

## **Cloud technology as a factor of organizational competitiveness**

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**Abstract:** In modern conditions of globalization challenges and constant economic transformations, the issue of ensuring organizational competitiveness is not only urgent but also acquires the latest content, given the need for rapid adaptation to changing factors of influence of internal and external environments, innovativeness in business processes, adaptability and relevance of management decisions. Of course, the complexity and innovativeness of business processes is provided by the need to use the latest information technology in the organization, which will form the impetus for stable and relevant competitive development. The study notes that one such mechanism to ensure competitiveness is the use of cloud technology. Cloud technology is primarily a modern, relevant means of storing and accessing data through the use of the Internet. The need to use cloud technology is due to the need to address a large number of problems associated with optimizing the functioning and competitiveness of the organization, the speed of management decision-making, which ensures a high level of competitiveness. The article shows the advantages and disadvantages of the use of modern information technology in the organization, analyzes the basic requirements of cloud services and opportunities to improve the performance of the organization, taking into account the use of modern cloud technologies, the possible risks of such use, and losses. In addition, the study analyzes the impact of cloud technology on the competitiveness of the organization in an unstable market, globalization transformation, and transformation.

**Keywords:** information technology, competitiveness, cloud services

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### **1. Introduction**

Globalization transformations of economic systems form an urgent need to analyze and approve a comprehensive approach to the use of cloud technology in business. The relevance of considering this topic is caused by the urgent need to analyze the modern development of the organization, taking into account the provision of a high level of competitiveness, close connection, and constant communication with the extensive introduction of new information technologies, the rapid development of electronic mapping information and navigation systems, satellite navigation tools, etc. Using such a comprehensive approach forms an urgent need to change the concept to the formation of approaches in the use of information technology in the organization. For example, taking into account the requirements of modern business conduct - one of the information technologies, actively implemented in organizations, is a platform for cloud storage of databases.

Over the past few years, global communication has shown that the development of modern business processes is impossible without the use of cloud technologies, and to achieve synergies from such development, information technology is becoming an integral part of doing business in any organization. This development is happening very rapidly and requires constant adaptation to the speed and relevance of management decisions. Thanks to the emergence of cloud technology, one of the completely new areas has been formed, capable of influencing not only the business processes within a particular company but also the entire market as a whole or even the general fundamentals of doing business in any state. Of course, the current challenges form an urgent need to understand the potential impact of modern cloud technologies on the formation of organizational competitiveness, the creativity of business processes, and the speed of making balanced management decisions.

Given the fluidity of time and the need to quickly adapt to changing factors of the external and internal environment - organizations have opportunities for self-development, implementation of long-term strategic programs, projects, not only holding competitive positions in the market but also capturing new trends. Traditional methods of competition are outdated and do not give relevant positive results of changes. For example, price wars unsupported by appropriate external resources are a long and dangerous process for the organization. At the same time - extensive scale-up in the organization has either exhausted itself or is not adapted to certain areas of production, such as the creation of software based on the principles of SaaS [8]. Opportunities for the adaptive formation of innovative approaches, aspects, factors of influence on the ways of development of the organization are needed.

Thus, the formation of cloud technologies becomes a necessary integral component of success in the formation and development of organizational competitiveness. Understanding this, it becomes clear that the transition to the use of modern relevant cloud technologies not only affects the quantitative and qualitative indicators of the organization but also completely changes the principles of doing business not only in Ukraine but all over the world. However, despite the large set of benefits of the modern cloud, there are questions: Is it really necessary to use cloud technology when doing business? How to determine whether an organization needs

to move to a new cloud technology, whether such a transition will form the desired economic result? How much does the use of cloud technology relate to the formation of a high level of competitiveness of the organization?

## **2. Background and related work**

Given the speed of influence of external and internal environment factors, changes in the conceptual foundations of doing business, given the need for balanced strategic management decisions of the management of the organization - the issue of digitalization development on the business platform is one of the most relevant.

