Term Project Report

On

Adoption of Cloud Computing by Public Sector Banks in India

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Master of Business Administration (Executive)

Submitted by: Pragya Mallick, 2K17/EMBA/530

Under Guidance of

Mr. Manoj Kumar, Assistant Professor & Head (Computer Centre)

Delhi School of Management, Delhi Technological University

Bawana Road, Delhi-110642

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Pragya Mallick

2K17/EMBA/530

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Chapter 1: Introduction

Cloud computing is an advanced IT technology that enables people and organizations to use the Internet to use powerful hardware and software programs and tools. The means from which these services can be used are typically powerful and advanced computers that are placed in remote locations for safety purposes.

Cloud is a separate IT environment that measure remotely and scalable IT resources, and depends on a pool of shared physical and virtual resources rather than the implementation of personal or local software and hardware. Cloud implementation provides a great choice for choosing the required management and security level, and is therefore suitable for nearly every business. Although there is no miracle cure able to meet all the requirements, cloud computing offers a number of advantages to the financial institutions. These benefits include:

Cost savings- The large capital expenditure can be converted in advance to running, smaller operating costs without any bulge investments in new software and hardware.

Business continuity- In cloud computing, the service provider manages the technology and can have a higher level of fault tolerance, data protection and disaster recovery. Cloud computing also provides a high level of support and redundancy at lower cost.

Usage-based billing– Institutions may choose and choose the services based on the conversion basis.

Business agility– As the cloud is available to the demand, the investment in infrastructure is minimized and the time taken to set up the infrastructure is saved. The development cycle for the new products is decreasing, making customers more efficient and faster.

Business focus– Financial corporations can move non-critical services, such as software patches, maintenance, etc., to the cloud, and focus on their core business, not IT.

Green IT– Transferring banking services to the cloud reduces carbon footprint and energy consumption, and there is a minimised working time with more efficient use of computing power.

Cloud Service model

Cloud computing offers more flexible business models to the financial institutions that reduce operational costs. However, it is critical to select the cloud service model that best matches core business requirements. These models are:

SaaS– (Software-as-a-service) – Users have access to the software and data from their browser, and enterprise software and related data are hosted with the cloud service provider. You can provide this model to accounting, enterprise resource planning (ERP), Customer relation management (CRM), human resource management, billing, service desk management, and content management software.

IaaS (Infrastructure-as-a-service) – Rather than purchasing software, servers, network equipment or data centre space, the businesses can buy these resources as fully outsourced services.

PaaS(Platform-as-a-service) – In this model, the cloud service provider offers a complete platform to the businesses to develop , run and manage their applications without engaging in the infrastructure complexities associated with application development and launch.
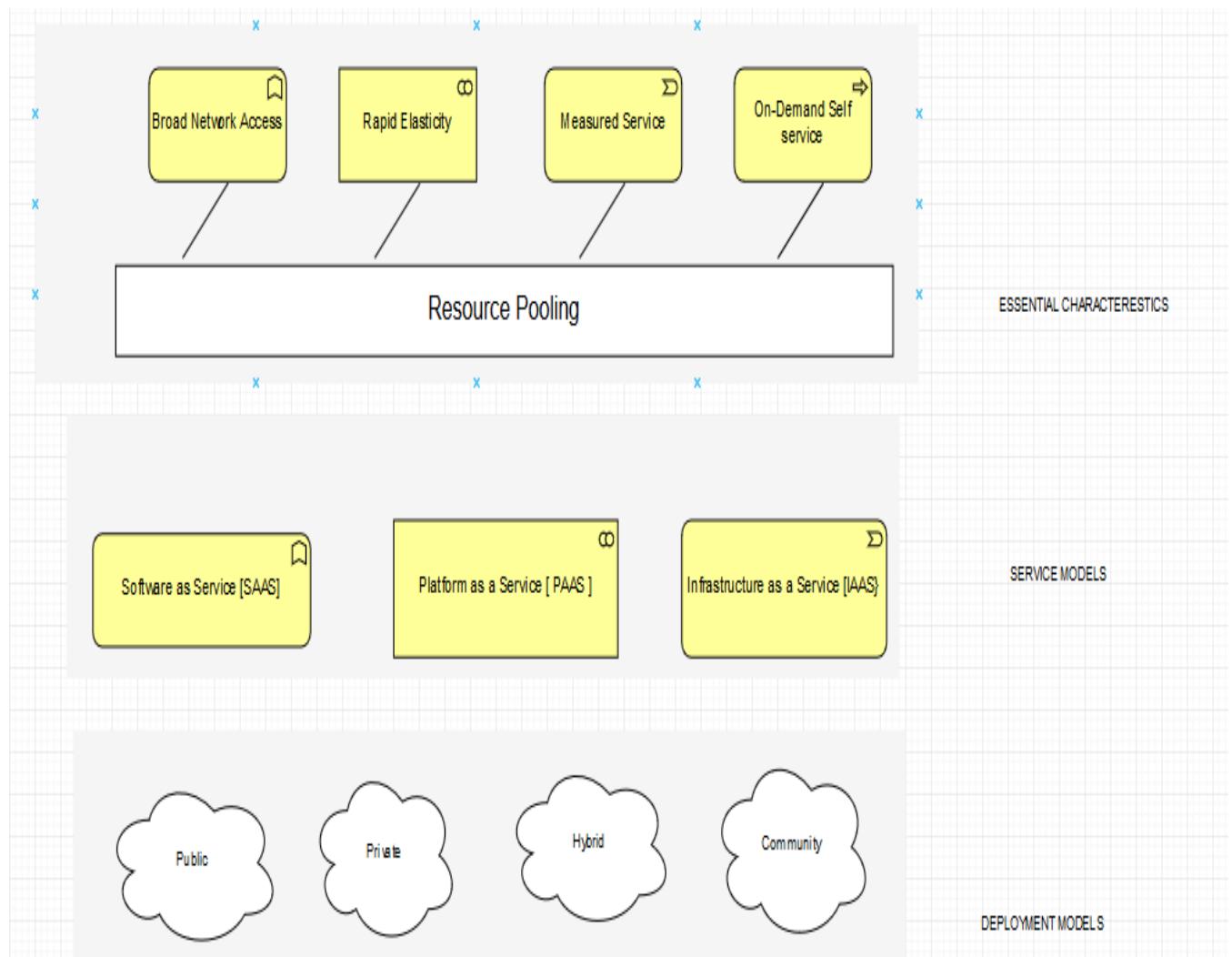
Banking on the Cloud

