
Research article

The Role of Cloud Computing in the Growth of the Digital Economy in the Kingdom of Saudi Arabia

Elfatih Mohamed Osman Mukhtar

Department of Economics, college of Business & Economics - Qassim University, Qassim, Kingdom of Saudi Arabia; e.mukhtar@qu.edu.sa

Abstract: This study intended to address the role of cloud computing in the growth of the digital economy in the Kingdom of Saudi Arabia. It reviewed previous studies that dealt with cloud computing, pointing out the concept of cloud computing and its characteristics, the types of cloud computing and its benefits, and study the basic components of the application of cloud computing and its risks. The study also discussed the reality of cloud computing in Saudi Arabia, and its role in the growth of the digital economy in the Kingdom of Saudi Arabia, using the deductive approach and the descriptive approach. The study revealed numerous results, the most important of which is that the contribution of cloud computing to the growth of the digital economy appeared in many sectors and fields. For example, in the tourism sector, when the electronic tourist visa was launched in 2019, where more than 440,000 tourist visas were issued until March 2020 to approximately 50 countries, making the tourism sector in the Kingdom the fastest growing in the world by registering a growth of 14%, and its contribution to the Saudi economy reached 9.5%. The results also showed that the Korona pandemic contributed to increasing the pace of trend towards digital transformation, as cloud computing became an essential enabler of access to a range of educational, health, religious and security services, which made it play an important and great role in the growth of e-government and the digital economy in the Kingdom of Saudi Arabia.

Keywords: Cloud computing, Digital economy, Saudi Arabia

APA Citation: Mukhtar, E.M.O. (2025). The Role of Cloud Computing in the Growth of the Digital Economy in the Kingdom of Saudi Arabia. *Journal of Business and Environmental Sciences*, 4(2), 1-20.

Introduction:

Today, the digital economy is considered as one of the most important economic resources in the world that contributes to the production of value added. It has contributed highly to changing traditional global economic concepts about defining economic resources and how to use them in light of the existing economic and social challenges.

Globally, the digital economy is no longer the most important economic resource, but it will increase

Received: 29 August 2024; **Revised:** 15 October 2024; **Accepted:** 22 October 2024; **Online:** 12 November 2024

The Scientific Association for Studies and Applied Research (SASAR)

<https://jcese.journals.ekb.eg/>



Copyright: © 2025 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license.

in importance in the near future. It is unlike traditional economic resources that are sometimes characterized by scarcity, such as gold, oil, water, and agriculture. However, the digital economy depends on quality of human knowledge and the provision of technologies such as servers and applications. Software and storage applications via computers or any other devices via the Internet, which are considered the source and focus of the current information and technology revolution.

Based on previous studies indicate that the return from adopting the digital economy will not only stop at addressing the current pressing challenges and problems, such as depleting natural resources, creating new jobs, and others, but it will contribute to improving the ability to achieve sustainable development goals and will also accelerate economic growth. The impact of the digital economy on economic growth, according to some studies and experiments, it is estimated to be five times higher compared to other traditional methods, which makes it the most important accelerator of economic growth available today in the world. (Arab League Report, 2020: p12-14).

Recent years have witnessed an increase in investment in technological equipment as a result of steady technological developments. Consequently, the costs of expanding the establishment, operation, maintenance and modernization of data centers have become high, which has led to governments moving to focus on managing their resources efficiently and adopting cloud technology that allows them to expand with great flexibility and little expenses. Achieving better results with less effort, making electronic services available to beneficiaries faster, in addition to developing skills, providing an appropriate environment for innovation, and enhancing the growth of the digital economy. (United Nations Report, 2020:p 5).

Cloud computing plays a pivotal role in building the digital economy and helps create a better digital system for the benefit of companies and beneficiaries. It is also an essential driver for a range of new technical services and solutions, including artificial intelligence, block chain, encryption, augmented or virtual reality, and others. (Report of the Saudi Communications, Space and Technology Commission).

The economy of the Kingdom of Saudi Arabia is witnessing increasing diversification and a great demand for digital transformation, which is one of the basic pillars of achieving the Kingdom's Vision 2030. (, 2022,Annual Report, Al.'ard Al Motqan Company:p 16).

This was demonstrated by the launch of the ICT sector strategy for the year 2019, which seeks to develop technical fields in the Kingdom, as it launched the "Cloud Computing First Policy" in February 2019, which aims to accelerate the pace of transition of government and semi-governmental agencies from traditional information technology solutions to cloud computing solutions. (Bibi, Walid, Tamrabat, Zainab, Taqrart, Yazid, 2022:p 370). The Kingdom serves as a role model for implementing advanced digital technologies that enhance the economy's ability to diversify, improve the pillars of the internal innovation environment, and build a prosperous digital economy by investing in cloud computing services that help in the growth of technical investment opportunities and enhance the culture of innovation and entrepreneurship.

Research problem:

Many developed and developing countries, including the Kingdom of Saudi Arabia, have become aware of the importance of cloud computing in enhancing e-government and achieving integration in the provision of services in government departments, through their knowledge that the tremendous growth in the volume of data and information limits the ability of organizations, whether governmental or private, to manage this. data and information, and control them effectively, As storage costs continue

to rise, this makes these organizations face problems in retrieving data and preparing backup copies, as administrative information technology requires large costs, in addition to hardware and software costs, so the Kingdom included the shift to cloud computing within Vision 2030 to meet these challenges.

The research problem can be formulated in the following question:

Can switching to cloud computing help organizations solve the problems they face and contribute to the growth of the digital economy in the Kingdom of Saudi Arabia?

Research Objectives:

In light of the research problem, the researcher seeks to achieve the following objectives:

- Study and explain the concept of cloud computing and its characteristics.
- Explain the types of cloud computing.
- Discussing the reality of cloud computing in Saudi Arabia.
- Study and analyse the role of cloud computing in the growth of the digital economy in the Kingdom of Saudi Arabia.

Hypothesis of research:

1. The transition to a cloud computing economy in the Kingdom of Saudi Arabia faces many challenges, which include attracting international companies specialized in cloud computing and cooperating in accelerating the adoption of the concept of cloud computing within organizations because this technology has not received much exploitation and attention despite its many features and benefits. As well as work to take advantage of the opportunities available for this technology.
2. Cloud computing plays an important role in the growth of the digital economy in the Kingdom of Saudi Arabia.
3. Cloud computing technologies help solve many problems for Saudi organizations, especially those related to high expenses and information and data management, which helps them achieve profits, avoid losses, and continue in the market and grow.

The Research Methodology:

This research relies on the deductive approach, with the aim of studying and deducing the role of cloud computing in keeping pace with technological developments and accessing data at any time and in any place, and its role in reducing expenses and improving the performance of organizations from previous studies that dealt with this field. It also relies on the descriptive approach by describing computing concepts. The cloud as an important pillar of the cloud economy, and addressing the reality of cloud computing in Saudi Arabia and analysing the role of cloud computing in the growth of the digital economy in the Kingdom of Saudi Arabia. It also relies on the analytical approach through analysing data and digital indicators issued by the competent authorities related to cloud computing in Saudi Arabia.

