WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Study of the Different Factors and Drivers for Adopting Cloud Computing ERP Over On-Premise ERP by Different Indian Companies

Abhijit Aditya[1], DR. Tanmoy Dasgupta[2]

[1]Assistant Professor, *Dr. B. C. Roy Engineering College* Academy of Professional Courses (BCREC-*APC*) ,MAKAUT (West Bengal), West Bengal, India Email: abhijit1980aditya@gmail.com

[2]Professor & Head of the Department of MBA, The University of Burdwan Email :tanmoy.dasgupta@gmail.com

DOI: https://doi.org/10.55248/gengpi.4.623.45246

ABSTRACT

ERP (Enterprise Resource Planning) systems are modular applications that aim to support and integrate the organization's business processes through a data repository. Traditional ERP systems, also known as on-premise systems, are hosted and maintained internally. On-premises solutions can be time-consuming to implement, difficult to upgrade, and require high upfront investments. In recent years, companies have been striving to move their ERP system to the cloud to solve these problems. Cloud ERP systems can be fully hosted by a third party and accessed online without local installation. Also known as Software as a Service (SaaS), this cloud solution offers lower costs, time savings, greater scalability and is easier to update.

Keywords: Cloud ERP, On-premises ERP, Cost Reduction, Flexibility, Scalability.

Introduction

Panorama Consulting Group's 2020 ERP report shows that more than half of them analyzed companies (62.70%) opt for cloud ERP systems instead of on-premises ERP systems. In addition, almost 90% of companies opted for SaaS ERP solutions. The report also finds that a lack of information or knowledge about cloud ERP was the most common reason for choosing on-premises systems. Cloud ERP is a relatively young concept, and companies are still learning about its pros and cons. The risk of data loss and security concerns are cited as additional barriers. Although safety was the most common barrier in existing research, several studies found it to be the least common barrier to adoption decisions.

Cloud computing is actually revolutionized the IT industry in terms of alternative way of service delivery using internet on subscription-based pricing model. Many benefits of cloud model, which include faster deployment, scalability, lower total cost of ownership and elasticity. Business communities can focus more on their core business competencies rather than emphasizing on capital expenditure and skills development for IT.

Literature Review

Huang, Z., Yang, Y., Huang, L., Xiong, Y., & Zhao, S. (2019)determined that cost reduction is a key factor in cloud adoption, and examined various cost models and methodologies for evaluating the economic benefits of cloud computing. The authors argued that cloud computing can reduce IT costs by providing on-demand access to resources, eliminating the need for on-premises infrastructure, and enabling efficient use of resources.

Wu, D., &Buyya, R. (2014)explored the concept of elasticity, or the ability of the service to dynamically adjust its resources in response to changes in workload demands in cloud computing. The authors argued that elasticity is a key factor in cloud adoption as it allows for flexibility and efficient use of resources.

Vaquero, L. M., Rodero-Merino, L., Caceres, J., & Lindner, M. (2011)argued that scalability is a key factor in cloud adoption. This is because it allows resources to be applied and removed dynamically in response to changes in workload requirements. The study identified multiple scalability models and methods, including scale-out and scale-up, that can be used to optimize cloud resource allocation and improve quality of service.

Shang, S., Sedera, D., & Tulu, B. (2017)argued that collaboration is a key factor in cloud adoption as it enables improved communication, coordination and knowledge sharing. The authors consider the benefits and challenges of collaborating in cloud computing and point to several factors affecting collaboration, including trust, culture, and governance.

Ghemawat, Gobioff, and Leung (2003) demonstrated the importance of resiliency in large-scale distributed systems with their development of the Google File System, which has since become a fundamental building block for cloud computing infrastructure. Their work showed that fault tolerance

and automated recovery mechanisms are critical for ensuring reliable and scalable data storage in a distributed environment, making resiliency a key driver of cloud computing.

