

The Impact of Cloud Systems on Enhancing Organizational Performance through Innovative Business Models in the Digitalization Era

Dragoş TOHANEAN

*University of Economic Studies, Bucharest, Romania
tohanean_dragos@yahoo.com*

Sorin-George TOMA

*The University of Bucharest, Bucharest, Romania
tomagsorin62@yahoo.com*

Abstract. *Information technology has massively transformed the world of business over the past fifty years - first individual functional areas within companies ("first wave"), later increasingly also cross-divisional value-added processes and trade ("second wave"), advent of the internet and the World Wide Web marked a transformative shift in how information is accessed, shared, and distributed ("third wave"), mobile computing and smartphone ("fourth wave") and cloud computing that has emerged as a paradigm for delivering computing resources and services over the internet on-demand, providing scalability, flexibility, and cost-effectiveness ("fifth wave").*

This paper investigates the transformative impact of cloud systems on increasing organizational performance through innovative business models in the age of digitalization. By employing a mixed methods approach, the study integrates qualitative and quantitative techniques to provide a comprehensive understanding of the research phenomenon.

Keywords: cloud technology, innovative business models, digitalization era

Introduction

In an era characterized by rapid digitalization and technological advancement, organizations across industries are facing unprecedented challenges and opportunities. Significant periods of technological advancement and innovation have shaped the field of IT. Waves of transformative shifts in computing paradigms, hardware capabilities, software development methodologies. While the categorization of these waves may vary depending on perspective and context, some commonly recognized waves include: Mainframe Computing Era (1950s - 1970s): this era saw the emergence of mainframe computers, which were large, centralized computing systems used primarily by large organizations and government institutions. Mainframes were used for tasks such as data processing, scientific computations, and business applications. Personal Computing Revolution (1970s - 1990s): this wave brought about the rise of personal computers (PCs), characterized by the introduction of affordable, mass-produced computers designed for individual users. The introduction of the IBM PC in 1981 and the subsequent proliferation of software applications and operating systems such as MS-DOS and Microsoft Windows drove the growth of the personal computer market and facilitated widespread adoption. Internet and World Wide Web (WWW) (1990s - Present): The advent of the Internet and World Wide Web marked a profound shift in the way information is accessed, shared, and distributed. The development of protocols such as TCP/IP, HTML, and HTTP enabled the creation of a global network of interconnected computers. The WWW, introduced by Tim Berners-Lee in 1990, revolutionized communication, commerce,

and collaboration, giving rise to e-commerce, social media, search engines, and other online services. Mobile Computing and Smartphone Era (2000s - Present): The proliferation of mobile devices, particularly smartphones and tablets, has fundamentally changed the way people interact with technology. Advances in mobile hardware, wireless communication technologies (such as 3G, 4G, and 5G), and mobile operating systems (e.g., iOS, Android) have enabled ubiquitous access to information, location-based services, mobile apps, and mobile commerce. Cloud Computing and Big Data (2000s - Present): Cloud computing has established itself as a paradigm for delivering computing resources and services over the Internet on demand, offering scalability, flexibility, and cost-effectiveness. Cloud services include infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS), enabling organizations to utilize computing resources without extensive on-premises infrastructure. In addition, the proliferation of big data technologies, including data storage, processing, and analytics tools, has enabled organizations to leverage large amounts of data for insights and decision-making.

The integration of digital technologies into various aspects of business operations offers a great opportunity for companies to improve their performance and remain competitive (Improved efficiency and productivity, Increased agility and flexibility, Improved decision-making, Improved customer experience, Exploiting new business opportunities). However, it is important to be aware of the challenges involved and to actively address them in order to fully reap the benefits of digital transformation.

Cloud systems, also known as cloud computing, refer to the provision of IT resources (e.g. computing power, storage space, databases, software) over the Internet. Instead of running their own servers and programs, companies access services hosted by specialized cloud providers such as Amazon Web Services (AWS), Microsoft Azure or Google Cloud Platform (GCP). These services are scalable, i.e. they can be flexibly adapted to the needs of the company, and are usually billed according to a usage model - companies only pay for the resources they actually use.

