institutions and industries is a common phenomenon these days. It has facilitated the data storage and management on the virtual servers by which institutions and applications at any corner of the world can have accessibility to the data and the resources at any feasible time. The CC model makes the businesses convenient and enhances the technological capacity of the organizations adopting it. It is simply the utilization of the networking of the distant, and even the remote, servers to store, arrange, manage, and process data, rather than a local server or a personal computer interface. It contributes to the capacity building of the organization to handle huge mass of tasks without degrading the efficiency of the system. It also enhances the computing ability of the small and medium enterprises (SMEs) with the dire constraint of the financial and human resources in IT sectors. (Raymond, 2018)

1.2 Limitations:

The CC services are mainly dependent on the resource infrastructures and all-time network facilities. Diagnosis and proper record-keeping mechanisms pertaining to the specific user's requirements is vital to devise a cloud-based solution to meet those requirements. The targeted user should use his/her personal digital identifier to verify himself/herself with the cloud environment and validate his/her accessibility to the resources of his/her interest and requirements. (Zissis and Lekkas, 2012)

The study conducted by Raymond (2018) showed that CC could store data on the virtual servers by which organizations at any corner of the world could connect to the shared pool of resources. The study showed that adoption of the CC was still in its infancy in Uganda. The CC is less time-consuming and more cost-saving, flexible system that minimizes the data leakage, improves technical innovation, creates healthy competition and improves IT performance. With the CC technology, clients/customers may pay only for the services they utilize, saving other extraneous costs incurred in the IT infrastructure maintenance (Kautish et al, 2008, 2012, 2013, 2020).

1.3 Problem Statement

The CC technology has dramatically transformed the IT industries. Innovative idea developers no longer need huge capital investment in hardware to deploy their service or the human capital. The CC indicate the applications delivered as services via internet and hardware and software in the data centers. (Armbrust et al., 2010) The CC frees the organizations from the more expensive, capital-intensive infrastructure, tedious and staff-intensive interfaces. It frees the organizations from the more expensive, capital-intensive infrastructure, tedious and staff-intensive interfaces. (Sallehudin et al., 2015)

The present study bridged the gap on the cloud adoption influencing factors. The CC adoption is an evolutionary concept in Malaysia factors for its adoption should have been explored. New technologies' adoption generally requires legal arrangements and the existing compatible systems should be integrated. Cloud offers cost minimization in both hardware and software installation. By integrating the Diffusion of Innovation Theory (DOI) and IT characteristics, a model was formulated and tested to find the factors of CC adoption by the Malaysian public sector to improve its service delivery. In the USA, UK and Japan, CC technology played a vital role in the progression towards the IT efficiency. (Sallehudin et al., 2015)

The CC technology offers innovative experiences to the customers, effective collaboration, speedy penetration to the market and improved IT efficiency. Organizations are adopting cloud frameworks to support their day-to-day operations. Main challenges to be addressed for the adoption of the CC are:

- Security (Kaur and & Kautish, 2019)
- Regulatory and compliance
- Privileged user access
- Data location and segregation
- Data recovery
- Investigative support

The CC helps the banks create unique experiences to the clients, enable effective collaboration and improve penetration to the market with improved IT efficiency. Banks can better respond to the financial uncertainties, interconnected economic systems and customers. It offers following advantages:

- Cost savings (Rani and Kautish, 2018)
- Scalability
- Speedy entry to the market
- Data virtualization
- Mobility (Agre, 2015)

Research conducted by Agre (2015) showed that the clouds are helpful to switch from the capital-intensive way to the business with reduced operational costs. This can be obtained by the choice of the right cloud. Banks should have adopted evolutionary approach towards the CC services. Banks should adopt practical approach to ensure data security and privacy in the cloud. (Agre, 2015)

The CC is similar type of computing service like e-mail, software. The research conducted in the high-tech industry might compromise the external validity of the research. Complexity and compatibility are the major barriers to the CC adoption. The present research analyzed the influential factors for the CC adoption by the high-tech industry. The research helped firms consider their IT investments for the CC adoption. (Low et al., 2011)

1.4 Objectives of the study

1.4.1 General objective

To study the critical success factors in cloud computing adoption in banking sector of Nepal

1.4.2 Specific Objectives:

- To examine current scenario and usage of cloud computing in banking sector.
- To identify the factors which are crucial in successful cloud computing adaptation in banking sector.
- To propose a context free framework for successful cloud adaptation in banking sector of Nepal.

1.5 Rationale of the study

The study was aimed to identify the critical success factor for implement the cloud computing in the banks of Nepal. It was significant for overall banking sector of the Nepal.

1.6 Aim of the research

The main aim of the research was to examine the current situation of cloud computing in banking sector of Nepal. Moreover, the aim of the present study was to identify the significant crucial success factor to adopt to cloud computing in the bank.

1.7 Research Questions

Q.1: How to examine current scenario and usage of cloud computing in banking sector?

Q.2: How to identify the factors which are crucial in successful cloud computing adaptation in banking sector?

Q.3: How to propose a context free framework for successful cloud adaptation in banking sector of Nepal?

1.8 Scope of the Research

The research would help to generate or identify the new innovative idea on cloud computing. Which could help for banking sector in Nepal.

1.9 Operational Definition

National Institute for Standards and Technology (NIST) defined the CC as the model for ubiquitous, convenient, on-demand network access to a shared pool of computing resources (e.g., networks, servers, storage, applications and services) that can be released with minimal service provider interaction.

2 LITERATURE REVIEW

Table 1: Comparative analysis of cloud computing

Authors	Hentschel R, Leyh C, Baumhauer T (2019)	Gao F, Thiebes S, Sunyaev A (2018)	Yoo S, Kim B (2018)	Senyo PK, Boateng R, Addae E (2018)	Saleh A, Drus SM, Shariff SSM (2017)
Title	Critical Success Factors for the Implementation and Adoption of Cloud Services in SMEs	Rethinking the Meaning of Cloud Computing for Health Care: A Taxonomic Perspective and Future Research Directions	A Decision-Making Model for Adopting a Cloud Computing System	Cloud computing research: A review of research themes, frameworks, methods and future research directions	Empirical studies on cloud computing adoption: A systematic literature review
Features	The CC is a rapidly emerging technology and is beneficial for the digitalization of business activities. Adoption of a suitable cloud environment is challenging and requires collaboration of the managers and IT staff.	The CC technology is an innovative paradigm providing the users with the on-demand access to a shared pool of computing resources namely virtual servers, storage, and applications.	Technologically, CC involves hardware, virtualization, and automation via internet and provides on-demand self-service.	The CC technology has been rapidly emerging to address such need and achieve the operational excellence in IT-based service delivery in the organization.	Cloud computing has become a good option for higher academia within the budget constraint scenario because it operates even without huge capital investment for infrastructure development and resource allocation.

