Original Article

Designing and validating a digital leadership model in the education system: A case study with a mixed approach

Mostafa Mollazehi [1] iD, Sanjar Salajegheh [1*] iD, Amaneh Firooz Abadi [2] iD, Zahra Shokooh [1] iD

[1] Department of Management, Kerman Branch, Islamic Azad University, Kerman, Iran.

[2] Department of Social Sciences, Bardsir Branch, Islamic Azad University, Bardsir, Iran.

*Corresponding author and reprints: Sanjar Salajegheh, Associate Professor, Department of Management, Kerman Branch, Islamic Azad University, Kerman, Iran.

Email: s.salajeghe@iauk.ac.ir

Abstract

Background: This research aimed to design and validates a digital leadership model in the education system.

Methods: This research was a case study with a mixed qualitative-quantitative approach. The statistical population in the qualitative section was 23 experts in education organization, and in the quantitative section, it was 400 education organization employees in Sistan and Baluchestan province. After semi-structured interviews and qualitative content analysis in MAXQDA software, interview coding was done and primary and secondary categories of the research were identified. The causal relationships between categories were identified by structural-interpretive modeling method and MICMAC software and the model was validated by using the partial least squares technique and SMART PLS software.

Results: A total of 39 secondary categories were categorized into 7 primary concepts including leadership, technological infrastructure, governance structure, strategy development, policy-making, human resource management and digital culture. It was found that governance structure and digital technology infrastructure, as the underlying variables of digital leadership model, directly affects "digital strategy formulation" and digital strategy affects "human resource management" and "digital policymaking". "Digital culture" can also be institutionalized in the organization through digital policymaking and human resource management, and finally "digital leadership" can be achieved.

Conclusion: The present study results can be used by relevant managers in today's dynamic environments that pursue the establishment of digital leadership model in the Iran's education system, especially in Sistan and Baluchestan province.

Keywords: Education; Iran; Leadership; System Analysis.

Introduction

Considering the impact of digitalization on employees and the organization, any action requires alignment between technology, process and employees, and digital leadership (1). In a digital organization, leadership gaps are considered among important challenges (2). Transformational leadership leads to acceptable results in the organization (3) and digital transformation justifies them by filling the gap between user expectations and the real value given to him or her (4). Digital technology is a set of extensive transformations and changes in

organizations and businesses in the areas of activities, processes, capabilities and business models. It allow them to take advantage of opportunities arising from the development and promotion of technology and the resulting changes in their development in different communities and in line with their strategies and priorities (5).

The education system is one of the important areas in any country that needs to keep pace with digital developments. Education system management in the digital age requires new attitudes, skills and knowledge that are gained from the experience of today's situations. This style of leadership seeks to adapt to digital-oriented situations and conditions (6). Studies on health inequalities suggests that the lower the level of education, the worse the health status, since education is one of the strongest indicators of one's socio-economic status. Also, public policy interventions that consider educational deprivation and awareness have a great impact on combating poverty and creating a desirable impact on health by providing public education and health (7).

In the digital transformation of schools, the focus is not only on e-learning methods, but also the management approach of educational organizations should be changed fundamentally. These changes should be at the top of the organizational pyramid, and managers should be at the forefront of the transformation toward digitalization. The implications of these developments are ultimately reflected in the increased capability of students (8). Educational leadership, especially digital leadership, is a key issue in modern educational design. Providing an appropriate answer to this question requires an interactive relationship between digital leadership and educational management. Such a relationship can be established by identifying the appropriate infrastructure (9).

At current, there is no standard package of digital leadership and the Iran's education system, which is responsible for developing the talents, needs a fundamental transformation and change (10). Hence, the present study aimed to provide a model of digital leadership to improve the services of education system in Sistan and Baluchestan.

Methods

The fundamental method was used in this study. It was conducted based on a mixed approach of qualitative (interview) and quantitative (survey). The statistical population in the qualitative section included education experts of Sistan and Baluchestan province. Sample of the study was selected using purposeful and non-probabilistic method. The sampling process continued until theoretical saturation was reached. In this regard, in-depth and semi-structured interviews were performed with 23 experts. In the qualitative phase, experts of education organization of Sistan and Baluchestan province who had academic education were used. Based on the Cochran's formula for an unlimited population, the sample size was estimated at 384 people, which was increased to 400 people given the probability of dropout in samples.

To provide a model of digital leadership in the Iran's education system, in the analysis of research data, qualitative content analysis in MAXQDA software was used. In the interviews, construct validity was established through three tactics: 1. The trinity of interview questions in the research design through two or more practical questions, so that the desired phenomenon is examined from different angles. It means that a qualitative researcher should not use just one question to study the phenomenon in question, but it is better to use several questions to gain a deep understanding of the topic. 2. Analysis of the negative cases in which the interviewer tries to somehow resolve the contradictory explanations interpreted in the data. 3. Flexibility of the

method: In this case, the researcher can re-evaluate the interview program and review its content and processes (content validity).

