

Cloud Computing Adoption Trends: A Systematic Literature Review of Organizational Perspectives


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ABSTRACT

This research presents a systematic review of cloud computing adoption trends from an organizational perspective. Leveraging a rigorous research methodology, we collect and analyze related literature studies to identify common patterns in organizations' adoption of cloud computing. The theoretical foundation covers the basic concepts of cloud computing and organizational technology adoption models, providing a framework for understanding these changes. Through an in-depth review, we uncover common trends in cloud computing adoption, such as the evolution of business models and attention to security and compliance aspects. Organizational factors, such as organizational structure and culture, play an essential role in the decision-making process regarding adopting these technologies. In addition, we explore the benefits and challenges that organizations face during the adoption process. The research also includes case studies or examples of successful cloud computing deployments, providing in-depth insights into how specific organizations overcame challenges and leveraged the benefits of the cloud. The findings pave the way for further discussion regarding practical implications for business stakeholders and future research directions. By investigating these essential elements, this research provides a comprehensive overview of cloud computing adoption trends and contributes to understanding how organizations can manage the transition to an ever-evolving technological environment.

Keyword : Adoption, Cloud Computing, Organization.

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1. INTRODUCTION

A theory known as Dynamic Capability Theory explains that organizations need to have the ability to deal with the challenges posed by changing market competition. Every organization must invest in building a core competency and adopting new technologies to remain competitive. This refers to the ability of a cost-effective organization to stay competitive in a changing business environment (Bharadwaj & Lal, 2012).

Over the past decade, enterprises' interest in adopting cloud computing has increased. This technology can transform how companies acquire and manage their computing resources efficiently and cost-effectively. Utilizing cloud computing technologies to gain value has become famous for enterprises today. However, many enterprises have difficulty determining whether they should use cloud-based services to add value to their products or services (Gai & Steenkamp, 2014). As a shared services approach, cloud computing is considered an innovative model for providing IT services that add value to the companies implementing it (El-Gazzar, 2014).

The emergence of cloud computing is motivated by the need in the industrial and computerized world for joint use of scattered computing resources that can be used as needed (on demand). Other things supporting the emergence of cloud computing technology are web 2.0 technology, web service technology, and the ability of automatic computing performed by computers (mechanical computing) related to manage their resources (Agreindra Helmiawan et al., 2019).

Cloud computing is defined by the National Institute of Standards and Technology (NIST) as a model that enables ubiquitous, convenient, and demanding network access to a networked pool of configurable computing resources, storage, applications, and services that can be provisioned and released rapidly, to minimize service provider interaction (Tan & Lin, 2012).

Cloud computing is an old idea that has finally come of age. The term cloud is old because it is depicted in network diagrams as a metaphor representing the Internet. Cloud computing is generally referred to as the provision of Internet-based computing services. Still, its technical meaning is richer because cloud computing builds on existing computing technologies, such as grid computing and virtualization, which are forms of distributed computing technology. Virtualization involves concealing the physical characteristics of computing resources to hide complexity when systems, applications, or end users interact with them. Grid computing is a distributed computing model that uses geographically and administratively remote resources so that users can access computers and data transparently without worrying about location, operating system, and account administration. With the advent of cloud computing, the benefits of virtualization and grid computing have been combined and further enhanced. Cloud computing shares some characteristics with virtualization and grid computing; however, it still has distinguishing features and associated risks (Low et al., 2011).

Several studies have been conducted to determine the influence of Cloud computing adoption factors, with various research models built concerning multiple theories of technology adoption, including the Technology Organization Environment Model Factors (TOE) and the Technology Acceptance Model (TAM) that influence Cloud Computing adoption. have been conducted in research. Related research models show the factors considered by this study based on the knowledge gathered, but a comprehensive research model of cloud computing model factors has not been widely conducted to provide extensive information about the importance of elements and their relationship with cloud computing adoption (Ria & Susilo, 2023).