The review of literature:

The study conducted by Katherine Kinkela, which was conducted in 2015, indicated that the development of technology that allowed data to be stored outside the computer extended to the use of an electronic cloud through which data can be stored and managed outside the facility, in the same manner as outsourcing. The impact even extends to owning computing. The cloud provides tremendous efficiencies and advantages through which costs can be reduced, in addition to immediate access to many programs, and the use of cloud-based applications in confirming audit process

procedures, paying invoices, managing customer relationships, preparing financial statements, paying wages and salaries, and calculating value-added tax on goods. Sold. (Badawi, Muhammad, 2022: P21). The study conducted by Shenawa and others in 2019 emphasized the role of cloud accounting in keeping pace with modern changes and facilitating access to data and information at any time and from any place and its role in reducing computational errors and reducing the degree of risks faced by accounting data and information in economic units in addition to reducing The costs are a result of the lack of a great need for specialized cadres of accountants and bearing the costs of their wages and training.

The study conducted by Al-Basiouni in 2021 also confirmed the many advantages provided by the trend towards using cloud computing, such as reducing costs, saving effort and time in managing technology, easy access to data, and ensuring that services work permanently.

The 2019 Al-Awamra study examined the impact of cloud computing on infrastructure costs in telecommunications companies, and its results indicate the major role that cloud computing plays in reducing the infrastructure costs of information systems in telecommunications companies. It also emphasized the importance of expanding the application of cloud computing due to its distinctive features. Reducing the costs of the facilities you rely on for operation.

As for the Ozdemir & Elitas study, it investigated the risks of applying cloud computing in the field of accounting. It was conducted on a number of Turkish companies. The study emphasized the necessity of taking all necessary control measures when applying cloud computing to accounting data and information so that this information is not exposed to loss or leakage to the public. Other users, and this matter requires the availability of a technological infrastructure to maintain the privacy and confidentiality of companies' accounting information. The study also emphasized the importance of practical training for those responsible for storing and dealing with this accounting information through cloud computing.

By reviewing previous studies, the researcher draws the following important results:

1. Cloud computing is considered one of the modern technological means that provide many information services via the internet as a result of the steady increase in the volume of information and the high costs of storing and managing it. This indicates that cloud computing has enormous efficiencies and features that help reduce costs, provide immediate access to many programs and provide many services for the public and private sectors.
2. Cloud computing helps improve the operational performance of organizations, monitor costs, reduce computational errors, and reduce the degree of risks faced by accounting data and information in economic units. This indicates that this technology or phenomenon called cloud computing removes barriers to scientific and creative work and unleashes various creativity. Capable of enriching the global scientific heritage and the accumulation of science and knowledge, and thus contributing to the growth of the knowledge economy and the information society.

The Concept of Cloud Computing:

Cloud computing is a concept that the world is now turning to due to its many great advantages. This concept can be summarized in a model to enable the network user to access the network from everywhere and at any time easily and when there is a need for a set of configurable computing resources (such as networks and servers). and storage, applications and services) that can be provisioned and delivered quickly with minimal administrative effort or intervention on the part of the service supplier (ITU Report, 2021: 7).

The US National Institute of Standards and Technology defines cloud computing as “a model for enabling access to data over the Internet from anywhere on demand through a shared set of configurable computing resources (such as networks, servers, storage, applications, and services) that can be quickly provisioned and released with Minimal management effort or service provider interaction” (Rizq, Sameh, 2022: 111).

Cloud computing is also defined as "services provided to users over the Internet, such as computing operations and storing data and programs through servers located in remote locations." In addition to the possibility of eliminating the space needed to establish IT Data Canters and local servers, this technology provides easy access to virtual computing equipment and stores huge amounts of data that are ready for use in decision-making. (Makki, Imad, 2022: 11).

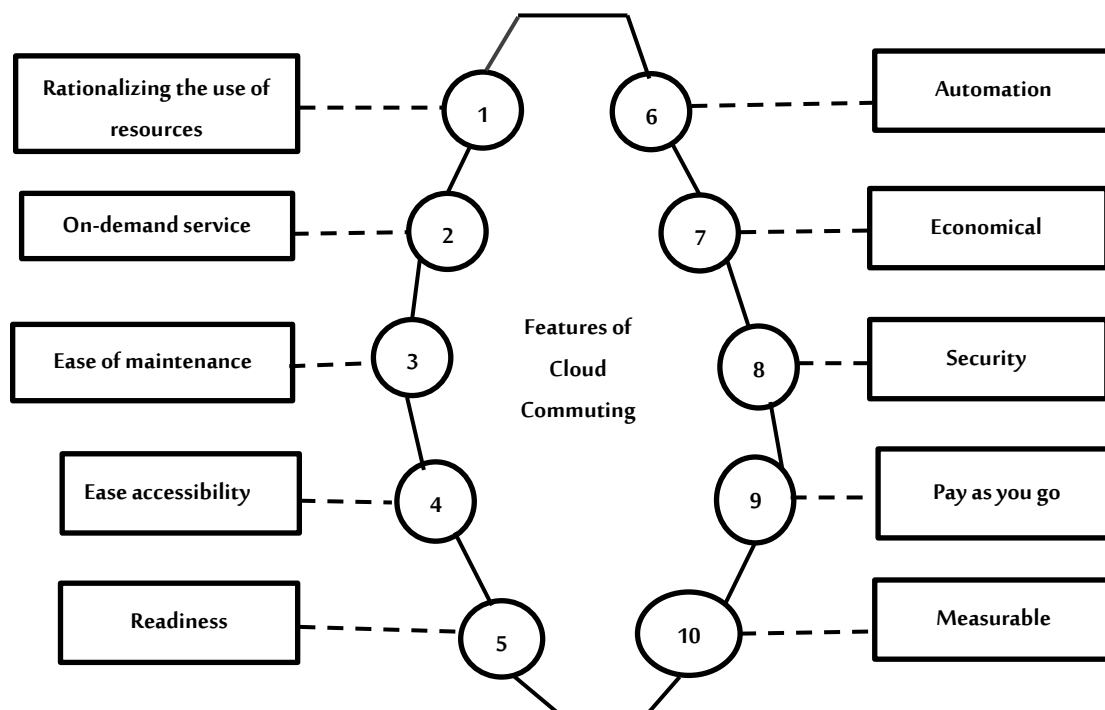
From the above, cloud computing can be defined as:

“A service technology that is provided to governments, companies, and individuals that allows them to work over the Internet, and relies on transferring services such as data storage and software from private computers to large servers and storage units called (the cloud), and they are accessed over the Internet in real time with minimal management efforts or interaction.” Service providers, in addition to providing analysis tools, software, and technologies that can be dealt with and used immediately, thus reducing reliance on personal computers versus reliance on servers.”

Features of Cloud Computing:

Cloud computing technology has many characteristics and features that make it widespread in many fields, as shown in Figure (1). (Flair Data, 2021).

Figure 1: Features of cloud computing technology



***Rationalizing the use of resources:** That is, the cloud computing service provider uses computing tools to provide them to a large number of customers instead of each customer having his own tools.

* **On-demand service:** This is a feature that allows the user to know the storage capacity of the cloud space and the availability of computing operations, continuously and easily, without the need to contact service providers.