Among the main researchers of this issue of implementation and ensuring the positive aspect of the organization's work with cloud technologies can be distinguished M.O. Liubymov (2019), A.O. Muzychenko (2018), A.O. Klochko (2020), V.A. Kulyk (2019) and others. Their studies reveal in detail the impact of information technology on doing business in today's digitalization environment. Nevertheless, today's realities lead to the fact that in order to ensure a high level of competitiveness, an organization must not only use modern cloud technologies but also quickly make non-standard creative decisions, using the advantages of digitalization in business. Thus, the use of cloud technology becomes one of the fundamental elements of a successful business, the use of which forms the prerequisites for stable and rapid development of the organization, its adaptation to changing any conditions, the conceptual basis of the relationship between digitalization and business competitiveness.

In the context of globalization, the problem of organizational competitiveness becomes important, being one of the founders of economic security. One of the factors of increasing competitiveness is the introduction of the cluster approach in the analysis of the problem of the development and formation of cloud technologies. The formation of clusters is based on combining science, technology, production, economics, and management to improve the competitiveness of the organization's products through the positive impact of cloud technology on business development.

According to the National Institute of Standards and Technology: “cloud computing is a model for providing ubiquitous, convenient, on-demand network access to a shared pool of computing resources (e.g., networks, servers, storage, applications, and services) that can be quickly configured and provisioned with minimal management effort or interaction with the service provider” [2, p. 203].

Thus, based on the above definition, it can be argued that the system of using cloud computing is based on two main components: The software application itself and the settings (configuration), which ensure stable operation and high efficiency of the software in the organization's activities. These two components need to be considered and analyzed solely in terms of interrelated components. Because separated from each other, these components do not produce a positive effect and only inhibit the stable development of the organization's competitiveness. Also, in an additional context, it is necessary to understand the fact how cloud technology can affect the software of the organization, the speed, and the balance of effective management decision-making by the management of the organization.

Software in the activities of any organization is an integral part of successful strategic development, the foundation of the formation of strategic priorities for long-term dominance and forecasting of the company. Organization's software has many constituent attributes that form the functionality of a software application, the ease and comprehensibility of its use. Suitable software attributes come in two types: functional and non-functional. Functional attributes of an organization's software have been studied quite a long time and in detail. They are clear, clearly labeled, simple, and available for use or modification. In turn, non-functional attributes of software for organization activities are studied rather poorly, which forms the preconditions for certain difficulties in their use, finding ways to avoid possible errors. Considering the fact that a typical software application of a certain information system is a certain rebirth into a service product - ignoring the role of non-functional attributes of software for organization activity is unacceptable, which, in turn, will have a significant impact on the performance of the organization and the speed and balance of its management decision making.

The focus of the study is to analyze the impact of cloud technology on the activities of the organization, ensuring the development and improvement of the position of its competitiveness in the market. Thus, for example, the software developer operating based on the SaaS model is an integral part of the general concept of cloud technologies, so it is impossible to consider the research in the field of SaaS applications without studying the scientific works in the general field of cloud computing.

Thus, cloud computing in general, and SaaS as a special case, have created an urgent need for scholars of information systems and technologies to study and understand the use of software as a cloud “service” in the activities of an organization to ensure its high competitiveness and market promotion.

For example, Demirkan studied the importance of service-oriented architecture in applications and offered some clear recommendations for developing and adapting information system applications and technologies based on such architecture [6].

Therefore, it becomes relevant to focus exactly on the study of the impact of cloud technologies based on non-functional attributes, namely the components of modularity and performance of a software application. The study of the mentioned opinion is confirmed by a lot of conducted researches. For example, for the basic products of Joglekar and Rosenthal in the course of the conducted research, it was found out that the use of modularity in software architecture improves the planned initial results of such a product in the process of addition of separate program components [4, p. 170].

However, the problem of comprehensive research of software performance attribute analysis has not been carried out. That, in turn, significantly complicates the formation of a general idea about the cloud technologies of an organization.

However, through research and observations by Jain and Jim Hodgins (2020), one can state the fact that in the software services environment “price is directly related to performance, so manufacturers are forced to charge a higher price for a product with more computing power used” [18]. Researchers such as V.O. Klochko (2020) have studied the role of productivity in shaping the competitiveness of an organization through the use of modern information technology. This topic is relevant and requires further in-depth analysis and the formation of strategic priorities for long-term development.