Innovative business models describe new ways in which companies create, capture and deliver value to customers. They differ from traditional models through value innovation, use of new technologies, disruption of existing industries, scalability and flexibility (e.g. platform models, sharing economy models, subscription models or data-driven business models).

Cloud systems and innovative business models are closely linked and mutually dependent. Cloud technologies enable the development and implementation of innovative business models, while innovative business models create new opportunities for the use of cloud systems (e.g.: provision of scalable and flexible infrastructure, enabling new technologies, reducing investment costs, new use cases for cloud technologies, increased demand for cloud resources).

Literature review

The digitalization era has ushered in a paradigm shift in the way organizations operate and compete, necessitating a reevaluation of traditional business models and strategies. We are in the age of business model innovation. Digitization, industry 4.0, internet of things and cloud systems or technologies call for a constant realignment of the business (Tohanean & Vasilescu, 2019). Therefore, an understanding of the terms used is required.

The concept of a business model has been extensively studied in the literature, emphasizing its role as a foundational framework for value creation, delivery, and capture. Teece (2010) defines a business model as the manner in which an organization creates, delivers, and captures value, encompassing elements such as value proposition, revenue streams, cost structure, customer

segments, channels, and key activities. Osterwalder and Pigneur (2010) propose the Business Model Canvas as a visual tool for mapping and analyzing business models, facilitating a holistic understanding of their components and interrelationships. Researchers highlight the importance of aligning business models with organizational goals, market dynamics, and technological trends to drive sustainable competitive advantage (Zott & Amit, 2010).

Business model innovation involves making significant changes to one or more components of a business model to create new sources of value, revenue, or competitive advantage. Chesbrough and Rosenbloom (2002) argue that business model innovation is as important, if not more so, than technological innovation in driving organizational success. Scholars explore various drivers and enablers of business model innovation, including technological disruptions, market shifts, regulatory changes, and shifts in consumer preferences (Foss & Saebi, 2017). They also examine different strategies and approaches for business model innovation, such as open innovation, co-creation, and design thinking (Teece, 2018).

The digitalization era has brought about profound changes in the way organizations operate and compete, with digital technologies reshaping entire industries and value chains. Researchers highlight the transformative impact of digital technologies such as cloud computing, big data analytics, artificial intelligence, the internet of things, and blockchain on business models (Gupta et al., 2020). They explore how organizations leverage digital technologies to create new value propositions, deliver products or services in innovative ways, and engage with customers in digital channels (Laudon & Laudon, 2016). Additionally, scholars examine the strategic implications of digitalization for organizational agility, scalability, cost-effectiveness, and competitive advantage (Bharadwaj et al., 2013).

Innovative business models based on cloud systems represent a convergence of cloud computing and business model innovation, enabling organizations to leverage cloud technologies to drive value creation and capture. Researchers investigate how organizations utilize cloud systems to create new revenue streams, deliver personalized experiences, and differentiate themselves in the marketplace (Berman et al., 2019). They explore the strategic implications of cloud-based business models for organizational agility, scalability, cost-effectiveness, and competitive advantage, as well as the challenges related to security, privacy, and regulatory compliance (Cusumano et al., 2019).

The concept of “cloud” is changing entire industries, redefining old and creating new ones. This will affect the core business of each company. As the concept creates an integrated relationship between business and technology, representing a key element of today’s business models (Tohanean et al., 2018).

Methodology

The research follows a mixed methods approach that integrates qualitative and quantitative techniques to triangulate data and increase the validity and reliability of the results. This approach enables a multidimensional investigation of the research topic, incorporating both subjective insights and empirical evidence. The qualitative method was used to gain in-depth insights into the complexity of cloud-based business models and their impact on organizational performance. Semi-structured interviews were conducted with key stakeholders, including executives, managers, and IT professionals from companies like SAP, Google, Deloitte or BMW, to explore their perceptions, experiences, and challenges related to cloud adoption and business model innovation. The

qualitative data obtained from interviews was analyzed thematically to identify patterns, themes, and recurring reasons, providing rich and nuanced insights into the research phenomenon. The quantitative method was employed to empirically examine the relationships between cloud systems, business model innovation, and organizational performance. Surveys were administered to a sample of organizations across industries (e.g. automotive, chemical, public sector), capturing quantitative data on various aspects of cloud adoption, business model innovation practices, and performance metrics.

