Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 01, Issue 06, June 2025
Website: ecomindspress.com

THEORETICAL FOUNDATIONS OF CLOUD COMPUTING AND THEIR APPLICATION IN ECONOMICS

Бабаева Сабинабону Давронбек қизи
Студентка Ташкентского государственного транспортного университета

Abstract
The article reveals the theoretical foundations of cloud computing, its key characteristics and implementation models. The economic mechanisms of the impact of cloud technologies on business processes, industries and the national economy as a whole are considered. Special attention is paid to the advantages and disadvantages of cloud solutions, as well as examples of practical application in various fields — from the public sector to industry and education implementation and outlines the prospects for the development of cloud computing in the context of the digital transformation of the economy.

Keywords: Cloud computing, digital economy, IaaS, PaaS, SaaS, economic benefits, digitalization, multi-cloud strategies.

Introduction

In recent decades, cloud computing has become an integral part of the digital transformation of the economy. The development of information technology leads to the fact that enterprises and government agencies are abandoning local IT infrastructure in favor of cloud solutions that provide computing resources as a service. This transition is driven not only by technological changes, but also by the economic benefits that cloud models provide. The purpose of this article is to review the theoretical foundations of cloud computing and analyze in detail its impact on the economy, revealing the advantages, disadvantages, and practical applications.

Cloud computing is a model of providing access to computing resources (servers, storage, networks, software) over the Internet on demand. Access is carried out using a self-service model (Pay-as-you-go), and users pay only for the resources they

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 01, Issue 06, June 2025
Website: ecomindspress.com

actually use. According to the U.S. National Institute of Standards and Technology (NIST), cloud computing has the characteristics of on-demand service, internet access, collaboration, flexibility, and scalability, making the cloud a powerful tool in the digital economy. Cloud computing is based on a service model for IT provisioning, which is divided into three key categories: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Each of these models represents a certain level of abstraction and carries a different degree of responsibility between the provider and the user. Understanding the differences between the two allows organizations to choose the most appropriate option for their objectives, strategic goals, and needs.

Infrastructure as a Service (IaaS). The IaaS model offers the user access to virtualized computing resources such as servers, storage, network components, and backup systems. The cloud provider is responsible for managing the physical infrastructure and underlying software, while the user administers the operating systems, applications, and data. service. Companies can quickly deploy their own IT infrastructure from scratch, scale it based on load, and reduce capital expenditures. Examples of IaaS providers: Amazon Web Services (EC2), Microsoft Azure, Google Compute Engine.

PaaS (Platform as a Service) is a platform as a service. The PaaS model provides the user with a ready-made platform for developing, testing, deploying and maintaining software solutions. In this case, the provider takes over the management of not only the infrastructure, but also operating systems, server environments, DBMS and development tools. The developer can focus exclusively on creating the application logic, without being distracted by configuring servers or updating libraries. increases the flexibility of team development and reduces technical barriers for startups. Typical examples of PaaS solutions include Google App Engine, Heroku, and Microsoft Azure App Services.

SaaS (Software as a Service) is software as a service. The most high-level model provides the user with access to ready-made software, which is fully maintained by a cloud provider. The user does not need to worry about servers, or the platform, or about installing and updating software. All that is required is Internet access and a web browser. SaaS solutions are used in a variety of areas, from email and office suites to CRM systems, accounting, and electronic document management. Among the most popular products are Google Workspace, Microsoft 365, Salesforce,

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 01, Issue 06, June 2025
Website: ecomindspress.com

Dropbox, etc. This model is especially in demand in small and medium-sized businesses, as well as in education and remote work, as it allows you to quickly and inexpensively access modern digital tools. Also, along with multi-level service models, the most important classification in the theory of cloud computing is deployment models. They determine how cloud resources are provided to users, who owns the infrastructure, and where computing power is physically located. The most common are public clouds, private clouds, hybrid clouds, and the increasingly popular multi-cloud environments. Each of these models has its own characteristics, benefits, and limitations, allowing organizations to choose the right option based on their data sensitivity level, security requirements, scalability, and economic feasibility.

Public Cloud. A public cloud means that computing resources, whether servers, storage, or applications, are leased, owned and managed by a third-party provider. The resources are available to a wide range of users via the Internet. This model is the most cost-effective, as users share resources with other tenants, which provides economies of scale and reduces costs. Public clouds are especially popular among startups, Small and medium-sized businesses, educational institutions, and users who need to launch and scale quickly without significant infrastructure investments. Well-known public cloud providers include Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform.

Private Cloud. A private cloud is deployed for the benefit of one specific organization and is usually managed by its own specialists or a specialized contractor. The infrastructure can be hosted either in the company's own data center or with an external provider, but access is strictly limited - it is used only by employees or departments of the same organization. This makes it preferable for banks, government agencies, medical organizations and large corporations working with confidential data. However, the cost of deploying and maintaining a private cloud is significantly higher than that of public counterparts.

Hybrid Cloud. Hybrid cloud is a combination of public and private clouds that are combined through unified technologies and tools, allowing data and applications to be moved between them as needed. This approach provides organizations with the flexibility to manage workloads: critical and sensitive data can be processed in a private cloud, while less significant tasks can be processed in a public cloud. maintaining a high level of security and control. This is especially true for

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 01, Issue 06, June 2025
Website: ecomindspress.com

organizations in the digital transformation phase, where a complete transition to the public cloud is not feasible or practical.