In qualitative research, external validity is created through theoretical replicability in the interviewee sample. Therefore, experts in various fields were selected to ensure this issue. Accordingly, external validity is appropriate to the elimination or correction of irrelevant dispersions. Reliability test techniques in qualitative research include accurately guiding of the interview to collect data, develop structured processes for conducting and interpreting convergent interviews, and use a specialized committee.

In this study, interpretive structural modeling technique in MICMAC software and its standard questionnaire were used to identify and design the pattern of relationships among the indicators. This technique was used for structuring the elements of indicators that were effective in solving a problem (or improving a system). Finally, the final research model was validated using the partial least squares technique in SMART PLS software.

Results

In the content quality analysis section, the texts of interviews were used to identify indicators related to the design and validation of digital leadership model in the Iran's education system. Interview questions and the primary and secondary categories extracted from the interview texts are presented.

Interpretive-structural modeling

Structural Self-Interaction Matrix (SSIM) was the first matrix in structural-interpretive modeling used to identify the internal relationships between the indicators based on experts' opinions and views. The reachability matrix (RM) was obtained by transforming the structural self-interaction matrix into a zero-one dual-value matrix. After entering the initial reachability matrix by entering the

transitivity in the variables, the final reachability matrix was obtained using Euler's theory in which the adjacency matrix was added to the unit matrix. The following formula shows the method of determining reachability using the adjacency matrix (11):

Equation 1: Determining the final reachability matrix

$$A + I$$
$$M = (A + I)^n$$

Matrix A is the initial reachability matrix of the identity Matrix M is the final reachability matrix. Boolean rules (Equation 3) were used for exponentiation operation.

Equation 2: Boolean rules

$$1 \times 1 = 1; 1 + 1 = 1$$

Thus, to ensure the secondary control relationships and the final reachability matrix, the digital leadership variables and the set of outputs and a set of inputs for each criterion were extracted from the received matrix to determine the relationships and level the criteria. The set of outputs includes the criteria that were affected by it and the set of inputs includes the criteria that affected it the set of two-way relationships of criteria presented in Table 1 Accordingly, the digital leadership (DL) variable was placed in the Level: 1.

After identifying the Level 1 variable(s), this variable(s) was deleted and the set of inputs and outputs was calculated without considering the Level 1 variable(s). The communality set were identified and the variables whose communality was equal to the set of inputs were selected as the Level 2 variables. Digital culture (DC) variables were placed at Level 2. The human resource management (HRM) and digital policymaking (DSM) variables were placed at Level 3. The Digital strategy development variable was placed at Level 4. Finally, the Digital Governance Structure (DGS) and Digital Technology Infrastructure (DTIS) variables were placed.

Table 1. Final reachability matrix of digital leadership variables and the Set of inputs and outputs to determine the level

| Final reachability matrix of digital leadership variables							
TRM	DL	DGS	DC	HRM	DTIS	DPM	DSM
Digital Leadership (DL)	1	0	0	0	0	0	0
Digital Governance Structure (DGS)	1	1	1	1	1	1	1*
Digital Culture (DC)	1	0	1	0	0	0	0
Human Resource Management (HRM)	1	0	1	1	0	0	1
Digital Technology Infrastructure (DTIS)	1	1	1*	1	1	1	1
Digital Strategy Development (DSM)	1*	0	1	1	0	1	1
Digital Policymaking (DPM)	1	0	1	1	0	0	1
Set of inputs and outputs to determine the level							
Research variables	Output: affect		Input: being affected		Communality		
Digital Leadership (DL)	DL		DL, DGS, DC, HRM, DTIS, DSM		DL		
Digital Governance Structure (DGS)	DL, DGS, DC, HRM, DTIS, DPM, DSM		DGS, DTIS		DGS, DTIS		
Digital Culture (DC)	DL, DC		DGS, DC, HRM, DPM, DSM		DC		
Human Resource Management (HRM)	DL, DC, HRM, DSM		DGS, HRM, DTIS, DPM, DSM		HRM, DSM		
Digital Technology Infrastructure (DTIS)	DL, DGS, DC, HRM, DTIS, DPM, DSM		DGS, DTIS		DGS, DTIS		
Digital Strategy Development (DSM)	DL, DC, HRM, DPM, DSM		DGS, DTIS, DPM		DPM		
Digital Policymaking (DPM)	DL, DC, HRM, DSM		HRM, DTIS, DPM, DSM		HRM, DSM		
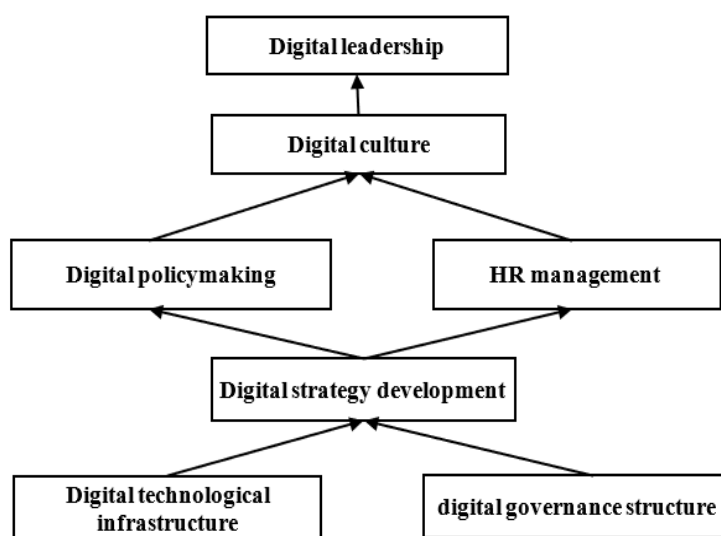
Figure 1. The initial model of digital leadership model in the Iran's education system