According to Mell, P., &Grance, T. (2011), stated that with on-demand self-service, users may access the cloud whenever they need to without having to interact with service providers directly. According to them, rapid elasticity refers to the ability of cloud resources to be elastically provisioned or released according to demand. Ubiquitous access refers to the ability of cloud computing to provide on-demand network access to a shared pool of configurable computing resources from anywhere at any time.

According to Buyya et al. (2009), cloud computing is a utility computing model that allows for resource sharing and multi-tenancy while also enabling the deployment of computing resources on an as-needed basis.

IDENTIFICATION OF THE RESEARCH GAP:

Despite a growing body of empirical evidence in this field, most studies adopt a technological approach and therefore miss out on the opportunity to provide a more in-depth account of the management issues involved in the applications of cloud computing. However, less attention has been placed on identifying the key factors and drivers which influence adoptation of Cloud ERP in Industry and the organizational strategy for performance management of Cloud ERP in the Industry. As seen in various research works, a majority of the research work has been conducted in the Industry of Europe, Canada and Australia. Since only a small number of studies have been undertaken by the Indian researches to understand the critical factors and drivers of adoptation of ERP in India, the present study attempts to analyze the relationship between the factors and drivers of cloud ERP in some Indian Organization.

Objective of study

In this study, we try to

1. Analysing the critical factors and drivers affecting the adaptation of Cloud ERP in selected industry.
2. Analyze the perceived benefits and drawbacks of cloud computing ERP compared to on-premise ERP for Indian companies.

Identification of variables

First, the variables that are expected to influence the use of Cloud ERP in industry were identified. Second, the four key drivers for the application of cloud computing, viz. On-Demand Self Service, Resiliency in Cloud Computing, Ubiquitous Access and Resource Pooling have been identified that influence the application of cloud computing in industry. These quantities are largely taken from existing literature and reports on the use of cloud computing in industry. Some of the variables were selected and taken from the literature on different cloud computing applications. This brings us to a set of 4 independent variables and four key drivers for the use of cloud computing formulated in the questionnaire.

The name of independent variables of cloud computing application along with their description have been presented and explained in Table 1.

The variables of Cloud Computing drivers in industries along with their notation and reference are presented in table 1.

Table 1 Factors of Cloud Computing in Industries with notations and References

Sl.	**Factors**	**References**
1	Cost Reduction	Huang, Z., Yang, Y., Huang, L., Xiong, Y., & Zhao, S. (2019)
2	Flexibility	Wu, D., &Buyya, R. (2014)
3	Scalability	Vaquero, L. M., Rodero-Merino, L., Caceres, J., & Lindner, M. (2011)
4	Sharing & Collaboration	Shang, S., Sedera, D., & Tulu, B. (2017)

The drivers of cloud computing in industries is presented in Table 2

Table 2 Drivers of cloud computing in industries and Reference

Sl.No.	**Cloud Computing Drivers**	**Reference**
1	On-Demand Self Service	Mell, P., & Grance, T. (2011).
2	Resiliency in Cloud Computing	Mell, P., & Grance, T. (2011) ;Ghemawat, Gobioff, and Leung (2003)
3	Rapid Elasticity ubiquitous Access	Mell, P., & Grance, T. (2011); Armbrust, M.,et.al(2010)
4	Multi tenancy & Resource pooling	Mell, P., & Grance, T. (2011); Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. (2009)

RESEARCH METHODOLOGY

Data Source

The selection of a location and area for research study is one of the major task in the research work. Ten selected industry institutions of India namely Procter & Gamble (P&G) , Mumbai,; Campus Activewear Limited, New Delhi; Kellogg India Private Limited ,Mumbai; Simulytics Services, Pune; Eva Software Solution, Mumbai were selected for the purpose of field survey.

The primary survey was conducted with the help of a questionnaire distributed to the selected industry in India. The set of questionnaires was given to employees at all levels(such as the Technical and administrative staff, Supervisors, Middle–level manager and Strategic Level Manager) in order to assess the critical factors which influence the application of cloud computing within the organization.

