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Identification of Digital Leadership Components in Universities of Mazandaran Province

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Abstract

The present study aimed to identify the components of digital leadership in the universities of Mazandaran Province. The research was applied in terms of purpose and qualitative with an exploratory mixed design in terms of data nature. Accordingly, in the qualitative phase, based on grounded theory, a descriptive–survey method was used to identify the components of digital leadership in the universities of Mazandaran Province. The statistical population consisted of all experts in the scientific community as well as academic specialists, managers, and planners of universities in Mazandaran Province. The sampling method was theoretical purposive and aligned with the principle of theoretical saturation; thus, 14 individuals were selected as the sample. Data collection in the qualitative part was performed through semi-structured interviews. The validity and reliability of the research were confirmed. Based on the qualitative findings, six key components of digital leadership within the context of higher education were identified. These components were extracted using three-stage coding (open, axial, and selective) and the analysis of more than 60 initial concepts. They represent the main dimensions of the role of academic leaders in the process of digital transformation. Thematic analysis of the qualitative data revealed eleven main components related to innovative organizational culture in the universities of Mazandaran Province. Each component reflects the internal and external mechanisms that influence the institutionalization of innovation in the academic environment. These findings indicate that an innovative organizational culture is not merely the product of macro-level policymaking or managerial decisions but rather the outcome of the dynamic interaction between structural, human, value-based, and technological factors.

Keywords: digital leadership components, university managers, Mazandaran Province

1. Introduction

The rapid acceleration of digital transformation across all sectors has fundamentally reshaped the leadership paradigm in higher education. Universities, as key knowledge-producing and talent-developing institutions, are under increasing pressure to embrace digital strategies not merely as operational tools but as drivers of innovation, competitiveness, and long-term sustainability (Tigre et al., 2024). As technology penetrates teaching, research, and administration, the capacity of academic leaders to guide institutions through complex technological change becomes an essential determinant of organizational resilience and academic excellence (Adie et al., 2024). This dynamic context has given rise to the concept of *digital leadership*

— a multidimensional construct that integrates technological insight, change facilitation, and human-centered strategies to enable institutions to thrive in the digital age (Abidi et al., 2024; Taid et al., 2023).

Digital leadership goes beyond technical proficiency; it requires vision-setting, cultural transformation, and enabling innovation ecosystems within universities. Leaders must anticipate technological disruptions, align digital initiatives with institutional missions, and inspire stakeholders to adopt and adapt to new digital practices (Anwar, 2025; Gilli et al., 2024). This shift moves leadership focus from transactional IT management toward transformational, future-oriented guidance that integrates technology into every strategic and operational layer (klein, 2020). In this sense, digital leadership is deeply linked to organizational learning and cultural evolution, ensuring that technology adoption translates into sustainable institutional development rather than isolated digital projects (Ruel et al., 2020; Sander, 2020).

One of the most important strategic priorities in higher education is fostering an innovative organizational culture that encourages experimentation, agility, and creative problem-solving (Seyedalitabar, 2022; Tarigan et al., 2024). Research shows that technology adoption alone does not guarantee meaningful change; rather, it is the interplay between digital leadership and a culture that values innovation, collaboration, and continuous improvement that drives success (Mallazehi et al., 2021; Rahmanitabar et al., 2024). Innovative organizational culture provides psychological safety for risk-taking, encourages knowledge sharing, and aligns core institutional values with creativity and change (Hashim et al., 2022; Wang et al., 2022). Without an intentional cultural shift, digital transformation efforts risk stagnation, resistance, and fragmented impact (Sharifian et al., 2021).

In this evolving landscape, universities in emerging economies face unique challenges and opportunities. Institutions in contexts such as Mazandaran Province, where digital transformation is advancing but unevenly institutionalized, need leadership models that reflect both global digital trends and local cultural and organizational dynamics (Ahmadi et al., 2023). The literature increasingly emphasizes that digital leadership competencies are context-sensitive and must integrate an understanding of social norms, academic governance structures, and the specific technological maturity of institutions (Nasrun, 2025; Susilowati, 2025). For instance, while visionary digital roadmaps and agile change management are critical everywhere, their implementation strategies may vary depending on institutional readiness, existing digital infrastructure, and cultural acceptance of change (Asfahani, 2025; Ertanto et al., 2025).