The banking sector needs to address the ever-growing demands of data input and there is a need to explore the systems that are not dependent on a similar system migration, so that the infrastructure can be changed without interruption. The banks have been slow in adopting cloud computing, because there is concern about the lack of control and the proliferation of the environment, which can lead to reliability and safety risks. The banks also want their financial data to be secured with controlled access. The public clouds come with issues such as location, regulation, recoverability and accountability, and this has led to a slow adoption and introduction of cloud computing in the banking sector.

However, cloud computing can change the way consumers work with banks, and migration to the appropriate cloud computing model offers different benefits. Understanding migration and the whole migration process can be very useful in the long term. The first step for the banking industry towards the introduction of cloud computing is an option for the private cloud, because it gives banks more control, more flexibility and less complexity. The banks can also adapt their resource configuration to the changes in demand for their services. The risk of security breach in the private cloud is minimized because it is implemented within the organization's firewall. Virtual private network (VPN) allows the company's IT infrastructure to be moved quickly and quickly across a single private network. By using private clouds, banks can operate large transaction volumes without delaying the processes and overburdening the network. The services become more efficient through specific resources of each unit, which improves customer experience. Private clouds provide security and affordability, because the resources are rented and are not purchased. Total operating costs are reduced as capital expenditure is converted into operational expenditure. Personal clouds are safe, affordable and provide an easy transition in the banking sector leading to a long-term success. The applications of the banking sector are highly critical, private clouds provide greater security to ensure that the data are not misplaced or lost. The public cloud offers economies of scale, cost advantages and ROI, while the private cloud offers high safety levels.

Since there is no solution to a single solution, the banks must consider some important aspects. It is essential that all challenges and benefits associated with cloud computing are thoroughly evaluated with respect to their full range of services-core and non-core. In addition, geographical rules, penalties, industry criticism, interoperability and interface impact, control rules and technology have a number of aspects that need to be thoroughly assessed. The cloud model selection must be evaluated based on the management control and support provided by the service provider. Non-core applications that do not need strict governance and strict monitoring are suitable for SaaS, while IaaS is more suited to the business critical applications that need to be monitored closely. The banks must take into account that the seller must provide transparency in security procedures and security policy.

Chapter 2: Research Objective

Cloud computing shows high potential for banking industries. Few of the most successful Public sector banks in the world have already implemented this solution. For example, DBS bank, has moved all its applications on cloud in 2016 .Although cloud computing is a very beneficial technology, it has not been leveraged by the Public - sector banks of India . This leads to the problem statement:

Why has cloud computing not been implemented in Public sector banks in India?

The research will evaluate the probable barriers to adoption of cloud computing by Public sector banks in India. The main objective is to do a comprehensive analysis of the reasons that lead to non - adoption of cloud computing in India.