at Level 5. The final model of the levels of the identified variables is shown in Figure 1. In this figure, only the significant relationships of the elements of each level on the elements of the lower level as well as the significant internal relationships of the elements of each row have been considered.

According to the structural-interpretive modeling calculations, it was found that the digital governance structure and digital technology infrastructure were the underlying variables of the digital leadership model. These variables are the most influential model variables that directly affect the "digital strategy development". Similarly, digital strategy.

Table 2. Driving force and degree of dependence of research variables

Research variables	Degree of dependence	Driving force	Level
Digital Leadership (DL)	7	1	1
Digital Governance Structure (DGS)	2	7	5
Digital Culture (DC)	6	2	2
Human Resource Management (HRM)	5	4	3
Digital Technology Infrastructure (DTIS)	2	7	5
Digital Strategy Development (DSM)	3	5	4
Digital Policymaking (DPM)	5	4	3

development has an impact on "human resource management" and "digital policymaking". "Digital culture" can also be institutionalized in the organization through digital policymaking and human resource management, and finally "digital leadership" can be achieved. In the ISM model, the interrelationships and effectiveness between the criteria and the relationship between the criteria of different levels are well shown, which leads to a better understanding of the decision-making space by managers. To determine the key criteria of driving force and dependence of the criteria in the final

reachability matrix is formed according to Table 2.

Based on the dependence and driving force of variables, a coordinate system can be defined and divided into four equal parts. In this study, a group of variables were placed in the driving force subgroup. These variables had high driving force and low dependence. In the next group, dependent variables were placed. They were the result of the product development process and can less be the basis for other variables.

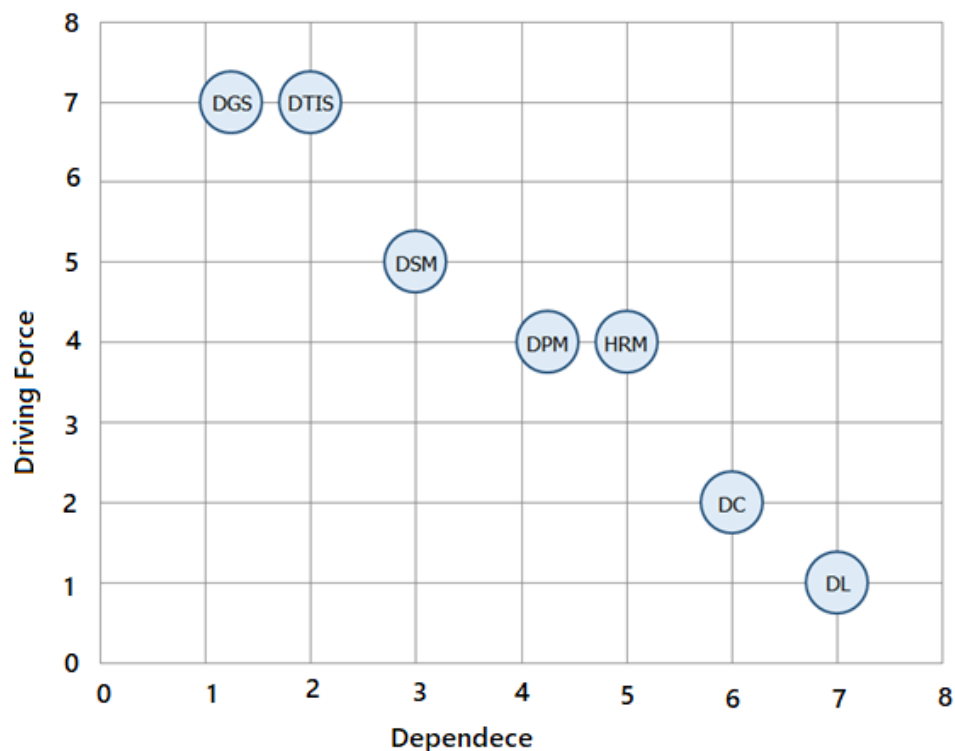The diagram of driving force-dependence for the studied variables is shown in Figure 2:

Figure 2. Diagram of driving force and degree of dependence (Micmac output)

According to the dependence and driving force diagram, the variables of digital governance structure (DGS) and digital technology infrastructure (DTIS) have high driving force and are placed in the area of independent variables. The variables of digital strategy development (DSM), human resource management (HRM) and digital policymaking (DPM) had high driving force and dependence, so they were mediating variable. The variables of digital culture (DC) and digital leadership (DL) had high dependence and low driving force, so they were considered dependent variables and no variable was placed in the first quarter that is independence region.