Several studies have attempted to define and operationalize the core components of digital leadership in higher education. Recent frameworks identify key domains such as digital vision and strategy, change management, technological competence of leaders, and the empowerment of academic staff to participate in digital innovation (Jaenudin et al., 2023; Li, 2024; Taid et al., 2023). These components collectively describe leaders who are not only technologically savvy but also capable of translating digital trends into academic value — enhancing student learning, research impact, and administrative efficiency (Adie et al., 2024; Gilli et al., 2024). For example, digital leaders establish forward-looking strategies aligned with the university mission, foster a culture that tolerates experimentation and learning from failure, and build cross-institutional networks to share digital resources and expertise (Mallazehi et al., 2021; Tigre et al., 2024).

At the same time, digital transformation in universities is inseparable from human resource development and empowerment. Employees and faculty members require continuous upskilling in digital literacy and must be given autonomy to innovate with technology in their own domains (Abidi et al., 2024; Nasrun, 2025). This requires leaders to design professional development pathways, provide accessible digital infrastructure, and cultivate intrinsic motivation for technology-enabled creativity (Asfahani, 2025; Ertanto et al., 2025). Moreover, collaborative digital ecosystems — including virtual platforms, interdisciplinary teams, and knowledge-sharing networks — are necessary to break down silos and accelerate institutional learning (Anwar, 2025; Susilowati, 2025). These practices link digital leadership directly with organizational agility and responsiveness to emerging challenges (Taid et al., 2023; Tarigan et al., 2024).

Importantly, building an innovative organizational culture under digital leadership requires deliberate alignment between formal structures and informal values. Formal mechanisms such as reward systems for creativity, structured feedback loops, and integration of innovation into quality assurance processes play a key role (Ruel et al., 2020; Seyedalitabar, 2022).

Simultaneously, informal cultural attributes — psychological safety, opportunity-oriented thinking, and positive risk-taking — empower faculty and staff to explore new approaches without fear of failure (Hashim et al., 2022; Wang et al., 2022). Studies show that when digital leadership explicitly connects institutional strategy with these cultural enablers, the likelihood of sustained innovation significantly increases (Adie et al., 2024; Sharifian et al., 2021).

Despite the growing global body of research, there remains a gap in localized, empirically validated models of digital leadership and innovative organizational culture in non-Western higher education systems (Ahmadi et al., 2023; Mallazehi et al., 2021). Much of the existing literature is conceptual or focused on business contexts (klein, 2020; Sander, 2020), leaving a need for grounded studies that capture the lived experiences of university leaders and staff navigating digital change in culturally specific environments. Moreover, digital transformation is not a one-size-fits-all process; variations in governance structures, funding, and cultural norms shape how digital leadership should be enacted (Amtu et al., 2021; Hashim et al., 2022). Addressing this gap is critical for universities aiming to systematically integrate digital leadership into strategic planning and organizational development (Nasrun, 2025; Susilowati, 2025).

This study responds to these theoretical and practical needs by identifying the key components of digital leadership and their relationship to innovative organizational culture in universities of Mazandaran Province.

2. Methods and Materials

The research was applied in terms of purpose and qualitative of an exploratory type regarding data. In the qualitative approach, purposive sampling and a descriptive survey method were employed. At this stage, theoretical foundations, relevant studies, and prior research were reviewed, analyzed, and organized using a systemic perspective. The main objective of this stage was to explore and examine the concepts and categories related to digital leadership and innovative organizational culture and to design the questionnaire for the quantitative part. Therefore, this stage aimed to identify the components of digital leadership and innovative organizational culture through semi-structured individual interviews with scientific experts who were purposively selected. The necessary qualitative data were collected and analyzed using content analysis as a research technique to identify and examine the main and sub-categories, factors, and concepts. These concepts, factors, and categories served as the basis for developing the research instrument (questionnaire) to identify the influencing factors and understand the dimensions and components of the model for explaining the role of digital leadership in shaping an innovative organizational culture in the Islamic Azad Universities of Mazandaran Province. The outcome of this part was a set of dimensions, fundamental components, and indicators of digital leadership and innovative organizational culture. Thus, at this stage, a **qualitative investigation** was carried out.

The statistical population in this part of the study included scientific experts, specialists, managers, and academic planners with executive experience in decision-making related to innovative organizational culture and digital leadership, known as informed experts. This group was selected to participate in the qualitative part of the research and took part in the interview process. The sample size and sampling method in the qualitative section were determined using purposive sampling based on the principle of theoretical saturation. When the aim of the interview is to explore and describe the beliefs and attitudes of interviewees, it is possible, depending on time and available resources, to use between 10 to 25 participants for interviews. In this study, 14 participants were selected as interviewees.