- * **Ease of maintenance:** that the servers can be easily maintained which ensures the continuity of service and that it is not subject to emergency stops or unexpected malfunctions.
- * **Flexible access to the service:** The user can download data from any device connected to the internet, anywhere in the world.
- * **Readiness:** That is, the service is always available, and the user can increase the storage capacity at any time he wants when he needs to store a larger amount of data.
- * **Automation:** Automatic System, where the cloud computing system performs analyzes automatically, and supports the ability to measure at a specific level of services, and thus it is possible to monitor the rate of use and control its percentage, and provide a report about it with transparency and accuracy to both the host company or the customer.
- * **Economical:** The cloud computing project is considered a profitable project that only needs to invest a specific amount to purchase services for one time, without monthly or annual operating costs. The services are then provided to many users.
- * **Security:** Security is considered one of the best features that distinguishes cloud computing technology. Even if one of the servers is damaged, the data is not damaged and can be easily retrieved. Data storage devices are also difficult to penetrate by hackers.
- * **Pay as you go:** The user only pays the service fee or storage capacity he needs without paying additional fees, and in many cases the user is given free storage capacity.
- * **Measurability:** Measured Service The user can view his level of consumption of the service by obtaining a detailed report from the service provider that includes details of usage and cost.

Types of Cloud Computing:

Cloud computing technology has evolved to include today several models of services and several types of clouds. Cloud computing models fall into three types: (United Nations report, ESCWA: 2014: P38).

Platforms as a Service:

The cloud provides the user with a platform to develop applications based on programming languages and other tools hosted in the cloud.

Software as a Service:

This service enables the user to benefit from certain software hosted in the cloud via widespread devices such as a computer or mobile phone and via approved user interfaces such as an Internet browser.

Infrastructure as a Service:

Enables the user to use equipment such as servers, data centers, networks, and other materials. As for clouds, they are also of different types, and these types are represented in four types: (id4 arab.com/2021/11/cloud-computig.html)

1. Public Cloud Computing

This model expresses cloud computing from a traditional perspective, where resources are provided on a self-service basis over the Internet, through web applications and their various services, through a third party remote from the site, which collects invoices and expenses based on service computing. This type is available to general users, such as e-mail via the Internet, or storage space, and this is what companies such as Google provide.

2. Private Cloud Computing

It is established within the institution or organization to impose its control over data management and operations without network service offering restrictions, and to control security issues and legal requirements that result from the use of public cloud computing services, and users' access to and use of the cloud is restricted and specified. That is, it is a private cloud used by a specific entity, such as one company or one government institution.

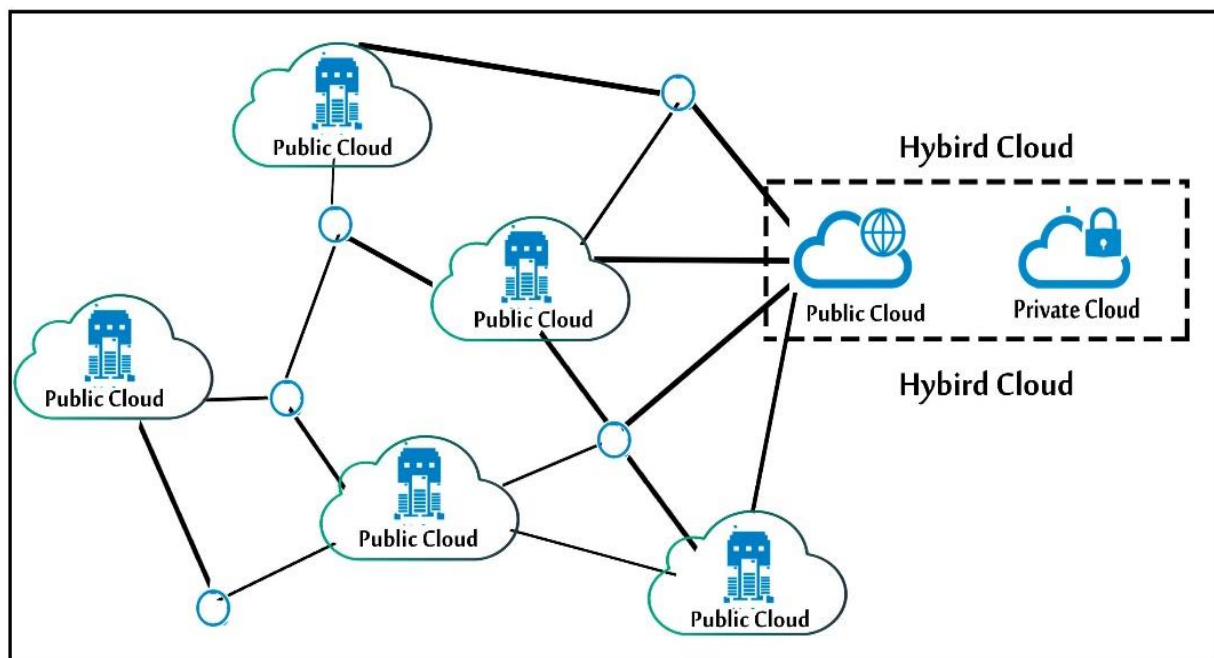
3. Community Cloud Computing

The community cloud computing model is managed and controlled by a group of organizations, where it is possible to create a shared cloud for a group of companies or institutions that have the same requirements, so they share the infrastructure with the aim of achieving common interests and benefits.

4. Hybrid Cloud Computing

It is a combination of public and private cloud computing. In this model, users use public cloud computing services to process information and non-critical work. Information and data are saved using private cloud computing, and the host infrastructure is a mixture between the cloud host and servers dedicated to management.

Figure No. (2) shows the types of cloud computing



Source: (Barrie Sosinsky, 2011, p. 28)

The Reality of Cloud Computing in Saudi Arabia:

Cabinet Resolution No. (81) dated 03/19/1430 was issued approving controls for the use of computers and information networks in government agencies, which relate to information security, dealing with official documents and information, controls for the use of information resources, and controls for computer projects, information networks, and training. In the year 1437, the Communications and Information Technology Commission requested public opinions on regulating the use of cloud computing in the Kingdom of Saudi Arabia.

In the year 1439, the first version of the regulatory framework for using and providing Saudi computing services in the Kingdom of Saudi Arabia was issued. The Communications and Information Technology Commission issued the regulatory framework for cloud computing in the Kingdom, after

studying and evaluating international experiences. The framework included obligations and rights for both cloud computing service providers and users. Individuals, government and private sectors, and the Authority indicated that the regulatory framework for cloud computing will enter into force after (30) days from the date of 05/20/1439 corresponding to 02/06/2018. (Al-Shaddadi, 2018: 10).

Based on the ICT sector strategy for 2019 and its endeavor to develop technical fields in the Kingdom, it launched the “Cloud Computing First Policy” in February 2019, which aims to accelerate the pace of transition of government and semi-governmental agencies from traditional IT solutions to cloud computing solutions, and it is one of the basic pillars of supporting And leading the digital transformation in the Kingdom.

Cloud computing is considered one of the most important emerging technologies in the communications and information technology sector, and due to the importance of cooperation in accelerating the adoption of the concept of cloud computing within public and private sector organizations in the Kingdom of Saudi Arabia, the Saudi Cloud Computing Association was established in 2019 by a group of specialists, and it is a non-governmental association. It is a profitable company authorized by the Ministry of Human Resources and Social Development under No. 1543 and under the supervision of the Ministry of Communications and Information Technology, as it seeks to help companies of all kinds transform to be regional or global by enabling them to exploit modern technology in their field of business, and enabling organizations to make optimal use of technology. (Cloud Computing Report, 2019: 14).