3 RESEARCH METHODOLOGY

3.1 Study design:

Cross-sectional study was conducted among the students and the bankers at Sanima and Machhapuchhre Bank Pvt. Ltd., Kathmandu, Nepal.

3.2 Study area and study site:

The study was conducted at Sanima and Machhapuchhre Bank Pvt. Ltd., in Kathmandu valley Nepal.

3.3 Study population:

The study was conducted among the students at various colleges in Kathmandu Valley Nepal. The population was 176 including students and banking respondents.

3.4 Study procedure:

The study was conducted in following ways:

- Structured data collection sheet was developed based on the standard literature sources.
- The data collection sheet was distributed to the students and the bankers working at Sidhartha Bank Pvt. Ltd., and Machhapuchhre Bank Pvt. Ltd.
- Data were then entered into Excel, processed and entered into the statistical package for the social sciences (SPSS) version 25.
- Descriptive statistics (frequency and percentage) were computed to ascertain the opinions or responses of the students regarding cloud-related various factors.

3.5 Sample size:

Altogether 136 students and 38 bankers were selected for the research purpose.

3.6 Sampling technique:

Both students and bankers were purposively selected for the research purpose.

3.7 Inclusion and exclusion criteria

3.7.1 Inclusion criteria

- Both students and bankers who were knowledgeable about the cloud computing and who were willing to participate in the research were included for research purpose.

3.7.2 Exclusion criteria

- The students and the bankers who were not knowledgeable about the cloud computing and who were not willing to participate in the research were excluded from the research.

3.8 Data collection instrument

Structured questionnaire was developed and applied as the research instrument to collect the responses of the students and the bankers on cloud related various factors.

3.9 Pretesting

The research was pre-tested in 10% of the samples size (i.e., 14 students and 4 bankers) in the similar setting where the final research was conducted. The pretested samples of both the students and the bankers excluded for the final research purpose and were considered only for updating or modifying the research questionnaire.

3.10 Data collection and processing

Data from both the students and the bankers about the cloud-related factors were collected in the pre-assigned structured questionnaire and the information obtained was entered into the Microsoft Excel sheet and processed before subjecting these to the statistical package for the social sciences (SPSS).

3.11 Statistical analysis

Descriptive statistics (frequency and percentage) was computed to depict the opinions of the students and the bankers regarding cloud-related factors.

4 Result and Discussion

Results

The result of the present study showed that the original task of the researcher. Throughout the research time there have been done various analysis task, and various tests with the help of Statistical Package Social Software (SPSS) version 25 software.

Q.1: Descriptive Result

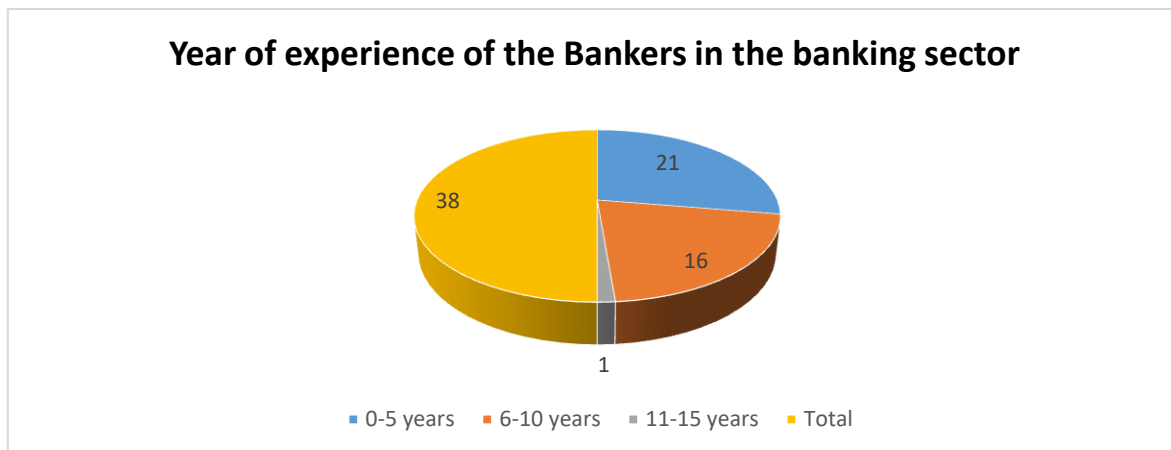


Figure 1: Year of experience of the Bankers

The figure 1 showed that there 21 respondents from the bank said 0-5-year work experienced in the bank, followed by 16 respondents from the bank said that 6-10 years experienced in the bank.

Q.3: Descriptive Result

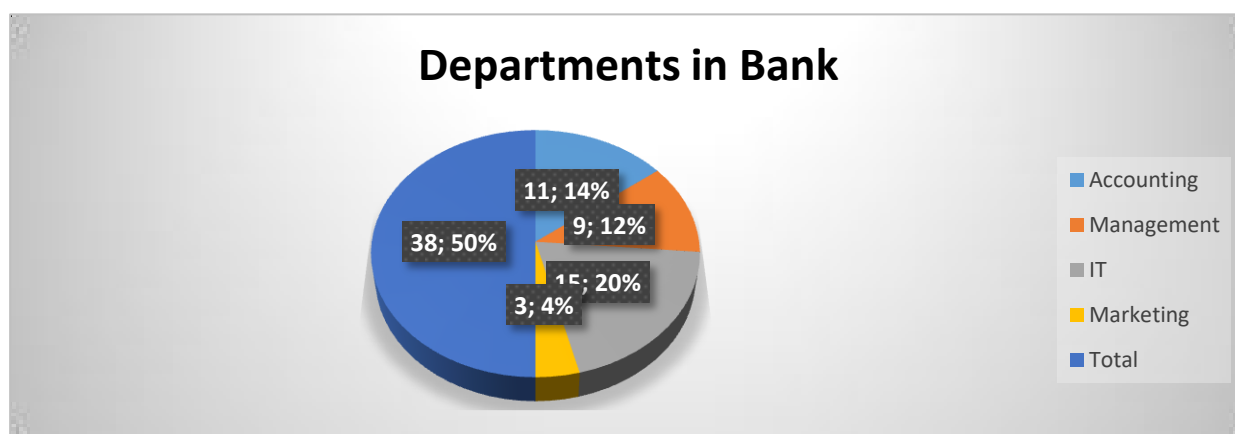


Figure 2: Departments in the Bank

The above figure 2 explored the information about the employee who were working in different departments. The figure showed that there were 15 (20%) people were working in Information Technology (IT) department followed by 11 (14%) people were working in accounting department.