Data collection in this research was conducted in two ways: first, a library-based method; and second, semi-structured interviews in the qualitative part. In the individual interviews, six preliminary interview questions were used for exploration. In the qualitative part, two tools were used for data collection: note-taking forms and semi-structured interviews to identify the dimensions and components of digital leadership and innovative organizational culture. By reviewing theoretical foundations and previous research, initial note-taking was performed, and through their categorization, the fundamental components and indicators were identified. Through semi-structured interviews with experts and achieving the necessary agreement, the final dimensions, components, and indicators for digital leadership and innovative organizational culture were determined. The number of interview questions used was six.

To ensure the validity of the qualitative section and verify the accuracy of the findings from the researcher's perspective, the valuable opinions of faculty members familiar with this field and organizational-academic specialists who were

knowledgeable and experienced in this area were utilized. Simultaneously, participants were involved in analyzing and interpreting the data to ensure trustworthiness. Content analysis was used to analyze the qualitative data. In this design, the stages of analyzing the collected qualitative data were conducted in two phases: open coding and axial coding.

In the first stage, the main dimensions and components were refined and conceptual codes were generated through open and axial coding of the data derived from the semi-structured interviews. The priority of each factor was determined based on the frequency of the concepts mentioned in the interviews. Concepts were the primary units of analysis for open and axial coding. During detailed data analysis, the concepts were directly derived from the interview transcripts of participants or were formed by identifying common patterns of use. The transcripts were systematically reviewed to discover main and sub-categories and to determine their importance and priority.

3. Findings and Results

In this section, the qualitative data obtained from semi-structured interviews are analyzed, and the results of qualitative data analysis and their relationship with the research questions are examined. For coding and analyzing the qualitative data, the grounded theory method was employed, which included three stages: open coding, axial coding, and selective coding. In the present study, MAXQDA 2020 software was used for coding and analyzing the data and, ultimately, for identifying and categorizing the dimensions and concepts of the conceptual model of the role of digital leadership in forming an innovative organizational culture in universities. This process was carried out step by step as follows:

Open coding is the first stage of analysis in grounded theory with the Strauss and Corbin approach, during which the data are broken down into smaller elements called “initial concepts.” The purpose of this stage is to discover key concepts within the data without relying on a specific theoretical framework. In the present research, concepts related to digital leadership and innovative organizational culture in universities were extracted from raw data (interviews, documents, and specialized texts) and were classified as initial codes.

In the axial coding stage, the concepts extracted in the previous stage were compared, analyzed, and organized around “core categories” or “intermediate-level components.” This stage aimed to create meaningful connections among the open codes and to identify recurring patterns within the data.

Table 1. Open and Axial Coding of Digital Leadership and Innovative Organizational Culture Dimensions in Universities

Open Coding (Initial Concepts)	Axial Coding (Components)
Future-oriented design, digital transformation, defining a digital mission, clearly articulating the strategic direction of technology, inspiring employees digitally, forecasting technological changes, mapping the digital roadmap, linking technology goals to the overarching vision, encouraging the organization toward technological transformation, deep understanding of the future position of technology in higher education, strategic ability to align digital programs with the university mission	Digital Vision and Strategy
Reducing psychological resistance to technological innovation, managing conflicts caused by digital change, guiding employees through the digital transformation process, applying a gradual approach to implementing change, creating organizational readiness for technological change, monitoring and adjusting operational processes along the digital pathway, providing psychological support to employees during change, shaping a transformation-oriented mindset among employees, flexible management in rapid technological shifts, strengthening organizational resilience to digital shocks	Digital Change Management
Mastery of current and emerging technologies, continuous learning in the digital field, ability to analyze data for decision-making, systematic understanding of smart infrastructures, creative use of technology to solve problems, effective use of digital tools in management, constant updating of specialized technological knowledge, competency in integrating technology with organizational goals, using technology to create added value, deep understanding and management of data security	Technological Competence of Leaders
Creating a technology ecosystem for innovation, supporting experimentation with technological ideas, designing infrastructure for digital creativity, facilitating the development of innovative services and products, encouraging employees to take technological risks, providing a mental space for innovation, policy-making to promote digital innovation, developing innovative digital platforms, offering financial and moral support for technological projects, fostering a trial-and-error culture in the digital environment	Digital Innovation
Increasing access to digital learning resources, providing developmental feedback on technological performance, teaching 21st-century technological skills, empowering technology-driven decision-making, creating digital career growth pathways, developing employees’ software and analytical capabilities, supporting autonomy in technology-based projects, encouraging individual creativity in digital environments, implementing project-based digital learning, fostering intrinsic motivation for learning technology	Employee Empowerment in the Digital Domain
Strengthening cross-departmental communications through technology, leveraging digital networks for synergy, using knowledge-sharing platforms, promoting a culture of online collaboration, participating in consortia and technological communities, developing interdisciplinary interactions with digital tools, using academic social networks, integrating	Digital Collaboration and Networking