Some organizations and companies registered with the Communications and Information Technology Commission that provide cloud computing services can be mentioned, including:

* **Sahari Network Company Limited:** It is a Saudi company that provides information and communications technology solutions in Saudi Arabia. It is the leading company in the field of communications and information technology in the Saudi market. The company has developed since 1989 to provide connectivity and communication solutions, electronic security, and cloud computing (<https://sahara.com/ar>).

* **Etihad Etisalat Company (Mobily):** Etihad Etisalat Company is considered a joint-stock company after winning the second mobile phone license in Saudi Arabia with a capital of five billion Saudi riyals, in which the UAE side, represented by the Emirates Telecommunications Corporation, participates with 27%, 11% for social insurance, and the rest for general shareholders.

The company provides cloud services for all types of companies, high performance, and cloud computing platform at the enterprise level. It also provides micro-virtual server technology. This service helps increase operational efficiency and return on investment and provides greater financial flexibility through the consumption billing model. Mobily provides pioneering integrated services. (<https://www.mobily.com.sa>).

* **Tamkeen Technologies Company:** It is a Saudi government company with a clear and ambitious vision to be the first choice for the government sector in information technology. Tamkeen was established to serve the Ministry of Labor and its sister institutions, and to be its technical arm in this field by providing high-value and innovative technical and information solutions in the government sector. Also specialized in cloud computing and electronic services development (<https://sp.tamkeentech.sa>).

***Saudi Mobile Telecommunications Company or Zain Telecommunications (Zain):** It is the Saudi Mobile Telecommunications Company or Zain Saudi Arabia, the third mobile telecommunications company in Saudi Arabia. After nine years of successive losses, Zain was able to achieve its first profits

since its founding at the end of the first quarter of 2017, with a net profit of about 45 million riyals, and Zain Saudi Arabia announced the launch of “Zain Cloud” dedicated to the business sector, small and medium companies, the entrepreneurship system, and government sectors, in partnership with (Ali Baba Cloud), one of the largest global companies in the field of cloud computing. This cloud has contributed to enhancing local cloud solutions and continuing In providing customers from various sectors with innovative solutions in the field of communications, comprehensive services and cloud computing (<https://sa-zain.com>).

***Oracle Saudi Arabia:** Oracle Saudi Arabia launched the Oracle cloud computing data center, in order to assist in the digital and technological transformation in the Arab region, especially in Saudi Arabia, which is considered the most influential and important market in the region due to its strategic importance in the world and technology market. This center is for the company Oracle is considered one of the 20 most important centers or companies around the world that provide these services in order to help provide job opportunities and eliminate unemployment, and at the same time enhance the state’s efforts in instilling a culture of technical innovation, which the Kingdom of Saudi Arabia is working on within Vision 2030, as it is the largest and most important. Information technology companies in general, and databases in particular (<https://mofeed.com>).

***Saudi Telecom Company (STC):** The Saudi Telecom Company is considered the leading national company in providing integrated telecommunications services in Saudi Arabia. The founding of the Saudi Telecom Company dates back to 1998, and this company was the only company providing telecommunications services in Saudi Arabia, but in 2004 This company lost its monopoly on mobile phone services in the Kingdom of Saudi Arabia after granting a second license to practice telecommunications business to Etihad Etisalat Mobily in April 2007. There is a group of services provided by the Saudi Telecom Company, and these services are represented in: (Al-Fifi, Yahya, undated: 20).

1/ Software services.

2/ Ready cloud computing packages,

3/ Support services for cloud services.

4/ Infrastructure services.

***SAP Company:** It is a company that provides services for implementing contracts for the preparation, development, modernization, integration, installation, maintenance, and operation of systems and software, and helps partners and customers benefit from the latest cloud solutions, databases, mobility technical solutions, analytics, and applications. It aims to enhance the Kingdom's adoption of innovations based on cloud technologies, such as artificial intelligence, learning machines, and the Internet of Things, as part of its investment plan in the Kingdom, which amounts to 76 million US dollars. (Report of the Ministry of Investment, 2021: 23).

In light of the Corona pandemic, cloud computing technologies have contributed to providing many services, such as telemedicine services, as the Ministry of Health developed the (Seha) application to provide innovative and sustainable solutions that enable individuals to receive health care from their homes, through medical consultations via text, voice, and video conversations provided by Specialized doctors certified by the Ministry of Health, and the application uses artificial intelligence techniques to provide safe medical information automatically by asking a set of questions about disease symptoms. In addition to providing health tips to maintain health. The Ministry of Health also launched a website (Covid 19 Prevention) to raise awareness about the new coronavirus disease. The site provides information about the virus, its symptoms and ways to communicate if symptoms appear. The site also

provides information on how to prevent the disease. The site includes videos, awareness guides, and links to health applications. Dr. Sulaiman Al Habib Medical Group launched the (Al Habib Life Care) service, which allows the patient to communicate with the doctor remotely to obtain medical advice via video technology.

This service was added to the group's services mobile application, which is available on devices running Android or iOS. This service comes within the framework of national efforts aimed at limiting the spread of the new Corona virus. (Report of the Saudi Data and Artificial Intelligence Authority (SDAIA), 2022: 27-25).

Cloud computing technologies were also used in light of the pandemic to benefit from educational services, as the trend was towards distance education, which represented a qualitative shift that achieved for students the perfect completion of their educational journey during the Corona crisis. Immediately, the Saudi Ministry of Education launched a large group of distinguished educational platforms such as (Madrasati) platform, the (Ain) channel for general education, and (Blackboard) for higher education at the university level. The Ministry of Education has also prepared a set of integrated practical training courses to enable all teachers, faculty members, students and parents to make the ideal use of distance education technologies and thus benefit from them in a way. Integrated.

This successful digital transformation encouraged various types of public, private and international schools and universities to do the same, as schools, universities and institutes witnessed great development in this aspect. The Organization for Economic Cooperation and Development (OECD) conducted a study on distance education in the Kingdom in cooperation with Harvard University, and it showed This study examined the extent of the Kingdom's great success in this aspect, through: (<https://www.rowad-alkhaleej.edu.sa>),

- The Kingdom's development in 13 out of 16 indicators on the level of readiness.
- The organization praised the integrated strategy that was developed to achieve inclusion in distance education in the Kingdom.
- Praise the support that teachers receive from government and private agencies in the Kingdom to overcome the obstacles they face towards the ideal use of distance education.

The language of numbers confirms that the efforts made in this direction deserve great praise for the following reasons:

- * The "Madrasati" platform witnessed 92% of the Kingdom's male and female students entering the educational platform during the pandemic in 2020.
- * 97% of male and female teachers and 37% of parents entered.
- * Training more than 389,000 male and female trainees in educational jobs on the platform.

In fact, we must point out that all these numbers would not have been achieved without the presence of a sustainable investment policy in the digital infrastructure in the Kingdom, and we must also praise the amazing cooperation on the part of governmental and private educational leaders and parents on the other hand, as these efforts demonstrated the relentless pursuit towards... Developing distance education methods in the Kingdom in order to help students develop their technical capabilities and abilities in a manner consistent with the progress needs required by "Vision 2030".