Validation of the model by using the partial least squares method

The relationship of the studied variables is tested based on a causal structure with the partial least squares technique, which is presented in Figure 3 and Figure 4.

between the variables by using the partial least squares method (bootstrapping)

According to Table 3, with 95% confidence level, the t-value is greater than 1.96, so the observed relationships are significant.

According to Table 4, the average variance extracted (AVE) is greater than 0.5, so convergent validity is confirmed. Cronbach's alpha of all variables is greater than 0.7, so reliability is confirmed. The value of composite reliability (CR) is also greater than AVE and in all cases, it is greater than the threshold of 0.7, so the third requirement is fulfilled.
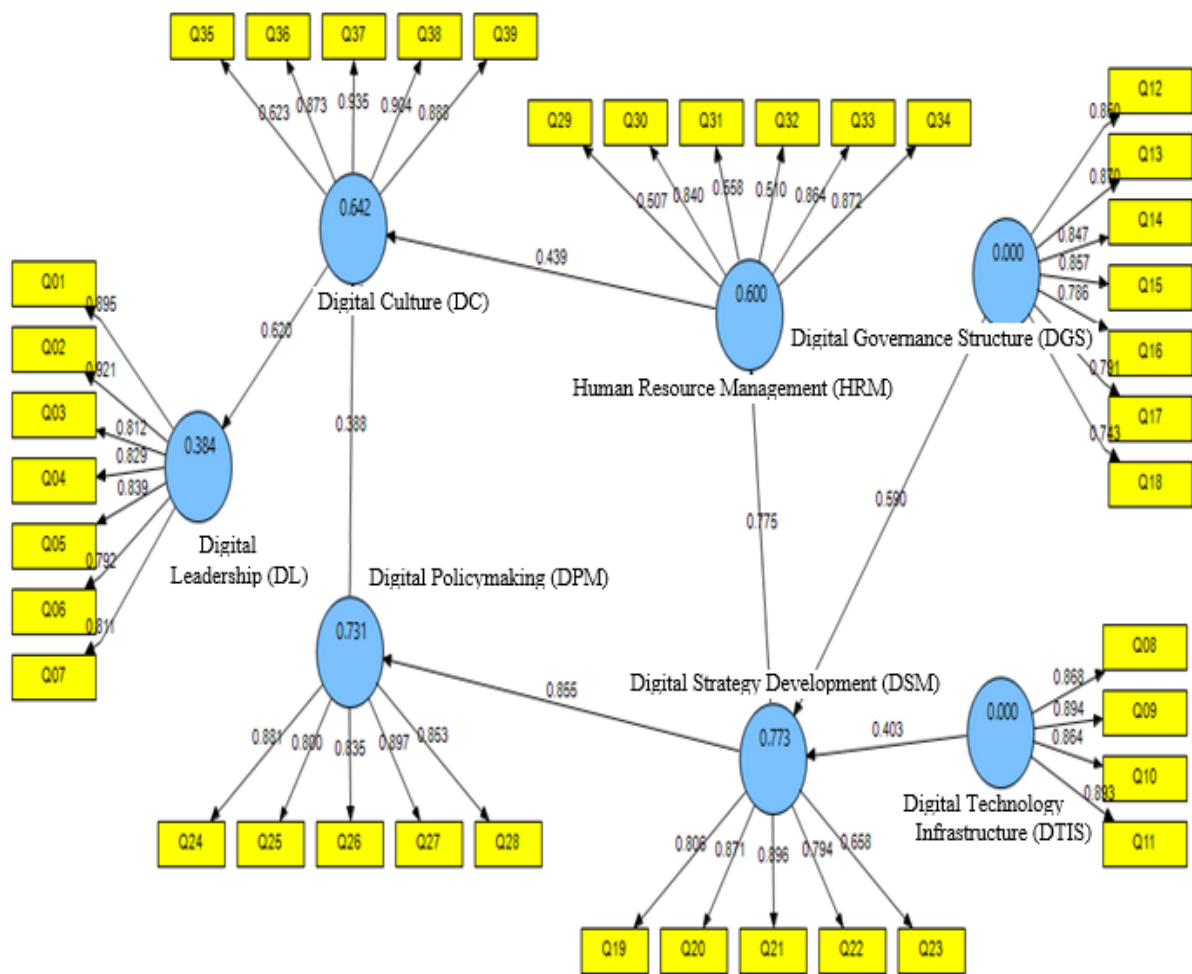