communication tools at the university level, facilitating joint projects with communication technology, expanding specialized virtual networks within the university	
Strategic orientation toward the future of innovation, envisioning a creative university horizon, delivering a clear innovation message in the organizational mission, aligning organizational values with innovation, organizational commitment to knowledge creation, fostering creativity in strategic vision, embedding innovative mindsets in top-level documents, promoting a mission of continuous learning and innovation	Innovative Vision and Mission
Culture of encouragement, free ideation, reward systems for innovation, securing financial resources for creative projects, managerial support for new ideas, reducing fear of failure in the innovation process, motivational structures for new experiments, acceptance of creative feedback, providing psychological safety for innovators	Support and Encouragement of Innovation
Learning from successful and unsuccessful experiences, documenting organizational knowledge, transferring creative experiences among colleagues, developing innovation-based learning programs, enhancing employees' innovation literacy, problem-based organizational learning, periodic evaluation, learning and sharing knowledge development within internal forums	Organizational Learning and Personal Development
Quick response to environmental changes, flexibility in administrative and operational procedures, decision-making based on creative thinking, removing bureaucratic barriers to innovation, creating agile structures for responding to change, flexibility in policy-making and implementation, using participatory decision-making for innovation, turning environmental threats into opportunities	Responsiveness, Flexibility, and Innovative Decision-Making
Interdepartmental networking for innovation, forming creative interdisciplinary teams, encouraging constructive interactions among colleagues, exchanging ideas in collaborative spaces, joint projects between faculty and staff, utilizing brainstorming sessions, supporting innovative team leaders, creating shared workspaces	Teamwork and Collaboration
Linking innovation to quality assessment, developing the learning–improvement cycle, applying innovation to enhance performance, continuous use of data for improvement, focusing on improving educational and research effectiveness, analyzing feedback to identify innovative opportunities, integrating innovation with total quality management, commitment to sustainable development through innovation	Commitment to Quality and Continuous Improvement
Institutionalizing belief in innovation within the university culture, valuing positive risk-taking, promoting an opportunity-oriented view of change, forming a creative organizational identity, fostering innovative organizational discourse, formalizing values in support of innovation, encouraging problem-solving mindsets, positioning innovation within the organization's professional ethics	Innovative Values and Norms

In the end, from a total of 200 initial concepts, after screening and eliminating duplicate items, 112 concepts were extracted and then classified into 13 components (Digital Vision and Strategy, Digital Change Management, Technological Competence of Leaders, Digital Innovation, Employee Empowerment in the Digital Domain, Digital Collaboration and Networking, Innovative Vision and Mission, Support and Encouragement of Innovation, Organizational Learning and Personal Development, Responsiveness, Flexibility and Innovative Decision-Making, Teamwork and Collaboration, Commitment to Quality and Continuous Improvement, Innovative Values and Norms) and 2 overarching dimensions (Digital Leadership and Innovative Organizational Culture in universities) (Table 2).

