

Identifying and Prioritizing Components of Cultural Development in Government Organizations Compatible with the Fourth Industrial Revolution

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ABSTRACT

Objective: The present study aimed to identify and prioritize the components of cultural development in government organizations compatible with the Fourth Industrial Revolution.

Methodology: This research is a fundamental-applied study in terms of its goal. The qualitative part involves deep and systematic analysis of texts and interviews, while the quantitative part is a descriptive-survey study. In this section, the research method is based on interviews. The statistical population for the qualitative part comprises 20 experts from Iranian government organizations as well as university experts and professors. In the quantitative section, the statistical population includes 335 managers and employees of Iranian government organizations. Data collection methods in this research are library and field methods. In the qualitative section, indicators were identified through interview text analysis. Ultimately, based on expert surveys, the research model and researcher-made questionnaire were developed. The quantitative section relied on both descriptive and inferential statistics. In this regard, tests such as one-sample t-test and structural equation modeling were conducted using SPSS and Smart PLS software. Additionally, the fuzzy AHP method was used to examine the priority of components.

Findings: The results indicated that cultural development compatible with the Fourth Industrial Revolution includes six components: organizational structure, strategic thinking, innovation, people, leadership, and technical systems. Among these components, technical systems are the top priority.

Conclusion: The study concludes that cultural development in government organizations compatible with the Fourth Industrial Revolution comprises six key components: organizational structure, strategic thinking, innovation, people, leadership, and technical systems. Among these, technical systems are the highest

priority. Effective management of these components can significantly enhance organizational performance and adaptability to technological advancements.

Keywords: *Development, Cultural Development, Fourth Industrial Revolution*

1 Introduction

In the past decade, the number of companies that have developed the concept of digital transformation through their actions has been on the rise. Digital transformation not only involves the use of new technologies (e.g., advanced analytics, machine learning, artificial intelligence applications, Internet of Things) but also includes changes in the core elements of business, such as strategy, business model, business processes, organizational structures, and organizational culture. If digital transformation is managed successfully, it can lead to business process optimization and better organizational performance. Moreover, the introduction of new business models and the development of digital products and services can result in industry transformation (Vukšić et al., 2018). New digital technologies are transforming every industry, and the trend of digitalization has created "digital transformation" in most industries (Butschan et al., 2018). The challenge for large companies in these industries is not only discovering and exploiting new technologies but also creating organizational changes, such as the necessary culture (Steiber et al., 2021).

If there is one word in the vocabulary that can be found to be applicable in the fields of sociology, psychology, political science, economics, and management, it is culture (Safiri & Mirzaei, 2022). Culture is a multidimensional set. Culture encompasses a collection of essential elements of human social life, such as customs, traditions, attitudes, assumptions, interaction styles, values, norms, language, and behavior patterns (Eniola et al., 2019). Organizations, like societies, have their own cultures that distinguish them. Organizational culture is closely linked to the general culture of society and significantly influences organizational behavior and development. It can be a source of movement and dynamism or an obstacle to growth (Ramaditya & Prihantoro, 2020).

A review of knowledge sources and discussions with organizational culture experts indicate that government organizations, as entities with the approach of maximizing public benefit to the most people, will face challenges and potential issues in transitioning to the Fourth Industrial Revolution. Cultural development as the main foundation for implementing organizational strategies under internal and external transformations is a concern for organizational managers (Busoi, 2015; Koizumi, 2019; Piteli et al., 2019).

In this context, the world has progressed through stages and reached a new level of evolution, technology, and innovation, envisioning a world with new structures where every phenomenon and process can be transformed. Therefore, it can be accepted that with this scientific progress and human effort to apply knowledge, a significant revolution and transformation are underway. Technological advancements brought by Industry 4.0 have created a constantly changing environment that is effective in creating programs aimed at motivating and innovating within organizations (Nosalska et al., 2020).

Thanks to Industry 4.0, it is possible to produce things of excellent and unique quality at prices comparable to mass-produced goods (Nowotarski & Paslawski, 2017). In Industry 4.0, production processes are vertically and horizontally interconnected within organizational systems (Basl & Kopp, 2017; Hahn, 2020; Silva et al., 2019). Due to its advantages, Industry 4.0 has attracted significant attention from researchers, and many studies in this field, including those on readiness and maturity models from a technology perspective, have been conducted. At the same time, the aspect of organizational culture in Industry 4.0 has received less attention. Organizational culture, considering the success of business systems, positively impacts knowledge sharing, which is also essential for Industry 4.0 (Alattas et al., 2016). In our country, this has not been effectively implemented, and it is still observed that in some organizations, the culture of technology use has not progressed. This problem seems to stem from a lack of cultural development in line with the industrial revolution. The present study aimed to identify and prioritize the components of cultural development in government organizations compatible with the Fourth Industrial Revolution. Accordingly, this research seeks to answer the question: What are the components of cultural development in government organizations compatible with the Fourth Industrial Revolution, and how are they prioritized?