Q.4: Descriptive Result

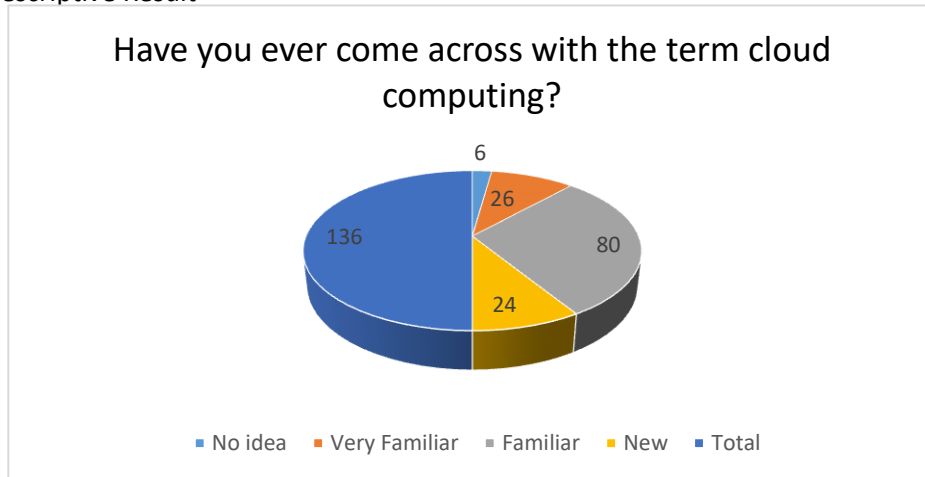


Figure 3: Term Cloud Computing

The figure 3 described that there were 80 respondents were familiar with cloud computing. Furthermore 26 respondents were very familiar with cloud computing.

Q.5: Descriptive Result

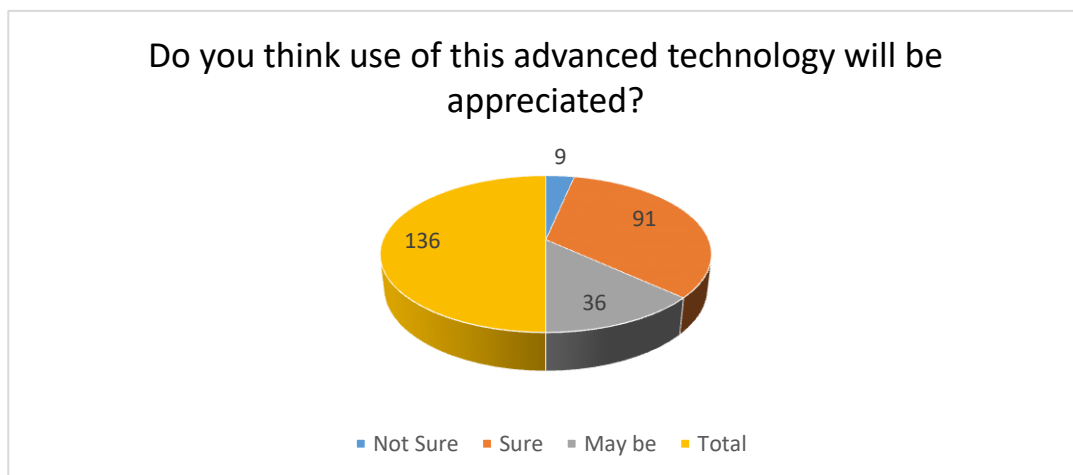


Figure 4: Advanced technology

The above figure 4 showed that there were 91 respondents revealed their answered as “Sure” followed by 36 respondents were said that “may be” on use of this advanced technology will be appreciated.

Q.6. Descriptive Result:

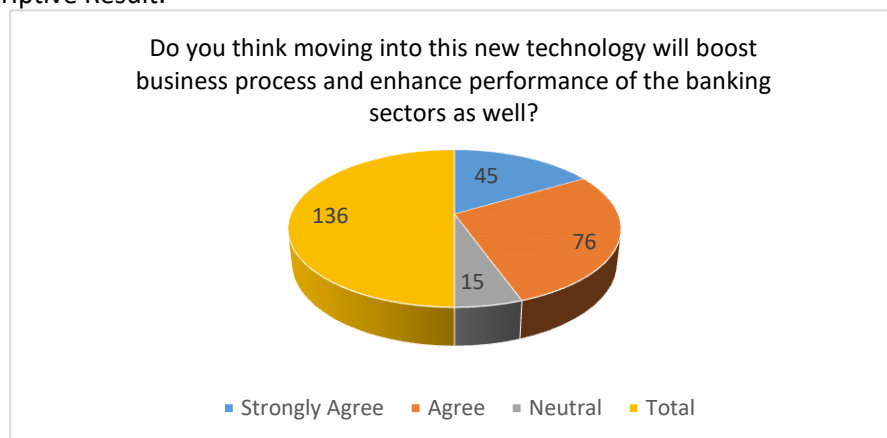


Figure 5: Moving into the new technology

The figure 5 insight that there were 76 people agree on the asked question to the respondents. Moreover, 45 respondents strongly agree on same asked question. The result showed positive impact of the cloud computing in the banking sector of Nepal.

Q.7. Descriptive Result:

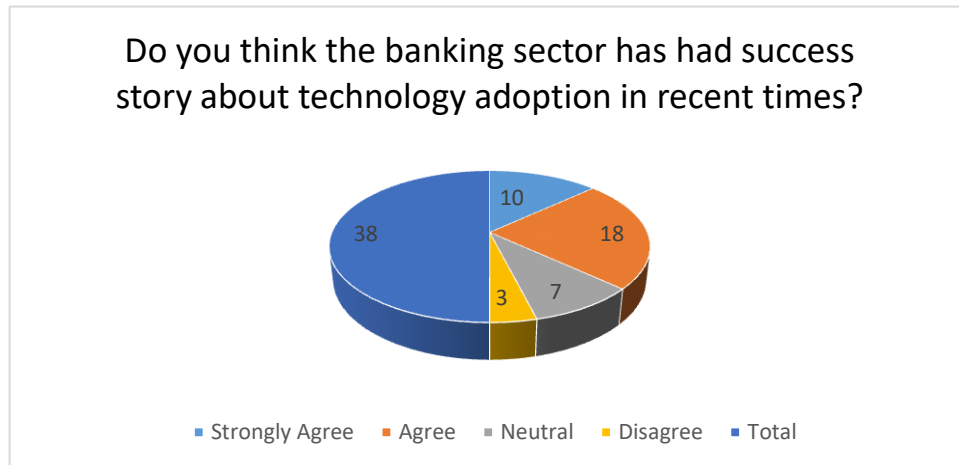


Figure 6: Banking sector has had success story about technology

The figure 6 found the result that there were 18 respondents agree with the asked question to them. Furthermore, 10 respondents were strongly agreeing with the same asked question.