Table 2. Selective Coding of Digital Leadership and Innovative Organizational Culture Dimensions in Universities

Axial Coding (Components)	Selective Coding
Digital Vision and Strategy	Digital Leadership
Digital Change Management	
Technological Competence of Leaders	
Digital Innovation	
Employee Empowerment in the Digital Domain	
Digital Collaboration and Networking	
Innovative Vision and Mission	Innovative Organizational Culture
Support and Encouragement of Innovation	
Organizational Learning and Personal Development	
Responsiveness, Flexibility and Innovative Decision-Making	
Teamwork and Collaboration	
Commitment to Quality and Continuous Improvement	
Innovative Values and Norms	

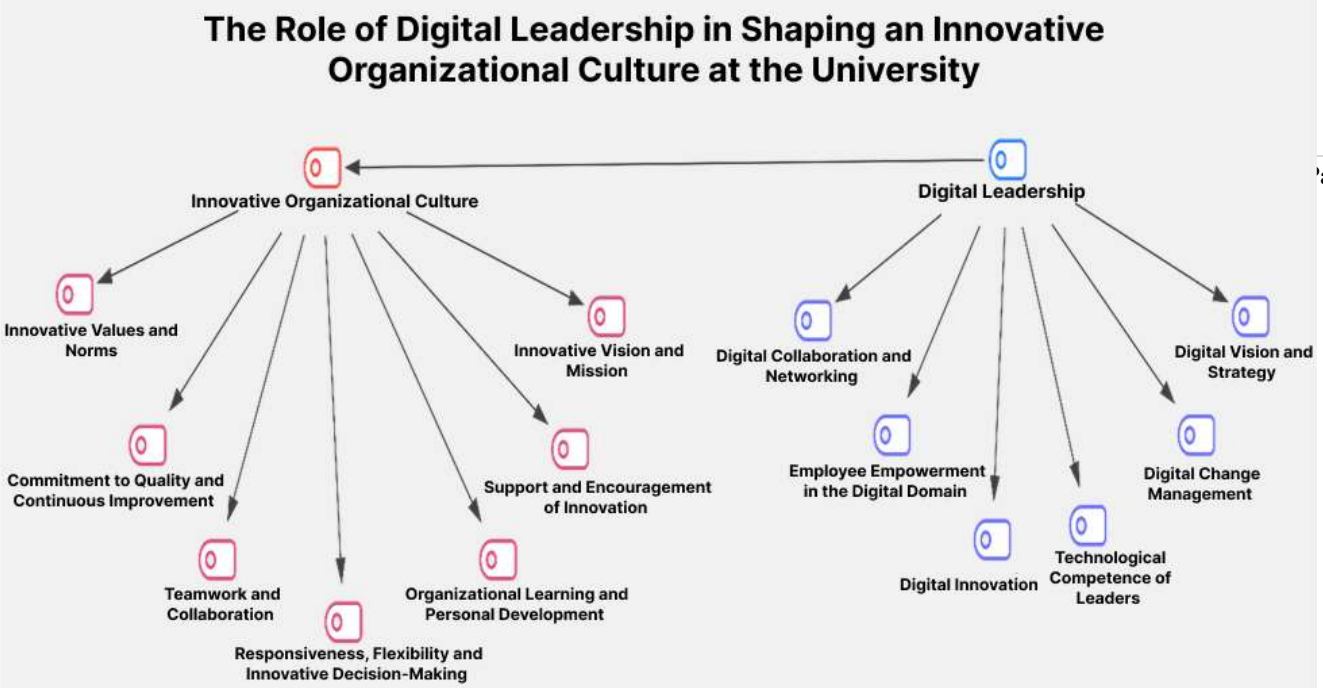

Figure 1. Conceptual Model of the Role of Digital Leadership in the Formation of an Innovative Organizational Culture in Universities (Qualitative Analysis Using MAXQDA Software)

For instrument development and questionnaire design for use in the quantitative phase, a researcher-made questionnaire was subjected to validity and reliability assessment. Twelve experts in innovative organizational culture and digital leadership, including university professors and faculty members, participated under the close supervision of academic advisors and supervisors.

Research Question 1: What are the components of digital leadership in the universities of Mazandaran Province?

The findings from qualitative data analysis showed that digital leadership in the universities of Mazandaran Province comprises multiple dimensions forming six key components. These components emerged from merging more than 60 initial concepts through the process of open, axial, and selective coding. They were directly derived from the perspectives of academic experts, with each representing a dimension of the role of leaders in the digital era within the context of higher education. The components are presented and explained as follows:

