

Role of Cloud Computing in Enterprise Systems

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DOI: <https://dx.doi.org/10.51244/IJRSI.2026.1304000046>

Received: 02 April 2026; Accepted: 07 April 2026; Published: 28 April 2026

ABSTRACT

Cloud Computing refers to the on-demand availability of IT resources via Internet. It delivers different types of services to the customer by “pay-per-use” basis. So it saves time & cost. Many industries, enterprises are moving towards the cloud due to its efficiency in services. There are various research challenges present in this context i.e. Service Level Agreement, Privacy, Inter-operability & Reliability. The main objective of cloud computing is to maximize its value by minimizing complexities.

Aim of the Research: The aim is to focus the major Role of Cloud Computing in Enterprise Systems and to develop a Cloud-ERP system, which will help to achieve excellence and also to take competitive advantage. A memorable growth will be seen in terms of Data Centers, and Cloud Usage.

Keywords: Cloud, SLA, Privacy, Data Center, IaaS, PaaS, SaaS, VPC, Cloud-ERP

INTRODUCTION

In today’s fast-moving digital era, cloud computing is a transformative force in the way enterprises operating, manage data, and deliver services. Enterprise systems—such as Cloud Enterprise Resource Planning (CERP), Customer Relationship Management (CRM), and Supply Chain Management (SCM)—are increasingly being integrated with cloud technologies to enhance efficiency, scalability, and flexibility. It helps organizations to access powerful computing resources and software platforms on demand, without the need for heavy investments in physical infrastructure. As a result, businesses can streamline operations, reduce costs, and improve collaboration across departments.

A cloud is a pool of virtualized computing resources that can handle different tasks like backend jobs and user applications. Cloud is present at remote location. It is a model for Parallel, distributed on-demand network access and provides services based on service level agreements established in between the service provider and customer.

Some popular Cloud Service providers are: “Amazon Web Service”, “Microsoft Azure”, “IBM Cloud”, “Google Cloud”, “YouTube”, and “Facebook”.

LITERATURE REVIEW

P.Choudhury, S.Purswani & B.Manimekala focused into enterprise cloud exploitation to better their solutions given both security and cost-related considerations. This paper, therefore, offers an understanding of the optimization of cloud solutions through an in-depth literature review, theoretical frameworks, and case studies. It also offers an in-depth review of the different practices and strategies available for cloud-based enterprise solution optimization [1].

Vincent Donat et al, investigated the impact of cloud computing on organizational performance. A systematic literature review identified 31 relevant papers. The analysis underscores the diverse benefits of cloud

computing adoption across various facets, including financial and product market performance, organizational agility, productivity, innovation, sustainability, and supply chain performance [2].

A.K.Khurshed & S.R.M.Xeebare inscribed the impact of Artificial Intelligence and cloud computing on digital marketing and organizational operations. As businesses increasingly leverage AI technologies, they gain the ability to create personalized marketing strategies that enhance customer engagement and foster deeper connections with audiences. Cloud computing provides the necessary infrastructure to support these advancements, allowing for scalable solutions that improve operational efficiency and facilitate real-time data analysis [3].

Gerasimov A.S., focused the transformative impact of cloud computing on enterprise information systems, emphasizing its role in enhancing operational efficiency, scalability, and data availability in the digital business landscape [4].

Nanos I., & Mantsou E. analyzed the importance of Industry 4.0 in the transformation of supply chains and to explore the role of enterprise information systems and cloud computing as a key driver for success in the digital age [5].

Bitkowska A., Dziembek D., and Gzik T stated that, the purpose of the article is to identify the trends and directions of development of Cloud ERP systems. In order to realize the purpose of the article, the characteristics of ERP and Cloud ERP systems were briefly presented [6].

Alam M.J., Sharma S.D, & Chowdhury T. introduced how easily this cloud system can be implemented in an organization. By using this ERP system, an organization can be benefited in many ways; especially Small and Medium Enterprises (SMEs) can enjoy the highest possible benefits from this system [7].

P.Bajdor addressed two primary questions: how enterprises perceive the current influence of CC and their outlook on its future role. The research examined the adoption and utilization of CC services, identifying key drivers and challenges. Findings indicate that CC significantly enhances operational flexibility, reduces costs, and fosters innovation, through concerns about security, dependency on providers and data management persist [8].