Q.8: Descriptive Result

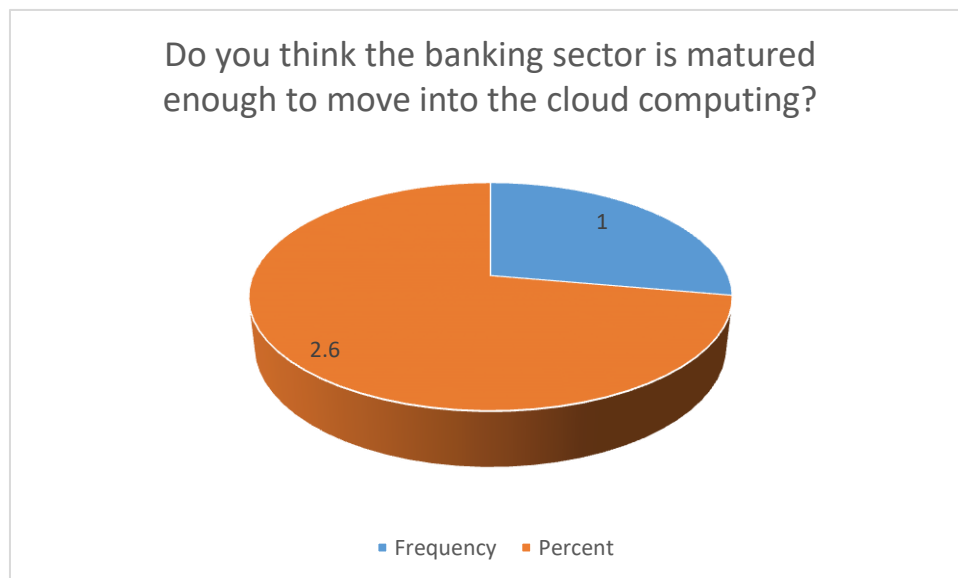


Figure 7: Banking sector is matured enough

The above pie chart revealed there were 2.6% respondents were agreeing with the asked question and 1% deny on the same asked question. The result displayed the majority percentage was positive on cloud computing.

Q.9: Descriptive Result

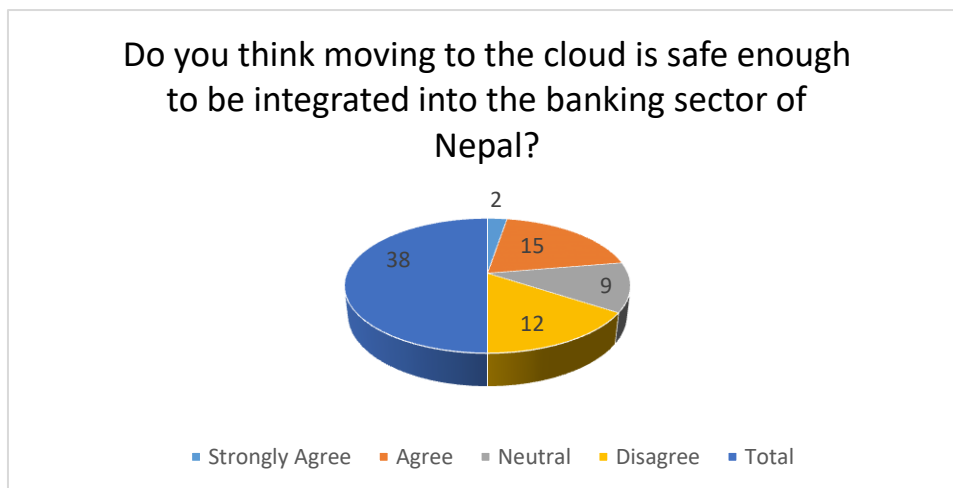


Figure 8: Moving to the cloud is safe enough

Q.10: Descriptive Result

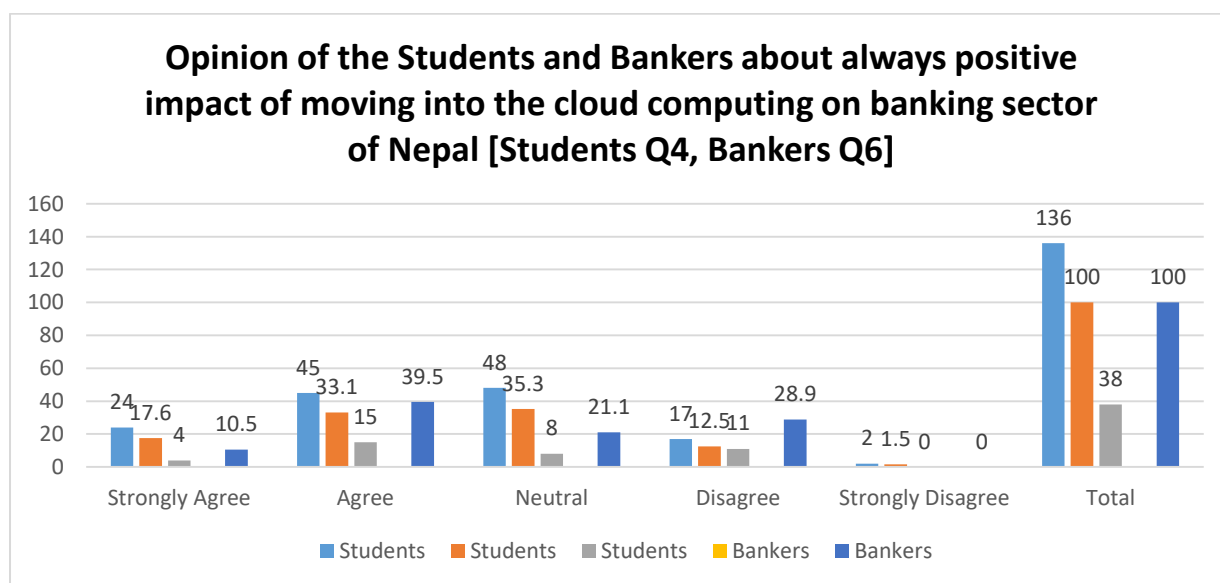


Figure 9: Always positive impact of moving into the cloud computing

Figure 9 showed that maximum students (48, 35.3%) were neutral that moving into the cloud computing would always have positive impact on banking sector of Nepal whereas maximum bankers (15, 39.5%) agreed upon that moving into the cloud computing would always have positive impact on banking sector of Nepal.