2 Methods and Materials

The methodology of this research is a fundamental-applied study in terms of its goal, involving deep and systematic analysis of texts and interviews in the qualitative part and a descriptive-survey study in the quantitative part. In this section, the research method is based on interviews.

In the qualitative part, the statistical population consists of 20 experts from Iranian government organizations and university experts and professors who have the following characteristics:

University Experts:

- Professors or faculty members of universities.
- Hold at least a master's degree.
- Engage in research and activities in the fields of digital transformation and organizational culture.
- Have authored books or conducted research on the Fourth Industrial Revolution and cultural development.

Experts from Tehran's Government Organizations:

- Have at least 10 years of work experience or 3 years of management experience in government organizations.
- Preferably hold at least a bachelor's degree.

In the quantitative part, the statistical population consists of 335 managers and employees of Iranian government organizations, selected as samples using stratified random sampling. Additionally, in the multi-criteria decision-making section, the opinions of 10 experts were utilized. Data collection methods in this research include library and field methods. In the qualitative section, interview text analysis was used to identify indicators. Finally, based on expert surveys, the research model and researcher-made questionnaire were developed. The quantitative section relied on both descriptive statistics with coding and inferential statistics, including one-sample t-test and structural equation modeling (confirmatory factor analysis) using SPSS-v21 and Smart PLS-v2 software. The fuzzy AHP technique was also used to prioritize the components.

3 Findings and Results

The qualitative participants in this study included 20 academic experts and specialists proficient in the subject of the Fourth Industrial Revolution and organizational culture. At this stage, using the meta-synthesis method with a systematic review and PRISMA model approach, and through thematic analysis, the components of cultural development compatible with the Fourth Industrial Revolution were identified. The following steps were followed for this purpose:

In the process of searching articles, initial constraints were applied in terms of temporal domains (domestic and international), spatial domains (domestic and international databases), research nature (synthesis, review, qualitative, and quantitative), and thematic scope (keywords for search). Then, the screening process was conducted in two stages: coarse and fine screening.

According to the PRISMA model, after screening, 18 articles were finally selected, whose quality was reviewed and analyzed. The results of the search for all journals related to cultural development compatible with the Fourth Industrial Revolution indicate that between 2000 and 2022, only 18 articles with the meta-synthesis approach and without meta-synthesis were published in this domain using the keywords culture, development, and the Fourth Industrial Revolution. The overall quality alignment of the reviewed articles with the 27-item PRISMA checklist criteria was estimated to be 64%. The most significant quality deficiencies were found in the methods section of the articles, estimated at 54%.

Table 1

Chi-Square Test Results on the Role of Researcher's Field, Publication Year, and Number of Authors in the Quality of Article Reports

Variable	Chi-Square Statistic	Degrees of Freedom	Significance Level	Result
Researcher's Field	0.69	1	0.41	No Difference
Publication Year	0.54	9	0.57	No Difference
Number of Authors	0.78	4	0.35	No Difference

Based on the chi-square test and Table 1, it can be concluded that the quality of articles authored by researchers from both organizational and behavioral management fields did not differ ($p=0.41$). Similarly, the quality of article reports did not show any significant statistical differences across different years ($p=0.57$). Additionally, the number of

authors did not have a significant impact on the quality of article reports ($p=0.35$).

Ultimately, either all articles are of suitable quality or high quality since the quality percentage for each item is either above 75% or between 50% and 75%. If the quality

percentage achieved was less than 50%, it could be stated that the quality of the respective item is low.

Given the obtained kappa coefficient (0.56), it can be concluded that the evaluation results by two assessors are appropriate.

The next step involves analysis and synthesis to identify the behavioral components of investors for managing investment portfolio risk. Then, the indicators extracted from the meta-synthesis are obtained.

For data analysis in the qualitative section, thematic analysis was used. The coding process, which includes three stages of open, axial, and selective coding, was applied for the indicators reviewed in the meta-synthesis and the indicators derived from interviews. The final coding from this process is presented in Table 2, including the interview codes and the sources of the codes.