Figure 1*: Conceptual Framework*
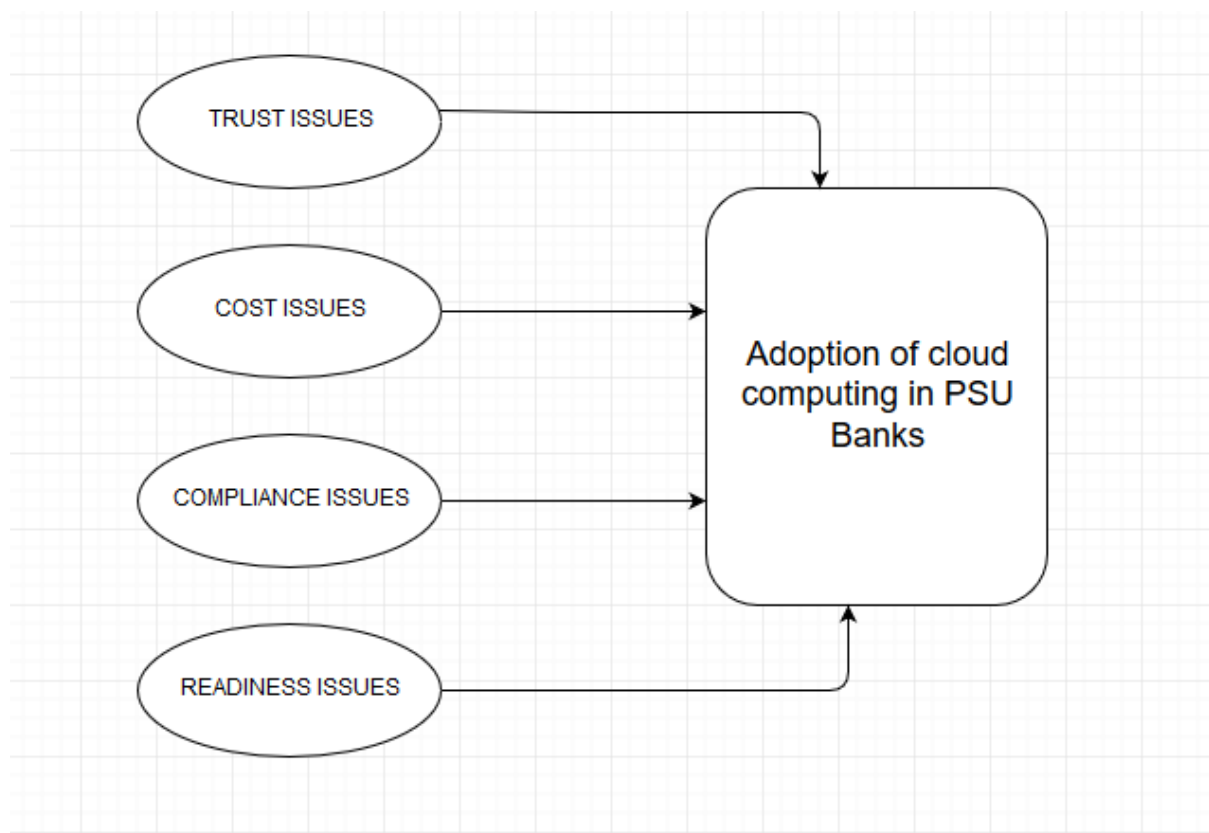
Chapter 3: Research Design:

Methodology:

This is a qualitative research in which a survey was done. A questionnaire was prepared based on the literature review. It was mailed to the IT managers of different banks in India, IT consultants and academicians. It was sent to 250 people out of which 52 have responded. After initial sanity y check of data, it was found that 5 of them were bogus and hence the calculations were done on 47 data. The respondents from Public sector banks were from various banks
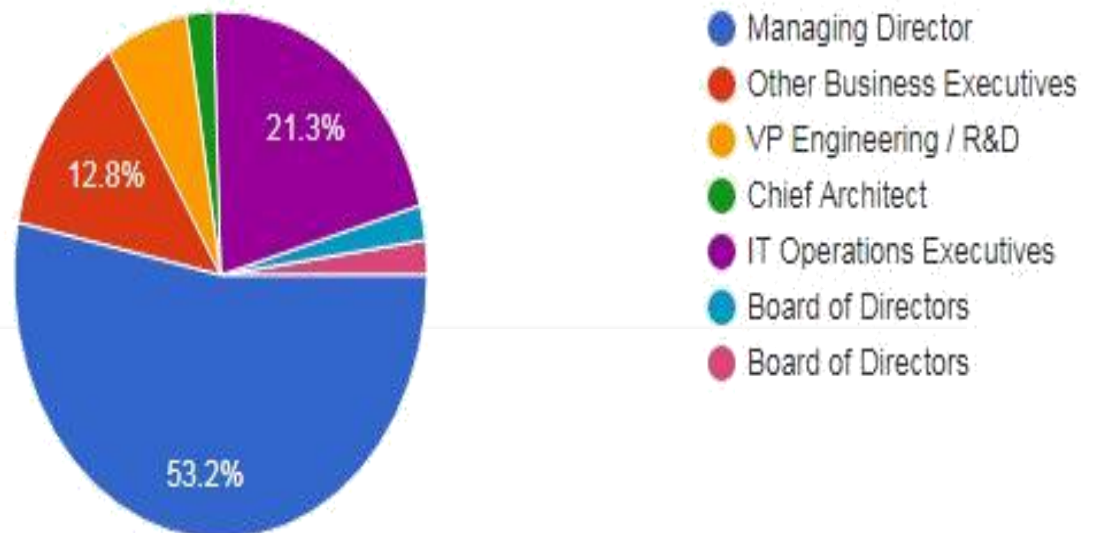
SCALE DEVELOPMENT