1. **Digital Vision and Strategy**: This component refers to leaders' ability to design a digital roadmap, forecast technological changes, align technological goals with the university's overarching mission, and inspire the academic body. Such leaders are future-oriented and integrate technological transformations into university policymaking Example statement from experts: "University leaders should be able to see technology as serving the university's overarching goals; that means the university mission should be defined with a digital perspective from the start."
2. **Digital Change Management**: This component includes leaders' skills in guiding universities through technological changes, managing conflicts resulting from these changes, reducing psychological resistance, and building organizational readiness for the future Example statement from experts: "In our experience, there was significant resistance to technology; a manager should reduce this resistance through a gradual approach and psychological support."
3. **Technological Competence of Leaders**: This includes leaders' mastery of current and emerging digital tools and technologies, knowledge of data analytics and cybersecurity, continuous learning, and the ability to apply technology to organizational decision-making Example statement from experts: "A university president who uses digital tools only at a basic level cannot convince others to embrace change."
4. **Digital Innovation**: This component emphasizes leaders' ability to create an environment and supportive policies for developing technological ideas, providing infrastructure for digital innovation, and encouraging technology-driven

creativity Example statements from experts: “If there is no trial-and-error culture, no innovation in technology will emerge.” “A leader should pay attention to digital projects even in their pilot stages; this is where innovation begins.”

5. **Employee Empowerment in the Digital Domain**: Leaders should provide an environment where staff and faculty can improve their digital skills, experience technological creativity, and participate in learning processes Example statement from experts: “When you give colleagues the opportunity to be creative in technology-driven projects, their motivation and interest in technology increase.”
6. **Digital Collaboration and Networking**: Digital leaders create technology-based connections, leverage scientific networks, and use online collaboration tools to generate both internal and external synergy within the university Example statement from experts: “Digital leadership means creating a platform for technological interaction; through academic social networks, webinars, and knowledge-sharing platforms.”

In summary, university digital leaders are those who, alongside technological competencies, possess the ability to manage change, provide strategic inspiration, and empower human resources along the path of digital transformation. This approach creates a favorable foundation for the formation of an innovative organizational culture.

Research Question 2: What are the components of an innovative organizational culture in the universities of Mazandaran Province?

Based on qualitative data analysis, innovative organizational culture in the studied universities consists of eleven main components. These components resulted from integrating more than 70 initial concepts through coding stages and thematic analysis. Each component describes an aspect of attitudes, behaviors, values, and norms that drive organizational innovation.

1. **Innovative Vision and Mission**: An innovative culture becomes sustainable when foundational values and the university’s mission documents explicitly emphasize innovation Example statement from experts: “If innovation is not embedded in the university’s fundamental values, it remains just a slogan.”
2. **Support and Encouragement of Innovation**: Organizations that allow innovators to make mistakes, provide resources to test ideas, and define innovation rewards create a fertile ground for creativity Example statement from experts: “For innovation, there must be encouragement structures, psychological safety, and reward systems, not just criticism of mistakes.”
3. **Organizational Learning and Personal Development**: Sharing experiences, learning from failures and successes, collaborative learning programs, and fostering individual creativity build the foundation for innovative learning Example statement from experts: “When colleagues share their innovative experiences in internal meetings, motivation for learning increases.”
4. **Responsiveness, Flexibility, and Innovative Decision-Making**: In an innovative culture, the organization can respond quickly, remove inefficient processes, and make creative decisions Example statement from experts: “The university must be able to align its structure with environmental changes; it should not always react with delay.”
5. **Teamwork and Collaboration**: Cross-departmental collaboration, joint projects, brainstorming, and interdisciplinary interaction form the basis of an innovative culture Example statement from experts: “We formed multidisciplinary teams at the university, resulting in innovative projects that were previously impossible.”
6. **Commitment to Quality and Continuous Improvement**: An innovative culture must have a direct link to quality and improvement through data-driven approaches, feedback, and continuous learning cycles Example statement from experts: “Analyzing feedback and using data helped us turn weaknesses into opportunities for innovation.”
7. **Innovative Values and Norms**: Cultural and value-based roots of the organization must support innovation, positive risk-taking, problem-solving mindsets, and an opportunity-oriented approach to change Example statement from experts: “Innovation must be part of the university’s culture and identity; everyone must believe that positive change is a core value.”

Innovative organizational culture results from embedding a set of beliefs, attitudes, and supportive mechanisms that materialize through interaction with digital leadership. Universities with active digital leadership possess the greatest capacity for developing and sustaining an innovative culture.