Table 2

Selective Coding

Component	Indicator	Source	Interviewee Code
Organizational Structure	Innovative Culture	Wallach (1983), Ulakatan & Ulankus (2017), Ziaei Nafchi (2019)	I1, I18, I20, I8, I16
	Business Readiness	Chunsawat & Chupadang (2020)	-
	Flexible Policies and Regulations	Shamim et al. (2017)	-
	Readiness for Change	-	I3, I9, I15, I14
	Organic Structure	Shamim et al. (2017)	I17
	Support for Organizational Creativity	Ziaei Nafchi (2019)	-
	Adapting Innovative Processes	Shamim et al. (2019)	I19
	Sufficient Resources	Oduwani et al. (2019)	-
	Organizational Agility	-	I7, I9, I17, I16
	High-Performance Culture	-	I8, I12, I11
Strategic Thinking	Customer-Centric Culture	-	I18, I3, I5
	Continuous Improvement	Lee et al. (2018)	-
	Openness in Data Management Methods	Lee et al. (2018)	I9, I17
Innovation	Agile Planning	-	I20, I19, I6
	Forward-Looking and Evolutionary Vision	-	I10, I2, I5, I19
People	Innovative Culture	Wallach (1983), Ulakatan & Ulankus (2017), Ziaei Nafchi (2019)	I16
	Governance of Innovative Attitude Creativity	-	I15, I17, I20
Leadership	Cultural Aspects of Employees	Lanza et al. (2015), Roden et al. (2010)	I3, I5, I8
	Multiskilled Employees	-	I11
	Employees with Problem-Solving Ability	-	I16, I9, I15
	Technologically Mature Employees	-	I13, I20
	Open-Mindedness	Veal et al. (2019)	-
	Employee Empowerment	Shamim et al. (2017)	I15
	Skilled and Competent Employees	Oduwani et al. (2019)	I12
	High-Level Human Interaction	-	I6, I8, I9, I10
	Teamwork	Shamim et al. (2017)	I1
	Workforce Ability to Adopt New Technology	Lee et al. (2018)	-
Technical Systems	Network Leadership	-	I13, I17, I9, I20
	Supportive and Nurturing	-	I1, I5, I9, I19
	Risk-Taking and Patient Leader	-	I20, I7, I13
Existence of Digital Technologies	Organizational Training	Shamim et al. (2019)	I14
	Technological Environmental Awareness	-	I6, I16, I18, I9
	Existence of Digital Technologies	Han (2020), Porter et al. (2014)	-

In the quantitative section, demographic information of the subjects was described based on educational qualification, age, gender, and teaching experience. 49% of the subjects were female and 51% male. 53% were between

30 to 40 years old, 27% between 40 to 50 years old, and 20% over 50 years old. 17% of the subjects had less than 10 years of experience, 67% had between 10 to 20 years of experience, and 16% had over 20 years of experience.

In the inferential statistics section, for conducting hierarchical analysis, pairwise comparisons were first made based on the objective. Pairwise comparison is very simple, and all elements of each cluster must be compared two by

two. For aggregating the experts' views in the fuzzy AHP method, the geometric mean was used. According to the results of aggregating the experts' views, the pairwise comparison matrix is presented as follows.

Table 3

Pairwise Comparison Matrix of Main Research Criteria

S11	S12	S13	S14	S15	S16
1	1	1	0.871	0.786	0.672
1.489	1.273	1.148	1	1	1
1.546	1.254	1.068	1.103	0.900	0.741
1.874	1.389	1.017	1.389	1.149	0.975
1.625	1.301	0.995	1.148	0.967	0.812
1.912	1.533	1.292	0.796	0.651	0.541

After forming the pairwise comparison matrix obtained, the fuzzy sum of each row is calculated. In the final step, defuzzification of the obtained values and crisp number

calculations were performed. The calculations made to determine the priority of the main criteria are as follows.

Table 4

Defuzzification of Normalized Weights Calculated for Main Study Variables

Variable	X1max	X2max	X3max	Defuzzy	Normal
Organizational Structure	0.133	0.132	0.131	0.133	0.129
Strategic Thinking	0.152	0.150	0.149	0.152	0.147
Innovation	0.179	0.177	0.175	0.179	0.173
People	0.159	0.157	0.156	0.159	0.154
Leadership	0.179	0.178	0.177	0.179	0.174
Technical Systems	0.231	0.230	0.228	0.231	0.224

According to the results of Table 4, technical systems with a normalized weight of 0.224 are the top priority. Leadership, with a normalized weight of 0.174, is the second priority. Innovation, with a normalized weight of 0.173, is the third priority. People, with a normalized weight of 0.154, is the fourth priority. Strategic thinking, with a normalized weight of 0.147, is the fifth priority. Organizational structure, with a normalized weight of 0.129, is the sixth priority. The inconsistency rate of the comparisons made is 0.02, which is less than 0.1; therefore, the comparisons made are reliable.