Figure 3. Validation output of the model by using partial least squares method
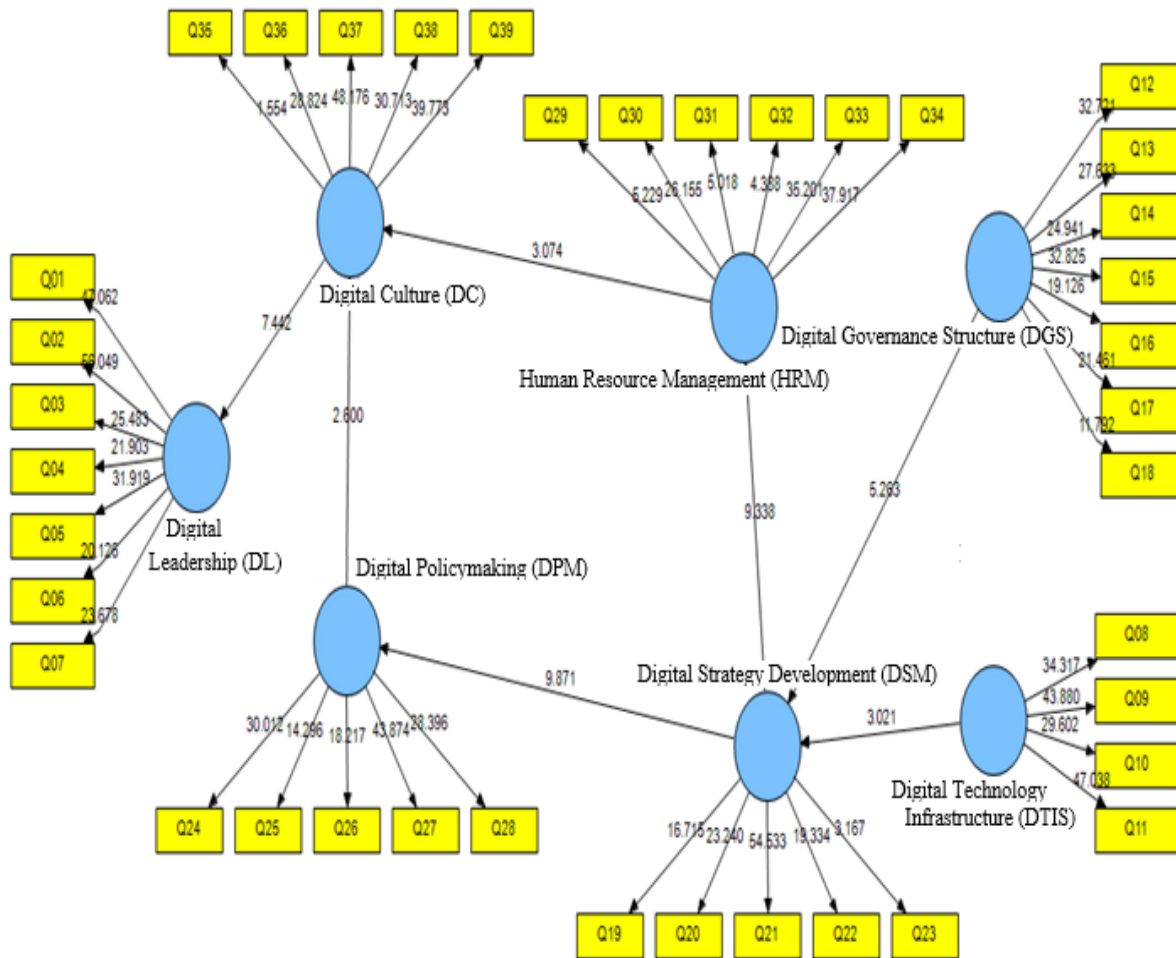
Figure 4. Significance of relationships

Table 3. Summary of results of testing hypotheses

independent variable	dependent variable	Factor load	Statistic t	Result
Digital Governance Structure	digital strategy development	0. 590	5.283	confirmed
Digital technology infrastructure	digital strategy development	0.403	3.021	confirmed
Digital strategy development	Human resources management	0.775	9.338	confirmed
Digital strategy development	Digital Policymaking	0.855	9.871	confirmed
Human resources management	Digital culture	0.439	3.074	confirmed
Digital policymaking	Digital culture	0.388	2.600	confirmed
Digital culture	Digital leadership	0.620	7.442	confirmed

Table 4. Internal validity of digital leadership structures in the Iran's education system

Main constructs	AVE	Composite reliability (CR)	Cronbach's alpha
digital strategy development	0.620	0.882	0.831
Digital consulting line	0.729	0.931	0.906
Digital leadership	0.712	0.945	0.932
Digital technology infrastructure	0.774	0.932	0.903
Digital governance structure	0.675	0.936	0.920
Digital culture	0.658	0.895	0.828
human resource Management	0.507	0.853	0.789

For redundancy and communality validity, positive values indicate the appropriate quality of the model. As shown in Table 5, these values are obtained positive for all research constructs. Also, the values of the variables are generally obtained in the range of 0.15 to 0.35 or greater than 0.35. Therefore, the predictive power of research constructs is estimated at moderate to strong levels. The coefficient of determination (R^2) of the endogenous constructs of the research model is desirable. The digital leadership coefficient value in the Iran's education system is reported at 0.395, which is an acceptable value.

