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Analysis of the Dimensions and Components of AI-Based Digital Transformation Management

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Abstract

The purpose of this study is to analyze the dimensions and components of digital transformation management based on artificial intelligence. This research was conducted qualitatively using the thematic analysis method. The statistical population consisted of 12 experts and specialists in the fields of human resource management and information technology management across the country (including university faculty members in HRM and IT management, as well as general directors of provincial education departments). Participants were selected using purposive sampling. The data collection instrument was semi-structured interviews. Data analysis was performed through thematic analysis using MAXQDA software.

The findings revealed that AI-based digital transformation management includes four overarching themes—contextual requirements, digital infrastructure, digital transformation management process, and organizational capital; twelve organizing themes—ethical requirements, cultural requirements, organizational requirements, hard digital infrastructure, soft digital infrastructure, digital transformation management process, digital transformation planning, prototyping, learning, human capital, process capital, structural capital, and social capital; and a total of 73 basic themes.

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Extended Abstract

Introduction

The rapid advancements in new technologies in the current era, particularly in the fields of artificial intelligence, machine learning, big data, and smart technologies, have caused fundamental changes in the structures and operations of organizations. These transformations are not limited to economic and industrial sectors but also significantly impact educational and cultural institutions (Mostafaei et al., 2024). Many experts believe that the future of organizations depends on their ability to manage digital transformation. Digital transformation is a process that goes beyond equipping organizations with IT infrastructure; it involves rethinking missions, structures, governance methods, and even organizational culture (Wang et al., 2025).

In this context, the education system, as the most fundamental social institution responsible for nurturing human capital, requires a reinvention and transformation of its processes more than ever before. In Iran, the education sector faces challenges such as centralization, inefficiency in some administrative procedures, underutilization of educational data, and a significant gap compared to global standards in digital transformation (Azimi et al., 2024). In many educational systems, including Iran's, the adoption of new technologies has largely remained at the level of tools and infrastructure, with less attention paid to its strategic and forward-looking dimensions. Domestic studies indicate that most digitalization projects in education are implemented in isolation and sporadically, lacking necessary coherence (Golestani, 2024).

In the Gilan province specifically, field evidence suggests that although some administrative and educational processes have been digitized, these changes often face resistance from employees, a lack of digital skills, and weaknesses in macro-level policymaking. Consequently, the potential capabilities of artificial intelligence for organizational transformation have not yet been utilized effectively or operationally. Therefore, in pursuit of this goal, the main research question is: What are the dimensions and components of artificial intelligence-based digital transformation management in the education system?

Theoretical Framework

Digital Transformation

Digital transformation is a profound, multidimensional, and strategic process through which organizations systematically and purposefully leverage digital technologies to fundamentally alter their structures, processes, business models, organizational culture, and service delivery methods. This transformation aims to enable them to achieve more effective, agile, and value-driven performance in today's complex, dynamic, and competitive environment (Asad Amraji et al., 2020).

AI-Based Digital Transformation

Artificial intelligence can bring about a fundamental transformation in the analysis of the performance of educational personnel, shifting it from a subjective, periodic, and guesswork-based process to an objective, continuous, data-driven, and development-oriented one (Agrawal et al., 2018).

Chen & Zhang (2025) in their examination of the impact of AI applications on the environmental, social, and governance (ESG) performance of companies, demonstrated that digital transformation can enhance the sustainable development of organizations by increasing coordination and collaboration, the demand for specialized digital knowledge, the ability to manage virtual systems, and by changing the roles and styles of managers.

Mohsen et al. (2025) in a study on financial institutions, found that the integration of artificial intelligence into organizational structures can significantly improve the managerial performance and operational efficiency of these organizations.

Research Methodology

This research was conducted qualitatively using the thematic analysis method. The statistical population of the study included 12 experts in the fields of human resource management and information technology management at the national level. This group comprised university faculty members in the fields of human resource management and information technology, as well as general directors of provincial education departments. They were selected using a purposive sampling method. The data collection tool used was semi-structured interviews.

Research Findings

Data analysis was performed using the thematic analysis method with the MAXQDA software. The findings of the present study indicate that AI-based digital transformation management has been designed in the form of four overarching categories: “Contextual Requirements,” “Digital Infrastructure,” “Digital Transformation Management Process,” and “Organizational Capital.” These are further broken down into 12 organizing categories: “Ethical Requirements,” “Cultural Requirements,” “Organizational Requirements,” “Hardware Digital Infrastructure,” “Software Digital Infrastructure,” “Digital Transformation Management Process,” “Digital Transformation Planning,” “Prototyping,” “Learning,” “Human Capital,” “Process Capital,” “Structural Capital,” and “Social Capital,” along with 73 basic categories.

Conclusion

The present research was conducted with the aim of exploring the dimensions and components of AI-based digital transformation management. These findings are consistent with the results of previous studies, including those by Brock & Von Wangenheim (2019), Chen & Zhang (2025), Mohsen et al. (2025), Rosemary (2025), Malik et al. (2022), Alemi Pasand & Farahani (2024), Tavakoli-Rad & Zargaran-Khozani (2022), and Kitsios & Kamariotou (2021). In their research, they acknowledged that indicators such as individual prerequisites, organizational culture, organizational digital culture, data, digital ethics and privacy, hardware and software, and policy-making play a significant role in improving organizational digital leadership. Furthermore, Mohsen et al. (2025) asserted that attention to the structural dimensions of an organization can play a crucial role in improving organizational performance. Chen & Zhang (2025) also stated that focusing on changes in organizational structure and regulations significantly contributes to the development of organizational practices.

Based on the research findings, it is recommended that the Education Departments of Gilan Province develop and issue a special ethical charter for artificial intelligence. This charter should explicitly include principles such as algorithmic transparency, data privacy protection, prevention of discriminatory biases, and the necessity of human oversight in decision-making processes.