The questionnaire has been developed in such a way that the answer can be given in a scale of 5. 1 represents strongly disagree and 5 represents strongly agree.

Summary of Findings:

Following were the questions asked in the survey and their results:

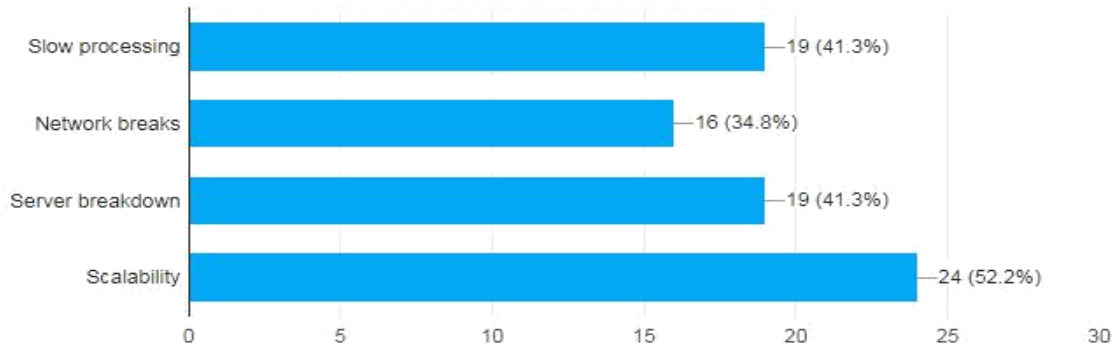1. Key Decision takers in the Bank to adopt a modern technology

47 responses

2. Pain points of the Public -Sector Banks in India related to current structure
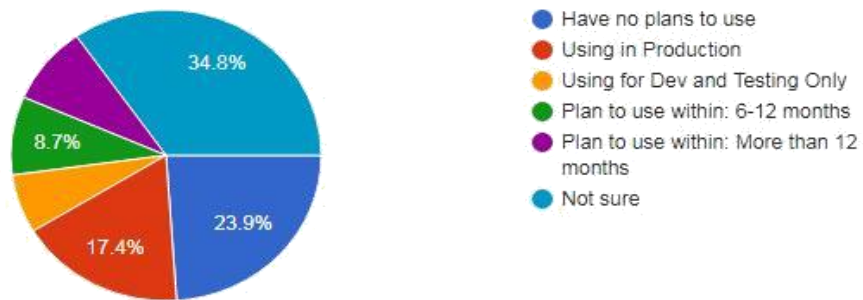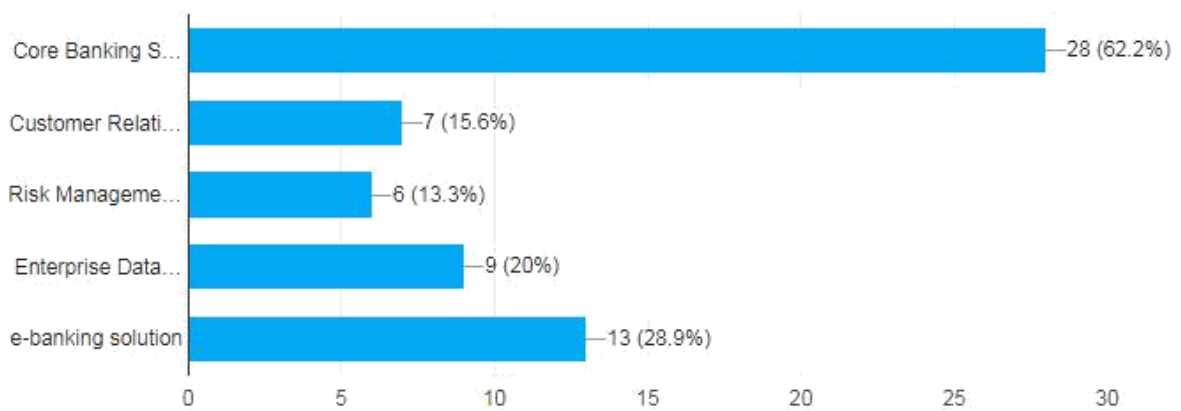
3.   Stage of adoption of cloud computing or plans for adoption in Banks