Table 5. Cross-validity values of redundancy and commonality

Main constructs	Coefficient of determination	Communality cross-validity	Redundancy cross-validity
digital strategy development	0.773	0.257	0.221
Digital consulting line	0.731	0.376	0.340
Digital leadership	0.384	0.359	0.323
Digital technology infrastructure	-	0.421	0.385
Digital governance structure	-	0.322	0.286
Digital culture	0.642	0.305	0.269
human resource Management	0.600	0.154	0.118

The most important index of model fit in the least squares technique is the GOF index. This index is calculated using the following equation:

Equation 3

$$GoF = \sqrt[2]{(R^2) \times (Communality)}$$

The value of goodness of fit in this study is equal to:

The mean values of the coefficient of determination $((R^2) =) = 0.626$

The mean values of the redundancy index (Communality) = 0.313

$GOF = \sqrt[2]{0.626 \times 0.313} = 0.443$

The GOF index is 0.443, so the model has a good fit.

Then, based on the results of identifying causal relationships between categories using ISM method, digital leadership variable was placed at Level 1, digital culture variables were placed at Level 2, human resource management and digital management variables were placed at Level 3, digital strategy development variable was placed Level 4 and digital governance structure and digital technology infrastructure were placed at Level 5. Finally, the validity of the model was confirmed using the partial least squares technique.

Discussion

According to the results of qualitative content analysis for the indicators of the digital leadership model in the Iran's education system, 7 primary categories and 39 secondary categories were obtained. The main categories included digital leadership, digital technology infrastructure, digital governance structure, digital strategy development, digital policy, human resource management and digital culture . The secondary categories of digital leadership included digital mission, digital vision, digital investment, core values of the education system, ecosystem and data-driven thinking, risk-taking, digital vision and attitude. The results of the research conducted by Aldawood et al., (9) and Tamasoki (10), also refer to the components of digital mission and vision that are consistent with the results of the present study. The secondary categories of digital technology infrastructure are educational hardware facilities, educational software facilities, integration of educational processes, creating digital work environment. The results of research conducted by Nabouti (12) also refer to the components of educational facilities that are consistent with the results of the present study. The secondary categories of digital governance structure are digital educational organizational structure, digital change management, digital educational content management, digital information

technology management, efficiency improvement and cost reduction, digital planning, digital performance monitoring and evaluation. The results of studies conducted by Nabouti (12) and Rüth & Netzer (13) also refer to the component of digital information technology management, which is line with the results of the present study.

The secondary categories of digital strategy development are digital creativity and ideation, implementation of digital innovation, digitization enablers, digital information technology strategy, and digital strategies development. The results of studies conducted by Hedayati & Naji (14) and Stone & Lukaszewski (15) have referred to the component of digital strategies, which is in line with the results of the present study. The secondary categories of digital policy are policies, digital organization, digital technology team formation, digital services development, allocation of necessary educational resources. The results of the studies conducted by Guthrie & Meriwether (16) and Tabarsa et al. (17) also refer to the component of policy, which is consistent with the results of the present study.

The secondary categories of human resource management are empowerment of human resources, increasing the individuals' digital literacy, strengthening the digital skills of individuals, increasing the capacity of digital absorbing and learning, identifying digital talent and skills, providing digital education. The results of the study conducted by Malekzadeh & Sadeghi (18) also referred to the component of digital learning, which is consistent with the results of the present study. The secondary categories of digital culture are creating and increasing digital awareness, innovative digital culture, digitization of processes, establishing organizational digital culture, and increasing individual participation. The results of studies conducted by Boudlaie et

al. (19) and Schwarzmüller et al. (20) also refer to the components of innovative digital culture that are consistent with the results of the present study.

Based on the recent survey of Gartner, 56 percent stated that their digital improvements make them more profitable and efficient, indicating that 9 out of 10 IT decision-makers claim that older systems prevent them from using digital technologies (21). In the digital age, educational institutions and higher education have also undergone extensive changes. The success of educational organizations in the area of information and communication technology requires a new leadership style. This is not just a recommendation to educational institutions, but an unavoidable necessity. If educational institutions do not revise their management and leadership style, it will create many consequences for the society. Failure in education is not like failure in other business institutions, and its consequences affect the foundations of society. Thus, moving towards digital leadership in educational systems is a necessity (22). Hedayati & Naji (14). Digital transformation can be defined as the application of technology in business, which significantly improves organizational performance. Digital transformation is considered as changes that are created due to digital technologies and affect all aspects of human life (23). The use of a transformational leadership style in the country's education system is an inescapable fact (24). Great leaders understand that rapid change requires rapid learning, and this learning comes from a variety of sources and experiences. Most importantly, great leaders believe that people have the power to improve and provide an environment model for learning so that their entire team is challenged and grows (25). It means that great leaders in the digital age have come to understand what data is relevant to their work, appropriate and using it to help them make decisions (26). Fundamental change in

education should be based a well-developed, new and operational plan agreed by elites in both structural and content dimensions of education by employing the main agents. It is also appropriate to change the consumption view to investment and justice orientation based on the upstream documents and 1404 vision.