2. RESEARCH METHOD

The type of research used is a literature study. The literature study method is a series of activities related to library data collection methods, reading and recording, and processing research materials. Reviewing existing literature is an important step that builds a solid foundation for advancing knowledge. It helps identify areas that require further investigation. This study systematically evaluates the literature to present the current landscape of information systems (IS) research on cloud computing adoption from an organizational perspective. This review adheres to the essential guidelines for conducting a comprehensive literature review and operates within specific parameters. The contextual scope of this review pertains to business users rather than individuals, as important issues require attention before businesses adopt cloud technologies. The time limit of this review covers articles published in previous years until June 2023.

3. RESULTS AND DISCUSSION

As the development of the Internet leads to cloud computing (CC) technology, there is a need for effective online interaction for information services between stakeholders. Consumers expect a good, practical, easy-to-understand information service, thus requiring an informative and communicative interface. CC is a computing model where resources such as processors, storage, networks, and software are abstracted and provided as services on a network using remote access patterns. To optimize the role of online interaction efficiently and effectively, systems and data built based on the performance evaluation of information services based on cloud computing architecture are needed to provide meaningful benefits. Therefore, it is necessary to implement an IT Governance strategy to minimize operational costs by utilizing CC-based information system services. For CC to be used for organizational development purposes, it is necessary to create communication and interaction media for these stakeholders in building interface and architecture models (Saptadi & Marwi, 2015).

Cloud computing has become one of the options for managing files so that they can be accessed anywhere and anytime in a draft entitled The NIST Definition of Cloud Computing. Cloud computing is a model that allows shared and easy use of resources, provides network access anywhere, can be configured, and services are used as needed (Yusuf & Ikasari, 2023).

Cloud computing allows companies to utilize as many services provided in the cloud as they need at any given time, and they will only be charged based on the resources they use. In other words, it converts fixed capital costs into variable costs of the enterprise and offers profit maximization through economies of scale. They are aiming to maintain their business cost-effectively and efficiently. In addition, most of the services provided by the cloud are low-cost and available everywhere. So, it can indirectly cause multilateral network effects between businesses and increase business productivity (Setyawan, 2015).

Several studies state that cloud computing is one of the technologies that will experience the most rapid growth in recent years, occupying more than 12% of the IT market in 2015. Other research mentions that there are estimates that predict the cloud services market. Revenue will reach approximately \$148.8 billion in 2014. In addition, the financial crisis and recession also contributed to the adoption of cloud computing as companies had to find cost-effective IT solutions. Large enterprises and businesses primarily own and use private clouds, while public clouds are used by small businesses and millions of individual consumers (Lim & Husain, 2013).

There are several cloud service models available, but the common and widely used ones are as follows:

- Platform-as-a-Service (PaaS)
This service model provides users with a development environment and programming platform. Users can design, program, build, and deploy their applications to the cloud using application frameworks, programming languages, and built-in application programming interfaces (APIs) provided or supported by cloud service providers. It covers the entire software development life cycle process, including design, implementation, debugging, testing, deployment, and operation.
- Software-as-a-Service (SaaS)
Resides at the top layer of cloud infrastructure where the capability provided to the end user is an integrated set of platform, hardware, and application services accessed using a web browser. In short, software applications are offered as a service by the provider.
- Infrastructure-as-a-Service (IaaS)
This service model offers customers IT infrastructure based on physical and virtual resources. These resources fulfill end-user needs in processing power, storage, networking, operating systems, and other hardware-related services. This allows many companies to rent available resources rather than spending large amounts of capital on investment or purchasing and maintaining necessary hardware, such as high-end server hardware.

Of these three models, most companies like to outsource their internal IT functions, IaaS and PaaS (Andriani, 2013).

In an organization's cloud computing adoption process, there are two most popular adoption models (Oliveira et al., 2014): DOI and TOE.

