Cloud Computing-Based M-Government

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In recent time, several governments throughout the world have implemented cloud services, promising citizens a number of proven benefits such as cost savings, data management, rapid scaling, and increased public service delivery, resource sharing, and extended communication channels. Despite the importance of this field, the majority of previous studies focused on the development of cloud computing and the possibility of its application to implement e-government services. These studies were not concerned with the extent of governments' orientation towards implementing e-government and exploiting it in the service of citizens. Therefore, in this paper, an overview is presented on the level of M-Government implementation based on cloud computing and benefit from its services in many developed and developing countries of the world, especially the Kingdom of Saudi Arabia.

Povzetek: V zadnjem času je več vlad po vsem svetu uvedlo storitve v oblaku, ki državljanom obljubljajo številne dokazane prednosti, kot so prihranki stroškov, upravljanje podatkov, hitro skaliranje, povečano zagotavljanje javnih storitev, souporaba virov in razširjeni komunikacijski kanali. Kljub pomembnosti tega področja se je večina dosedanjih študij osredotočala na razvoj računalništva v oblaku in možnosti njegove uporabe pri izvajanju storitev e-uprave. Te študije se niso ukvarjale z obsegom usmerjenosti vlad k izvajanju e-uprave in njenemu izkoriščanju v službi državljanov. Zato je v tem prispevku predstavljen pregled nad nivojem implementacije M-Government, ki temelji na računalništvom v oblaku in koristi od njegovih storitev v številnih razvitih in državah v razvoju sveta, zlasti v Kraljevini Savdski Arabiji.

1 Introduction

Information and communication technology (ICT) development is one of the defining characteristics of our day, and, like other advancements, it has had a huge impact on changing and modernizing people's lives to some level. ICT has had a huge impact on individuals' interactions with their governments, greatly raising their expectations in this area (Abu-Shanab, 2014; Al-Zyadat, 2016).

With the advent of M-Government solutions, a number of government organizations around the world have shifted from traditional forms of public administration to electronic ones, realizing the necessity of providing high-quality and effective services to their citizens (Al-Hujran et al., 2015; Dwivedi et al., 2017). Nevertheless, when M-Government services became more widely used, more adoption and acceptability issues arose, including technological and financial issues (Dwivedi et al., 2017). Innovative ICT, like cloud computing technologies, can help to overcome these obstacles; cloud computing marks a significant shift in the public sector's technical environment and how governments conduct business (Dwivedi & Mustafee, 2010).

In latest years, numerous governments throughout the world have adopted cloud services promising their citizens a variety of demonstrated benefits like cost savings, data management, rapid scalability, improved public service delivery, resource sharing, and expanded communication channels (Ali, Manzoor, & Alouraini, 2021). In light of this, the current research sheds light on the level of implementation of M-Government based on cloud computing in various developed and developing countries in the world and the Arab world, specifically the Kingdom of Saudi Arabia.

2 M-Government definition

M-Government is a type of information technology that makes use of the Internet and the World Wide Web to make it easier for citizens, corporations, and governments to communicate with one another. M-Government enhances relationships with business, people's access to public services, citizens' ability to obtain information, and government management efficiency (Kuldeep, Shravan, & Amit, 2012).

M-Government also refers to using mobile and wireless technology in government administration and the delivery of information and services to the general public (Alijerban & Saghafi, 2010). Mobile technologies such as wireless, WiFi, and networks such as 3G and 4G have enabled the transfer of information using mobile devices (such as, phones and tablets) at any time and from any location (Simi et al., 2012). This evolution, nevertheless,

necessitates more effective infrastructure, platforms, and services that can successfully support the government-citizen connection at any time and from any location, as facilitated by the concept of M-Government. The essential infrastructure support can be provided in "cloud computing" (CC), which is an Internet-based computing model that provides unrivaled access to computing resources (Le Roux & Evans, 2011).

3 Cloud Computing (CC) definition

The term "cloud" appears in network diagrams in cloud computing, where it refers to the interconnection barrier between networks (Louridas, 2010). A proposal has been made to use the term "cloud" as an abbreviation for shared, location-independent, digital utility available on demand.

Cloud computing is a type of computing in which several external clients can access massively scaled IT-related skills "as a service" via Internet technology. It's a new IT development, deployment, and delivery model that allows for real-time delivery of products, services, and applications through the internet (namely, cloud services)" (Mosa, El-Bakry, & Abuelkhir, 2015).

The CC model, which is one of the most popular business trends, is defined as the packaging of traditional IT infrastructure and software services like storage, CPU, network, applications, and services. This approach offers on-demand network access to a shared pool of configurable computing resources like networks, servers, storage, applications, and services that can be quickly supplied and released with minimal administrative effort or service provider engagement (Heier, Borgman, & Bahli, 2012).

Many developed countries' government sectors have adopted cloud computing technology. As a result, the government's function, the services it delivers to its citizens and institutions, and its collaboration with other government agencies have all improved. While cloud computing is no longer considered a new technology in developed countries, it is still a novel concept in developing countries (Al-Ruithe, Benkhelifa, & Hameed, 2017). In the next part, the level of implementation of M-Government based on cloud computing in many countries of the world will be reviewed.