Table 2: Combined response of the Students about kind of positive impacts

Please choose what kind of positive impacts in moving into the clouds:	Number of students	Percent
Easy management and maintenance of clients	17	12.5
Easy to maintain the Accounts	6	4.4
Transaction independent of the platform and environment	8	5.9
Reliability and consistency then the in-house IT infrastructure	7	5.1

Easy retrieval of data	6	4.4
Response 1, 2, 3, 4, 5	23	16.9
Response 1, 2, 3, 4	1	0.7
Response 1, 2, 3, 5	2	1.5
Response 1, 2, 4, 5	8	5.9
Response 1, 2, 3	4	2.9
Response 1, 2, 4	1	0.7
Response 1, 2, 5	7	5.1
Response 1, 3, 4	1	0.7
Response 1, 3, 5	5	3.7
Response 1, 4, 5	3	2.2
Response 2, 3, 4	1	0.7
Response 2, 3, 5	2	1.5
Response 2, 4, 5	1	0.7
Response 1, 2	7	5.1
Response 1, 3	3	2.2
Response 1, 4	6	4.4
Response 1, 5	4	2.9
Response 2, 3	1	0.7
Response 3, 4	2	1.5
Response 3, 5	7	5.1
Response 4, 5	3	2.2
Total	136	100

*1. Easy management and maintenance of clients, 2. Easy to maintain the Accounts, 3. Transaction independent of the platform and environment, 4. Reliability and consistency then the in-house IT infrastructure, 5. Easy retrieval of data.

Table 2 showed that maximum students (23, 16.9%) responded all options of easy management and maintenance of clients; easy to maintain the accounts; transaction independent of the platform and environment; reliability and consistency then the in-house IT infrastructure; and easy retrieval of data as the positive impacts of moving into the clouds.

Table 3: Opinion of the Students and the Bankers about Security

Do you think shifting of the banking sector of Nepal into the cloud computing would help the banking sector secure more money and increase investment?	Students		Bankers	
	Number	Percent	Number	Percent
Strongly Agree	13	9.6	4	10.5
Agree	53	39	15	39.5
Neutral	55	40.4	11	28.9
Disagree	11	8.1	8	21.1
Strongly Disagree	4	2.9	-	-
Total	136	100	38	100

Table 3 showed that maximum students (55, 40.4%) were neutral about shifting of the banking sector of Nepal into the cloud computing would help the banking sector secure more money and increase investment whereas 15 (39.5%) bankers agreed upon that shifting of the banking sector of Nepal into the cloud computing would help the banking sector secure more money and increase investment.

Table 4: handing it off to somebody else would reduce ability to be fixable and agile

Do you think handing it off to somebody else would reduce your ability to be fixable and agile?	Students		Bankers	
	Number	Percent	Number	Percent
Yes	11	8.1	6	15.8
Most probably	54	39.7	17	44.7
May be	61	44.9	12	31.6
No	10	7.4	3	7.9
Total	136	100	38	100

Table 4 showed that maximum students (61, 44.9%) were uncertain and responded 'may be' as handing it off to somebody else would reduce your ability to be fixable and agile. Maximum bankers (17, 44.7%) responded 'most probably' as handing it off to somebody else would reduce your ability to be fixable and agile.

Table 5: Negative publicity with storing and managing banking information through clouding

Will the storing and managing banking information through cloud be affected resulting in hefty fines and negative publicity?	Students		Bankers	
	Number	Percent	Number	Percent

Yes	17	12.5	5	13.2
Most probably	40	29.4	14	36.8
May be	57	41.9	15	39.5
No	22	16.2	4	10.5
Total	136	100	38	100

Table 5 showed that maximum students (57, 41.9%) replied 'may be' as storing and managing banking information through cloud be affected resulting in hefty fines and negative publicity whereas 15 bankers (39.5%) may be' as storing and managing banking information through cloud be affected resulting in hefty fines and negative publicity.

Table 6: Control of data breaching to maintain security and integrity of data

Can data-breaching of extremely sensitive banking information be controlled to maintain the security and integrity of data?	Students		Bankers	
	Number	Percent	Number	Percent
Yes	35	25.7	9	23.7
Most probably	46	33.8	15	39.5
May be	48	35.3	13	34.2
No	7	5.1	1	2.6
Total	136	100	38	100

Table 6 showed that maximum students (48, 35.3%) replied 'may be' that data-breaching of extremely sensitive banking information could be controlled to maintain the security and integrity of data whereas 15 bankers (39.5%) replied 'most probably' that data-breaching of extremely sensitive banking information could be controlled to maintain the security and integrity of data.

Discussion

Research objective 1: To examine current scenario and usage of cloud computing in banking sector.

Cloud computing is one of the most discussed issues all over the world among the Information Systems (IS). The cloud services are classified under three main models namely: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). The SaaS model helps the cloud customers to access and utilize the pooled resources via web browsers or program interfaces. The PaaS model grants the cloud users such as programmers and web application developers to deploy the applications or to acquire on the cloud platform. The IaaS model helps to control the cloud infrastructures such as deployed applications, and networking modules. (Amponsah et al., 2016) The current research study found that there were 114 male and 22 females from the student respondents whereas 27 represented male and 11 represented females from banker's respondents. The figure (4.2) explored the age group of student's respondents and banker's respondents whereas 97 respondents existed in 20-30 years from students followed by 18 respondents existed in 31-40 from the bankers. Whereas the previous literature research study showed that there 62.3% respondents had little knowledge on the CC, 21.1% zero knowledge, while

16.5% neutral. Moreover 113 (58.2%) organizations were already using cloud, while 81 (41.8%) were not (RA, et al., 59-76).