4 Discussion and Conclusion

Based on the results, the components and indicators of cultural development in government organizations compatible with the Fourth Industrial Revolution are as follows:

Organizational Structure includes business readiness, flexible policies and regulations, readiness for change, organic structure, support for organizational creativity,

adapting innovative processes, sufficient resources, organizational agility, high-performance culture, customer-centric culture, continuous improvement, and openness in data management methods. Organizational structure plays a very important role in the cultural development of government organizations and can help shape and enhance organizational culture. Organizational structure determines the tasks and responsibilities of each individual and can determine the level of flexibility and adaptability of the organization. A flexible structure increases the organization's ability to adapt to changes and cultural development. The presence of flexible policies and regulations can direct organizational culture towards flexibility and the ability to adapt to changes. Flexible policies can create a space for innovation and ideation, contributing to organizational cultural development and creating a dynamic environment. Flexible policies can instill in employees the belief that the government organization pays attention to their needs and expectations, which can enhance satisfaction and improve organizational culture.

Additionally, supporting creativity can encourage employees to present new and innovative ideas, contributing to organizational cultural development and increasing the organization's ability to respond to challenges. Supporting creativity can lead to increased participation and cooperation among organizational members, helping to strengthen the culture of cooperation and effective communication within the organization. In this regard, Shamim et al. (2017) in a similar study referred to flexible policies, organic structure, and adapting innovative processes (Shamim et al., 2017). Ziaei Nafchi (2019) also mentioned support for organizational creativity (Ziaei Nafchi, 2019).

Strategic Thinking includes agile planning and a forward-looking and evolutionary vision. Strategic thinking is a systematic and long-term approach to decision-making and performance that involves setting goals, determining strategies, and planning to achieve those goals. This type of thinking can have very important impacts on the cultural development of government organizations. Strategic thinking can help create a systemic and comprehensive perspective on organizational performance and goals, contributing to cultural development and coordination among members. Strategic thinking helps organizations to precisely identify their priorities, aiding cultural development and focus on main objectives. Strategic thinking leads to setting precise strategies and plans to achieve organizational goals, contributing to cultural development and commitment to objectives. Strategic thinking can encourage organizations to be flexible and adaptable to changes, aiding cultural development and increasing organizational adaptability.

Innovation includes an innovative culture, governance of innovative attitudes, and creativity. Innovation in government organizations can have very important impacts on their cultural development. Innovation can encourage organizational flexibility and adaptability to changes, aiding cultural development and increasing organizational adaptability (Parsakia et al., 2023). The innovation process can increase employees' motivation and energy, contributing to cultural development and increasing participation and cooperation among members. Innovation can create a dynamic, creative, and stimulating work environment, aiding cultural development and creating an efficient and dynamic culture. The innovation process can enhance the capabilities and skills of organizational members, contributing to cultural development and increased productivity. Innovation can facilitate organizational

changes and improve organizational culture, leading to a flexible and change-accepting environment.

People includes cultural aspects of employees, multiskilled employees, employees with problem-solving abilities, technologically mature employees, open-mindedness, employee empowerment, skilled and competent employees, high-level human interaction, teamwork, and workforce ability to adopt new technology. Motivated employees and their active participation can significantly influence the cultural development of government organizations. Employees can contribute to creating a positive organizational culture by establishing positive patterns, adapting to organizational values and principles, and demonstrating desirable behaviors. Active participation of employees in decision-making processes and providing constructive ideas can enhance cooperation and effective communication among organizational members. Employees can contribute to organizational cultural development by providing suggestions related to process improvement, waste reduction, and performance enhancement. Enhancing employees' skills, knowledge, and abilities through training and educational courses aids cultural development and increases organizational capabilities. In this regard, Rutten & Gelissen (2010) in a similar study referred to cultural aspects of employees (Rutten & Gelissen, 2010). Shamim et al. (2017) also mentioned employee empowerment and teamwork (Shamim et al., 2017).