Sharma C., Kakkar H., Mehta A. examined the benefits of cloud computing for modern businesses, including cost savings, scalability, and improved efficiency. Additionally, the paper evaluates the potential risks and challenges associated with cloud computing, such as security and privacy concerns [9].

C.P.Noguerra provides a concise overview of the exploration into this integration, encompassing its historical evolution, fundamental concepts, benefits, challenges, and best practices. Cloud computing, emerging from its roots in virtualization technology, has evolved into a versatile framework offering an array of service models to cater to diverse organizational needs. Cloud-based solutions empower businesses to optimize resource allocation, expedite application deployment, and adeptly respond to evolving demands [10].

Lavanya L analysed could computing technology-based features and the business model of ecommerce have shown that the ecommerce business model genesis, growth and excellence has a lot to do with the ever-evolving technological features of cloud computing and is actually an instance of a successful nexus between technology and business strategy [11].

S. Narang & S.Kumar mentioned that, their research paper gives an idea to the readers/audience about basics of Cloud Computing, its application in business and future of Cloud Computing in business and other areas. The nature of this study is qualitative, and the author recommends there are many possible directions of research in cloud computing, which can be helpful for the development of society and the world [12].

Hustad E. et al., stated Cloud Enterprise Resource Planning solutions allow organizations to support and coordinate key business processes by leveraging virtualization. They conducted an in-depth systematic review of relevant research literature and identified six key concerns related to cloud ERP implementation: a) the introduction of new ERP work arrangements, b) the migration of legacy data, c) the assurance of compliance

with extant rules and regulations for security, d) the continuous alignment between ERP functionality and business processes, e) the ongoing integration between ERPs and the rest of the organization's application portfolio, and f) the establishment of adequate reliability levels [13].

R.M.U. Ullah et al, stated that the primary objective is to highlight the benefits, challenges in adopting cloud computing and utilizing services offered by cloud computing [14].

U.M.Z. Usman et al highlighted an insight into the identification of the potential issues and challenges for the advancement of theories in the Information Systems field. Further, they focused on the direction for research and adoption of Cloud ERP [15].

M.A.M.Nasimuddin & N.A.Khan stated a brief introduction of the cloud computing perspective for the coming future in which the enterprise level computing is set to a very small cost-effective computation in which the cost of establishment is reduced by a huge factor [16].

M.A.A Elmonem highlighted the Systematic Literature Review (SLR) research method to explore the benefits and challenges of implementing ERP systems over a cloud environment [17].

R.Bernsteiner, B. Ebersberger., & D.Killian presented a conceptual framework that offers guidance for further research in this field. They also derived topics for further research. From a stakeholder's perspective the framework focuses on the customer of services [18].

C.T.S.Xue inscribed that cloud computing has played a major role in solving the inefficiencies problem in organizations and increase the growth of business thus help the organizations to stay competitive. It is required to improve and automate the traditional ways of doing business. Cloud computing has been considered as an innovative way to improve business. Benefits and drawbacks of cloud computing in business will be explored in this paper. Some solutions also provided in this paper to overcome the drawbacks [19].

K. Vasuki & S.M.S.Shankar focused how to maximize the effectiveness of the shared resources. Cloud resources are usually not only shared by multiple users but are also dynamically reallocated per demand. This approach should maximize the use of computing power thus reducing environmental damage as well since less power, air conditioning, rackspace, etc. are required for a variety of functions [20].

S.S.Bhatia & V.Gupta compared technologies used in the architecture of Enterprise Resource Planning Systems to evaluate the benefits of emerging technologies. The emerging technologies, Cloud Computing, Software as a Service (SaaS) and Multi-Tenancy significantly alter the current ERP space and become a primary part of ERP Systems of the future [21].

G.C.A.Peng.et al. reported the results of a study that aimed to identify and explore potential risks that organizations may encounter, when adopting cloud computing as well as to assess and prioritize the identified risks. The study adopted a deductive research method based on a cross-sectional questionnaire survey [22].

M.G.Avram analyzed from a company's point of view the factors that need to be considered by an enterprise when making the decision of using cloud computing. Some of the companies are moving towards cloud computing just because it is the latest trend in information technology [23].