1. DOI (Diffusion of Innovation)
A leading adoption model used in information systems research. DOI has five attributes that explain the concept of adoption in an organization, namely:
 - Relative Advantage is the extent to which an innovation is superior to the previous generation.
 - Compatibility is the extent to which an innovation can be assimilated into existing business processes, practices, and value systems.
 - Complexity is the level of difficulty in using the innovation.
 - Observability is the extent to which the innovation is visible to others.
 - Trialability is the ease of experimenting with innovations.
2. TOE (Technology Organization Environment)
A framework to explain the innovation process in the context of the firm. TOE considers three main features that will influence innovation adoption, as the name implies: technology, organization, and environment.
 - Technology refers to internal and external technologies relevant to the organization.
 - Organization refers to the company's descriptive characteristics, resources, and communication processes.
 - The environment consists of market elements, competitors, and environmental regulations.

A. Results

Cloud computing is an evolution of information technology that provides on-demand services and products that promise competitive Advantage, cost savings, improved service processes, and business performance, and it is helpful for long-term investment. The key to cloud computing is infrastructure visualization that provides and maintains virtual servers that can be scaled up and down on demand.

The roots of cloud computing are advances in hardware, internet technology, distributed computing, and system management (Nuseibeh, 2011).

Some main factors that dominate cloud computing implementation are organizational readiness for technology, resource readiness, support from the organization, the environment, and security and privacy (Amron et al., 2017).

A solid basis for the concept of cloud computing is service-oriented architecture (SOA). In an SOA environment, end users request information technology services at a predetermined level of quality and functional capacity both at the time of request and at a specific time. Cloud utilization used by the general public is divided into several types of cloud whose use is tailored to the needs, namely:

- **Public Cloud**
Many customers can access the cloud with an internet connection and access cloud space. Public cloud can also be interpreted as using a cloud used by the general public and paying after finishing using it or commonly referred to in a pay-as-you-go manner.
- **Personal Cloud**
The cloud is created only for the group or organization, and access to the cloud is limited to that group or organization. Cloud computing services for the internal data center of a group or organization benefit significantly from cloud computing that is not available to the general public.
- **Cloud Community**
The cloud is used and shared between two or more organizations with a common interest in cloud usage. The organization or a third party can manage community clouds and can be co-located.
- **Hybrid Clouds**
A cloud combines two clouds that can be mixed into public, private, or community. The point of a hybrid cloud is that when we run out of capacity when using a private cloud, we can immediately switch to a public cloud or community cloud to increase capacity (Golightly et al., 2022).

Utilizing cloud computing provides many advantages in building servers for businesses, some of which are:

- It is low cost, as there is no need to purchase a server, and you only pay as needed.
- High capacity because the cloud provides data storage with much bandwidth.
- Flexibility because cloud users can quickly add and remove servers and databases, add capacity in other locations as needed, and can be integrated with third-party services.
- Maintenance is cheap, as users no longer need to consider system administration or configuration.

However, not all organizations can adopt cloud computing. For example, in government organizations where the framework created by the government can influence the adoption and implementation process, integration theory is suitable for building a contextual and specific framework. Some parties also recognize that the application of cloud computing in e-government is not comparable to public services (Swamy, 2013).

Some of the major factors hindering the adoption of cloud computing are the interrelated requirements of security, privacy, trust, compatibility, and integration. Security risks can be intended as risks associated with remote data hosting, shared virtual resources, and data transfer over the Internet. In the public cloud model, the service provider manages the physical location where data is stored, which raises concerns for consumers. This is referred to as institution-based trust, which can be described as the extent to which the organization believes there is an effective guarantee to meet client expectations (Al-Hujran et al., 2018).

Cloud computing innovations in government help process, store, and communicate quickly and cheaply. The government uses cloud computing to store data-driven stock information. Adopting cloud computing in government certainly has positive and negative impacts. The accuracy and speed in storing data and distributing information extensively impact public services. The obstacle lies in human resources (HR) as cloud computing managers. A lack of understanding about cloud computing adoption makes people less proficient in Information Technology (Suluh et al., 2022).