The cloud deployment has been categorized into private, public, community, and hybrid clouds models. Private clouds help the organizations meet their IT-based requirements and they remain the sole managers or the owners. Public clouds provide the cloud services openly to the general users. Community cloud services on the other hand are offered to collective organizations with related mission of supporting community with mutual concerns. Hybrid cloud is integration of two or more of the above-mentioned models to form a single one, and is a complex model. (Amponsah et al., 2016) The current research study tells that maximum students (48, 35.3%) were neutral that moving into the cloud computing would always have positive impact on banking sector of Nepal whereas maximum bankers (15, 39.5%) agreed upon that moving into the cloud computing would always have positive impact on banking sector of Nepal. Previous research by Gangwar and Date (2016) developed a framework to test the effect of security, availability of cloud provider and compliance mediated by the perceived ease of use (PEOU) and perceived usefulness (PU). Questionnaire was developed to collect data from 280 companies in IT, manufacturing and finance sectors in India. The data were analyzed using exploratory and confirmatory factor analyses. The proposed model was tested with the structural equation modelling (SEM). The findings offer a better understanding of security, availability of cloud provider and compliance affecting the CC adoption. (Gangwar and Date, 2016)

Research objective 2: To identify the factors which are crucial in successful cloud computing adaptation in banking sector.

The present study's table 4.1 showed that maximum students (23, 16.9%) responded all options of easy management and maintenance of clients; easy to maintain the accounts; transaction independent of the platform and environment; reliability and consistency then the in-house IT infrastructure; and easy retrieval of data as the positive impacts of moving into the clouds. The research showed that extensive awareness campaigns are to be conducted to promote cloud data privacy to have an effective adoption of the cloud services. The study would help the cloud service providers and policymakers in developing strategies to address the issues liable to the insufficient cloud adoption in Ghana. It would also help the managers understand and realize its beneficial impacts to their business growth. The CC technology is equally advantageous to both the small and medium-size enterprises as it allows a gradual implementation steps on minimal initial investment. That's the prime reason for its rocketing popularity in the business world. (Amponsah et al., 2016)

Table 4.2 showed that maximum students (55, 40.4%) were neutral about shifting of the banking sector of Nepal into the cloud computing would help the banking sector secure more money and increase investment whereas 15 (39.5%) bankers agreed upon that shifting of the banking sector of Nepal into the cloud computing would help the banking sector secure more money and increase investment. Cloud offers flexibility, scalability, and affordability to the service providers and the users. It is advantageous to both the large and the SMEs due to its inherent feature of gradual implementation-friendly at minimal investment. The present research explored the factors affecting the cloud adoption in Ghana, and provided guidance for organizations willing to adopt it. The CC adoption rate is low in developing countries despite its plethora of advantages. However, organizations in the developing countries may be benefitted from its augmented productivity and efficiency in business operations. Threats for the successful and uninterrupted adoption of the CC technology may compromise the privacy and security of data shared via the cloud networks. Important threats for the same are mobile device attacks, social networking attacks, verification problems, insider and organized crime threat. (Amponsah et al., 2016)

Research objective 3: To propose a context free framework for successful cloud adaptation in banking sector of Nepal.

Table 4.3 showed that maximum students (61, 44.9%) were uncertain and responded 'may be' as handing it off to somebody else would reduce your ability to be fixable and agile. Maximum bankers (17, 44.7%) responded 'most probably' as handing it off to somebody else would reduce your ability to be fixable and agile. The research conducted by Awosan (2014) revealed that following three factors significantly affected the adoption CC in Nigeria:

1. Low awareness of CC
2. Unstable power supply
3. High cost and unreliability of internet service (Awosan, 2014)

The current study's table 20 showed that maximum students (48, 35.3%) replied 'may be' that data-breaching of extremely sensitive banking information could be controlled to maintain the security and integrity of data whereas 15 bankers (39.5%) replied 'most probably' that data-breaching of extremely sensitive banking information could be controlled to secure data. The CC relieves the firms from owning data centers and install applications. Cloud provides scalability, on-demand service, flexibility and minimized cost. This research was conducted to find the employees' perception in IT & telecommunication companies about CC in Nigeria. Both quantitative and qualitative researches were carried out to fulfill the research objectives. Questionnaires were designed and distributed using online survey application namely survey monkey. Many semi-structured interviews with the employees and IT managers were conducted through Skype. The present research findings showed that CC would be the next generation computing model in Nigeria. Increased focus on quality services, collaboration, easy data access and provision of infrastructures were major motivating factors for CC adoption in Nigeria. (Awosan, 2014)

The research showed that 62.3% respondents had few knowledges about the CC technology, 21.1% no knowledge at all, while 16.5% remained neutral. Similarly, 113 (58.2%) organizations were already adopting cloud, while 81 (41.8%) were yet to implement it. The research found that the performance expectation, cost factor, cloud-conducive environment, and data security positively and significantly influenced the organizations' intention to adopt it. The results of the study depicted the relationship among the cloud adoption variables (e.g., performance expectancy (PE), social influence, facilitating condition (FC), motivation, price value, data security) with the organizations' intention to adopt and use the cloud. Regression coefficient revealed FC as the most significant factor to the model, followed by PE, price value (PV) whereas security (SE) had no significant effect. (Amponsah et al., 2016)

The advent of cloud computing has transformed the IT demands in all arena of businesses. Many banks are now migrating to the cloud technologies from their traditional IT interfaces because it helps them deliver unique and innovative services to their clients, collaborate with them effectively, and enhance their IT efficiency. The CC technology provides secure deployment provisions during service delivery to the customers. Banks that adopted cloud computing could respond to financial uncertainties in a quick and efficient manner. Perceived cost reductions, ease of scaling-in and scaling-out, faster time to-market, data and server virtualization, technology standardization, and ability to access data and applications on-demand are the major factors driving the firms towards the CC technology. (Sudhakar et al., 2014)

With the CC, banks can assign budget only for their operational expenses and for testing new service and applications on the cloud network. No CC model is already customized to address all the technology requirements for each firm, they can be customized later as well. Banks should adopt stringent mechanism to ensure data security, privacy and integrity in the cloud environment. Many banks also fragment their data depending on their sensitivity into low level (shared with no restrictions), ultra-secure (only accessible by top level managers). (Sudhakar et al., 2014)

Using the CC technology, banks can create a flexible environment to respond immediately to new business requirements and upgrade the existing ones. Cloud models help to march from a capital-intensive pattern to a low operational cost model. This can be achieved by choosing the right cloud model as per the business requirements. Following two prime challenges must be tackled by the banks that show willingness to adopt the CC:

- Security: Privileged user access, Regulatory adherence, Data segregation, Data recovery
- Regulatory and compliance

The cloud can store users' data, customize product or service due to of its versatile computing capacity and offers following benefits to the users:

- Cost reductions
- Scalability
- Rapid entry to the market
- Data virtualization
- Mobility (Sudhakar et al., 2014)