4.   Applications for which cloud computing would be mission critical

5.   Organization view as the most important benefits of cloud computing – Ability to rapidly launch new products and services

6. Organization view as the most important benefits of cloud computing – Better collaboration across teams

Better Collaboration

Better collaboration...
- Disagree
- Neutral
- Agree
- Strongly Agree
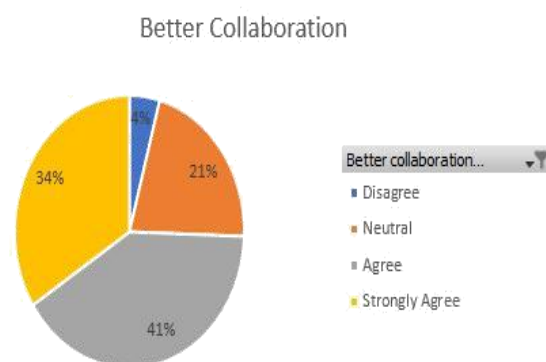
7. Greatest barriers for adoption of cloud computing in Banks – Security

47 responses
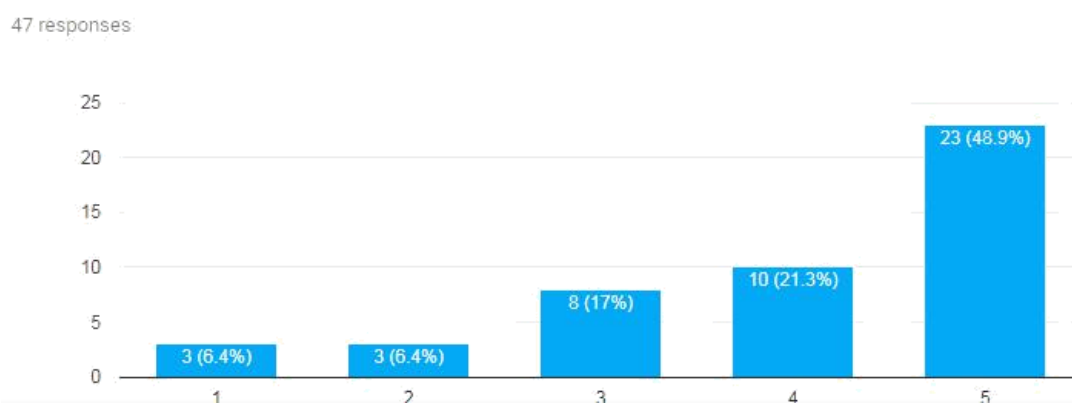
8. Greatest barriers for adoption of cloud computing in Banks – Uncertainty of safety of data

9. Greatest barriers for adoption of cloud computing in Banks – lack of strong data protection laws

Count of Responses
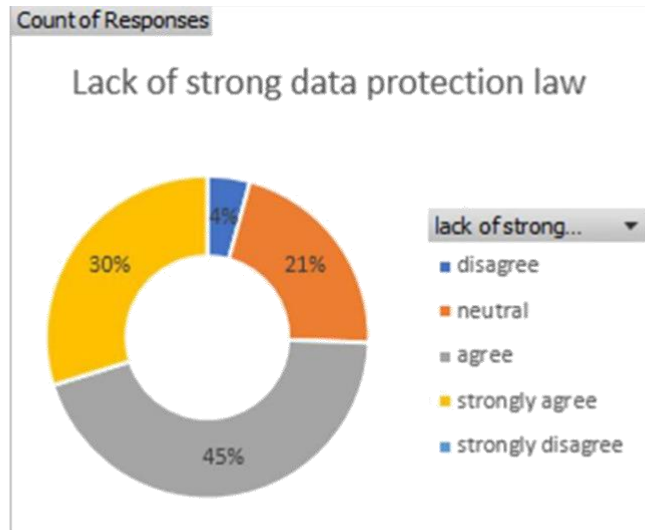
Lack of strong data protection law

lack of strong...
- disagree
- neutral
- agree
- strongly agree
- strongly disagree

10. Greatest barriers for adoption of cloud computing in Banks – lack of good infrastructure (data centres, inefficient power supply y, low internet penetration)

Infrastructure

lack of good...
- strongly disagree
- disagree
- neutral
- agree
- strongly agree