Multi-Cloud. The main goal of a multicloud strategy is to minimize the risks of dependencies on a single provider, increase resiliency, and optimize the use of various specialized services offered by different platforms. competence of personnel and the availability of a centralized monitoring system, but in the future, it opens up opportunities for building a flexible and reliable digital infrastructure. From the point of view of economic theory, cloud computing reduces transaction costs (according to Coase), allows for the redistribution of resources, accelerates innovation (according to Schumpeter) and contributes to the formation of new digital business models. The cloud is becoming not just a technology, but the structural foundation of a new economic logic in which flexibility, scalability and access to data come to the fore. Cloud technologies have an impact on the economy at both the micro and macro levels. At the enterprise level, they contribute to:

- ✓ Reduce IT infrastructure costs.
- ✓ Increasing flexibility and speed of adaptation to changing conditions.
- ✓ Automate processes and accelerate decision-making based on data analytics.
- ✓ Develop digital business models with pay-as-you-go or pay-as-you-go digital business models. At the industry level, the cloud drives innovation, allows startups to scale without large investments, and promotes the spread of digital solutions in education, healthcare, industry, and other sectors.

At the macro level, cloud computing contributes to productivity growth, accelerates the digitalization of the economy and increases the country's competitiveness in the global market.

The advantages of clouds are:

- ✓ Cost savings that enable the transition from capital to operating expenses, thereby making cloud solutions affordable for small and medium-sized businesses.
- ✓ For enterprises, there is an opportunity to easily scale resources, increasing or decreasing their volume depending on current needs, providing flexibility.
- ✓ Clouds facilitate the rapid implementation of innovations, such as advanced technologies (AI, Big Data, IoT).
- ✓ Access to data and applications is possible from any device and at any time – this is accessibility and mobility.

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 01, Issue 06, June 2025
Website: ecomindspress.com

✓ Cloud providers provide geo-distribution of servers, thereby increasing fault tolerance. This is achieved through backups.

The disadvantages of clouds are:

✓ The security issue, as well as the threat to privacy, is data breaches, attacks, and unauthorized access.

✓ Dependence on the Internet is also one of the disadvantages of cloud services, since without a network connection, the ability to perform your work tasks does not exist and the workflow is suspended.

✓ Changing service providers can be a costly undertaking, while relying on a single provider can also be technically burdensome.

✓ Low speed and latency are a problem primarily for those tasks that require data processing immediately.

✓ Ensuring the proper functioning of clouds requires experts in DevOps, cloud architecture, and cybersecurity, which raises the question of finding the right talent.

Cloud solutions are also used in various sectors of the economy, such as:

Business: Small companies use SaaS services (e.g., cloud accounting, CRM systems), and large enterprises are building hybrid clouds to ensure high availability and security.

State: Uzbekistan has the UzCloud platform, which provides access to digital public services, data warehouses and platforms for interdepartmental cooperation.

Education and healthcare: cloud platforms are used for online learning (Google Workspace, Moodle), medical data storage and analysis, remote diagnostics and telemedicine.

Industry: Clouds allow you to collect and process telemetry in real time, optimize production processes, logistics, and equipment maintenance.

Finance: Using Big Data and analytics in the cloud to predict customer behavior, optimize supply chains, and manage risk.

Despite the wide opportunities, the adoption of cloud technologies is associated with a number of challenges:

✓ The growth of cyber threats and the need to create a reliable data protection system.

✓ The problem of digital inequality: not all regions and organizations have equal access to the Internet and modern technologies.

✓ Limited human resources and a shortage of cloud technology specialists.

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 01, Issue 06, June 2025
Website: ecomindspress.com

In the coming years, hybrid and multicloud strategies are expected to become more common. Developing AI-enabled services on cloud platforms and increasing the focus on the sustainability of cloud data centers by transitioning to green energy. Thus, states will continue to invest in national cloud platforms and develop digital infrastructure.

Cloud computing is a key element of the digital economy, combining both technological and economic innovation. With their flexibility, availability, and scalability, cloud technologies help reduce costs, accelerate digitalization, and increase competitiveness. The theoretical models on which they are based are confirmed by real economic practice, and the advantages of the cloud are already being realized in a variety of industries, from government to industry. Despite the existing challenges, the potential of cloud technologies remains extremely high, and further development in this direction will determine the face of the economy of the future.

REFERENCES

1. Kouz R. Firma, Market and Law. Moscow, Novaya shkola Publ., 1993. 198 p.
2. Schumpeter J. Theory of Economic Development. Moscow, Progress Publ., 1982. 455 p.
3. Mell P., Grance T. The NIST Definition of Cloud Computing. — Gaithersburg: National Institute of Standards and Technology, 2011. — Special Publication 800-145.
4. Armbrust M. et al. A View of Cloud Computing // Communications of the ACM. — 2010. — Vol. 53, No. 4. — pp. 50–58.
5. Marston S., Li Z., Bandyopadhyay S., Zhang J., Ghalsasi A. Cloud Computing — The Business Perspective // Decision Support Systems. — 2011. — Vol. 51, No. 1. — pp. 176–189.
6. OECD. Cloud Computing: The Concept, Impacts and the Role of Government Policy. — OECD Digital Economy Papers, No. 240, 2015.
7. IDC Report. Cloud Computing Trends to Watch. — IDC, 2024.