Recommendations

The following recommendations are presented based on the results of this study:

Regarding digital leadership, it is recommended for education organization managers of Sistan and Baluchestan province develop digital vision, determine the digital mission with digital investment, and have a digital vision and attitude in appointment of managers of this organization. Regarding the digital technology infrastructure, it is recommended to facilitate the ways of achieving digital leadership goals in the education system by creating coherent and integrated educational processes that ultimately lead to the creation of a digital work environment.

Regarding the digital governance structure, it is recommended for education organization managers take the necessary measures to strengthen the digital educational organizational structure and increase people's awareness of digital change management, and improve the efficiency by using digital educational content management in line with digital information technology management and reduce costs. They can overcome the challenges of digital leadership in the education system by developing a digital program along with monitoring and evaluating digital performance.

Regarding the digital strategy development, it is recommended for managers take measures to enable digitalization and digital information technology strategy.

Regarding the secondary categories of digital policy, it is recommended for

managers develop policies and form a digital technology team and to develop digital services, and pave the way to achieve positive results by allocating the necessary educational resources.

Regarding human resource management, it is recommended to increase the digital literacy of people to increase the empowerment of human resources and to strengthen the digital skills of people to increase the capacity of digital absorption and learning. Since implementation of digital leadership in the education system depends on identifying digital talent and skills and providing digital education, achieving the goals of digital leadership will not be far-reaching if the mentioned measures taken correctly.

Regarding digital culture, it is recommended for managers create and increase digital awareness and digitize the processes, establish an organizational digital culture and, most importantly, increase the participation of individuals in education.

Conclusion

Since the success of educational organizations in the area of information technology, communication developing the future human resources of societies requires a new leadership style, it seems that the results of this study can be used by education managers in today's dynamic and complex environments by establishing a model of digital leadership in the Iran's education system, especially education organization in Sistan and Baluchestan province.

Author's contribution

Mostafa Mollazehi and Sanjar Salajegheh developed the study concept and design. Amaneh Firooz Abadi acquired the data. Zahra Shokoh and Sanjar Salajegheh analyzed and interpreted the data, and wrote the first draft of the manuscript. All authors contributed to the intellectual

content, manuscript editing and read and approved the final manuscript.

Informed consent

Questionnaires were filled with the participants' satisfaction and written consent was obtained from the participants in this study.

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Conflict of interest

The authors declare that they have no conflict of interests.

References

1. Nouri M, Shah hoseini M, Shami zanjani M, Abedin B. Designing A Conceptual Framework for Leading Digital Transformation in Iranian Companies. Journal of Management and Planning in Educational System. 2019;12(2):211-242. https://doi.org/10.29252/mpes.12.2.211

2. Askari F, Shakuri M. Cultivating a digital leader, The Critical Needs of a Digital Organization. Journal of Co-Management. 2019;2(2):1-11.

3. Kien SS, Soh C, Weill P. How DBS Bank Pursued a Digital Business Strategy. MIS Quarterly Executive. 2016;2(4):1-11. https://aisel.aisnet.org/misqe/vol15/iss2/4

4. Westerman G, Bonnet D, McAfee A. Leading Digital: Turning Technology into Business Transformation. Harvard Business Press;2014. https://books.google.com/books?id=Fh9eBAAAQBAJ&printsec=frontcover#v=onepage&q&f=false

5. Kane GC, Phillips AN, Copulsky JR, Andrus GR. How digital leadership is(n't) different. MIT Sloan Management Review. 2019;60(3):34-39. https://www.proquest.com/docview/2207927776

6. Tanniru M, Peral J. Digital Leadership in Education. Effective Leadership for Overcoming ICT Challenges in Higher Education: What Faculty, Staff and Administrators Can Do to Thrive Amidst the Chaos (Emerald Studies in Higher Education, Innovation and Technology), Emerald Publishing Limited;2021.

7. Tirgar A, Kazemi F, Babazadeh S, Aghalari Z, Gholinia-Ahangar H. Assessing the Students' Viewpoint about teaching a course by several lecturer in Babol University of Medical Sciences. Research in Medical Education. 2018;10(1):38-30. http://rme.gums.ac.ir/article-1-552-en.html

8. Navaridas-Nalda F, Emeterio MC, Ortiz RF, Oliva MA. The strategic influence of school principal leadership in the digital transformation of schools. Computers in Human Behavior. 2020;112(1):106481-106490. https://doi.org/10.1016/j.chb.2020.106481

9. Aldawood H, Alhejaili A, Alabadi M, Alharbi O, Skinner G. Integrating Digital Leadership in an Educational Supervision Context: a Critical. Appraisal, 2019 International Conference in Engineering Applications (ICEA), Azores;2019. https://ieeexplore.ieee.org/document/8883484

10. Tamasoki M. Models of Guidance needed for the Fundamental Transformation of Education. Counseling Culture and Psycotherapy. 2020;11(42):143-172. https://doi.org/10.22054/qccpc.2020.42624.2155

11. Azar A, Khosravani F, Jalali R. Soft operational research; problem structuring methods. Tehran: Industrial Management organization poblication;2016. https://www.adinehbook.com/gp/product/6002750471

12. Nabouti A. A description of the actions of the world's leading organizations in creating a digital work environment, the second international and national conference on management. accounting and law studies;2020.