11. Greatest barriers for adoption of cloud computing in Banks – Geographic Location of Cloud Provider Data Centres

12. Greatest barriers for adoption of cloud computing in Banks – Integration with Existing Systems
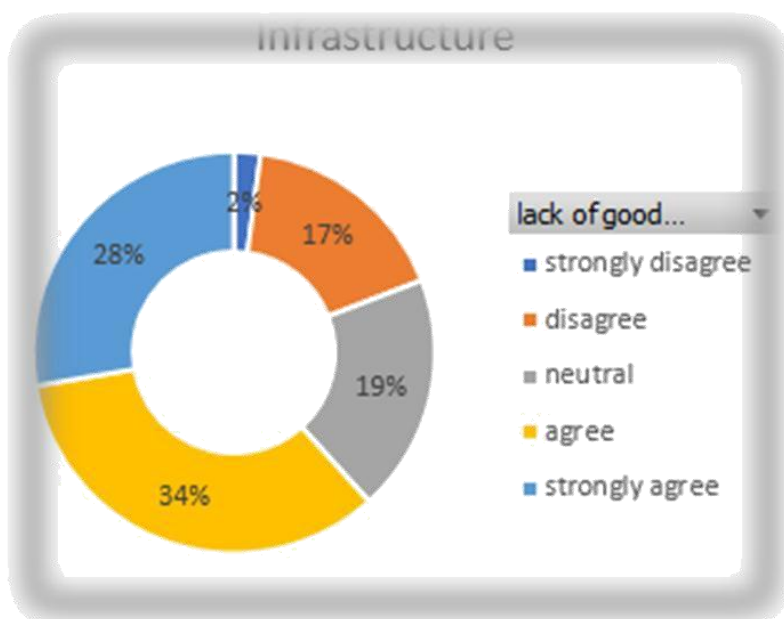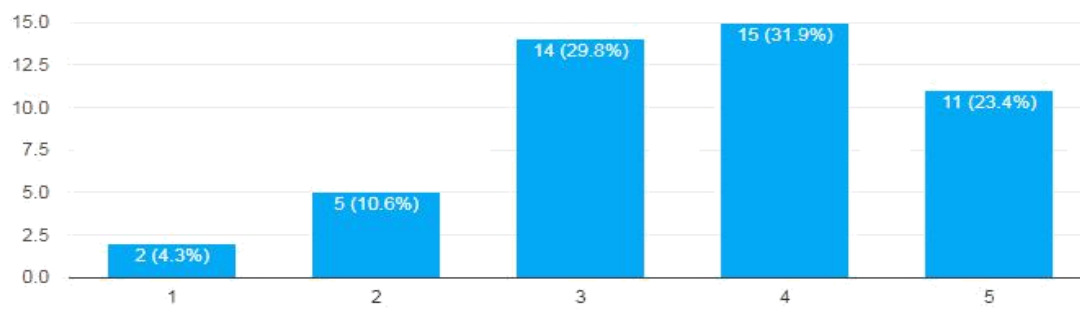
13. Greatest barriers for adoption of cloud computing in Banks – Costs and Return on investment

14. Greatest barriers for adoption of cloud computing in Banks – lack of skills and expertise
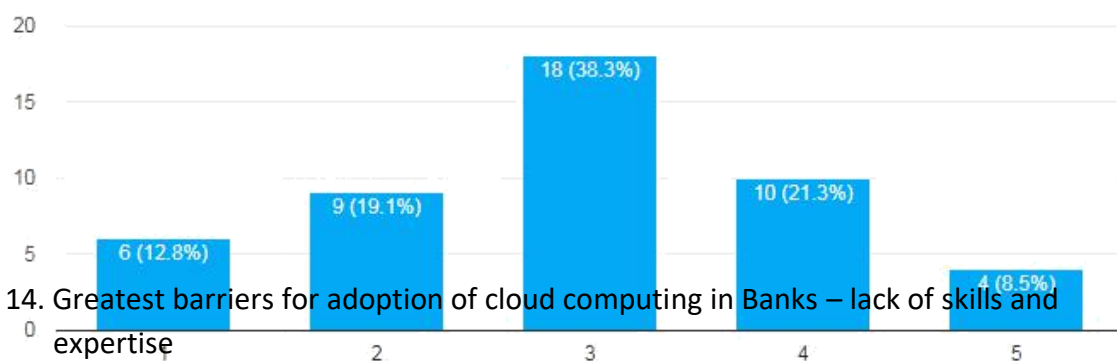
Chapter 4: REGRESSION TESTING