In order to gather the needed information, the authors used various sources such as journals (e.g., International Journal of Cloud Computing, IEEE Transactions on Cloud Computing, Journal of the Knowledge Economy, Information Systems Research, Strategic Management Journal, Review of Financial Studies, Journal of Management Information Systems, Journal of Business Models), reports and books from the fields of management, IT and innovation, or corporate reports of cloud technologies (e.g. Deloitte, PwC) - through desk research. These sources were found both in electronic databases (e.g., Springer, Google Scholar, Amazon) and libraries (e.g., Central University Library “Carol I”, Goethe University Frankfurt Library, British Council Romania).

Cloud technology at a glance

Cloud computing describes on-demand access to IT resources via the Internet. These resources include applications, servers (physical and virtual), data storage, development tools, network functions, etc. The respective resources are hosted in a remote data center managed by a cloud service provider (or CSP). The CSP makes these resources available for a monthly subscription fee or charges for actual consumption.

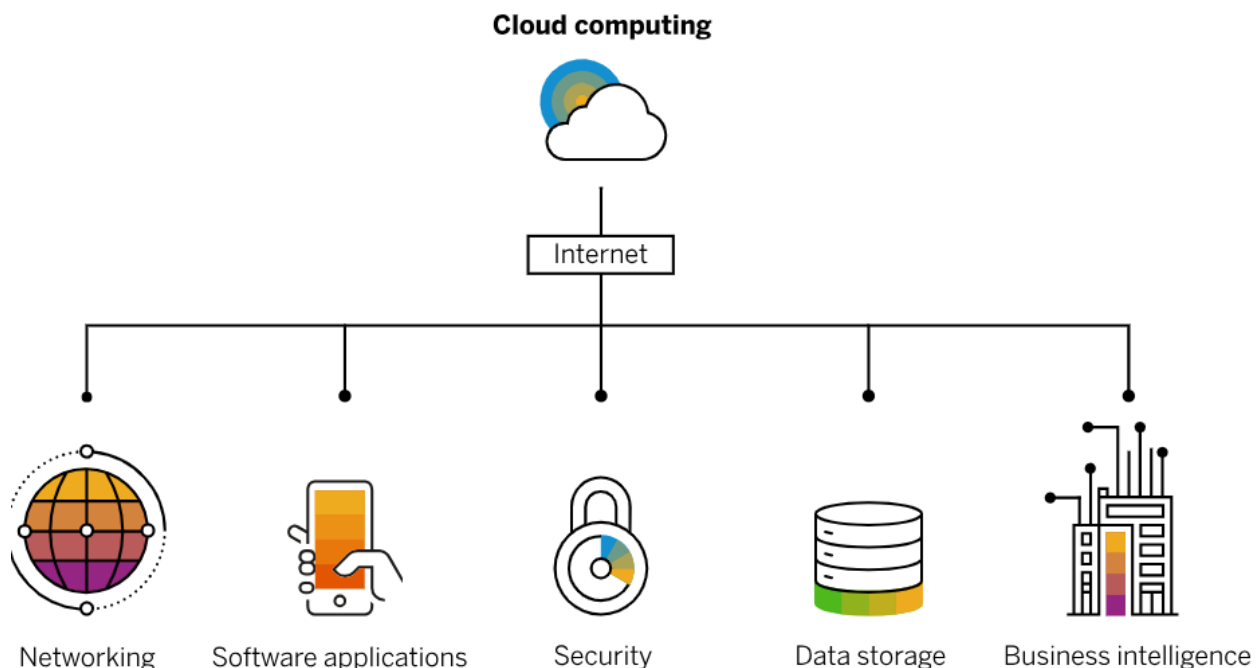


Figure 1. What is Cloud Technology?