### **3. Research Methodology**

In today's environment of rapid changes in business factors and the need to adapt to conditions, the cloud services market is actively developing, forming an offer for consumers to use modern tools that allow organizations to make balanced management decisions, adapt to changes in internal and external factors of the business, increase the level of flexibility and resilience in the uncertain modern environment.

Today, cloud technology is not only a modern trend but also the need to ensure a high level of competitiveness in the market, forming a large-scale virtual universe of service development and virtual capacity. In a transformational economy, there is an urgent need for a rapid exchange of information, data, stimulating the continuous development of technologies and products in all areas of the organization. Given this, providing a high level of processing and analysis of relevant information is one of the main factors of the quality and long-term existence of the organization in the market.

Cloud technology is the latest tool for the development of information technology in the activities of the organization and ensure the long-term life cycle. This technology allows for the effective and timely upgrading of information technology infrastructure, accelerating the introduction of modern digital innovations in the activities of the organization. In their research, McKinsey & Company experts analyzed the real prospects for the mass use of cloud technology in the activities of organizations in Poland. Thus, for example, according to the published results of the study, experts say that the introduction of this technology in the use of organizations may bring the Polish economy an additional 124 billion zlotys in 2030, which forms about 5% of the gross domestic product of the state. Thus, the urgent need for active development of the state economy is the creation and maintenance of new “digitalized” organizations, the creation of which is possible through the establishment and active development of “cloud” infrastructure, the modernization of traditional approaches to business, which will create opportunities for reducing costs of information technology.

In today's environment of globalization transformations, the positive effect of the actual use of cloud computing forms the potential for automation of production, increasing the efficiency of operations and optimization of energy conservation, optimization of logistical processes, and saving potential resources.

As of today, the economy of Northern Europe is the most “digitalized”, with Central and Eastern Europe in second place. However, according to an expert assessment by McKinsey & Company (2020), there are a significant number of problems that complicate the process of “digitalization” of the organization, namely:

- 1) Lack of timely awareness. One of the most common problems is the lack of necessary knowledge about cloud solutions and their benefits in the organization. Most organizations do not understand the possible synergistic effects of using cloud technology, and because of the cost savings and lack of time and staff simply do not use this innovative resource in their activities, which significantly reduces the level of competitiveness of the organization.
- 2) Regulatory uncertainty. Some organizations face the problem of strictly controlling the physical location of data centers. These policies are seen in sectors of the economy that are highly regulated and have the need to clearly comply with complex regulatory requirements and central office policy compliance criteria.
- 3) The challenge of ensuring a high level of security. Organizations are concerned about the possibility of an “attack” on massive amounts of sensitive information, and due to active concerns about data security, companies simply abandon the possible use of cloud technology.
- 4) Lack of trained personnel.
- 5) Lack of funds to implement relevant innovations.

Gartner (2021) predicts: “in 2022, global enterprise cloud spending will be in the range of \$331.2 billion, and in 2026, the global cloud services market will be about \$521.8 billion” [ 5]. Modern business structures should quickly reorient their work to the cloud services to achieve greater flexibility, efficiency, and mobility. For example, in 2022, business entities in the United States of America spent \$146 billion on cloud services, which is about 76% of the total global market. In addition, the top three innovators are the United Kingdom (\$ 11.4 billion) and Germany (\$ 8.9 billion). The fourth place in the leaders in the introduction of innovative cloud services is Japan (7.4 billion U.S. dollars) [3].

The situation in the formation and development of cloud services in Europe is very mixed. For example, Western European countries are developing much faster and more successfully than Eastern European countries. According to Forrester Research analyst company, in 2021 cloud market in Western Europe will be \$29.7 billion, whereas in Eastern Europe it will be only \$1.9 billion [17-18].

It should be noted that the global cloud market is concentrated around three major companies: Google, Amazon, and Microsoft, the market share of IaaS services is 82%. However, the distribution between these companies is not even. For example, Amazon and Microsoft services are most often used by companies in the United States and Europe. However, for example, in China, the market is almost completely monopolized by the local provider Alibaba Cloud.