HYPOTHESIS	EFFECT	CORRELATION	MEAN VALUE	p-Value
	ADOPTION OF CLOUD			

H1	COMPUTING- UNCERTAINITY OF SAFETY OF DATA	-0.08	3.91	**0.99**
H2	ADOPTION OF CLOUD COMPUTING-TRUST	0.01	3.45	**0.91**
H3	ADOPTION OF CLOUD COMPUTING- SECURITY	0.07	4.00	**0.83**
H4	ADOPTION OF CLOUD COMPUTING- LAWS of PROTECTION	-0.03	4.00	**0.83**
H5	ADOPTION OF CLOUD COMPUTING-LACK of DATA PROTECTION	0.07	4.00	**0.62**
H6	ADOPTION OF CLOUD COMPUTING- LACK OF INFRASTRUCTURE	-0.26	3.68	**0.07**
H7	ADOPTION OF CLOUD COMPUTING- MANAGEMENT SUPPORT	0.24	3.45	**0.10**
H8	ADOPTION OF CLOUD COMPUTING-EXPERTISE IN SKILL	0.16	3.26	**0.27**
H9	ADOPTION OF CLOUD COMPUTING- COST SAVING	0.28	3.91	**0.06**
H10	ADOPTION OF CLOUD COMPUTING-ROI	0.16	2.94	**0.29**

Chapter 5: CHI SQUARE TEST STATISTICS

It is used to determine whether there is a significant association between the two variables.

Decision Criteria

D1: If the Chi -square value is greater than or equal to the critical value there is a significant difference between the groups we are studying. Then reject your null hypothesis. That is, the difference between actual data and the expected data (that assumes the groups aren't different) is probably too great to be attributed to chance. So, we conclude that our sample is not supported D2: If the Chi -square value is less than the critical value. There is significant difference. The chi - square critical value, then you "fail to reject" your null hypothesis.

DEPENDANTS	HYPOTHESIS	EFFECT	VALUE	TEST STATISTIC	p-Value	SUPPORTED
SECURITY	H1	ADOPTION OF CLOUD COMPUTING-UNCERTAINITY OF SAFETY OF DATA	21.03	11.49	0.49	NO
	H2	ADOPTION OF CLOUD COMPUTING-TRUST	26.30	26.39	0.05	YES
	H3	ADOPTION OF CLOUD COMPUTING-SECURITY	26.30	29.22	0.02	YES
COMPLIANCE ISSUES	H4	ADOPTION OF CLOUD COMPUTING-LAWS of PROTECTION	26.30	29.22	0.02	YES
		ADOPTION OF				

	H5	CLOUD COMPUTING-LACK of DATA PROTECTION	21.03	13.39	0.34	NO
INDUSTRIAL ISSUES	**H6**	ADOPTION OF CLOUD COMPUTING- LACK OF INFRASTRUCTURE	26.30	13.36	0.65	YES
	H7	ADOPTION OF CLOUD COMPUTING- MANAGEMENT SUPPORT	26.30	19.81	0.23	YES
	H8	ADOPTION OF CLOUD COMPUTING- EXPERTISE IN SKILL	26.30	20.29	0.21	YES
COST ISSUES	**H9**	ADOPTION OF CLOUD COMPUTING- COST SAVING	21.03	7.29	0.84	NO
	H10	ADOPTION OF CLOUD COMPUTING- ROI	26.30	16.17	0.44	NO

The p -value derived after regression run is considered. The significance level value is .05.

Chapter 5.1: SECURITY

H0: Adhoc security events cause more hurdles in adoption of cloud computing

H1: Uncertainty of safety of data has a less effect on adoption of cloud computing.

The first hypothesis puts focus on the barriers to adopt the cloud computing in banks. The p - value derived from the e regression shows that hypothesis is highly y supported since .4 9> .05(significance level). The chi -value (11.49) which is less than critical value (26.30), thereby H0 is supported

H0: Trust in 3rd party is inversely proportional to cloud computing adoption.

H1: Trust in 3rd party is incrementally related to cloud computing adoption.

The second hypothesis is measuring the trust between the parties (supplier - buyer). The p - value is .05 which is equal to .05, thereby supporting the hypothesis. The chi - value (26.39) which is greater than critical value (26.30), thereby H1 is supported.

H0: Security and Privacy concerns are less related to cloud adoption.

H1: Security and Privacy is more related to cloud adoption.

The cloud computing should be a reliable system. The third hypothesis measures the level of security and privacy maintenance by the system. The p -value is .0 2 which is again less than .05. The chi value (29 .22) which is greater than critical value (26. 30) thereby the hypothesis (H1) is supported.

Chapter 5.2: COMPLIANCE ISSUES

H0: Presence of data protection laws has less impact on cloud computing adoption.

H1: Presence of data protection laws has more impact on cloud computing adoption.

The fourth hypothesis is about the awareness of data protection in cloud computing system. The p - value is. 02 which is less than. 05. The chi value (29 .22) I more than critical value (26.30), therefore, the hypothesis (H1) is supported.

H0: The compliance laws for data protection are a hurdle in adoption of cloud computing

H1: The lack of strong data protection laws is a resistance in adoption of cloud computing
.The fifth hypothesis is about whether the laws & regulation for Indian banks is a hurdle for adoption of cloud computing or not . The p - value is .34 which greater than the significance value (.05), thereby the hypothesis is strongly supported. The chi - value (13.39) is less than critical value (21.03), thereby H0 is supported.

