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CLOUD COMPUTING AND BIG DATA AS A FOUNDATION FOR DATA-DRIVEN DECISION-MAKING IN PUBLIC ADMINISTRATION AND BUSINESS

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Abstract: The paper examines the role of cloud computing and Big Data in supporting decision-making in public administration and business. Key advantages such as scalability, accessibility, and analytical capabilities are identified. Main application areas and implementation challenges are outlined.

Keywords: cloud computing, Big Data, decision-making, public administration, digital transformation, data analytics, data governance.

The rapid development of information technologies has fundamentally transformed approaches to decision-making in both the public and private sectors. Cloud computing and Big Data technologies have become key enablers of data-driven governance, allowing organizations to process large volumes of heterogeneous data, improve operational efficiency, and enhance transparency. This paper analyzes the role of cloud technologies and Big Data in supporting informed decision-making within public authorities, local governments, and business entities. The main advantages, challenges, and practical applications of these technologies are considered, with a focus on their strategic importance in modern digital transformation initiatives.

In the context of digital transformation, decision-making increasingly relies on the analysis of large and complex datasets. Traditional information systems are often unable to provide the flexibility, scalability, and computational power required for real-time data processing. As a result, cloud computing and Big Data technologies have emerged as critical tools for improving the quality and speed of managerial decisions.

Public authorities and local governments face growing demands for transparency, efficiency, and evidence-based policy making, while business entities operate in highly competitive and rapidly changing environments. In both cases, the ability to collect, store, process, and analyze data effectively determines organizational success. Cloud technologies and Big Data analytics provide the technological foundation for these capabilities.

Cloud computing refers to the delivery of computing resources – such as servers, storage, databases, networking, and software – over the internet on a pay-as-you-go basis. Its adoption in public administration and business has significantly reduced infrastructure costs and increased operational flexibility.

One of the key advantages of cloud technologies is scalability. Organizations can dynamically adjust computing resources based on current needs, which is particularly

important for data-intensive tasks such as statistical analysis, forecasting, and simulation. This allows decision-makers to access up-to-date analytical results without investing in expensive on-premises infrastructure.

Another important benefit is accessibility. Cloud-based systems enable authorized users to access data and analytical tools from different locations, supporting collaboration between departments, agencies, and stakeholders. In public administration, this facilitates inter-agency cooperation and integrated service delivery, while in business it supports distributed teams and global operations.

Cloud platforms also enhance reliability and data availability through redundancy, automated backups, and disaster recovery mechanisms. As a result, decision-making processes become more resilient to technical failures and external disruptions.

Big Data is characterized by large volume, high velocity, and wide variety of data generated from multiple sources, including sensors, social media, transaction systems, and public registries. Big Data analytics involves the use of advanced methods – such as machine learning, data mining, and predictive analytics – to extract valuable insights from these datasets.

In public authorities, Big Data analytics supports evidence-based policy making by enabling the analysis of socio-economic indicators, demographic trends, and citizen behavior. For example, data-driven analysis can be used to optimize public transportation routes, allocate budget resources more efficiently, or assess the impact of social programs.

Local governments can use Big Data to improve urban management through smart city initiatives. By analyzing data from traffic sensors, utility systems, and environmental monitoring devices, municipalities can make informed decisions related to infrastructure development, energy consumption, and environmental protection.

In the business sector, Big Data analytics plays a crucial role in strategic and operational decision-making. Companies use data analysis to forecast demand, personalize customer experiences, detect fraud, and optimize supply chains. Predictive models allow managers to anticipate risks and opportunities, reducing uncertainty and improving competitiveness.

The combination of cloud computing and Big Data technologies creates a powerful ecosystem for decision support. Cloud platforms provide the computational infrastructure required to store and process Big Data, while analytics tools transform raw data into actionable knowledge.

Cloud-based Big Data solutions offer several advantages, including faster data processing, lower entry barriers, and access to advanced analytics services. Public institutions and small or medium-sized enterprises can leverage these technologies without maintaining complex IT infrastructures, enabling wider adoption of data-driven decision-making.

Furthermore, cloud environments support the integration of data from multiple sources, improving data quality and consistency. This is particularly important for public authorities, where fragmented information systems often hinder comprehensive analysis.

Despite their benefits, the use of cloud technologies and Big Data in decision-making is associated with several challenges. Data security and privacy remain major concerns, especially when dealing with sensitive personal or governmental information. Compliance with data protection regulations requires robust security mechanisms and clear governance frameworks.

Another challenge is data quality. Decisions based on incomplete, biased, or inaccurate data may lead to incorrect conclusions. Therefore, effective data governance, validation procedures, and transparency in analytical models are essential.

Finally, the lack of digital skills among public officials and employees can limit the effective use of advanced analytics tools. Addressing this issue requires targeted training programs and organizational changes aimed at fostering a data-driven culture.

Cloud computing and Big Data technologies have become indispensable components of modern decision-making systems in public administration, local governments, and business entities. By providing scalable infrastructure and advanced analytical capabilities, these technologies enable evidence-based, timely, and more effective decisions.

Their successful implementation requires not only technological solutions but also organizational readiness, data governance frameworks, and investment in human capital. In the long term, the integration of cloud technologies and Big Data analytics will continue to shape digital governance and competitive strategies, contributing to sustainable development and improved public services.

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Анотація: Розглянуто роль хмарних обчислень і технологій Big Data у забезпеченні прийняття рішень у публічному управлінні та бізнесі. Визначено їх основні переваги, зокрема масштабованість, доступність і аналітичні можливості. Окреслено ключові напрями застосування та основні виклики впровадження.

Ключові слова: хмарні обчислення, Big Data, прийняття рішень, публічне управління, цифрова трансформація, аналітика даних, управління даними.