Cloud computing has been declared as the first among the top 10 technologies at present. It offers cost-effective and flexible solution to fulfill business objectives of the organizations. Many prospective-thinking enterprises are applying cloud technologies, and services to transform, automate and optimize their business processes. Prior to adopting the CC, every organization should weigh the potential security threats, vulnerabilities and their remedies. Although the CC adoption offers strategic and operational benefits to the organizations, its adoption is not up to the satisfactory level. It might be due to its perceived risks. The clouds offer scalability, and automated management of the computing resources and avoid expensive hardware expenses. Still, data security and compliance are serious concerns with its adoption. (Gangwar and Date, 2016)

The CC enables ubiquitous, easy, and on-demand access to a shared computing source. It has become the foundation for the business explosion and the advent of the new business models in a reduced operational cost. The CC technology radically transforms the traditional IT processes and also improves its performance. It also motivates the top management to appreciate the modifications, estimate the resources required for its adoption. The CC improves the efficiency, data accuracy, and minimizes costs. The present research tested eight different CSFs for the cloud adoption namely complexity, compatibility, advantage, top management support, company size, technical preparedness, competitive environment, and competitors' pressure. Survey from 16 pharmaceutical companies in Amman (capital of Jordan) was conducted to collect data. Hypotheses were formulated accordingly and tested with multiple regression analysis. All the above-mentioned factors significantly affected the CC adoption in the pharmaceutical companies in Jordan. (Al-Shura et al., 2018)

The CC technology ensures long-term cost reduction, easy access to data at desired time from desired location. Many cloud service providers are even providing free cloud storage facilities these days so that the users can easily store and share their data. Both government and private sectors are optimizing their cloud data storage mechanisms to deliver quality services to their customers. Still some organizations have the early implementation phase of the cloud due to problems in the technical and human resources. In Malaysia, the government has been promoting its adoption and implementation. Since cloud is in its infancy, the contributory factors are yet to be elaborated for future expansion of the services. Provision of the physical data storage center was mandatory for any individual organization in the historical periods, but these days, these physical data repository systems have been replaced by the CC technology, without increasing the costs. The CC adoption significantly minimizes the capital expenditures and operational costs. The CC technology is facing challenges of data security, privacy and integrity, lack of expertise and slow internet speed in some areas. The cloud offers easy access to data, applications, and services at minimal costs and creates healthy competitions among the cloud providers and the users. (Amron et al., 2017)

The researchers carried out an exploratory research on cloud technology within the banking firms. They applied an interpretivist epistemology to explore the complex and dynamic social world under study. Data were collected by one-to-one semi-structured interviews with the bank managers and employees, technical consultants and cloud providers. Due to cloud's perceived complexity, customization can be regarded as a barrier to its adoption by the organizations. The research concluded that further original researches are mandatory to conclude the best affordable cloud infrastructure for the banks. Various qualitative comparison analysis (QCA) procedures such as

assessing data coherence or congruence, matching with the current theories, and developing new theoretical arguments were used to ensure the data quality and integrity. The researchers found that IaaS was the most preferred cloud. (Owusu-Tucker and Stacey, 2018)

The CC offers facilities of using even the distant virtual servers and shared resources to store and manage data. It enables ubiquitous, convenient, on-demand access to the shared resources and helps to release these with minimal interaction with the service provider. Australia ranked the second among the countries for the expansion of the CC technology. It has radically redefined the computing paradigm with the help of dynamically on-demand scalable resources via internet. Further improvements in the e-education, e-health, and shared business activities across governmental departments are mandatory. The research showed that there was still knowledge and technology gaps in the CC research in Africa. Cloud computing is less capital-intensive. (Scholtz et al., 2016)

Adoption of the state-of-the-art technology helps to support the organizational processes and also enhances its competitiveness in the local as well as the global market. With the CC technology, firms can outsource their IS management to promote the core competencies of the organizations. Necessity of the cloud adoption is equally experienced by the top-level management as well as bottom level ones. Service delivery becomes faster, less costly, and better due to the cloud adoption. Many technology adopters are switching to the CC for its subsidized costs, less technical expertise requirements, dynamic applications. Business processes become more effective and scaled up so that the firms can penetrate the markets faster. The advent of the CC technologies is driving firms to upgrade their traditional IT infrastructure to become competitive. It is advantageous over the traditional computing system in terms of lower entry cost, device and location independency, and scalability. Exploration of the determinants for the adoption of CC to enhance its acceptance was the prime objective of the present research. First determining and then ranking the factors cloud computing adoption (CCA) are crucial to its successful adoption. (Priyadarshinee et al., 2017)

5 Conclusion & Recommendation

The present research study carried out to collect the data from the banking sectors in the Kathmandu valley, Nepal regarding the cloud computing critical success factors. The research study applied primary data from the banking institutions to conduct the whole research. The data analysis had been done with the help of SPSS version 25 and Microsoft excel. The method of the research study was quantitative because there were numerical data enrolled in the present study.

The present research study result explored that there were 114 male and 22 females from the student respondents whereas 27 represented male and 11 represented females from banker's respondents. Another result of the present research study was age group of student's respondents and banker's respondents whereas 97 respondents existed in 20-30 years from students followed by 18 respondents existed in 31-40 from the bankers. Furthermore, the present study found that there were 21 respondents from the bank said 0-5-year work experienced in the bank, followed by 16 respondents from the bank said that 6-10 years experienced in the bank. Finally, the present research study gave the various ways to advantages of the cloud computing and gave the idea about the cope with the challenges of cloud computing in real scenario.

The research showed that maximum students (55, 40.4%) were neutral about shifting of the banking sector of Nepal into the cloud computing would help the banking sector secure more money and increase investment whereas 15 (39.5%) bankers agreed upon that shifting of the banking sector of Nepal into the cloud computing would help the banking sector secure more money and increase investment.

5.1 Recommendation

After revealed of the various result regarding the cloud computing, here some recommendation had been mentioned as follows:

- The cloud computing should be implemented in the bank for maintain the good services to the customers.
- The cloud computing would give the security and would minimize the extra expenditure on the unnecessary hardware equipment.
- The cloud computing would be the played vital role in the competitive market

