

# DATA-DRIVEN DIGITAL TRANSFORMATION: CHALLENGES AND STRATEGIES FOR EFFECTIVE BIG DATA MANAGEMENT

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## Abstract

*The study is devoted to the study and analysis of the risks associated with managing big data during the period of digital transformation of organizations. The purpose of the work is to identify the problems and risks that organizations face when integrating and using big data in an effort to remain competitive and successful in today's economic realities. The study uses a mixed approach to data analysis, which allows a comprehensive study of the issues of data management in the process of digital transformation. In the course of the work, the main problems and risks that organizations face when working with big data are identified. These risks include data governance and privacy, data security, data integration and interoperability, scalability and infrastructure, data quality and integrity, and employee skill and experience issues. The study proposes strategies to address these challenges, including developing a comprehensive data governance framework, investing in data security, and using advanced analytics and artificial intelligence. It also discusses the importance of cultural change in an organization, a commitment to the ethical use of data, and the need for a scalable infrastructure for future growth. The results of the study bring us to the realization of the importance of effective management of big data in the context of digital transformation and provide practical recommendations for overcoming the difficulties associated with this process.*

**Keywords:** digital transformation, big data, challenges, strategies

## I. Introduction

In the era of technological advancement, two key concepts have become the driving force for businesses across industries: "big data" and "digital transformation". Their combined influence has revolutionized the way organizations operate, the way they make business decisions, and interact with customers.

In a rapidly evolving digital environment, companies around the world are seeing digital transformation as a means to innovate, improve operational efficiency and gain competitive advantage. At the heart of this transformation is "big data", a vast and diverse stream of information generated in an ever-expanding digital ecosystem. The interplay between big data and digital transformation has led to the evolution of workflows, decision making and customer interactions. In addition to the potential benefits, there are numerous risks associated with the effective management of big data in the context of digital transformation [1].

The term "big data" encompasses vast amounts of structured and unstructured data

generated from various sources such as social media platforms, IoT devices, mobile applications, and transactional systems. This data stream contains valuable information that can significantly influence strategic decisions and uncover hidden growth opportunities. It is also characterized by velocity, volume and variety, requiring advanced processing and analysis techniques to extract meaningful information [2].

The key characteristics of big data can be summarized as three “V”: volume, velocity and variety:

- Volume is the amount of data generated every second is unprecedented. Traditional data management systems are unable to efficiently process such huge amounts of information.
- Velocity – data is generated at an incredible speed, requiring real-time or near-real-time processing to provide actionable insights quickly.
- Variety – big data comes in a variety of formats, including structured, semi-structured, and unstructured data. This diversity creates challenges for effective data integration and analysis.

Digital transformation is the strategic implementation of digital technologies to radically change business processes, improve the customer experience, and create innovative products and services. This process goes beyond simple automation and includes profound changes in the culture, mindset and activities of the organization.

The main goals of digital transformation include [3]:

- Process optimization: Using digital tools and technologies to streamline operations to improve efficiency and reduce costs.
- Improving the customer experience: Creating a personalized and seamless experience with customers through digital channels that meets their ever-changing expectations.
- Data-Driven Decision Making: Using data and information analytics to make informed and strategic decisions that drive business growth.

The synergy between big data and digital transformation has become a driving force for many companies, bringing significant opportunities to improve business processes and achieve competitive advantage [4].

The interplay between big data and digital transformation is an important and mutually beneficial symbiosis. Big data provides the necessary raw material that fuels digital transformation initiatives. The abundance of data provides organizations with valuable insights into customer behavior, market trends and underperforming operations to inform informed decision making and guide the transformation process [5].

Big data analytics play an important role in creating personalized customer experiences, delivering targeted marketing campaigns, and optimizing product offerings based on real-world feedback and preferences. Big data-driven analytics help improve the overall customer journey by promoting customer loyalty and advocacy [6].

Digital transformation, in turn, ensures the effective use of the potential of big data. Digital technologies such as cloud computing, the Internet of Things, artificial intelligence and machine learning enable organizations to store, process and analyze massive datasets efficiently. Cloud infrastructure provides scalable storage and processing capabilities for ever-increasing volumes of data.

The use of artificial intelligence and machine learning algorithms allows you to identify patterns, trends and correlations in data that may not be visible to analysts [7]. This enables companies to make informed decisions that are in line with their strategic goals and drive innovation.

However, organizations pursuing a digital transformation path face both the many opportunities and risks associated with big data management. The effective management of big data is critical, as an insufficiently structured and systematic approach can lead to lost data and hinder the extraction of meaningful information needed to achieve strategic goals. The exponential growth of big data creates challenges such as data governance and privacy, maintaining data

security and integrity, improving data quality, integrating data from multiple sources, and scaling existing infrastructure [8].

In addressing these directions, organizations can leverage best practices and potential solutions to help mitigate risk and maximize the potential of big data for successful digital transformation. It is important to understand that technology is constantly evolving and influencing business strategies, so the effective management and use of big data is becoming a critical component for organizations seeking sustainable growth and success in a dynamic and competitive digital environment.

## II. Methods

The purpose of this study is to study and analyze the risks that organizations face in effectively managing big data in the process of digital transformation. To achieve this goal, a mixed approach of analyzing qualitative and quantitative research methods is used. The study will conduct a thorough literature review to deepen understanding of existing knowledge related to big data management and digital transformation, as well as their interactions [9]. This will provide a sound theoretical basis for the study and will help to identify existing problems and challenges that organizations face.

