

The Effect of Cloud Computing Adoption on the Sustainability of E-Government Services: A Review

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Abstract

The setting in which government agencies operate has evolved. Technology innovation, environmental demands, and changing demographics have all presented severe obstacles to the day-to-day operations of public institutions. As a result, public organizations must embrace sustainable business practices and develop creative ways to deal with the current business climate. Scalable and interoperable technology platforms are necessary for sustainable governance to facilitate the analysis, integration, sharing, and monitoring of various data sets and sustainability metrics. One such platform to assist sustainable governance is cloud computing. Businesses benefit from its agility and the platform it offers for sustainable operations with better services, a cleaner environment, and better resource management. This study goes over the relevant ideas again and analyzes other studies to find the gaps in using cloud computing as a platform for creating long-lasting e-services. The findings indicate that there is still a shortage of studies on how cloud computing may help ensure the supply of long-term e-government services. Research on the difficulties government initiatives face and creating more resilient e-government services through the choice and implementation of suitable cloud models is lacking.

Keywords: Cloud Computing; Sustainable E-services; Survey.

Introduction

E-government services are increasingly essential to people's

lives, enterprises, and governmental institutions. Governments must thus develop and deploy efficient e-services to provide better services. These services are fueled by public pressure, ICT advancements, and government power to reduce obstacles to social inclusion, the environment, and economic growth in the direction of sustainable development. The use of ICT to help governments improve the effectiveness of their internal operations, procedures, and infrastructures with an emphasis on sustainable development is known as sustainable e-government development. Accessible services may be provided using ICT at the lowest possible environmental cost. Increased engagement in governmental policy and decision-making processes is another benefit of ICT [1]. Sustainable e-government, according to Estevez and Janowski [2], may enhance public services, citizen contact, citizen involvement in decision-making, and social promotion while safeguarding natural resources for future generations.

Generations. In addition to protecting the environment, sustainable e-government services can generate economic value, adapt to technological advancements, foster fair access and information sharing among all stakeholders, and promote social sustainability [3]. Though the sustainable development and e-government areas have advanced separately, little is known about the efforts to define and construct sustainable e-government services and investigate how technological innovation may assist these services [2]. A sustainable e-government system may be realized using cloud computing by leveraging several resource-sharing methods. Data, pictures, and shared application infrastructure for e-government systems can be accommodated through cloud computing data centers independent of higher-tier ICT resources. A well-designed e-government system that leverages cloud computing and pre-existing telco infrastructure can establish a robust e-services infrastructure that can benefit developing nations and emerging economies in numerous ways, such as affordability, scalability, resources, integration, expertise, upkeep, and sustainability [4]. An overview of previous studies on the effect of cloud computing adoption on the long-term viability of e-government services is given in this report. To determine the possibility of more

studies evaluating the influence of cloud computing on sustainable e-government services, the relevant papers are investigated and analyzed.

The study is organized to introduce the concept of cloud-based e-government services. Then, state of the art in the sustainability of e-government services is explored and analyzed. Next, a summary of the studies, the applied methodology, and the results are presented. Finally, a discussion and conclusion are provided.

Cloud Based E-Government Services

The benefits of cloud computing have prompted governments worldwide to embrace this technology to provide dependable and long-lasting e-services. Alonso et al. [5] state that using cloud computing to construct reliable, integrated back-end processes while considering the right amounts of data portability, interoperability, and security would enable the successful delivery and maintenance of e-services. Numerous examples demonstrated how cloud computing has evolved into a significant global government initiative. It has already been used to put multiple e-government services into action. Through their research and analysis of several instances from various nations, Mohammed and Ibrahim [6] found that governments use cloud platforms to improve services and save ICT costs. While some businesses have used cloud computing to save costs and improve scalability, availability, and accessibility, others have done so to address actual ICT-related issues. It has also been used to boost openness and public engagement while enhancing the effectiveness and quality of e-services [6]. Cloud-based government solutions enable partner organizations to share ICT resources, systems, and business processes, which lowers operating costs for each organization [7]. A cloud-based government system significantly enhanced resource use [8, 9]. High-capacity storage space is made available via cloud computing, allowing for more data processing and assisting the government in making more informed choices [10]. Additionally, cloud services provide more integrated and fast feedback on various public services by providing more straightforward access and ubiquitous service supply, independent of time and

place [7, 11]. Furthermore, the deployment and updating of applications become more rapid and agile as resources may be automatically managed and dispersed on the cloud based on the business requirements[7,12].

State-of-the-Art: Sustainability of Cloud-based E-Services

Because e-services are becoming increasingly essential to daily living, corporate operations, and governmental duties, sustainability is more important than ever. The capacity to continue offering high-quality services while maintaining client happiness is known as e-service sustainability. According to Brundtland et al. [13], sustainability is defined as development that guarantees addressing the demands of the present generation while considering future generations' needs [14].

According to [14], a viable method for determining the feasibility of cloud computing technology is to apply sustainability assessment to every firm considering adoption. Before deciding whether to migrate to the cloud, sustainability concerns (economic, environmental, social, and technological) should be considered. The cost of cloud migration, including maintenance, consulting, and training expenses, is supposed to be an economic component. Concerns about the use of energy and resources are addressed by taking environmental practices into account. When choosing to migrate to the cloud, social and technical factors are also extensively considered [14].