#### **4. Result**

The concept of “virtualization of business life” is becoming an integral part of the key to the successful development of the organization and ensuring a high level of competitiveness. Such changes form the need for the active use of innovative information technologies by business entities. For organizations undergoing digital transformation, there is a certain set of benefits, in particular [7]:

- to form modern weighted and relevant management decisions with the use of monitoring forecasting systems, situational mathematical models, programs of real logistics development;
- to use systems of automated management of the organization's activities;
- create management systems based on self-diagnostics, which will ensure the transfer of operational information about the technical state, resources, expediency of changing the mode of operation, etc.;
- to respond quickly to changes in the factors affecting the production, release, or sale of products or services;
- ensure safety and environmental friendliness.

The main task of digital transformation of modern organizations is to ensure the flexibility and efficiency of business processes, which will increase the level of competitiveness in the market in today's business environment [14].

The use of cloud technology as one of the advanced technologies in the digital society for managing and recording information creates opportunities for the organization to form the following advantages:

- reducing the cost of creating data centers, purchasing equipment and programs, maintaining appropriate specialists, etc.;
- the ability to obtain the necessary information from any access point;
- accessibility;
- self-service;
- storage of necessary information without additional redundancy.

The active promotion of cloud services has created a new level of information technology. The strategy of active adoption of cloud services forms the urgent need for organizations to adapt to the created, quickly and deliberately respond to changes, and adapt. “Cloud computing acts as a revolutionary paradigm that allows remote processing and storage of unlimited amounts of data” [15].

The urgent need for cloud computing is driven by the urgent need for network access to a pool of configured computing resources (e.g., servers, networks, data archives, applications) that can be quickly provided at optimal management costs and calls to the provider. Cloud services fall into several main categories according to the types of services provided (Fig. 1).

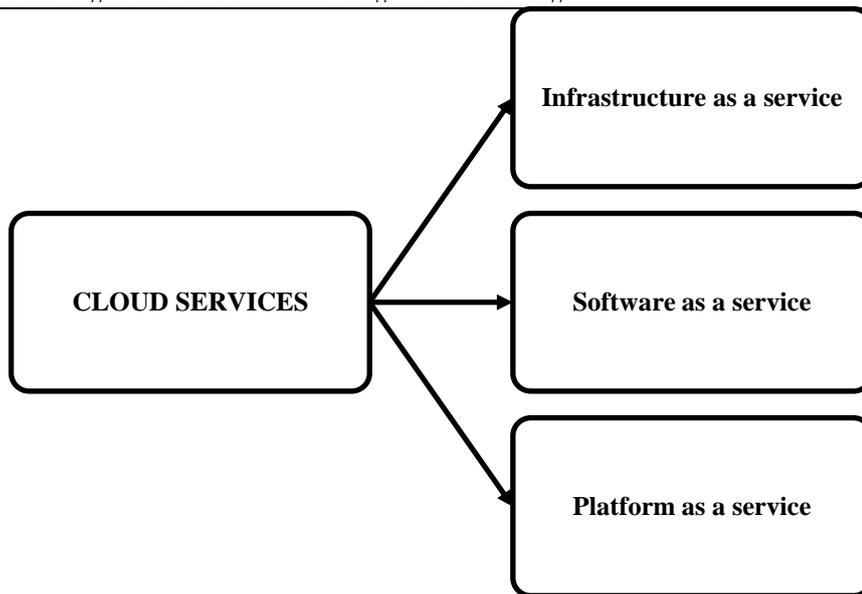


Fig. 1: Main categories of cloud services\*

\* Author' own development

To date, we can distinguish four main scenarios for the use of cloud technology in the activities of the organization (Fig. 2).