4. Discussion and Conclusion

The findings of this study revealed a multidimensional structure for digital leadership in universities of Mazandaran Province, represented by six key components: digital vision and strategy, digital change management, technological competence of leaders, digital innovation, employee empowerment in the digital domain, and digital collaboration and networking. Together, these components reflect how academic leaders can navigate the complexity of digital transformation while aligning technology-driven initiatives with institutional missions and cultural contexts. These results confirm and expand previous theoretical frameworks, which have conceptualized digital leadership as an integration of strategic foresight, technological understanding, and human-centered change facilitation (Adie et al., 2024; Tigre et al., 2024). The emphasis on building a digital vision and aligning it with the broader mission of the university resonates with global studies showing that the most successful digital leaders articulate a future-oriented narrative and connect technology adoption with long-term academic value creation (Gilli et al., 2024; Li, 2024).

One of the most important contributions of these results is the clear identification of *digital change management* as a critical leadership domain. Participants highlighted the need for reducing psychological resistance, providing gradual transition strategies, and fostering organizational readiness — insights that strongly align with the work of (Nasrun, 2025), who argued that without systematic change management, digital initiatives often encounter entrenched cultural barriers. Similarly, (Susilowati, 2025) emphasized that digital transformation is inherently disruptive and requires leaders to create psychological safety and resilience among staff. These findings also reinforce (Sander, 2020) and (klein, 2020) who argue that leadership in the digital era is as much about adaptive and emotional intelligence as it is about technical expertise. Our data show that change resistance among faculty and staff can be addressed by empathetic leadership and continuous engagement, which creates a bridge between innovation goals and human concerns.

Another strong theme was *technological competence of leaders*. The study found that without sufficient mastery of digital tools, data analytics, and cybersecurity, leaders cannot effectively guide or inspire their teams. This is consistent with (Abidi et al., 2024) and (Ahmadi et al., 2023), who identified technological literacy as a prerequisite for credible and persuasive digital leadership in academic settings. (Ertanto et al., 2025) also demonstrated that digital skill gaps in leadership directly affect employees' commitment and engagement, which are essential for sustaining transformation. Additionally, (Asfahani, 2025) showed that in remote and hybrid educational contexts, leaders with strong digital competencies are better equipped to integrate technological tools into decision-making and performance improvement. The present research supports these assertions by showing how faculty perceive leaders with strong technological fluency as role models, which reduces skepticism and fosters trust in digital strategies.

The emergence of *digital innovation* as a core component underscores the dual role of leaders as both strategic visionaries and cultural architects. Our analysis highlights the importance of fostering an experimental mindset, providing resources for pilot projects, and legitimizing failure as part of the learning process. These results support (Seyedalitabar, 2022) and (Wang et al., 2022), who noted that innovation-driven cultures arise when leadership actively dismantles bureaucratic barriers and encourages creative exploration. (Tarigan et al., 2024) also emphasized that leaders who integrate innovation into strategic goals achieve better institutional adaptability and performance. (Mallazehi et al., 2021) specifically argued that higher education leaders in Iran must deliberately embed innovation values in planning and policies to overcome conservative academic structures — a finding echoed in this study's context.

Employee empowerment in the digital domain emerged as another pivotal factor. The results demonstrated that when faculty and staff are given opportunities for skill development, creative engagement, and digital autonomy, motivation to participate in transformation increases. This aligns with (Anwar, 2025) and (Nasrun, 2025), who both found that empowerment fosters proactive digital behaviors and institutional sustainability. (Adie et al., 2024) similarly concluded that distributed digital leadership — where leaders empower rather than control — strengthens collective capacity for change. Moreover, (Taid et al., 2023) and (Jaenudin et al., 2023) confirmed that psychological empowerment mediates the relationship between leadership style and effective digital teaching, showing the practical benefits of empowering employees. Our participants' emphasis on

individualized growth opportunities and project-based digital learning reflects these insights and points to the need for structured, ongoing faculty development programs.

The theme of *digital collaboration and networking* also reflects a global consensus on the necessity of breaking down organizational silos in digital transformation. Leaders who cultivate internal and external networks, use digital platforms to enhance cooperation, and engage in interdisciplinary exchanges create a more innovative and resilient academic environment (Amtu et al., 2021; Ruel et al., 2020). The study's findings mirror the perspective of (Sharifian et al., 2021), who showed that digital identity models in smart government rely heavily on leadership's ability to create collaborative digital ecosystems. Additionally, (Susilowati, 2025) indicated that cross-boundary digital collaboration is critical to scaling change initiatives and maintaining momentum. Our data show that academic leaders in Mazandaran perceive networking — both within the university and across institutions — as vital for knowledge exchange and resource optimization.