Sample Design and Technique

A sample design is a definite plan for obtaining a sample from a given population. In sampling design, the type of population, unit of sampling, sampling frame, method of sampling and size of the sample are determined. In the present study, the population is 1000 and sample size is 250. Out of these 250 questionnaires distributed, 200 valid and usable response was collected. The sample size was calculated using the sample calculator at 95% confidence interval. The sampling frame for the present study has been taken from the employee list of the five selected industries of India. Viewing the finite population in the present study, the convenience sampling technique was used for selecting the sample. Convenience sampling is a type of sampling where the first available primary data source will be used for the research without additional requirements. In other words, this sampling method involves getting participants wherever researcher can find them and typically wherever is convenience.

Development of Questionnaire:

The questionnaire began with a brief description of the background and purpose for which the survey was to be conducted. The questionnaire different questions used to identify the critical factors affecting the adaptation of Cloud ERP in the industry. Most of the questions in the swere closed-ended and based on a Likert rating scale (very high to very low).

Table 3 Details of Research Methodology adopted for the study

Population Size	1000
Sampling Frame	Employee list of five industries in India
Sample Size	250
No. of usable and valid responses	200
Sampling Technique	Convenience Sampling
Research Instrument	Questionnaire

Development of hypotheses

A well-formulated hypothesis is mostly said to be essential for good research. As by the discussion of drivers of the application of cloud computing viz. On-Demand Self Service, Resiliency in Cloud Computing, Rapid Elasticity ubiquitous Access and Multi-tenancy & Resource pooling are need to be measured. All the hypotheses were developed on the basis of the insight gained through extensive literature studies. The study seeks to develop a conceptual framework for the drivers of application of cloud computing and link it with key factors of application of Cloud Computing in selected industries. Hence four hypotheses have been developed to

H1: There is a low level of relationship between factors of cloud computing with On-Demand Self Service in application of Cloud Computing in industries

H2: There is a low level of relationship between factors of cloud computing with Resiliency in Cloud Computing in industries.

H3: There is a low level of relationship between factors of cloud computing with Rapid Elasticity ubiquitous Access in application of Cloud Computing in industries

H4: There is a low level of relationship between factors of cloud computing with Multi tenancy & Resource pooling in the application of Cloud Computing in industries.

DATA ANALYSIS AND INTERPRETATION

Testing of Hypothesis

This section focuses on testing the four hypothesis developed in order to analyze the responses of the employees in industries, on the level of relationship between factors of Cloud Computing with drivers of Cloud Computing in industries. For testing the hypotheses, one sample t-test technique with 95% confidence level (which is the standard cut-off of significance for decision-making in accepting or rejecting the hypothesis) was used. Four null hypotheses, the level of relationship of Cloud Computing with the key drivers of Cloud Computing in industries is as follows:

H1: There is a low level of relationship between factors of Cloud computing with On-Demand Measured or payable Self Service in industries.

H2: There is a low level of relationship between factors of Cloud computing with Resiliency in Cloud Computing in industries.

H3: There is a low level of relationship between factors of Cloud computing with Rapid Elasticity and ubiquitous Access in industries.

H4: There is a low level of relationship between factors of Cloud computing with Multi-tenancy & Resource pooling in industries.

Based on the above four hypotheses one sample statistic is given below:

Table 4 One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
H1	200	3.8956	1.51443	.12285
H2	200	4.0000	1.53113	.12419
H3	200	3.6843	1.56713	.12711
H4	200	3.6776	1.49435	.12121

Descriptive table 4 displays the sample size, mean, standard deviation, and standard error for each of the four hypotheses. The sample means of H1, H2, H3, and H4 are above 3.5, which means that the level of the four performance drivers is high and it appears to have a significant amount of variation.