Source: <https://www.sap.com/germany/products/technology-platform/what-is-cloud-computing.html>

Compared to traditional on-premise IT and depending on the cloud services chosen, cloud computing can help with:

- Reduce IT costs: the cloud allows to outsource some or even most of the cost and effort of purchasing, installing, configuring and managing the own on-premises infrastructure.
- Improve agility and time-to-value: using the cloud, the business can start using enterprise applications in minutes, rather than waiting weeks or months for IT to respond to a request, purchase and configure necessary hardware and software. In the cloud, certain users – especially developers and data scientists, have the ability to access software and support infrastructure themselves.
- Easier and more cost-effective scaling: the cloud offers elasticity, rather than purchasing additional capacity that sits idle during slow periods, one can scale capacity up and down according to traffic peaks and troughs. One can also leverage the cloud provider's global network to bring the applications closer to users around the world.

The term “cloud computing” also refers to the technology through which the cloud works. This includes a form of virtualized IT infrastructure – servers, operating system software, networks and other infrastructure that is abstracted with specialized software so that it can be pooled and shared regardless of physical hardware boundaries. For example, a single hardware server can be divided into multiple virtual servers.

Through virtualization, cloud providers can optimize their data center resources. It is no surprise that many companies have adopted the cloud deployment model for their local infrastructure to achieve maximum utilization and cost savings compared to traditional IT infrastructure, while also providing their users with the same self-service and agility.

Cloud systems typically offer three primary service models. IaaS (Infrastructure-as-a-Service), PaaS (Platform-as-a-Service) and SaaS (Software-as-a-Service) are the three most common models of cloud services and it is not uncommon for a company uses all three models:

- Infrastructure as a Service (IaaS): In this model, cloud providers offer virtualized computing resources over the internet, including virtual machines, storage, and networking infrastructure. Users can provision and manage these resources as needed, without having to invest in physical hardware.
- Platform as a Service (PaaS): Refers to a cloud service through which the provider provides a development environment and tools for developing new applications. PaaS as a service is therefore particularly useful for developers and software companies who want to quickly and easily create and publish new programs or apps without having to worry about the necessary infrastructure themselves.
- Software as a Service (SaaS): SaaS delivers software applications over the internet on a subscription basis, eliminating the need for users to install, manage, and maintain software locally. Common examples of SaaS applications include email services, customer relationship management (CRM) systems, and productivity suites.

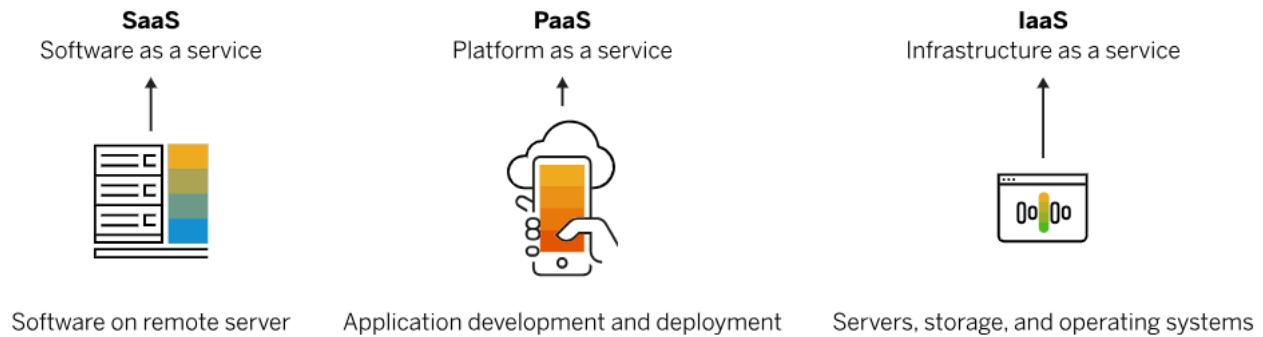


Figure 2. The three types of cloud computing services

Source: <https://www.sap.com/germany/products/technology-platform/what-is-cloud-computing.html>