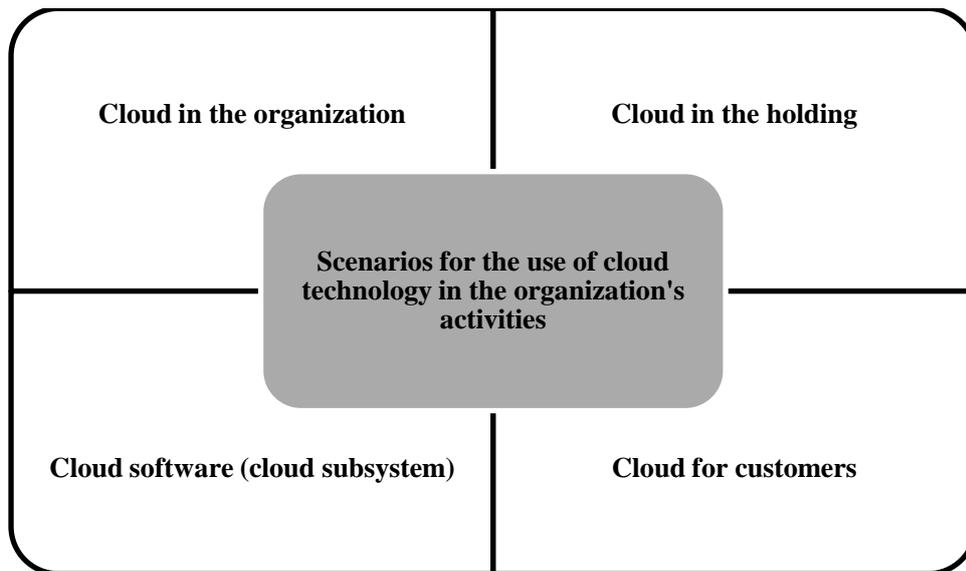


Fig. 2: The main scenarios for using cloud technology in the organization's activities \*

\* Author's development based on [8]

A characteristic feature of the modern world development of states is the intensification of integration processes in the world and Europe in particular. Among the existing vectors of development, the European integration course provides the state with a place in the system of world business relations. For Ukraine investment integration with the European Union is a movement to the standards of civilized, socially oriented market business taking into account modern trends of digitalization, digitalization, competitiveness in the world market [6].

For most organizations, the main advantage in choosing a cloud service is the free use of the necessary licensed software, its maintenance, and updating. In this case, for example, the SaaS model is focused on the end-user and is positioned as a reliable tool for efficient business and ensuring a high level of competitiveness of the organization. Under this model, potential users do not incur the cost of ownership of a package of necessary programs but pay for their use. When using the SaaS model, users note a number of advantages (Fig. 3).