R.Kothari , & S.Misra stated that, the role of cloud technology is very important for individuals who provide these services to those in need, who ultimately becomes the trusted advisors and gets integrated into the small and medium-sized businesses. Their research has tried to understand the importance of Cloud Computing for SMBs. The specific areas researched were what is cloud computing, its similarities with the old concept of utility computing, why now, its importance in SMBs and how SMBs can make decision on moving to the Cloud. Cloud computing today meets the changing business needs of dynamic changing environment, where a workload can shrink or grow very fast [24].

G.Singh., M.S.Manna & G.S.Bhasin looked at how manufacturing Small and Medium sized Enterprises (SMEs) using or planning on using Enterprise Resource Planning (ERP) software could integrate Business to

improve the availability of operational and strategic planning information within the constraints imposed on organizations in the SME category [25].

Rimal B.P. et al. focused the architectural features of Cloud Computing and classify them according to the requirements of end-users, enterprises that use the cloud as a platform and cloud providers themselves. They also provide key guidelines to software architects and Cloud Computing application developers for creating future architectures [26].

RESEARCH METHODOLOGY

It consists of the following stages:

- Stage -1 Select the Right Cloud Model for the Business. (Business requirements, Budget, Resources)
- Stage-2 Identify new opportunities for Growth & Innovation.
- Stage-3 Develop a Cloud-ERP Model.
- Stage-3 Optimize Resource utilization & Operational efficiency by reducing Infrastructure cost.
- Stage-4 Quick Response to Changing market conditions, Business requirements & Customer requirements.
- Stage-5 Provide Quality of Service as per Customer demand.
- Stage-6 Do analysis with respect to Profit / Loss / Market Demand / Business Growth / Quality of Service / Customer Feedback etc. by using AI & ML Tools.
- Stage-7 Explore Cloud Security & Data Privacy.
- Stage-8 Evaluate the performance of CERP Model & Control.
- Stage-9 Results & Discussion.

Major Findings

This study has examined the need of cloud computing with respect to sustainability in businesses. Following are the major findings:

- It enables enterprises to report their environmental, social and economical impact.
- It offers better Reporting, Analysis & Decision-making.
- It provides Service-Oriented Architecture.
- However, there are some challenges & obstacles present in its journey.

Cloud Computing Services:

The different cloud services are

1. Infrastructure as a Service (IaaS):

It provides virtualized resources on demand is known as Infrastructure as a Service, which includes servers, storage devices and networking that is delivered as a service. “Virtualization is a computer architecture technology in which multiple virtual machines are multiplexed in the same hardware platform”. The purpose of a Virtual Machine is to enhance resource sharing by many users and improve performance in terms of resource utilization & application flexibility.

This model is generally handled by a “**System Manager**”.

2. **Platform as a Service (PaaS):**

It includes operating systems and services for a particular application. It is a platform on outsourcing basis. It offers the services like Data Access, Authentication, and Payments etc. It provides an environment on which, developers create and deploy applications and do not need to know how many processors or how much memory that applications will be using. This service model is generally handled by a “**Programmer**”.

3. **Software as a Service (SaaS):**

It is a software delivery method for providing access to software and its associated functions remotely as a web-based service. The SaaS customers pay a recurring fee amount for subscribing to their services. This service model belongs to “**User**”.

Cloud Deployment Models: (The Enterprise Cloud Computing Approach)

The cloud deployment models as follows:

- a. **Public cloud:** It provides services for general public under “pay-per-use” basis.

Example: Amazon’s AWS (EC2, S3), Cloud Suite, and Microsoft’s Azure.

- b. **Private cloud:** It is designed, operated, and managed by an organization for its internal use only. It is also called as an internal cloud or corporate cloud. It is used by organizations to build and manage their own data centers internally or by the third party.

Example: Amazon VPC, HPE (Hewlett Packard Enterprise), VMware.

- c. **Virtual Private Cloud (VPC):** It is a secure, isolated private cloud hosted within a public cloud.

Example: Amazon VPC, Op Source Cloud, and Sky tap Virtual Lab.

- d. **Community Cloud:** It is shared by several organizations and supports specific community. It is managed by the organizations or a third party.

Example: Open Cirrus formed by HP, Intel, and Yahoo.