The adoption of cloud computing has become increasingly prevalent in organizations worldwide, offering a range of deployment models to suit diverse needs and requirements:

- Public cloud computing involves the provision of computing resources and services over the internet by third-party providers to multiple users or organizations. Public clouds offer scalability, flexibility, and cost-effectiveness, making them an attractive option for organizations seeking to leverage external resources for their IT needs (Armbrust et al., 2010). Research indicates that public cloud adoption is associated with improved operational efficiency, reduced infrastructure costs, and increased agility, enabling organizations to innovate and respond quickly to market demands (Bhattacharya et al., 2018).
- Private cloud computing refers to cloud infrastructure and services that are dedicated exclusively to a single organization, either hosted on-premises or provided by a third-party vendor. Private clouds offer greater control, security, and customization options compared to public clouds, making them suitable for organizations with stringent regulatory requirements or sensitive data (Khan et al., 2017). Studies suggest that private cloud adoption can lead to enhanced data protection, improved compliance, and increased flexibility in resource allocation, driving organizational performance and innovation (Marston et al., 2011).
- Hybrid cloud computing combines private cloud infrastructures with public cloud services. In other words, companies use both their own data centers (private cloud) and external cloud providers (public cloud) for their IT needs. Hybrid clouds offer flexibility, scalability, and cost optimization, enabling organizations to dynamically allocate workloads between on-premises and cloud-based infrastructure (Buyya et al., 2015). Research indicates that hybrid cloud adoption is associated with improved resource utilization, enhanced disaster recovery capabilities, and increased innovation potential, supporting organizational performance and competitiveness (Armbrust et al., 2010).
- Multi-cloud computing refers to an IT model in which companies use several public cloud services from different providers simultaneously. Multi-cloud environments offer redundancy, resilience, and vendor diversification benefits, reducing dependency on a single provider and mitigating risks of service disruptions (Zhang et al., 2010). Studies suggest that multi-cloud adoption can enhance performance, reliability, and innovation by leveraging specialized services and optimizing costs across multiple providers (Botta et al., 2016).
- Hybrid multi-cloud computing combines private clouds located in its own data center with public cloud services from external providers such as AWS, Microsoft Azure or Google

Cloud Platform. Hybrid multi-cloud environments offer flexibility, scalability, and interoperability advantages, enabling organizations to optimize performance, mitigate risks, and leverage best-of-breed services from different providers (Nedelkoski et al., 2018). Research in this emerging area highlights the potential for enhanced agility, innovation, and competitive advantage through effective management of hybrid multi-cloud environments (Buyya et al., 2020).

How cloud shapes the business of the future

Cloud computing is reshaping the business landscape and driving transformative changes across industries.