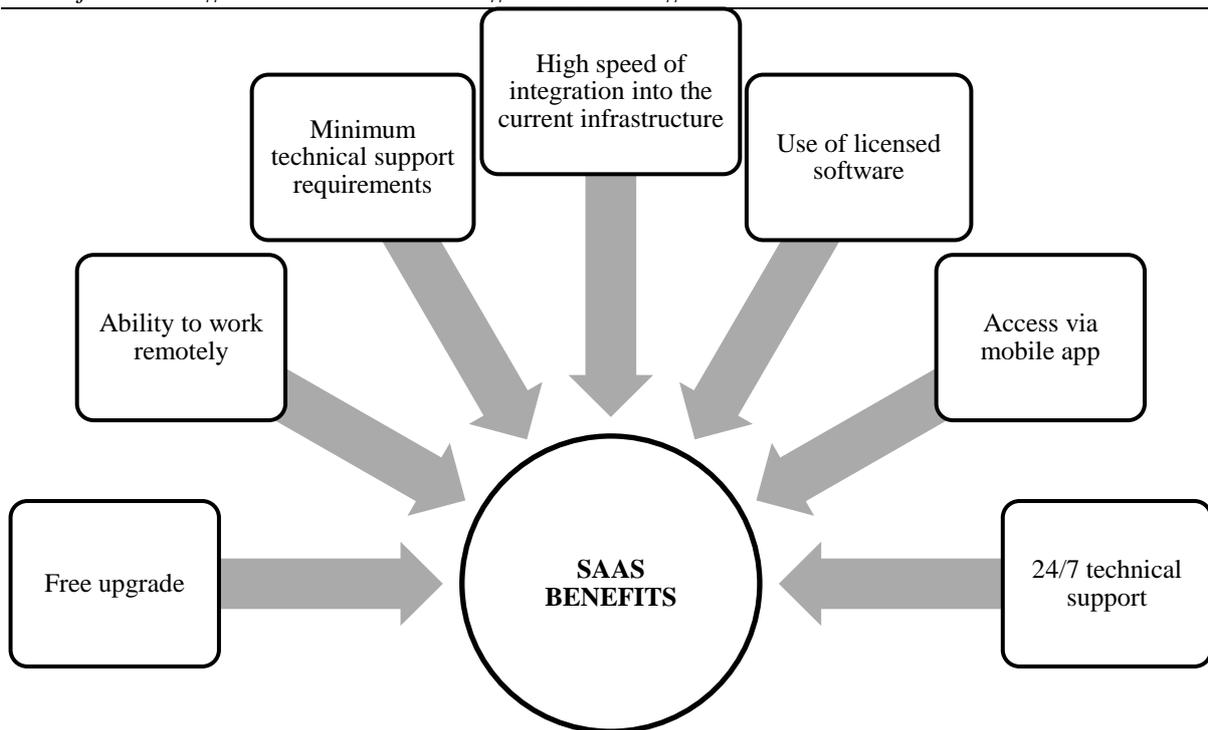


Fig. 3: The benefits of using the SaaS model in the organization's activities \*

\* Author's development based on [11]

For accounting and management of the organization using modern cloud technologies, there are the following programs: Accounting Saas, jSolutions, iFin, cloud offerings for BAS Accounting, 1C:Enterprise and others.

Continuous improvement of engineering cloud infrastructures equipment and improvements in virtualization technologies and methods form the opportunity for customers to use cloud services in the security of private clouds. An increasing number of international and domestic organizations are seeking to use cloud computing in hybrid clouds, implementing and producing computing for public and private projects on their platforms. Under these conditions, the service customer has the option of not keeping the cloud-based internal computer network, but to fully outsource certain functions, such as data storage or backup, to a public cloud provider.

Due to the constant growth of interest in the transfer of certain tasks of external computing power, most vendor companies face an urgent problem, namely the sale of solutions based on cloud technology. Thus, as of today, there is a list of the main service models that complement each other and occupy different market positions, namely: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS) (Table 1).

Table 1: Analysis of cloud service models in today's environment to ensure a high level of competitiveness of the organization \*

No	Model Name	Brief description of the model	Purpose of cloud services model
1	<i>Infrastructure-as-a-Service</i>	The elastic environment of heterogeneous resources: server, network, storage resources	The model allows for flexible and on-the-go reconfiguration of platforms. An example implemented is Amazon's cloud service.
2	<i>Platform-as-a-Service</i>	IaaS management interface from applications	The model allows you to manage the cloud from application systems. An implemented example is the Google Drive service.
3	<i>Software-as-a-Service</i>	The model of selling software as a service on an external IaaS-cloud	The model allows you to reduce the cost of implementation and maintenance of software. An implemented example is the Google docs service.

\* Author's development based on [12]

With the popularization of cloud technology in recent years, many innovative models are emerging in the market, for example: hardware as a service (HaaS), workplace as a service (WaaS), data as a service (DaaS), security as a service (SaaS), everything as a service (EaaS)[9].

Thus, it becomes clear that the steady global trend towards the declining popularity of royalty-based software consumption is shaping the innovation of software usage based on the SaaS model and cloud computing.

## 5. Threats to Validity

One of the main factors constraining the rapid development of cloud infrastructure in today's environment is the limited bandwidth of communication channels. Despite the fact that, as of today, the speed of new cables in the world is 1,300 meters per second - channel capacity is insufficient due to the constant growth of traffic, the volume of computing data, requests, and other.

## 6. Conclusion and Future Work

The introduction of cloud services forms the priorities for improving the level of efficiency of organizations, ensuring the level of satisfaction of customers and business partners, and, accordingly, the development and improvement, increasing the ranking positions of the organization by increasing the level of its competitiveness.

As for further research on this issue, a thorough detailed analysis of the reality and effectiveness of the introduction of cloud technology in an organization in order to increase its competitiveness and ensure high-ranking positions in the world arena is necessary.

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