- e. **Hybrid cloud:** It is a combination of the public cloud and private cloud. It is partially secure because the services which are running on the public cloud can be accessed by anyone, while the services running on a private cloud can be accessed only by the authorized users.

Example: Gmail, Google Apps, Google Drive, MS Office 365, Amazon Web Services.

Responsibilities Taken By Cloud Computing:

- a. Recognizing enterprise policies, market dynamics & risk administration.
- b. Classifying Trade definitions & regulations.
- c. Creating value-added information.
- d. Efficient utilization of resources with respect to location independent.
- e. Minimizes the up-front expenditure on hardware, software & project execution.
- f. Omnipresent network access.
- g. Peer-to-Peer decentralized approach having no central server.
- h. Services are both public & private.

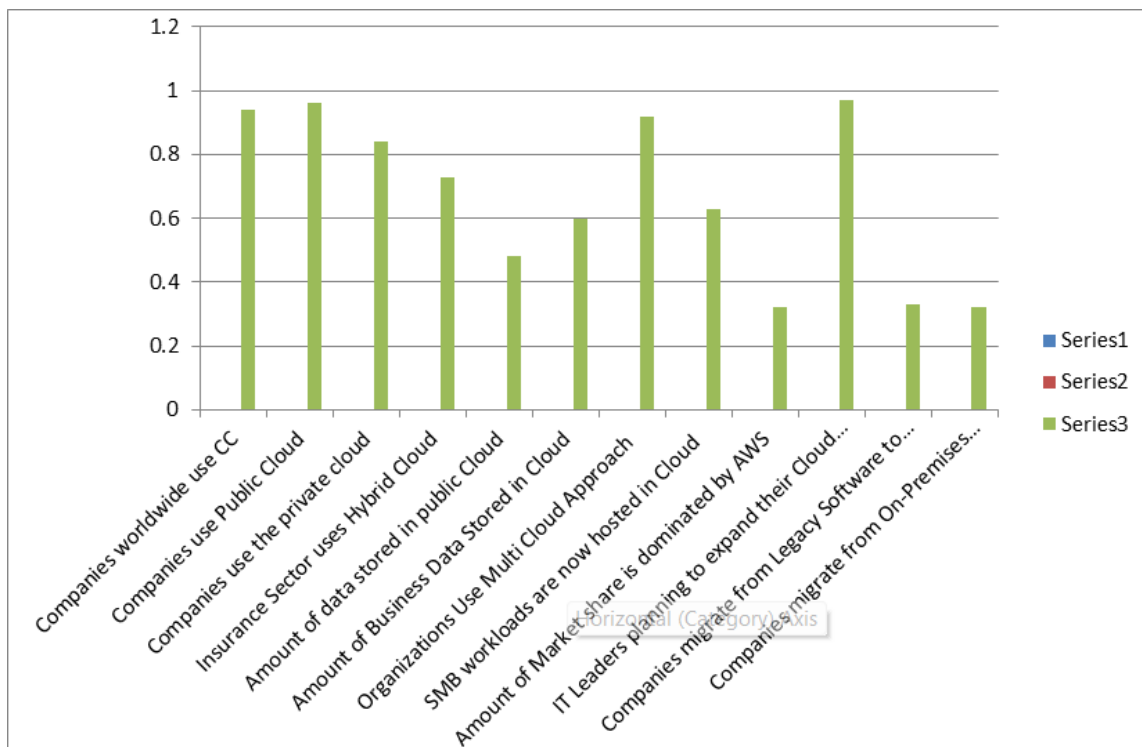
- i. Strengthen data security.
- j. Reusing Equipments.
- k. Businesses are switching to digital marketing strategies.
- l. Provides trusted service with respect to back-up & recovery.
- m. Supports customized tools like e-mail, Web conferencing, CRM etc.