4 At the level of the world

Cloud technology has advanced successfully towards becoming the next generation of egovernment services, thanks to pioneering activities in several industrialized countries such as the United Kingdom, Japan, the United States, and the European Union (Almarabeh, Majdalawi, & Mohammad, 2016). The concept is to use ubiquitous, highly scalable, location-independent IT resources to establish organizational processes and reinvent government services that match citizens' expectations by using more flexible, open, low-cost, and unified computing to improve collaboration amongst government departments. Nevertheless, while cloud-based M-Government is seen as a significant shift within governments, it also serves as a user-centric services platform aimed at increasing citizen participation (Wyld, 2010).

Furthermore, cloud computing was included in the 2011 US Federal Budget as a key component of the government's cost-cutting and efficiency agenda (Kundra, 2010). According to the strategy, cloud computing must be assessed as part of every agency's budget proposal for all IT initiatives. The federal government of the United States has already begun integrating cloud computing into their IT initiatives (Ishaq and Rana, 2011). Some government organizations, such as the City of Miami, the Federal Government (General Services Administration (GSA)), the City of Edmonton, and NASA, have made early forays into cloud computing to improve service delivery and cut IT costs.

The UK's 'cloud first' policy and G-Cloud marketplace have surely boosted cloud adoption in the UK public sector. Six UK government agencies declared in mid-2011 that they had no intentions to migrate to cloud computing. According to Cloud Industry Forum statistics, only 38% of the UK public sector had formally accepted at least one cloud service in 2010. By 2015, that proportion had more than quadrupled to 78% (Wyld, 2010).

The Malaysian government has launched a cloud government project that aims to integrate cloud computing and unified communications-based technologies into a digital and cloud work environment. Nevertheless, according to the impact assessments, the program's execution has various flaws, including a lack of infrastructure support, a lack of IT experience, and an unawareness between public sector employees, all of which result in the applications not being fully exploited (Amron et al., 2019).

As part of its Digital Japan Creation Project, the Japanese government launched the ICT Hatoyama Plan in 2009, which aims to move all government departments to a private cloud environment (Craig et al., 2009). Furthermore, in order to address the growing demands on the government's IT systems and to assure improved efficiencies without having to operate different IT systems for several ministries, the Japanese government created the Kasumigaseki Cloud initiative (Kundra, 2010).

Tanzania's government has begun to roll out mobilM-Government projects. Nevertheless, little is known about the elements that influence Tanzanians' willingness to use mobile government. As a result, some m-government services have been embraced successfully, while others have not (due to a low adoption rate) (Ishengoma, 2021).

5 At the level of the Arab world

In recent times, the public sector in developing nations, particularly the Middle East, has begun to shift to cloud computing in order to reach higher levels of efficiency and performance at a lower cost (ALMutairi & Thuwaini, 2015). Several of these nations, though, are still in the early phases of the process.

The GCC countries, such as Saudi Arabia, the United Arab Emirates, and Qatar, have made massive investments in IT. These governments are eager to digitize their departments and services in order to improve their

infrastructure and public services. The United Arab Emirates, for example, has launched a series of e-applications to expedite government processes (ALMutairi & Thuwaini, 2015). Kuwait and the United Arab Emirates have also enacted data protection legislation, which is overseen by independent privacy commissioners. Because of the confidentiality, the improvements are important for cloud users. Users may now confidently accept and adopt cloud computing, knowing that their personal data, kept anywhere in the world, would not be divulged in unanticipated ways by cloud providers. National privacy regime predictability aims for openness and avoids overly burdensome cloud service provider regulations.

Jordan, a country in the Middle East's heartland, is in the midst of a total shift to cloud-based government. Jordan recognized the importance of cloud computing in the M-Government environment and established the first "National Cloud Platform," which seek to enhance and expand M-Government services throughout time. A number of government bodies and ministries are now using cloud-based technologies to provide better public services to their citizens; nonetheless, a large majority of Jordanians have yet to adopt cloud-based M-Government services and still rely on paper printouts of their official transactions. As a result, services relying on cloud computing technologies are underutilized (Alkhwaldi, Kamala, & Qahwaji, 2018).

6 At the level of the Saudi Arabia

Several studies have been conducted in an attempt to assist Saudi decision-makers in addressing their worries about cloud computing adoption. The majority of these studies concentrate on the factors that influence cloud computing adoption in Saudi Arabia (Alkhater, Wills, & Walters, 2014; Noor, 2016). A few other researches have concentrated on cloud computing adoption in certain government entities, such as healthcare and higher education (Alharbi, F., Atkins, A., & Stanier, 2016). These studies categorized the elements impacting the Saudi government's use of cloud computing into three categories: organizational, environmental, and technological. The organizational element involves the company's size, senior management support, readiness, and status. Competitive pressure, external support, government support, regulatory rules, and compliance with regulations are all examples of environmental factors.