Cloud computing technologies have allowed Saudi banks to access customer management or customer relationship management and enterprise resource planning software applications designed to improve relationships with customers. It has also helped banks increase speed and flexibility and save infrastructure and information technology costs.

The Ministry of Hajj and Umrah also benefited from cloud computing technologies to serve pilgrims

and Umrah pilgrims, as it launched the (Nusk) application to enable those wishing to perform Umrah and visit to request the issuance of permits to enter the Two Holy Mosques to perform Umrah, visit and prayers according to the capacity approved by the concerned authorities to ensure the provision of a spiritual and safe atmosphere that fulfills the procedures. Precautionary and regulatory controls are integrated with the (Tawakkalna) application to verify the health status of the permit applicant.

From the above, it is clear that the Corona pandemic has contributed to accelerating the pace of the trend towards digital transformation, as cloud computing has become an essential enabler for a group of new technical services and solutions (emerging and advanced), including artificial intelligence, block chain, encryption, and augmented reality (Virtual reality), and other wireless services and technical devices.

Therefore, it can be said from the above that cloud computing played a pivotal role in building and growing the new digital economy in the Kingdom.

The role of cloud computing in the growth of the digital economy in the Kingdom of Saudi Arabia:

The government of the Kingdom of Saudi Arabia took the initiative to launch the digital transformation program, as one of the basic programs to achieve the Kingdom's Vision 2030, with the aim of building a digital government and a digital economy with an industry built on the Fourth Industrial Revolution, and a digital society to create a busy and prosperous environment and a better future for the Kingdom. Through the digital transformation program, the Kingdom supported the spirit of creativity and entrepreneurship in Saudi society, in order to reach the desired digital society in addition to developing public services (Muhammad, Abdul Rahman, Al-Ghobairi, Muhammad, 2020:P 9).

The Kingdom's Vision 2030 seeks to diversify sources of income and stimulate investment and marketing investment opportunities in an effort to economic diversification. The National Transformation Program, as one of the executive programs of the vision, works to develop the digital economy under the leadership of the Ministry of Communications and Information Technology and by working with an integrated system that includes the public and private sectors. The program's initiatives have succeeded in advancing the Kingdom. In the field of communications and information technology, the communications infrastructure in the Kingdom has become one of the best in the world, making it the focus of global digital investments from the largest local, regional and international companies such as Google, Alibaba and Oracle. In May 2022, the Saudi Telecom Company (STC) signed a partnership agreement with (Alibaba Cloud), a subsidiary of the Alibaba Group, and the two companies, "EWTPA Arabia" for Technical Innovation Limited, and the Saudi Information Technology Company, to establish a limited liability company specializing in the field of cloud computing, with a capital of 894. One million riyals, equivalent to \$238.4 million, to develop high-speed cloud computing services, which is in line with the growth and increasing demand for public cloud computing services and products.

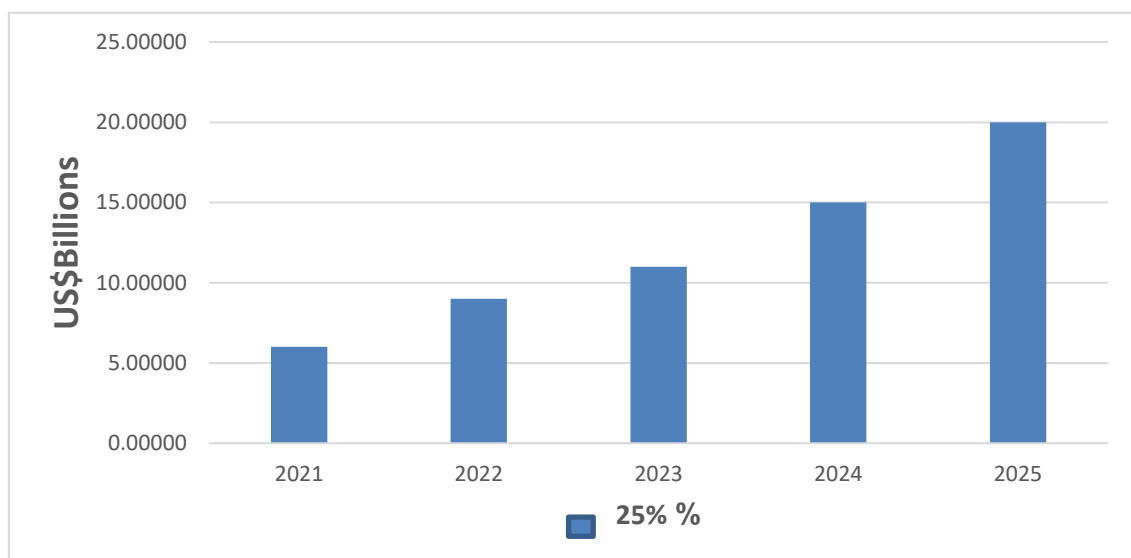
In the same context, the Tourism Development Fund announced the installation of cloud infrastructure applications in cooperation with the American company Oracle, which is considered one of the largest and most important technology companies, in order to support its goals of developing the tourism sector and enabling investors to benefit from the promising opportunities in the sector.

In a qualitative partnership between Saudi Aramco and Google to provide cloud services, Aramco, a subsidiary of the Saudi Arabian Oil Company, announced a partnership with Google, which has world-class performance and speed for institutional clients in the Kingdom of Saudi Arabia. This partnership to provide cloud services to companies and organizations throughout the Kingdom helps them

maximize their presence in the market while providing digital products and services faster and more reliably. This cooperation covers a large portion of the growing demand for cloud services in the Kingdom. As market opportunities are expected to reach about \$10 billion by 2030, and with the increasing reliance on internet services during the emerging Corona virus pandemic (Covid-19), the pace of transformation towards digital solutions has doubled, and the deployment of Google cloud services (Google Cloud) will and infrastructure in the Kingdom, providing robust, reliable and high-quality solutions to meet the growing demand for IT and cloud services. (Aramco.com/ar/news-media/news/2020).

There is no doubt that cloud computing services solutions, which help organizations and governments rationalize expenses, and also help save time and effort for workers and all government sectors. They also help save time and effort for workers and all government or private sectors, have achieved a high growth rate in the Kingdom, and this indicates In addition, the size of the cloud computing market in 2021 exceeded “6” billion Saudi riyals, with a 25% cumulative growth rate until 2024, according to the expectations of the International Data Corporation (IDC), and it is expected that the market will reach a maturity stage with the beginning of 2025 to more than 19 One billion Saudi riyals. (Cloud Computing Report: 20).

Figure (3) The Market Volume of the Clouding Computing



The data and cloud computing market are expected to grow by 3.5 times in the period from 2018 - 2025. It is one of the fastest growing sectors in information technology services, and contributes significantly to the growth of the market as a whole. Cloud computing for the public sector is also expected to enhance the growth of the sector and the broader information technology services market at a rate A compound annual growth rate of about 27.6% due to the continued trend towards cloud computing. The public sector cloud computing sector is expected to represent more than 60% of the market in 2025. The private sector cloud computing sector is expected to expand at a compound annual rate of 27.3% in the same period. (Report of the Arab Internet and Communications Services Company, 2021,September: p6).