Table 5 One-Sample Test

	Test Value = 3					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
H1	7.284	199	.000	.89474	.6520	1.1374
H2	8.052	199	.000	1.00000	.7546	1.2454
H3	5.383	199	.000	.68421	.4331	.9354
H4	5.591	199	.000	.67763	.4381	.9171

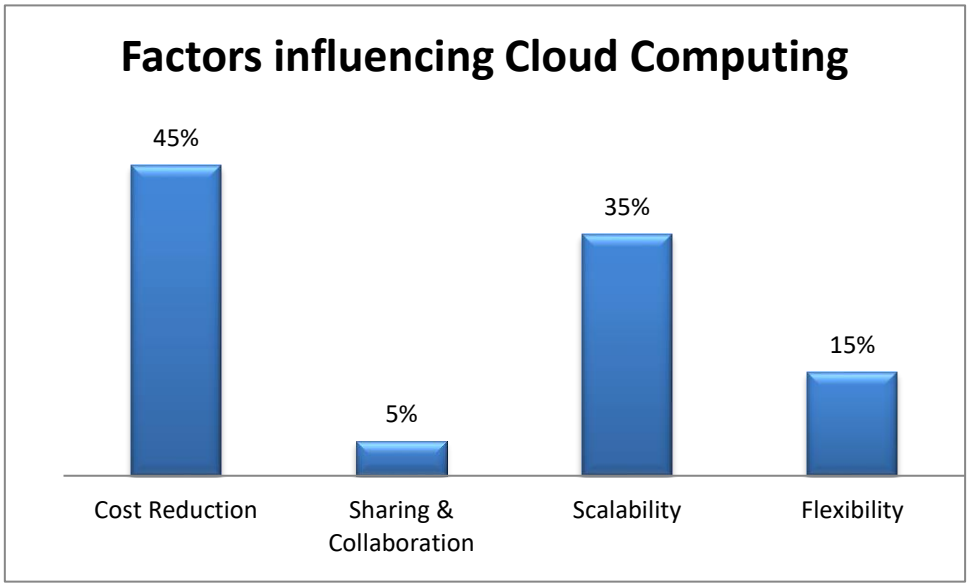
The test statistic (table 5) displays the results of the one-sample t-test. The degrees of freedom for the t statistic to test the hypothesis are n-1. In this case, n-1 = 200-1 or 199. In the case of the first hypothesis testing the probability of getting a more extreme value than the observed t value of 7.284 is less than 0.05(The critical t value for 199 degrees of freedom and a significance level of 0.05 is less than the calculated value). Hence, the null hypothesis is rejected. Similarly, for the second hypothesis, the calculated value is more than the critical t value, which indicates that the null hypothesis is rejected. For the third hypothesis, the calculated value is more than the critical t-value; hence the third hypothesis is rejected. Also in the fourth hypothesis calculated value is more than the critical t value; hence the fourth hypothesis is rejected.

Thus, it can be inferred that there is a high level of relationship between factors of Cloud Computing with drivers of Cloud Computing in industries. The summary of the results obtained from the hypotheses testing is displayed in Table 6.

Table 6 Summary of the Results of Hypotheses Testing

Null Hypothesis	**Particulars**	**Result**
H1	There is a low level of relationship between factors of Cloud computing with On-Demand Self Service in industries.	Rejected
H2	There is a low level of relationship between factors of Cloud computing with Resiliency in Cloud Computing in industries	Rejected
H3	There is a low level of relationship between factors of Cloud computing with Rapid Elasticity ubiquitous Access in industries.	Rejected
H4	There is a low level of relationship between factors of Cloud computing with Multi tenancy & Resource pooling in industries.	Rejected

Factors influencing Cloud Computing



The chart above displays the percentage of responses for the different factors of Cloud Computing in selected industries. Based on their responses,45% of respondents stated that the Cloud computing can help organizations reduce costs by eliminating the need for expensive hardware and software, reducing maintenance costs, and providing a pay-per-use model that allows organizations to only pay for what they need .Also, 35% of respondents said that Scalability is a key factor in enterprise cloud computing as it allows them to adapt to changing computing needs by either increasing or decreasing their resources such as processing power, storage or network capacity as needed. Additionally, 15% of respondents said that flexibility is a critical factor in the success of cloud computing for organizations. By leveraging the scalability, cost savings, agility, and geographic flexibility of cloud computing, organizations can become more agile, responsive, and competitive in their respective industries. The remainder of the respondents concluded that Sharing and Collaboration were important for enhancing performance level in Cloud Computing.