Beyond digital leadership itself, the second part of the study illuminated the structure of *innovative organizational culture*, identifying eleven components: innovative vision and mission, support and encouragement of innovation, organizational learning and personal development, responsiveness and flexible decision-making, teamwork and collaboration, commitment to quality and continuous improvement, and innovative values and norms, among others. These findings build on existing frameworks linking leadership to cultural change (Mallazehi et al., 2021; Seyedalitabar, 2022). For example, (Wang et al., 2022) argued that culture mediates the relationship between digital leadership and exploratory innovation by shaping risk-taking behaviors and knowledge sharing. Our results confirm that without cultural reinforcement — such as reward systems, safe experimentation, and shared values — digital strategies may fail to translate into sustainable change.

Moreover, this research offers a context-specific contribution. While many studies discuss the theoretical link between digital leadership and innovative culture, empirical work grounded in non-Western, higher education contexts is scarce (Ahmadi et al., 2023; Rahmanitabar et al., 2024). The lived experiences of Iranian academic leaders provide nuanced insights into how socio-cultural factors, such as hierarchical governance and risk aversion, influence digital transformation. This aligns with the argument of (Gilli et al., 2024) that leadership models must adapt to local traditions and organizational maturity. Similarly, (Adie et al., 2024) and (Tigre et al., 2024) stressed the importance of developing flexible, multi-method approaches to digital leadership research to capture diverse contexts.

The synthesis of digital leadership and innovative culture emerging from this study supports a systems perspective: effective digital transformation is not the product of technology adoption alone but of a reinforcing cycle where leadership fosters culture and culture amplifies leadership initiatives (Ruel et al., 2020; Tigre et al., 2024). This integrated model aligns with (Li, 2024) and (Tarigan et al., 2024), who argue that educational institutions should view leadership and culture as interdependent levers for performance improvement. It also provides empirical backing for (Anwar, 2025) who claimed that digital leaders create competitive advantage not simply by deploying technology but by embedding innovation capacity within organizational DNA.

By combining international theoretical perspectives with local empirical insights, the study advances both scholarship and practice. It provides a detailed conceptual map that universities in Mazandaran — and comparable contexts — can use to guide digital transformation strategies. Furthermore, it confirms that digital leadership must be approached holistically, integrating strategic foresight, technological competence, cultural engineering, and human empowerment (Abidi et al., 2024; Susilowati, 2025). These contributions are especially timely as higher education institutions worldwide confront rapid technological advances and the need for organizational agility.

Despite its valuable insights, this study has some limitations that should be acknowledged. The research relied on a qualitative exploratory design, which, while suitable for concept development and in-depth understanding, limits generalizability. The sample consisted of a relatively small group of academic experts and leaders within Mazandaran Province; therefore, the findings may not fully capture the diversity of perspectives across other regions or types of universities. Additionally, while the coding and thematic analysis process was rigorous, it is inherently interpretive and may reflect researcher subjectivity. Another limitation is the dynamic nature of digital technologies: leadership competencies and cultural enablers may evolve rapidly, potentially outpacing the findings if not regularly revisited. Finally, the study focused primarily on leadership and cultural factors and did not include quantitative validation or performance outcomes, which could have strengthened its practical applicability.

Future studies could expand this work by employing mixed-methods or large-scale quantitative approaches to validate and refine the proposed model of digital leadership and innovative culture. Researchers should test the relationships among identified components, such as the mediating role of culture between digital leadership and institutional performance. Comparative studies across regions, types of universities, or international contexts would help determine the transferability of these findings. Additionally, exploring the role of digital leadership in specific subdomains, such as online pedagogy, research innovation, or administrative digitalization, could offer more targeted recommendations. Longitudinal research would also be valuable to examine how digital leadership competencies and cultural dynamics evolve over time as institutions advance in their digital maturity.

University leaders and policymakers should use the identified components as a practical framework for guiding digital transformation. Institutions can invest in developing leaders' technological competencies alongside strategic change management skills. Building capacity for digital empowerment among faculty and staff is crucial, including professional development programs and project-based learning opportunities. Universities should also focus on fostering an innovative culture by aligning values and mission statements with digital aspirations, creating reward systems for creativity, and reducing structural barriers to experimentation. Finally, establishing robust digital networks and partnerships — internally and externally — will help universities accelerate learning, share resources, and remain agile in the face of ongoing technological disruption.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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