Chapter 5.3: INDUSTRIAL READINESS

H 0: Lack of good infrastructure (data centres, inefficient power supply, low internet penetration) has more impact on adoption of cloud computing.

H1: Deficiency in system for the support of infrastructure has less impact on adoption of cloud computing in banks.

The sixth hypothesis is to measure the impact of infrastructure facility y in adoption of cloud computing for Indian banks. The hypothesis is supported by p-value being greater than significance levee l (. 65> .05). The chi - value is (13 .36) is less than critical value (26.30), thereby H0 is supported.

H0: Proper management system inherits less motivation in adoption of cloud services.

H1: Adoption of cloud computing suffers more due to unsupportive management.

The seventh hypothesis is to measure the effect of restlessness among the top management in banks to adopt cloud computing. The hypothesis s is supported since p -value (. 23) is greater than .05. The chi -square value (19 .81) which is less than critical value (26.30), thereby H0 is supported.

H0: Lack of skills and expertise hinders the process of adoption of cloud computing in banks.

H1: The adoption of cloud services is less hindered by scarcity of skilled resources.

The eighth hypothesis is to measure the impact of scarcity y of skills & expertise in adoption of cloud computing. The p - value is .21 which is greater than. 05, thereby hypothesis is strongly supported. Since the chi value (20.29) is merely less than critical value (26.30), thereby H0 is supported.

Chapter 5.4: COST ISSUES

H 0: the cost incurred on h adware, software, IT operations staff impacts more on adoption of cloud computing.

H1: The more focus on cost rather than on revenue impact adoption of cloud computing.

The ninth hypothesis is about the impact of cost saving to adopt cloud computing. The p - value. 84 which is greater than significance value (.05) thereby the hypothesis is strongly y supported. Since the chi -value (7.29) is less than critical value (21.03) thereby H0 is supported.

H0: The adoption of cloud computing suffers more due to cost and return on investment.

H1: The adoption of cloud computing suffers less due to optimal expectation of return and payback

The tenth hypothesis is to measure the return on investment for adoption of cloud computing. The p -value is .44 which is greater than. 05, thereby supporting the hypothesis. Since the chi -value (16 .17) is less than critical value (26. 30), thereby the hypothesis H0 is supported.

Chapter 6: RECOMMENDATION

The results of this study show that environmental factors, such as regulatory burdens, competitive landscape, reputational risk and supplier support, should be addressed by both IT and business users in determining in-house deployments versus cloud-based deployments. However, while in a house deployments banks can manage external risk factors, they limit the bank's ability to respond to the increasing demand of their customers to provide efficient, timely service.

It is in the interests of the banks to cooperate closely with regulators to provide a meaningful framework for minimising the distortions that could be caused by the use of cloud computing, while the banks are able to use this new technology efficiently, while critical banking services, such as access to cash withdrawals, personal account information, etc., can be hosted in local data centres that are protected from external threats, other products, and services can be hosted in cloud computing environments to achieve better results.

Chapter 7: LIMITATION & FUTURE RESEARCH

The research aimed to establish a causal link between the customer adoption of cloud computing in banking operations and the environmental factors influencing the adoption decision. The cloud computing landscape is rapidly evolving and ever changing, which is bringing in new opportunities as well as increased risks. Future research can be directed

toward establishing some best practices and models that can be used by banking and financial service institutions to adopt cloud - computing technologies.

- The survey has been done within a small group. With addition of more members, the results can change.
- A comprehensive one to one interview can be an option to get better insights. Some answers suggested that few of the IT managers are not fully aware of CC.
- The survey is limited to few big PSU banks. Other PSU banks which operate in different markets can be taken into future works.
- The study suggests that many factors such as law etc. affect adoption. A better study of government IT policies in India will give a bigger insight.
- The study can also be extended to the private banks and other financial institutes which do not use cloud.
- The market studied is India. There is a scope to study more about Public sector banks in other developing nations.

Chapter 8: CONCLUSION

It is known that cloud computing acceptability in most sectors brings more benefits, due to cost savings, scalability, elasticity of cloud deployments and speed and ease of use. However, the regulated sectors, such as banking and healthcare, need to address the risks associated with cloud computing deployments, in particular those related to regulation and reputation. This research has the general perception of IT staff involved in the decision to identify cloud computing related to environmental factors, such as regulatory burdens, competition conditions, reputational risk, and the seller's support, uncovered. While data-related incidents in private cloud deployments are relatively rare, care should be taken by these industries so that they do not affect customer data, which can cause significant reputational changes, and penalties imposed by the regulators.

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