Findings of the Study

The summary of the findings is given below:

1.A set of four factors were identified that relate Cloud ERP Adoptation to the drivers of Cloud Computing in selected Industries. The four factors are: Cost Reduction , Scalability, Flexibility and Sharing & Collaboration.

2. Factor 1 includes the **Cost Reduction** factor of Cloud Computing. Cost reduction is a crucial factor in the introduction and continued use of cloud computing services in companies. Cloud computing offers cost savings by reducing the need for on-premises hardware and software and the associated maintenance and upgrade costs. cloud computing can help organizations reduce costs by eliminating the need for expensive hardware and software, reducing maintenance costs, and providing a pay-per-use model that allows organizations to only pay for what they need.

3. Factor 2 includes the **Flexibility** factor of Cloud Computing. Cloud computing has a significant impact on organizational flexibility. The adoption of cloud computing increases a company's agility. Cloud computing enables operational agility and greater efficiency, which are essential for businesses to adapt to changing market conditions. By leveraging the agility, and geographic flexibility of cloud computing, organizations can become more agile, responsive, and competitive in their respective industries.

4. Factor 3 includes the **Scalability** factor of Cloud Computing. Scalability is a key factor of cloud computing from an organizational perspective as it offers organizations the ability to efficiently manage their resources to meet changing business needs. Cloud computing scalability is the ability of a cloud-based system to automatically and dynamically adjust its capacity in response to changes in demand. Scalability is a key factor in enterprise cloud computing as it allows them to adapt to changing computing needs by either increasing or decreasing their resources such as processing power, storage or network capacity as needed. Cloud scalability can significantly benefit businesses that are experiencing spikes in demand or need to expand their operations quickly. Cloud scalability enables organizations to quickly adapt to changes in their computing needs while ensuring efficient use of computing resources..

5. Factor 4 includes the **Sharing and Collaboration** factor of Cloud Computing. Cloud computing has revolutionized the way businesses collaborate and share information. Cloud collaboration allows employees to collaborate and collaborate on documents and other file types that may be stored outside of the company or outside of the company's firewall. Cloud collaboration happens when a user creates/uploads a file online and then shares access to other people.

6. Testing of Hypothesis shows that there is a high level of relationship between four factors of Cloud Computing and the drivers of Cloud Computing viz. On-Demand Self Service, Resiliency in Cloud Computing, Rapid Elasticity and Resource pooling. This study identified a positive association

between the four factors of Cloud ERP and the drivers of Cloud Computing in selected Industries. There is a strong association with the Cost Reduction factor , followed by Scalability-related factors and Flexibility factors,. However, it is less strongly related to the Sharing & Collaboration-related factors of Cloud Computing.

Advantage of Cloud ERP Adaptation :

Specifically, cloud computing offers the following key benefits:

- It drastically lowers the cost of entry for smaller companies trying to take advantage of computationally intensive business analytics previously only available to the largest companies. These computational exercises typically require large amounts of computing power for relatively short periods of time, and cloud computing makes such dynamic resource allocation possible.
- It can provide near-instant access to hardware resources with no upfront investment for users, resulting in faster time-to-market for many organizations. Treating IT as an operating expense also helps to drastically reduce the upfront cost of enterprise computing.
- The cloud is becoming an adaptive infrastructure that can be shared by different end users, each of whom can use it in very different ways. The beauty of the arrangement is that as the number of users increases, the demand load on the system becomes more balanced in a stochastic sense, even as its economies of scale increase.
- Cloud computing makes it easier for companies to scale their services, which increasingly rely on accurate information based on customer demand. Since the computer resources are managed via software, they can be made available very quickly when new requirements arise. In fact, the goal of cloud computing is to dynamically scale resources up or down based on client load with minimal interaction with the service provider via software APIs.