The previous analysis and the numbers we referred to are consistent with the achievements of the Kingdom’s “2030” vision (2016-2020), as the vision report shows that the Kingdom has achieved many achievements in the context of attracting technical investments despite the economic challenges

that the world has experienced. The Kingdom has been able to attract the largest investments. Technology in the Middle East and North Africa with deals exceeding one billion and 700 million dollars in the cloud computing sector, and this resulted after the announcement of:

- * The partnership between Google and Aramco to choose the Kingdom as a regional center for cloud computing operations and build the largest cloud computing center in the Middle East and North Africa.
- * The partnership between Alibaba Cloud and the Saudi Telecom Company to build huge cloud computing centers in the Kingdom.
- * Oracle chose the Kingdom to be a regional center for cloud computing operations to serve the Middle East and North Africa.
- * The Kingdom has implemented a number of legislations supporting these investments, including: the cloud computing policy and its regulatory framework.

Among the achievements that the Kingdom has achieved in the growth and development of the digital economy thanks to cloud computing technologies is the creation of many applications and platforms that provide electronic services, including, but not limited to, the Meras platform, which is a platform that provides more than 200 electronic services through interconnection and integration with 30 government agencies. Instead of 15 days and reviewing 8 government agencies in 2015, business owners were able to establish companies electronically in 2020, and the commercial register is currently extracted within 180 seconds. (Achievements of the Kingdom's Vision 2030).

Table No. (1) shows some applications, digital platforms, and the services they provide to individuals and the business sector.

Table No. (1) Some government applications and electronic services in Saudi Arabia

Application/Platform	Features/services
Spacing	One of the technical solutions to track the spread of Coronavirus infection, and it allows its users to know whether they have been in contact with people proven to be infected with the virus, as it enables them to obtain direct and proactive notifications if any infection recorded through it is discovered during the past fourteen days, while maintaining the confidentiality of the data.
Tawalna	It shows the health status of its user through colored codes with the highest levels of security and privacy. It also allows individuals to contribute to breaking the chain of infection by reporting infected people, or gatherings violating precautionary measures. It is the official approved application to limit the spread of the Corona virus. It also provides government services such as government documents and others.
Mauwyed	It enables the patient and the service recipient to book appointments at primary health care centers in coordination with the Appointments Department, through which the appointment can be booked, modified or canceled in any hospital to which the patient is referred.
Rawdati	A new method for managing education electronically through an interactive learning environment that complements classes inside and outside the school, targeting students and parents. The application includes many educational activities.

Istishraq	A platform that relies on the use of artificial intelligence techniques, big data, and advanced analysis capabilities to cover future predictions for decision makers in the Kingdom to formulate important economic and social policies.
Absher	It provides government electronic services, and has contributed to linking more than 335 government services for citizen use, reducing the passport renewal time from 8 days to one day, implementing more than 20 million transactions and delivering documents within one day.
Eitimaad	The first financial platform of this size in the world for electronic connectivity, through which more than 450 government facilities deal, and the number of public tenders offered for purchase through the platform reached more than 96 thousand tenders, worth about 1.203 billion riyals.
We All Safe	It makes the citizen and resident part of an interactive technical security system to speed up rescue operations and reduce damage and losses by sending a report and uploading pictures, video or audio recording.
Opportunities	It brings together investment opportunities announced by 258 secretariats and municipalities for more than 100 activities, and provides the ability to view the terms and conditions brochure and purchase it electronically, in addition to many of the features that the portal provides to the investor, to help determine the appropriate investment opportunities for him.

Source: [My.gov.sa/wps/portal/snp/content/appslst](https://my.gov.sa/wps/portal/snp/content/appslst)

It is noted from table (1) that cloud computing technologies played a pivotal role in building and growing e-government and advancing it to global ranks, and contributed to making the Kingdom a global economic power, and contributed to making major transformations in the digital infrastructure, and ensuring a better life for all its residents by providing all electronic services.

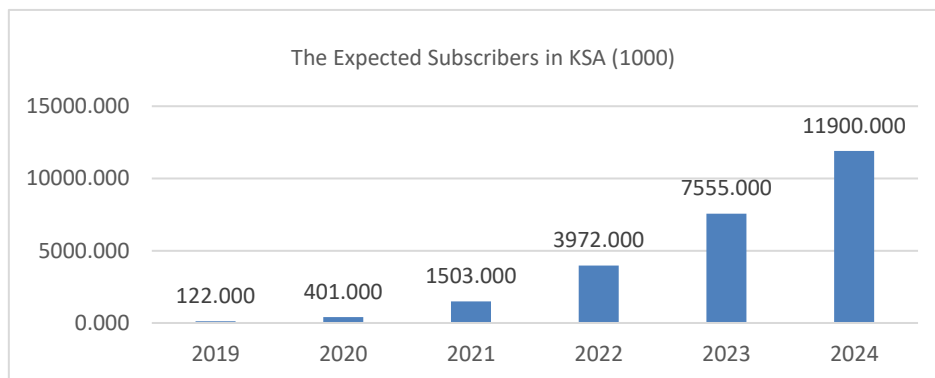
This technology also helped the Kingdom open its doors to tourists from all over the world when it launched the tourist visa in September 2019, electronically, for citizens of 49 countries. It issued more than 440,000 tourist visas until March 2020, as issuing the electronic tourist visa only takes minutes. Between 5 and 30 minutes in most cases, making the tourism sector in the Kingdom the fastest growing in the world, as it recorded a growth of 14% and its direct and indirect contribution to the Saudi economy reached 9.5%. (Report on the Achievements of the Kingdom's Vision 2030: 156).

It is clear that the advanced digital infrastructure in the Kingdom of Saudi Arabia played a major and influential role in facilitating the use of digital technology in all economic sectors, including the Internet of Things, big data and open data, cloud computing, and artificial intelligence, because these technologies in turn facilitate the provision of services in their various fields.

The Saudi Arabia is one of the first countries to adopt 5G technology in the Gulf Cooperation Council region, as the Communications, Space and Technology Commission is doing great work to enhance the infrastructure of the fifth generation and broadband network, and both Saudi Telecom Company and Zain Saudi Arabia are in a good position to convert subscribers to The use of technology, with the massive expansion of fifth generation technology, and Figure No. (4) shows the adoption of fifth

generation technology and the number of current and expected subscribers until the year 2024.

Figure (4): Relying on the G-5 Technologies



Source: Al Jazira Capital Financial Markets Company Report, 2020: 2

As part of the ongoing development efforts, the Saudi government launched in April 2023 four special economic zones, aiming to develop and diversify the Saudi economy and improve the investment environment, including cloud computing and information technology, which aims to attract international companies in the field of cloud computing, as it will play a vital role in stimulating the adoption of modern technologies and technologies. Fourth industrial revolution. It will also contribute to enhancing the Kingdom's global reputation as an investment destination for technology companies in the region and a vital center that enjoys flexible regulations, competitive advantages, and systems and regulations for the cloud region.