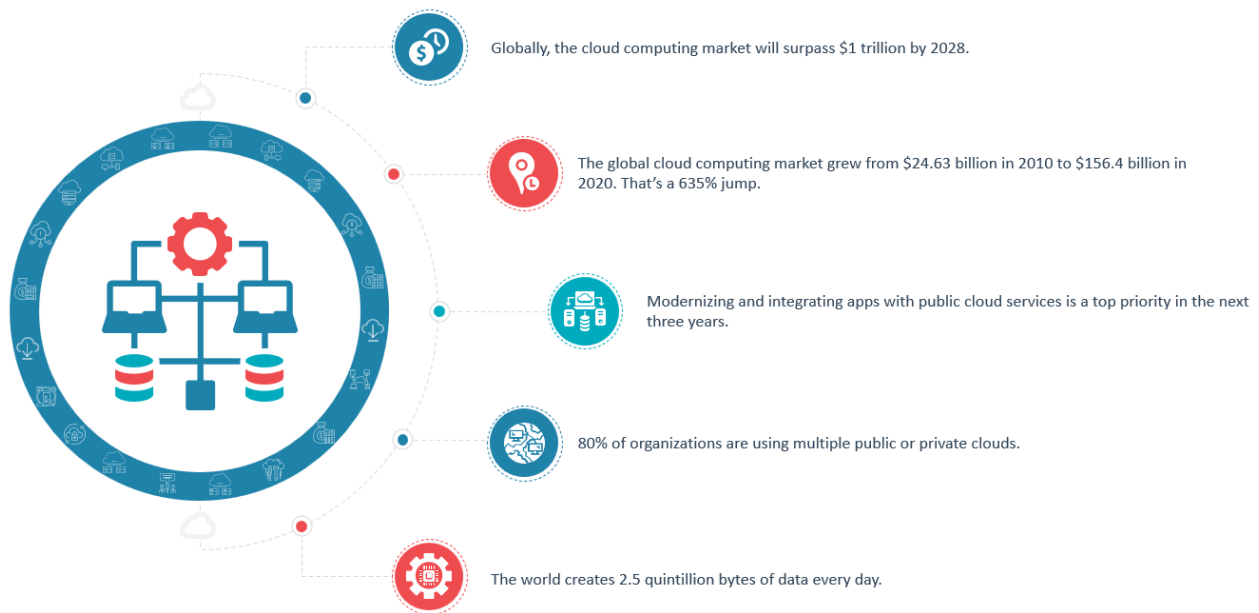


Figure 3. Top pics of how cloud shapes the business of the future

Source: Authors' own research.

Here's how the cloud shapes the business of the future:

- **Scalability and Flexibility:** cloud computing allows businesses to scale their IT resources up or down based on demand, providing unparalleled flexibility.
- **Cost Efficiency:** by shifting from traditional on-premises infrastructure to cloud-based solutions, businesses can reduce capital expenditures associated with hardware procurement, maintenance, and upgrades. Cloud services operate on a pay-as-you-go model, allowing organizations to optimize costs by paying only for the resources they consume.
- **Global Reach and Accessibility:** the cloud eliminates geographical barriers, enabling businesses to reach customers and employees worldwide.
- **Innovation Acceleration:** cloud technologies enable companies to accelerate innovation processes (faster deployment and development, scalability and flexibility, access to new technologies (AI, ML, Big Data, etc.), willingness to experiment and fault tolerance). Cloud offers several factors that drive this innovation push.
- **Agility and Speed to Market:** cloud-native development practices, such as DevOps and continuous integration/continuous deployment (CI/CD), enable businesses to deliver software applications and updates faster and more efficiently.

- **Data-Driven Decision Making:** The cloud enables companies to use the huge amounts of data that can be stored and processed in the cloud to make even more informed decisions.
- **Business Continuity and Disaster Recovery:** ensure that the company can continue to operate even in the event of disruptions or failures. The focus is on maintaining critical business processes and restoring IT systems and data.

Large cloud service providers such as Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), and others serve millions of customers, including small businesses, startups, large enterprises, government agencies, and nonprofits. In addition, there are numerous smaller cloud service providers that serve specific industries or niche markets.

While it's challenging to provide an exact number of companies using cloud computing due to the dynamic nature of the industry and varying definitions of cloud adoption, surveys, reports, and market analyses consistently indicate widespread adoption and increasing reliance on cloud technologies.

For example, according to IDC's Worldwide Public Cloud Services Spending Guide, worldwide spending on public cloud services and infrastructure is projected to reach over \$500 billion by 2023, reflecting the significant scale of cloud adoption across industries.