Barriers to Cloud Computing Adoption in the Enterprise

While cloud computing adoption has many benefits, there are also some significant barriers to adoption.

1. **Security and Privacy**: Because cloud computing is an emerging computing model, there is a lot of uncertainty about how to achieve security at all levels (e.g., network, host, application, and data layers). This uncertainty has prompted information leaders to state security is their primary concern in cloud computing.

2. **Reliability**: Business applications are now so critical that they must be reliable and available 24/7. In the event of an outage or failure, contingency plans must function smoothly. In the event of a major outage, recovery plans must begin with minimal disruption. Additional costs may be associated with the required reliability. However, there is only so much the company can do to mitigate outage risks and costs. A track record of reliability will be a prerequisite for widespread adoption.

3. **Interoperability**: The interoperability and portability of information between private clouds and public clouds are crucial prerequisites for widespread cloud computing adoption in companies. Many companies have made significant strides in standardizing their processes, data, and systems by implementing ERPs. This process has been enabled by scalable infrastructures to create single instances or highly integrated connections between instances. This is to manage master and transactional data consistency and create reliable consolidated information. Even with these improved platforms, the speed at which businesses change can still outpace IT organizations' ability to respond to those changes.

5. **Changes in the IT Organization** : Cloud computing will affect the IT organization as with other technological changes. Technological change has two dimensions. The first is acquiring the skills to use technology to solve a business problem. The second is how technology is changing IT role.

Conclusion :

This study dealt with the analysis and interpretation of the questionnaire responses by testing the hypotheses developed. This study identified the four key factors, tested the four hypotheses developed within this study, and provided a thorough analysis of the results obtained. Testing the hypotheses reveals that there is a high level of relationship between four factors of Cloud ERP adoptation with drivers of Cloud computing. This study identified a positive association existing between the four factors of cloud computing and drivers of performance management in cloud computing. There is a strong association with the Cost Reduction related factor of performance, Flexibility and Scalability- related factor of performance and Sharing and Collaboration-related factor of Cloud ERP.

Considering the estimated costs of cloud-based ERP solutions, the costs can be compared based on the following factors: licensing, IT support and activation. The on-premises solution includes licensing, hardware, IT support and maintenance pricing, and the on-demand solution includes license costs and setup/activation costs. Other possible factors include capital costs, power savings, and implementation and upgrade services. Cloud ERP solutions control certain costs by escaping the upfront hardware acquisition, maintenance and upgrade costs and get the services at a monthly subscription cost per user that includes the software maintenance fee, and benefit from the software upgrade at no additional cost services that determine the cost of cloud computing.

Reference :

Mell, P., & Grance, T. (2011). The NIST definition of cloud computing. National Institute of Standards and Technology, 53(6), 50.

S. Ghemawat, H. Gobioff, and S.-T. Leung, "The Google file system," ACM SIGOPS Operating Systems Review, vol. 37, no. 5, pp. 29–43, 2003.

Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. (2009). Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility. Future Generation computer systems, 25(6), 599-616..

Huang, Z., Yang, Y., Huang, L., Xiong, Y., & Zhao, S. (2019). Cloud computing in healthcare: A comprehensive survey. Journal of parallel and distributed computing, 131, 240-257.

Wu, D., & Buyya, R. (2014). Introduction to cloud computing. In M. Parashar & X. Li (Eds.), Handbook of Cloud Computing (pp. 1-31). Springer US.

Vaquero, L. M., Rodero-Merino, L., Caceres, J., & Lindner, M. (2011). A break in the clouds: towards a cloud definition. ACM SIGCOMM Computer Communication Review, 39(1), 50-55.

Shang, S., Sedera, D., & Tulu, B. (2017). Factors influencing cloud computing adoption in organizations: A comprehensive literature review. Journal of Enterprise Information Management, 30(2), 142-174.