Use Of Cloud Computing In Enterprise Systems (World Wide Statistics)

STATISTICS OF CLOUD USERS	PERCENTAGE
Companies worldwide use Cloud Computing in their operations.	94 %
companies use the public cloud	96 %
companies use the private cloud	84 %
Insurance Sector uses Hybrid Cloud	73 %
The amount of data stored in public Cloud	48 %
The amount of Business Data Stored in Cloud	60 %
Organizations Use Multi Cloud Approach (Public & Private Cloud)	92 %
SMB workloads are now hosted in Cloud	63 %
The Amount of Market share is dominated by Amazon Web Service	32 %
IT Leaders planning to expand their Cloud Systems	97 %
Companies migrate from Legacy Software to Cloud-based Tools	33 %
Companies migrate from On-Premises Workloads to Cloud	32 %

Source – (www.edgedelta.com, www.Statista.com, www.marketsandmarkets.com as on (02-03-26, 4:33 pm)

Table 1.1



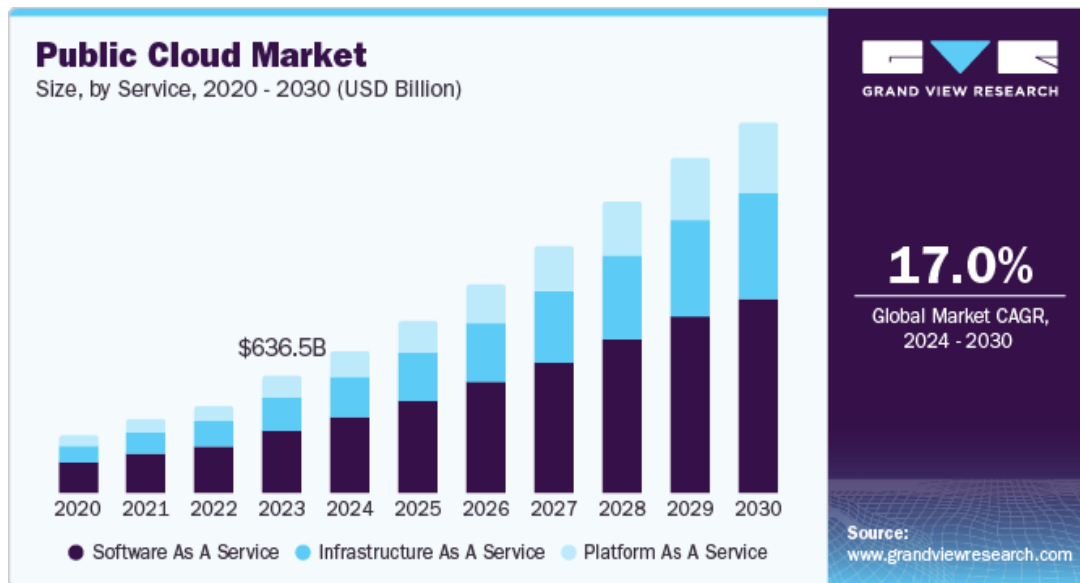


Fig-2

Source: <https://www.grandviewresearch.com/industry-analysis/public-cloud-market> (02-03-26, 4:33 pm)

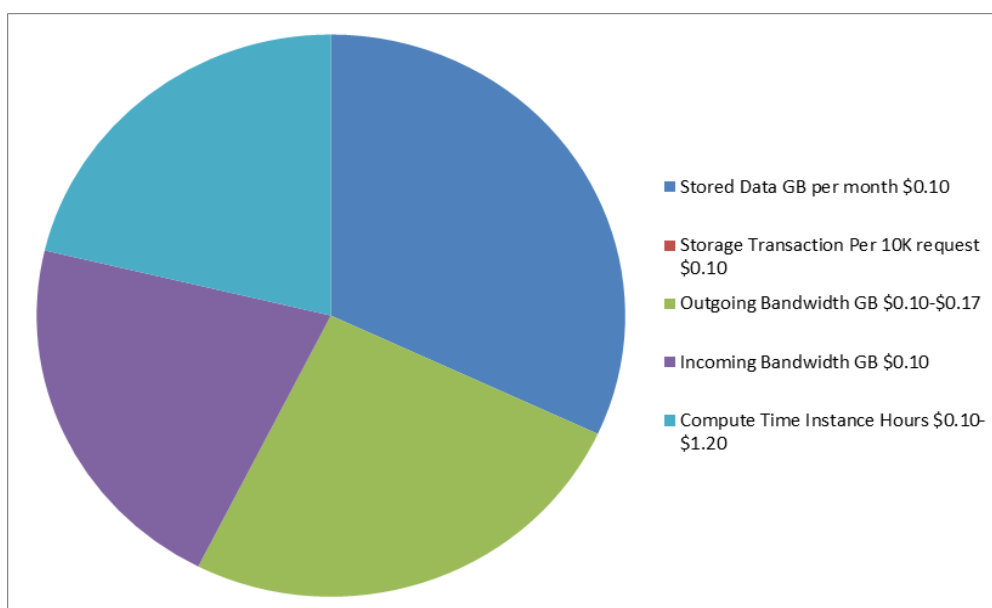
The public cloud market was valued at USD 636.47 billion in 2023 and is expected to experience a CAGR of 17.0% from 2024 to 2030.