References

- Agre C. Implementation of a Cloud in Banking Sector. *International Journal of Computer Science and Information Technology Research* 2015;3(2):1168-1174.
- Amponsah RA, Panford JK, Hayfron-Acquah JB. Factors Affecting Cloud Computing Adoption in a Developing Country– Ghana: Using Extended Unified Theory of Acceptance and Use Of Technology (UTAUT2) Model. *International Research Journal of Engineering and Technology (IRJET)* 2016;3(11):59-76.
- Amron MT, Ibrahim R, Chuprat S. A Review on Cloud Computing Acceptance Factors. *Procedia Computer Science* 2017; 124:639-46.
- Armbrust M, Fox A, Griffith R, Joseph AD, Katz R, Konwinski A, Lee G, Patterson D, Rabkin A, Stoica I, Zaharia M. A View of Cloud Computing. *ACM Journal on Computing and Cultural Heritage* 2010;53(4):50-58.
- Asadi S, Nilashi M, Husin ARC, Yadegaridehkordi E. Customers perspectives on adoption of cloud computing in banking sector. *Inf Technol Manag* 2016:1-26. doi: 10.1007/s10799-016-0270-8.
- Awadallah N. Usage of Cloud Computing in Banking System. *International Journal of Computer Science Issues (IJCSI)* 2016;13(1):49-52.
- Awosan RK. Factor Analysis of the Adoption of Cloud Computing in Nigeria. *African Journal of Computing & ICT* 2014;7(1):33-42.
- Gangwar H, Date H. Critical Factors of Cloud Computing Adoption in Organizations: An Empirical Study. *Global Business Review* 2016;17(4):886–904.
- Gao F, Thiebes S, Sunyaev A. Rethinking the Meaning of Cloud Computing for Health Care: A Taxonomic Perspective and Future Research Directions. *J Med Internet Res* 2018;20(7): e10041.
- Hassan H, Nasir MHM, Khairudin N. Cloud Computing Adoption in Organizations: Review of Empirical Literature. *SHS Web of Conferences* 2017; 34:02001. doi: 10.1051/ 73402001.
- Hentschel R, Leyh C, Baumhauer T. Critical Success Factors for the Implementation and Adoption of Cloud Services in SMEs. *Proceedings of the 52nd Hawaii International Conference on System Sciences* 2019:7342-51.
- Kaur, H. and Kautish, S., (2016). "An Implementation of Wireless Sensor Network Using Voronoi _ PSO (Particle Swarm Optimization)", *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, Volume 4, Issue XI, November 2016, pp.361-368
- Kautish, S. (2008), "Online Banking : A Paradigm Shift", *E-Business*, Vol. 8, No.10, pp. 5459.
- Kautish S., Thapliyal M P, "Concept of Decision Support Systems in relation with Knowledge Management – Fundamentals, theories, frameworks and practices", *International Journal of Application or Innovation in Engineering & Management (IJAIEM)* Volume 1, Issue 2, October 2012 ISSN 2319 – 4847
- Kautish S. 2013. Knowledge sharing: A contemporary review of literature in context to information systems designing. *Academia* 3(1). *The South Asian Academic Research Journal*: 101-113.
- Kautish, S., & Thapliyal, M. P. (2013). Design of new architecture for model management systems using knowledge sharing concept. *International Journal of Computer Applications*, 62(11), 27–30.
- Kumar, A., Rajpurohit, V.S. and Kautish, S., 2020. A Study on Technology-LED Solutions for Fruit Grading to Address Post- Harvest Handling Issues of Horticultural Crops. In *Modern Techniques for Agricultural Disease Management and Crop Yield Prediction* (pp. 203-221). IGI Global.

- Kaur, R., & Kautish, S. (2019). Multimodal Sentiment Analysis: A Survey and Comparison. *International Journal of Service Science, Management, Engineering, and Technology (IJSSMET)*, 10(2), 38-58.
- Liana J, Yenb DC, Wang Y. An exploratory study to understand the critical factors affecting the decision to adopt cloud computing in Taiwan hospital. *International Journal of Information Management* 2014; 34:28- 36.
- Niraula, P. and Kautish, S., Study of The Digital Transformation Adoption in The Insurance Sector of Nepal. *LBEF Research Journal of Science, Technology and Management*, 1(1), pp.43-60.
- Owusu-Tucker E, Stacey P. An exploratory study assessing the role cloud computing has in achieving strategic agility with the banking industry. Presented at the Hawaii International Conference on System Sciences (HICSS-51), Hawaii, 3rd-6th January 2018. Extracted from Loughborough University's Institutional Repository.
- Palos-Sanchez PR, Arenas-Marquez FJ, Aguayo-Camacho M. Cloud Computing (SaaS) Adoption as a Strategic Technology: Results of an Empirical Study. *Mobile Information Systems* 2017:1-20. doi: 10.1155/2017/2536040.
- Priyadarshinee P, Jha MK, Raut RD, Kharat MG, Kamble SS. To identify the critical success factors for cloud computing adoption by MCDM technique. *Int. J. Business Information Systems* 2017;24(4):469-510.
- Rani, S. and Kautish, S., 2018, June. Association Clustering and Time Series Based Data Mining in Continuous Data for Diabetes Prediction. In *2018 Second International Conference on Intelligent Computing and Control Systems (ICICCS)* (pp. 1209-1214). IEEE.
- Rani, S., Kautish, S. (2018). Application of data mining techniques for prediction of diabetes-A review. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 3(3), 1996-2004.
- Raymond M. Adoption of Cloud Computing Services for Sustainable Development of Commercial Banks in Uganda. *Global Journal of Computer Science and Technology* 2018;18(1):1-9.
- Rieger P, Gewald H, Schumacher B. Cloud-Computing in Banking Influential Factors, Benefits and Risks from a Decision Maker's Perspective. *Proceedings of the Nineteenth Americas Conference on Information Systems, Chicago, Illinois, August 15-17, 2013*:1-12.
- Saleh A, Drus SM, Shariff SSM. Empirical studies on cloud computing adoption: A systematic literature review. *Journal of Theoretical and Applied Information Technology* 2017;95(24): 6809-32.
- Scholtz B, Govender J, Gomez JM. Technical and Environmental Factors Affecting Cloud Computing Adoption in the South African Public Sector. *International Conference on Information Resources Management (CON-FIRM) 2016 Proceedings*. 16. Extracted from Association for Information Systems AIS Electronic Library (AISeL).
- Senyo PK, Boateng R, Addae E. Cloud computing research: A review of research themes, frameworks, methods and future research directions. *International Journal of Information Management* 2018;38: 128–139.
- Sudhakar K, Kumar GV, Rani LS. A View on Cloud Computing in the Banking Sector. *International Journal of Computer Science and Information Technologies (IJCSIT)* 2014;5(3):3305-08.
- Yan G. Application of Cloud Computing in Banking: Advantages and Challenges. *Advances in Economics, Business and Management Research (AEBMR)* 2017;23:29-32.
- Yoo S, Kim B. A Decision-Making Model for Adopting a Cloud Computing System. *Sustainability* 2018, 10, 2952; doi:10.3390/su10082952.
- Zissis D, Lekkas D. Addressing cloud computing security issues. *Future Generation Computer Systems* 2012; 28:583–592.