Leadership includes network leadership, supportive and nurturing leadership, and risk-taking and patient leadership. Creating an exemplary and correct culture is costly. Organizational culture reflects the leader's attitude. Leaders define and maintain the culture and teach employees how to care for it. Employees' competencies and growth depend on whether the leader fosters a positive or negative culture. The leader's presence in the organization is not merely physical; their way and method permeate the entire organization, with all personnel adhering to their thought frameworks (Koizumi, 2019; Ramaditya & Prihantoro, 2020). Unfortunately, this leader characteristic is sometimes not given special attention in organizations, and many managers, lacking this feature, never step into the realm of leadership. Responsible individuals are present wherever needed, but competent individuals go a step further. Founders and senior managers play a fundamental role in shaping culture. The founders' beliefs, values, goals, and behavior determine the type of expectations the organization has now and in the future, and these beliefs and behaviors are transferred to the

staff by other managers. Employees constantly observe their managers' behavior and remember every important event resulting from management actions. The characteristics of justice, urgency, arrogance, kindness, and other traits of managers influence the formation of organizational culture. This behavior indicates what the organization really expects from them. What matters in employee promotion, how issues should be resolved – all these form the unwritten rules of work that workgroups accept and teach to newcomers, thus perpetuating a culture. Undoubtedly, the most important source of culture creation is the impact of founders. Founders not only choose the fundamental mission and the environmental context in which the new group should operate but also select the members of the group. Often, founders tend to choose their colleagues based on their interest in these ideas. Leaders teach their assumptions to the group through various mechanisms.

Technical Systems include organizational training, technological environmental awareness, and the presence of digital technologies. Culture and education are inherently complementary and separating them is challenging because culture is the product of education, and the educational process is influenced by the semantic system, values, and norms (culture) existing in a society. Technology is also one of the underlying cultural characteristics of humans that must be fully aligned with humans to be effective. Scientists have concluded that the concept of technology can have different uses depending on the application type and the perspectives of those responsible for different cultural domains. For example, an engineer views technology from the perspective of machinery and tools. For an economist, technology means reducing costs and increasing productivity. For an anthropologist, it has a cultural meaning, leading to the conclusion that the purpose of technology is to transform the environment in which they live, and technology is a perspective that plays a decisive role in phenomena discussed on various scales. Information and communication technology undoubtedly has had significant and widespread impacts on societies' economic and social aspects, including cultural exchanges and cultural permeability, as each technology has its specific methods and practices. When people from different cultures use a specific technology for information exchange and communication, they effectively use a nearly common culture, breaking down boundaries and creating a vast and extensive information society, essentially a global village. In this regard, Shamim et al. (2019) in their study referred to organizational training (Shamim et al., 2017). Han (2020)

and Porter et al. (2014) also mentioned the presence of digital technologies (Hahn, 2020; Porter & Heppelmann, 2014).

Ultimately, based on the results, technical systems with a normalized weight of 0.224 are the top priority. Leadership, with a normalized weight of 0.174, is the second priority. Innovation, with a normalized weight of 0.173, is the third priority. People, with a normalized weight of 0.154, is the fourth priority. Strategic thinking, with a normalized weight of 0.147, is the fifth priority. Organizational structure, with a normalized weight of 0.129, is the sixth priority. The Fourth Industrial Revolution, also known as Industry 4.0, has created a significant transformation in the ICT industry and society. This era focuses on significant advancements in automation, data exchange, and intelligent production systems, bringing fundamental changes to production methods, management, and human interaction with industrial technologies. Since information technology (IT) is considered the axis of development for societies and organizations, designing its structure requires deep reflection and contemplation, along with presenting an appropriate model and reviewing existing models in domestic and international organizations. The application of information technology has brought about extensive transformation in administrative affairs and information systems, enabling the electronic transfer of data, documents, and various correspondences through computers and telecommunications networks. Studies and research show a positive two-way relationship between IT investment and institutional returns and human resource productivity. Technology, as a key factor, significantly impacts organizational cultural changes. These changes occur through facilitating communications, increasing efficiency, changing work methods, and creating flexibility in the organization. Technology can also contribute to improving organizational culture by creating a collaborative and innovative work culture, enhancing transparency and easy access to information, changing organizational attitudes and values, and even raising employees' educational levels. Overall, technology can bring attractive improvements to organizational culture, helping the organization better handle daily challenges.

Based on the research findings, several practical suggestions are presented:

- It is suggested that the organizational structure be such that it welcomes environmental changes. A specialized team should analyze the organization's

strengths and weaknesses using SWOT analysis to leverage strengths against changes.

- It is suggested that managers be forward-looking. Identifying potential futures is a very important task. After that, an organization must identify the likely futures, those that are most likely to occur.
- Since innovation is a crucial pillar of development in the organization, it is suggested that leaders and managers periodically hold meetings to encourage employees to present their innovative ideas and plans in line with organizational changes.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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