In addition to the incentives and exemptions from customs duties on imports and competitive tax rates provided to companies, this will encourage the attraction of many international companies working in the field of cloud computing, which will help enhance the wheel of development, develop non-oil resources, and increase investment in emerging companies, which will be reflected in the training of local talents. Providing quality jobs for Saudi youth, supporting entrepreneurs, supporting academic research and innovation, and promoting the growth of the digital economy. (Adapted by Sputnik Arabic).

According to a report issued by Gartner, an American technology research and consulting company, the Kingdom's government spending on the information and communications technology sector is the highest in the world, with an expected growth at an annual rate of 2.89% during the period (2018 - 2024). In addition, the expected market size in this sector will reach 56.71 billion riyals by 2024. The Kingdom is scheduled to witness an annual growth of 16.85% in the value of cloud services during the coming period (2024-2029), based on a study and market report by Wardour Intelligence, which provides predictive consulting services for the market and commercial ecosystems.

The future expectations that appear through the measurement and indicators of international organizations indicate an increase in economic value due to steps, initiatives and projects that favour the business environment, attract foreign investment, create many job opportunities, and enhance innovation in various cloud and digital services, which contributes to reducing capital expenditures and converting them to operational expenditures at a cost. Less and a sustainable economy that guarantees quality of life, enhanced by improving government services directed to all sectors and public and private entities.

It appears from the above that the Kingdom's government has made great efforts to expand cloud

computing services and adopt it as an emerging technology in all its public and private sectors in a stimulating, continuous and fruitful manner, which has produced maturity indicators that increase the growth of the digital economy, drive improvement of the gross domestic product, and enhance innovation and speed of digital transformation with its various service. These indicators, which are considered accelerators for the adoption of cloud services, have contributed to the greater maturity of technology and digital capabilities in the Kingdom, which enhances productivity, improves capabilities, and increases prowess in using new technology and digitization significantly in all government sectors. As a result, the Kingdom has advanced in a number of international and digital indicators, including the e-Government Development Index, which is considered one of the most important indicators published by the United Nations globally, as the Kingdom ranked 31st in 2022, compared to 43rd in 2021, as a result of fruitful investment in The telecommunications technology sector and contributing to improving human capabilities at the level of health and education (Saudi Digital Government Authority report, 2024, August).

Conclusion:

It appeared from the research that the Kingdom of Saudi Arabia paid great attention to the transition to cloud computing when it launched the “Cloud Computing First Policy” in February 2019, which aims to move to cloud computing solutions instead of traditional information technology solutions, in order to achieve Vision 2030, which aims for digital transformation, Building a digital government, a digital economy with an industry built on the Fourth Industrial Revolution, and a digital society to create a thriving and prosperous environment and a better future for the Kingdom.

This interest was reflected in the Kingdom's communications infrastructure becoming one of the best in the world, making it the focus of global digital investments. It signed agreements with many international companies working in the field of cloud computing, such as Alibaba Cloud, Google, and Oracle, to provide cloud services to organizations and companies throughout the Kingdom to help them rationalize expenses and save time and effort for workers, and this was reflected in the growth of the cloud computing market in The Kingdom, where it exceeded 6 billion Saudi riyals in 2021.

It also became clear from the research that cloud computing technologies in light of the Corona pandemic made a strong contribution to the provision of many services, such as health, educational, and other services by relying on many applications and platforms created by official authorities in the Kingdom such as Tawakkalna, Tabaad, and Rawdati. And my school, and others, which made it play a pivotal role in building and growing e-government and the development and growth of the digital economy.

The research explained that cloud computing technologies helped the growth and development of the digital economy in the Kingdom through the tourism sector when it launched the electronic tourist visa in 2019, as more than 440,000 tourist visas were issued until March 2020 to approximately 50 countries, which made the tourism sector in the Kingdom the fastest growing country. Growth in the world, as it recorded a growth of 14% and its contribution to the Saudi economy reached 9.5%. All these indicators and figures confirm that the Kingdom’s government spending on the information and communications technology sector is the highest in the world, with a compound annual growth rate of (2.89) percent in the period from (2018-2024). The Kingdom is expected to witness a compound annual growth rate of (16.85) percent in the value of cloud services during the period (2024-2029) based on the study and the annual report. Mordor Intelligence is a leading provider of predictive consulting services for markets and Commercial environment ecosystems.

Findings and recommendations:

First: Findings:

1. It appeared from the research that the communications infrastructure in the Kingdom is considered one of the best in the world, making it the focus of global digital investments. This advanced infrastructure has attracted the best international companies specialized in the field of cloud computing such as Google, Alibaba Cloud, and Oracle. In addition to local and regional companies to provide high-speed cloud computing services to cover the growth and increasing demand for cloud computing services and products.
2. The Corona pandemic (Covid-19) has contributed to increasing the pace of the trend towards digital transformation, as cloud computing has become an essential enabler of access to a range of educational, health, banking, religious, and security services, which has made it play an important and great role in the growth of e-government in the Kingdom of Saudi Arabia.
- 3- Cloud computing plays a significant and important role in the growth of the digital economy in the Kingdom of Saudi Arabia, and this has been evident in many sectors and fields, including, for example, the tourism sector, when the electronic tourist visa was launched in 2019, where more than 440,000 tourist visas were issued until March 2020 to approximately 50 countries, making the tourism sector in the Kingdom the fastest growing in the world by recording a growth of 14%. The Meras platform has also contributed to providing more than (200) electronic services in conjunction and integration with 30 government agencies, and instead of 15 days and reviewing 8 government agencies in 2016, business owners were able to establish companies electronically in 2020, and the commercial register is extracted within 180 seconds.
4. Cloud computing helps solve many problems for Saudi organizations, especially those related to high expenses and information management and big data.
5. The Kingdom of Saudi Arabia demonstrated its great interest in transitioning to cloud computing when it launched the “Cloud Computing First Policy” in February 2019, and this interest was reinforced by its launch again in April 2023 of special economic zones, including the cloud computing zone, which will help enhance the wheel of development and develop unparalleled resources. Oil and innovation, and promoting the growth of the digital economy. The figures confirm the great interest of the Saudi government in digital transformation, as the percentage of the Kingdom’s government spending on the information and communications technology sector is the highest in the world, with a compound annual growth rate of (2.89) percent in the period from (2018-2024). The Kingdom is expected to witness a compound annual growth rate of (16.85) percent in the value of cloud services during the period (2024-2029) based on the study and the annual report. Mordor Intelligence is a leading provider of predictive consulting services for markets and Commercial environment ecosystems.

Second: Recommendations:

1. Spreading sufficient awareness of the importance of switching to cloud computing for its great role in the growth of e-government and solving problems for Saudi organizations.
2. Work to build the capabilities and skills necessary to move to cloud computing, by opening cloud computing specializations in Saudi universities, and encouraging research and development in the fields of cloud computing while providing faculty and researchers specialized in the field.
- 3- Working to exploit the capabilities of cloud computing and its services in the public and private sectors more effectively to enhance the growth of the digital economy and achieve economic prosperity

and sustainable development, especially since the reports of international companies are promising, as they expect the Kingdom to witness an annual growth rate of 16.85% in the value of cloud services in the period (2024). - 2028).

4- Benefiting from the Kingdom of Saudi Arabia's experience in relying on cloud computing technology and the shift it has brought about in the development and growth of the digital economy.