Walterbusch et al. [15] presented a decision-making approach to assess and choose suitable cloud computing services while considering social, environmental, and economic sustainability factors. A mixed-method approach highlighted the key features of cloud computing and its effects on the economy, environment, and society. Experts validated the model and the findings of a statistical analysis and scenario-based simulation research. The results show that the characteristics of sustainable systems should be considered when assessing and choosing cloud computing services.

Yoo and Kim [16] analyzed technical, organizational, and environmental aspects, other decision-making elements,

and cloud computing qualities using the Delphi method and AHP (Analytic Hierarchy Process). The research recommended that compatibility, competitive pressure, and top management support be considered when using cloud computing services. Furthermore, from the standpoint of the demander, compatibility and competitive pressure were highlighted as high-priority variables; from the supplier's perspective, relative advantage and top management support were regarded as high-priority factors.

Truong and Dustdar [17] investigated the potential of cloud computing to satisfy new demands for the sustainability of public services. After studying academic studies and industrial platforms, they determined the fundamental components and shared traits of cloud computing for sustainability. After careful consideration, they determined that cloud computing may help sustainability by offering several strategies that enable many stakeholders and intricate analysis.

From the standpoint of internal users, Stamenkov and Dika [18] presented a model for sustained quality of services in the e-banking sector. The capacity of a business to supply e-services with sustainable quality while controlling and preserving customer happiness and loyalty was termed sustainable quality of service. A qualitative investigation using interviews was carried out to create a theoretical model. The specified characteristics were the quality of e-service, IT and infrastructure capabilities, quality management system, business/ICT alignment, and ICT service environment. The suggested model was experimentally investigated using structural equation modeling and exploratory factor analysis. Findings confirmed the impact of IT, business/ICT alignment, quality management systems, and

Infrastructure capacity, the ICT service environment, and the quality of the e-services affect the long-term sustainability of e-services that forecast customer pleasure and loyalty.

Chou [19] offered a value-creation model after analyzing the benefits and risks of cloud computing. Several components were determined to assist enterprises in assessing the benefits of cloud computing. Additionally, an analysis was conducted on the impacts of cloud computing adoption on businesses.

To achieve sustainable computing, the suggested cloud computing value creation paradigm had four primary stages: awareness, translation, understanding, and cloud computing value creation.

Estevez et al. [20] examined ten examples of active e-government projects with clear goals for sustainable development. The findings demonstrated how e-government helps achieve a range of sustainability objectives. The most often addressed sustainability challenges are social (empowerment), economic (enterprise possibilities), environmental (artificial activities), and institutional (capacity development). Furthermore, it was shown that industrialized and developing nations' use of e-government for sustainable development differed significantly.

Estevez and Janowski first presented the notion of electronic governance for sustainable development (EGOV4SD) [2]. Initially, a conceptual framework known as EGOV4SD was introduced, aiding in defining the parameters and aspects of both Sustainable Development (SD) and E-Government (EGOV). Next, a conceptual framework-based analysis method for EGOV4SD was established. Using this method, the state of EGOV4SD research was presented, drawing on an analysis of relevant literature.

E-services aren't sustainable until they're built with sustainability factors in mind, according to Razavian et al. [3]. It takes skill to create sustainable e-services, and it takes skill to communicate and evaluate sustainability. A conceptual model was put out by Razavian et al. [3] to determine the fundamental components of sustainable e-services. The goal was to improve stakeholders' awareness of sustainability and to provide a mechanism for sustainability assessments. An actual case study was used to demonstrate the usefulness of the suggested paradigm.

In e-government research, Larsson and Grönlund [21] looked into sustainability. A literature review revealed that the sustainability theory is used arbitrarily and superficially in contemporary e-government research. Furthermore, few studies include and integrate all four aspects of sustainability;

instead, relevant studies mainly concentrate on a subset of the sustainability dimensions (social, economic, environmental, and technological). Most studies focused on the social element of sustainability, with little attention paid to other factors. There was a narrow understanding of what constituted sustainability. Trust, engagement, and economy were among the broad and relevant public sector characteristics that received less attention than project or e-service sustainability.

Discussion and Conclusion

To create and execute efficient e-services, governments must address environmental, social inclusion, and economic growth issues to promote sustainable development. Governments may use cloud computing to improve internal operations efficiency by implementing cutting-edge ICT strategies, procedures, and infrastructures that prioritize sustainable growth. Thanks to cloud computing, small businesses may benefit from affordable, readily available services. Additionally, cloud computing benefits the environment and the economy. The inclination to decrease overall infrastructure, boost productivity, optimize server usage, and enhance data center efficiency propels these effects. Related research has shown that cloud computing improves e-service performance, scalability, and dependability. The associated study used various approaches to look into the possibilities of cloud computing and put forward models and frameworks to determine what elements impact it. However, the variety of cloud models makes it difficult to decide which service model best suits a particular organization's needs and which model to use for deployment. Additionally, choosing a cloud service architecture and deployment strategy that meets the company's goals may increase the e-services' sustainability. Because of this, choosing to migrate to the cloud is a difficult option. It depends on several variables, including shifting governmental regulations, financial constraints, the applicability of the cloud environment for certain services, and the development of new technologies.

Few studies provide decision-making models to assist in choosing the best cloud model to satisfy the unique needs of e-services and increase sustainability. Therefore, by selecting

and implementing the best cloud model utilizing Multi-Criteria Decision-Making Models, research can be done to solve the issues with government projects and produce more sustainable e-government services.

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