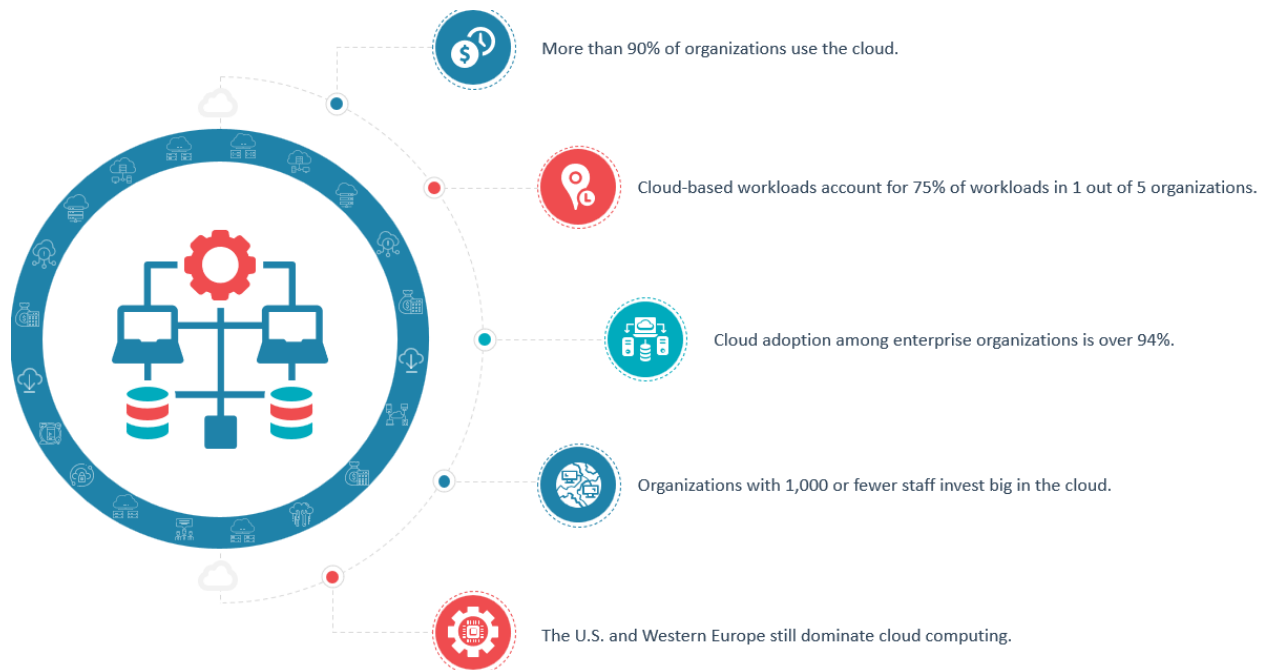


Figure 4. How many companies use cloud computing?

Source: Authors' own research.

In the context of digital transformation and innovation of business models, cloud computing represents a fundamental change in the way companies use IT resources and operate business processes. It offers companies a variety of opportunities to improve their agility, scalability and efficiency, develop new products and services and enter new markets (Toma et al., 2014). As organizations continue to embrace the cloud, its transformative impact on the business world will continue to grow.

Conclusion

As digital transformation continues, cloud systems are proving to be a transformative force that can fundamentally improve business performance through innovative business models. This conclusion is based on extensive research that highlights the diverse benefits of cloud technologies for companies across all industries.

Cloud systems act as catalysts of digital transformation by enabling companies to modernize their IT infrastructure, optimize business processes, and create outstanding customer experiences. The scalability and flexibility of cloud platforms enable companies to respond quickly to changing market conditions, seize new business opportunities, and remain competitive in the dynamic digital economic environment.

Cloud technologies promote agility, scalability, and cost efficiency in companies. By using cloud-based services, companies can flexibly scale their IT resources to meet the fluctuating needs of business operations. This leads to a reduction in IT costs and enables companies to focus on strategic initiatives that drive business success.

Cloud systems provide companies with access to a wealth of data and powerful analytics tools that enable data-driven decision-making. By analyzing customer data, market trends, and internal business processes, companies can make informed decisions that increase efficiency, develop new products and services, and strengthen their competitive position.

Integrating cloud systems with innovative business models opens up new opportunities for companies to create value and increase revenue. By leveraging digital platforms, ecosystems, and collaborative partnerships, companies can drive innovation, develop disruptive business models, and enter new market segments.

To realize the full benefits of cloud systems, strategic implementation is essential. Companies should align technology investments with their business objectives, foster a culture of innovation and experimentation, and use agile methodologies to adapt to evolving market trends and customer needs.

In summary, cloud systems have a transformative impact on improving business performance through innovative business models in the age of digitalization. By strategically leveraging cloud technologies and fostering a culture of innovation, companies can successfully position themselves in an increasingly digital and competitive landscape.

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