The research methodology aims to analyze the problems of big data management in the context of digital transformation in order to provide valuable information about the risks and potential solutions to overcome them. An analysis of these issues will highlight the most significant factors that may limit successful digital transformation and the effective use of big data. In addition, the study will attempt to offer recommendations and solutions to help organizations streamline their data management processes and successfully implement their digital transformation.

## III. Results

The results of the study confirm that digital transformation has become an integral element of the strategic activities of organizations seeking to maintain their competitiveness in a rapidly changing economic field. An important role in this process is played by the effective management of big data and its application [10]. Big data provides organizations with valuable insights to drive innovation, improve decision-making processes, and improve customer service.

However, our research has identified a number of key challenges that organizations face when integrating big data into their digital transformation process. The main list of problematic indicators is given below.

- Data management and privacy. Organizations must develop clear policies and procedures to manage the collection, storage, access and sharing of data, as well as adhere to privacy rules, to ensure that data is handled legally and ethically.
- Data security. As the volume of data sources increases, organizations become more vulnerable to cyberattacks and data breaches, so it is necessary to implement strong data security measures, including encryption and access control [11].
- Data integration and interoperability. Integrating data from different sources can be challenging due to the variety of data formats and technologies, seamless data integration is required to provide a single and accurate overview [12].
- Scalability and infrastructure. Organizations must invest in a scalable and reliable infrastructure to process and analyze growing volumes of data, but migrating to the cloud can present challenges.
- Data quality and reliability. Data quality is a key factor for accurate analysis and decision

making, and data quality management practices must be implemented to ensure data validity and accuracy.

- Skills and experience. The lack of qualified data scientists can make it difficult to effectively use big data in digital transformation, and collaboration between business and IT teams must be ensured.

- Cultural challenges. The adoption of big data and digital innovation can be reluctant among employees, especially if they are accustomed to traditional ways of working, so it is just as important as adopting the technology itself to develop an open and innovative culture within the organization, train staff in new skills, and motivate them to embrace change.

- Speed and return on investment. Implementing quickly can lead to waste of resources and unnecessary risks, while implementing too slowly can lead to loss of competitive advantage. Therefore, it is important to develop a clear implementation plan, evaluate the risks and benefits of investments, and find the optimal balance between speed and efficiency.

- Ethical considerations. The implementation of big data must be guided by ethical principles and commitments to the responsible use of information.

The results of the study highlight the importance of overcoming these challenges and risks in order to successfully implement digital transformation and optimize big data management [13].

#### IV. Discussion

In the digital age, big data has a significant impact on the activities of organizations that seek to extract valuable information, make informed decisions and achieve a competitive advantage. However, the volume, velocity and variety of data present serious challenges that require effective management practices. The importance of effective big data management cannot be overemphasized, as it affects various aspects of an organization's operations, its strategic planning and overall success.

Big data contains a huge amount of valuable information that can be used to make informed decisions. Effective data management ensures that the right data is available to stakeholders at the right time. Analyzing trends, patterns, and customer behavior based on big data enables decision makers to make accurate predictions, identify new opportunities, and address potential issues. Organizations that make data-driven decisions gain a competitive edge by being more agile and able to quickly respond to market changes.

Understanding customer preferences and behavior is critical to providing a personalized and seamless customer experience. Big data management allows organizations to combine data from various sources such as social media, websites, and purchase history to create a complete customer experience. This in-depth understanding helps deliver targeted marketing campaigns, personalized recommendations, and effective customer support, leading to increased customer satisfaction and loyalty.

Big data provides valuable insight into market trends and customer needs, which drives innovation and product development. Analyzing feedback and consumer behavior allows organizations to identify gaps in the market and develop innovative products and services that meet customer needs. Efficient data management provides easy access to relevant data for product development teams, accelerating the innovation process.

Properly managing big data facilitates data integration and breaks down information silos, ensuring employees have access to accurate and up-to-date information. This improves work efficiency, improves collaboration and optimizes resource allocation. Big data analytics also uncovers operational inefficiencies and bottlenecks, allowing for process improvements and cost reduction measures.

Data breaches and cybersecurity threats are on the rise, making data security a priority for

organizations. Effective big data management includes strong security measures such as data encryption, access control, and regular security checks.

## V. Conclusion

In this paper, the key problems of big data management in the process of digital transformation of organizations were considered. An analysis of the risks and challenges that organizations face in integrating and using big data has revealed several critical aspects that affect the effectiveness of digital transformation and the overall success of organizations in today's digital economy.

A review of the research literature confirms that big data has become a strategic imperative for organizations seeking to remain competitive and successful in a rapidly changing market environment.

The key issues highlighted in the study are data governance and privacy, data security, data integration and interoperability, scalability and infrastructure, data quality and credibility, lack of skilled professionals, cultural challenges, cost and ROI, and ethical considerations.

Strategies have been proposed to address these challenges, including developing a comprehensive data management framework, investing in data security, and using advanced analytics and artificial intelligence. Also discussed was the importance of cultural change in an organization, commitment to the ethical use of data, and the need for a scalable infrastructure for future growth.

Effective management of big data plays a critical role in the success of organizations in the digital age. Good data governance enables informed decision making, enhances customer experience, drives innovation, ensures operational efficiency, and prepares organizations for a scalable and successful future. Responsible and efficient use of big data is key to keeping organizations competitive and resilient in today's rapidly changing business world.

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