Furthermore, the technology component includes issues such as technological readiness, security, privacy, availability, dependability, vendor lock-in, trust, and technical hurdles. Nevertheless, there are no quantifiable assessments of cloud computing's current state in the Saudi public sector. Quantitative measurements of cloud adoption are significant because they improve the accuracy and objectivity of decision-making in the public sector and among cloud providers. Only a few studies in the literature have looked at the kinds of factors that influence cloud computing adoption in Saudi Arabia based on empirical research, and the most of them are focused on specific government entities or areas.

Noor (2016) investigated customers' acceptability of cloud computing in Saudi Arabia using the Technology Acceptance Model (TAM). Yamin (2013) presented a broad picture on cloud adoption in Saudi Arabian companies, concluding that a lack of adequate regulation is the biggest impediment to the public sector's use of cloud computing in the kingdom. According to Alkhater, Wills, and Walters (2014), there are no standards or regulations in place to protect sensitive data when it is migrated to a cloud service provider. The Saudi government has just lately formed a specialised group to design the required legislation for the cloud paradigm, in order to promote its adoption across government agencies.

Osman and Adbalrahman (2013) proposed that Saudi Arabian universities and colleges create a cloud. Alkhater, Wills, and Walters (2014) looked at the factors that influence the decision to use the cloud in Saudi Arabian businesses. Other researchers looked into issues connected to cloud adoption in Saudi Arabia from other angles, similar to their findings (AlBar & Hoque, 2015; Albugmi, Walters, & Wills, 2016; Tashkandi & Al-Jabri, 2016). However, None of the solutions suggested or explained how government organizations in Saudi Arabia could benefit from embracing and deploying The Cloud. Moreover, none of the methods that will aid in the adoption and execution of such policies were given.

In addition, Alannsary and Hausawi (2019) proposed that the government use SaaS. The focus of their research was on SaaS as a cost-cutting technique. A National Cloud was also mentioned. Therefore, this was done to make the SaaS implementation process go more smoothly. With the current changes in the Vision 2030 projects and the present status of cloud with Yesser, it is necessary to describe the proper technique to implement the Cloud.

Cloud computing is still a young technology in Saudi Arabia, according to Al-Ruithe, Benkhelifa, and Hameed (2017). The majority of government organizations' meeting agendas do not include discussions about technology adoption. Nowadays, up to 70% of government organizations in Saudi Arabia do not use cloud services. Only 29.13 percent of those who took part in the survey have used cloud computing. Telecommunications and information technology, the military, healthcare, and financial services were the top public sector users of cloud services. Other firms who have not yet implemented cloud services said that they expect to do so in the next 6-24 months, according to 33.50% of respondents. Surprisingly, despite being in senior positions or at the very least specialists, many respondents (12.14%) lack expertise of cloud computing. The private cloud was stated to be the most popular cloud deployment option, while SaaS (58.33%) and IaaS were the most popular delivery models (56.67%).

7 Discussion

Despite the importance of cloud computing, the majority of previous studies focused on the development of cloud computing and its applicability to implement e-

government services. These studies were not concerned with the extent of governments' orientation towards applying e-government and exploiting it in the service of citizens. Therefore, this paper provided an overview of the level of e-government implementation based on cloud computing and benefiting from its services in many developed and developing countries in the world, especially the Kingdom of Saudi Arabia.

Recently, many governments around the world have implemented cloud services, promising citizens a number of proven benefits such as cost savings, data management, rapid scaling, increased public service delivery, resource sharing, and extended communication channels. Defining cloud computing is a reasonably old and stable technology that has promised consumers a number of well-proven benefits, including cost savings, instant scalability, and resource sharing, infrastructure, platform and SaaS are all examples of resources that can be provided as a service in the cloud. Thus, cloud users can get these services on demand.

Many government sectors in developed countries have adopted cloud computing technology. As a result, the function of government, the services it provides to its citizens, its institutions, and its cooperation with other government agencies, have improved. While cloud computing is no longer considered a new technology in developed countries, it is still a new concept in developing countries.

8 Conclusion

Cloud computing is a reasonably old and stable technology that has promised its consumers a number of well-proven benefits, including cost savings, instant scalability, and resource sharing. Infrastructure, Platform, and Software as a Service are all examples of resources that can be provided as a service in the Cloud. As a result, Cloud users can get these services on demand. Many developed countries' government sectors have adopted cloud-computing technology. As a result, the government's function, the services it delivers to its citizens and institutions, and its collaboration with other government agencies have all improved. While cloud computing is no longer considered a new technology in developed countries, it is still a novel concept in developing countries.

The adoption and use of the Cloud in Saudi Arabia's government sector are quite low. In light of the spread of the new Coronavirus in late 2019, the importance of implementing and officially adopting M-Government services has emerged. Although officially approved, the cloud has not yet been properly implemented. In addition, only a few studies in the literature have looked at the kinds of factors that influence cloud-computing adoption in Saudi Arabia based on empirical research, and the most of them are focused on specific government entities or areas. Based on the foregoing, the current research recommends the necessity of providing education and awareness to citizens and workers in government sectors with regard to M-government in order to achieve digital and technological development for society. The research also recommends the need for more research and development in the field of cloud computing, its reliability and security.

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