B. Discussion

Cloud computing is an emerging business concept and technology to support the on-demand delivery of computing, storage, and applications to run business processes over the Internet (Zhao et al., 2014). Cloud computing provides benefits that can reduce costs with the cost of information technology to the cloud, make data access more accessible, flexible, and scalable, minimize operational problems, and is a long-term investment (Garrison et al., 2012). There are also challenges or risks in implementing Cloud Computing, such as data security issues, power outages, internet connectivity, resistance to change, regulatory issues, and lack of awareness. Based on Kaspersky research data, 19.4% of companies have adopted cloud computing in Indonesia. An estimated 32.1% of companies in Indonesia plan to adopt this type of service in the next 12 months (Setiawan & Gui, 2023).

In addition to providing many benefits, since the development of the concept of cloud computing adoption, security has become an issue that triggers attention to accelerate the growth of technology. Security is seen as data confidentiality, data storage security, data transmission security, and privacy violations in business operations. Thus, security is a significant challenge for cloud users, followed by performance availability and issues related to cloud compliance (Gangwar & Date, 2016). Cloud computing is also related to other technologies, such as service-oriented architecture. Sometimes, cloud computing is considered a replacement for SOA, even though SOA is a way of designing, developing, deploying, and managing systems. So, cloud computing and SOA are two different things, but services in the cloud can be defined as services in the context of SOA, and SOA elements can be used in cloud environments (Lewis, 2010).

4. CONCLUSION

In the future, more and more businesses and consumers will use cloud computing services, and most of them will choose providers that can accommodate end-to-end needs, from devices to infrastructure. Some evidence also points to innovative new startups being prime candidates for cloud computing adoption, as they can take Advantage of cloud infrastructure's rapid deployment and elasticity.

Cloud computing is not new because it started from large-scale distributed computing technology. The emergence of cloud computing was motivated by the need in the industrial and computerized world for the shared use of distributed computing resources that can be used as desired. Despite the obvious advantages such as cost efficiency, scalability in deployment, and reduced environmental impact associated with cloud computing, the transition to the cloud is not without its challenges.

However, despite the various benefits, organizations will face barriers in adopting cloud services. Security concerns, effective management of physical and cloud-based infrastructure computing resources, compliance with compliance requirements are barriers to widespread cloud adoption, uncoordinated cloud concepts by stakeholders, and a lack of business and technical understanding. Overcoming compliance and legal obstacles can be challenging. However, advances in research and development have the potential to address significant issues faced by current and future cloud users in cloud security and management. For example, creating management solutions capable of seamlessly monitoring cloud and non-virtualized computing resources and providing a great user experience can further accelerate migration to the cloud.

Therefore, the following can be summarized regarding the things that need to be considered for organizations that will adopt cloud computing in their daily lives:

- Adoption Drivers: The critical drivers of cloud computing adoption in MIS include cost savings, increased flexibility, scalability, and resource accessibility.
- Barriers: The main barriers to cloud computing adoption in MIS are data security and privacy concerns, lack of trust in cloud service providers, and integration challenges.
- Success Factors: Some success factors identified include top management support, proper planning and implementation strategies, employee training, and effective change management.
- Impact: The application of cloud computing to MIS has resulted in various positive effects, including increased operational efficiency, improved collaboration, and enhanced decision-making capabilities.

The decision on cloud computing adoption should involve a detailed cost-benefit analysis, ensuring the service's effectiveness, regulations from service providers, and the conceptual standards in place. Understanding the impact of cloud computing adoption in the high-tech industry is essential. Companies that want to adopt cloud computing can start with a phased implementation, slowly increasing the

number of processes by developing more internet infrastructure or portable electronic equipment. Companies can begin by implementing cloud computing services, such as ERP and CRM, into their business processes.

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