Pricing Comparison For Major Cloud Computing Platforms

Resource	Unit	Amazon	Google	Microsoft
Stored Data	GB per month	\$0.10	\$0.15	\$0.15
Storage Transaction	Per 10 K requests	\$0.10	-	\$0.10
Outgoing Bandwidth	GB	\$0.10-\$0.17	\$0.12	\$0.15
Incoming Bandwidth	GB	\$0.10	\$0.10	\$0.10
Compute Time	Instance Hours	\$0.10-\$1.20	\$0.10	\$0.12

(Source: www.cumulux.com as on 02-03-26)

Table: 1.2



RESULTS AND DISCUSSIONS

Results

The use of cloud computing in enterprise systems has shown significant results across various organizational functions. Based on the analysis of existing literatures and industry reports, the following results have been observed:

a. Cost Efficiency

Enterprises adopting cloud computing reported up to 30–50% reduction in IT infrastructure costs, primarily due to pay-as-you-go models, reduced hardware maintenance, and lower energy consumption.

b. Scalability and Flexibility

Cloud-enabled enterprise systems allowed organizations to scale resources dynamically according to demand and provides services round the clock.

c. Improved Collaboration

Cloud platforms facilitate real-time collaboration and data sharing across different geographic locations, leading to faster decision-making and enhanced productivity, especially in hybrid and remote work environments.

d. Enhanced Data Management and Security

Advanced cloud solutions offered robust data backup, recovery, and encryption services, increasing trust in cloud-based Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and Human Resource Management Systems (HRMS).

e. Innovative Ideas & Services

Organizations experienced faster deployment of new applications and services, enabling rapid experimentation and innovation with minimal risk.

DISCUSSION

The results clearly stated that cloud computing plays a transformative role in the growth of enterprise systems. It enables Service-Oriented Architectures. Cloud adoption promotes business agility, enabling organizations to respond quickly to market changes, customer demands, and technological disruptions. Moreover, by reducing dependency on on-premises infrastructure, enterprises can focus more on core business strategies. However, this system challenges Data privacy, compliance with local regulations, and dependency on third-party service providers. Cloud computing is not just a cost-saving tool but a strategic enabler of digital transformation.

Top Cloud Challenges:

- Data Privacy & Security issues.
- Lack of resources or expertise.
- Compliance & Managing software licenses.
- Technological disruptions
- Govt. Policies
- Implementation of IT-Act-2000
- Good governance.

Future Scope

The cloud computing will focus more on hybrid and multi-cloud strategies, increased integration with AI and ML, enhanced security measures on Virtual Server architecture with greater flexibility, scalability, and cost optimization while addressing complex data.

Cloud computing may lead to a “**Green Economy**”.

CONCLUSION

The role of cloud computing in enterprise systems is very much important. By providing tools & techniques for measuring, analyzing, and integrating services, cloud computing contribute to the overall success to achieve goals.

Declaration

I, Sunil Kumar Samantaraya hereby confirm that the manuscript titled "**Role of Cloud Computing in Enterprise Systems**" authored by Sunil Kumar Samantaraya & Dr. Biswarup Samanta, has not been submitted for publication, review, or consideration to any other journal, conference, or publication venue.

I affirm that this work is original and is not under consideration elsewhere. All the authors listed have approved the manuscript and agreed to its submission to IMPeC 2025.

This article was previously presented at the International Management Perspective Conference 2025 (IMPeC-25), IIM Sambalpur, India, on January 31, 2025."

I/we declare that all necessary permissions have been obtained for any third-party materials included in the manuscript, and appropriate citations and acknowledgments have been made where required.

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