References:

1. Arab League Report, 2020.
2. United Nations Report, 2020.
3. Report of the Saudi Communications, Space and Technology Commission.
4. Bibi, Walid, Tamrabat, Zainab, Tagharat, Yazid (2022) Cloud computing and its role in serving finance and business: the experience of the Kingdom of Saudi Arabia, Journal of Economics of Finance and Business, Volume 6, Issue 3, September. Algeria.
5. Annual Rreport, Al Arid Al Motqan Company, 2022.
6. Katherine Kinkela, Iona college, (2015). Practical and ethical considerations on the use of cloud computing in accounting, journal of finance and Accountancy, pp-8 <http://www.aabri-com/copyright.html>.
7. Shinawa, Wissam Aziz, and Al-Shammari, Hussein Karim (2019). Cloud accounting, a new horizon for organizing accounting work, Journal of Madinat Al-Ilm University College, Baghdad, Iraq, Volume 11, First Issue: 2-17.
8. Badawi, Mohamed Mounir (2022), Proposed indicators to evaluate the quality of cloud computing applications in the digital transformation environment: a prospective analytical study, Scientific Journal of the Faculty of Commerce, Assiut University, Issue 76, December.
9. Al-Basiouni, Basma Abdel Rahman (2021). A comparative study between the positive returns resulting from the decision to switch to cloud computing and the risks arising from this decision in business organizations, Journal of Financial and Commercial Research, Faculty of Commerce, Port Said University, Volume (122), Issue Two, April: 632-651.
10. Al-Awamra, Muhammad Ismail (2019), The role of cloud computing in reducing IT infrastructure costs, a case study of a telecommunications company, unpublished master's thesis, Al al-Bayt University: 4.
11. Ozdemir, and Elitas, C. (2015), The risk of cloud computing in Accounting filed & the solution offers: the case of Turkey, journal of Business research, vol.7, No.1pp-43-59
12. ITU Report, 2021.
13. Rizq, Sameh (2022), Implications of Strong Structuring Theory on the Mutual Impact between the Development of the Role of Management Accountants and the Application of Cloud Computing Technology, Case Study of the Egyptian Food Industries Company, Alexandria Accounting Research Volume, Issue Three, Volume Six, September.
14. Makki, Imad, (2022), The role of digital transformation in improving the performance of the refining and petrochemical industry, Arab Oil and Cooperation Journal, Organization of Arab Petroleum Exporting Countries (OAPEC), Volume 48, Issue 180.
15. Flair data (2021). Flair data. Retrieved 2021, from features of cloud computing – 10 Major characteristics pf cloud computing: <https://data-flair.Training /blogs/features of cloud computing>.
16. United Nations Report, ESCWA, 2014.

17. id4arab.com/2021/11/cloud-computing.html.
18. Barries Rosinsky, cloud computing, 1st edition, 2011.
19. Fikr Magazine Editorial Team, (2013), The Future and Cloud Computing, Fikr Magazine, (4), 64-67.
20. Al-Shaddadi, Abdul Rahman, (2018), Cloud Computing: Its Characteristics and Security Challenges When Moving to It, First Information Technology Forum, University of Jeddah, College of Computers and Information Technology, Jeddah.
21. Report on cloud computing and its future in the Kingdom of Saudi Arabia, (2019), Monsha'at, the idea of the General Authority for Small and Medium Enterprises.
22. <https://sahara.com/ar>.
23. <https://www.mobily.com.sa>.
24. <https://tsp.tamkeentech.sa>.
25. <https://sa.zain.com>.
26. <https://mofeed.com>.
27. Al-Faifi, Yahya, (undated), the reality of cloud computing technology in telecommunications companies in the Kingdom of Saudi Arabia, and its challenges, Scientific Journal for Research Publishing.
28. Report of the Saudi Ministry of Investment, (2021), Invest in Saudi Arabia.
29. Report of the Saudi Data and Artificial Intelligence Authority, SDAIA, global experiences in using data and artificial intelligence to confront the emerging coronavirus, 2022.
30. <https://www.rowad-alkaleej.edu.sa>.
31. Muhammad, Abdul Rahman, Al-Ghubairi, Muhammad, (2020), The reality of digital transformation in the Kingdom of Saudi Arabia - an analytical study, Journal of the College of Administrative Sciences, Volume (4), Issue (3), King Khalid University, Kingdom of Saudi Arabia.
32. El-feky, M. I. (2023). Board Gender Diversity and Firm's Financial Performance: Further Evidence from an Emerging Capital Market. Journal of Business and Environmental Sciences, 2(1), 42-65.
33. Aramco.com/ar/news-media/news/2020.
34. Report of the Arab Internet and Communications Services Company, September 2021.
35. Report on the achievements of the Kingdom's Vision 2030 (2016-2020).
36. My.gov.sa/wps/portal/snp/content/appslst.
37. Al Jazira Capital Financial Markets Company Report, (2020), December.
38. Sputnik Arabic.ae.
39. Saudi Digital Government Authority report, August 2024.

دور الحوسبة السحابية في نمو الاقتصاد الرقمي بالمملكة العربية السعودية

الفتاح محمد عثمان مختار

قسم الاقتصاد - كلية الأعمال والاقتصاد، القصيم - جامعة القصيم - المملكة العربية السعودية
e.mukhtar@qu.edu.sa

المستخلص:

هدفت هذه الدراسة إلى تناول دور الحوسبة السحابية في نمو الاقتصاد الرقمي بالمملكة العربية السعودية، واستعرضت الدراسات السابقة التي تناولت الحوسبة السحابية، مشيرة لمفهوم الحوسبة السحابية وخصائصها، وأنواع الحوسبة السحابية وفوائدها، ودراسة المقومات الأساسية لتطبيق الحوسبة السحابية ومخاطرها، كما تطرقت لواقع الحوسبة السحابية في السعودية، ودور الحوسبة السحابية في نمو الاقتصاد الرقمي بالمملكة العربية السعودية مستخدمة المنهج الاستنباطي والمنهج الوصفي والتحليلي. وخرجت الدراسة بالعديد من النتائج ومن أهمها أن مساهمة الحوسبة السحابية في نمو الاقتصاد الرقمي ظهرت في العديد من القطاعات والمجالات، ومنها على سبيل المثال لا الحصر القطاع السياحي، عندما أطلق التأشير السياحية الإلكترونية في عام 2019، حيث صدرت أكثر من 440 ألف تأشير سياحية حتى مارس 2020 لحوالي 50 دولة تقريباً، مما جعل قطاع السياحة في المملكة الأسرع نمواً في العالم من خلال تسجيله نمواً بنسبة 14 %، ووصلت مساهمته في الاقتصاد السعودي إلى 9.5 %.

كما أوضحت النتائج أن جائحة كورونا أسهمت في زيادة وتيرة التوجه نحو التحول الرقمي، حيث أصبحت الحوسبة السحابية ممكناً أساسياً للوصول لمجموعة من الخدمات التعليمية، والصحية، والدينية والأمنية، مما جعلها لعبت دوراً مهماً وعظيماً في نمو الحكومة الإلكترونية والاقتصاد الرقمي بالمملكة العربية السعودية.

الكلمات المفتاحية: الحوسبة السحابية، الاقتصاد الرقمي، المملكة العربية السعودية