13. Rüth R, Netzer T. The key elements of cultural intelligence as a driver for digital leadership success. Leadership, Education, Personality: An Interdisciplinary Journal. 2020;2(1):3-8. https://doi.org/10.1365/s42681-019-00005-x

14. Hedayati F, Naji M. A Systematic Pattern of Fundamental Transformation in Education From the point of view of the Supreme Leader. Pouyesh in Humanities Education. 2019;5(16):12-21. https://doi.org/20.1001.1.27172260.1398.5.16.2.4

15. Stone DL, Lukaszewski KM. An expanded model of the factors affecting the acceptance and effectiveness of electronic human resource management systems. Human Resource Management Review, 2009;19(2):134-143. https://doi.org/10.1016/j.hrmr.2008.11.003

16. Guthrie KL, Meriwether JL. Leadership Development in Digital Spaces Through Mentoring, Coaching, and Advising. New Dir Stud Leadersh. 2018;2018(158):99-110. https://doi.org/10.1002/yd.20291

17. Tabarsa GA, Haghighi MA, Al-Masouri K. Assessing the level of electronic readiness of government organizations for the successful establishment of electronic human resource management system in Yemen. Public Administration Perspaective. 2016;7(2):77-104. https://jpap.sbu.ac.ir/article_95787.html?lang=fa

18. Malekzadeh Gh, Sadeghi S. Human resource management strategy in the digital age based on big data. Technology Growth. 2016;13(2):62-70. http://www.roshdefanavari.ir/Article/139601052152515446

19. Boudlaie H, Keshavarz Nik B, Mohammadi Moghadam Y. A Qualitative Study of Digital Footprints in Human Resource Management.

Journal of Research in Human Resources Management. 2018;10(1):211-232. https://hrmj.ihu.ac.ir/article_31366.html

20. Schwarzmüller T, Brosi P, Duman D, Welpe IM. How Does the Digital Transformation Affect Organizations? Key Themes of Change in Work Design and Leadership. Management Revue. Socio-economic Studies. 2018;29(1):114-138. https://doi.org/10.5771/0935-9915-2018-2-114

21. Sander P. Digital Leadership-Leadership competencies required in times of a multigenerational workforce in the digital age;2020.

22. Antonopoulou H, Halkiopoulos C, Barlou O, Beligiannis GN. Leadership Types and Digital Leadership in Higher Education: Behavioural Data Analysis from University of Patras in Greece. International Journal of Learning. Teaching and Educational Research. 2020;19(4):110-129. https://doi.org/10.26803/ijlter.19.4.8

23. Kreitstshtein A. Digital transformation and its effects on the competency framework: a case study of digital banking. Haaga-Helia University of Applied Sciences;2017. https://urn.fi/URN:NBN:fi:amk-201702011879

24. Farhoudi A, Ghanbari M. Investigating the relationship between transformational leadership style and job satisfaction of education workers in Pardis city. Management Science Research Quarterly. 2019;2(3):1-10.

25. Nikolaev N. A. Methodology for the Development of a Human Resource Management System Under the Conditions of a Highly Competitive Innovative and Digital Economy. Conference: 2nd International Scientific and Practical Conference "Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth" (MTDE 2020);2020. https://doi.org/10.2991/aebmr.k.200502.003

26. Salikov YA, Logunova IV, Kablashova IV. Trends in human resource management in the digital economy. Proceedings of the Voronezh State University of Engineering Technologies. 2019;81(2):393-399. https://doi.org/10.20914/2310-1202-2019-2-393-399

Appendix

Interview questions and the primary and secondary categories extracted from the interview

Interview questions	
Row	Questions
1	In your opinion, what are the primary components of the digital leadership model in the Iran's education system?
2	In your opinion, what are the secondary components of the digital leadership model in the Iran's education system?
3	In your opinion, what are the dimensions affecting the digital leadership model in the Iran's education system?
4	How do you evaluate the model of digital leadership in the Iran's education system?

Primary and secondary categories	
Primary category	Secondary category
Digital leadership	1. Digital mission
	2. Digital vision
	3. Digital investment
	4. Core values of the educational system
	5. Ecosystem and data-driven thinking
	6. Risk-taking
	7. Digital insights and attitudes
Digital technology infrastructure	8. Educational hardware facilities
	9. Educational software facilities
	10. Integration of educational processes
	11. Creating a digital work environment
Digital structure and governance	12. Digital educational organizational structure
	13. Digital change management
	14. Digital educational content management
	15. Digital IT management
	16. Improving efficiency and reducing costs
	17. Digital programming
	18. Monitoring and evaluating digital performance
Digital strategic management	19. Creativity and digital ideation
	20. Implementation of digital innovation
	21. Digitization enablers
	22. Digital IT Strategy
	23. Development of digital strategies
Digital policymaking	24. Policies and policies
	25. Digital organization
	26. Forming a digital technology team
	27. Development of digital services
	28. Allocation of necessary educational resources
Human resources management	29. Empowering employees
	30. Increasing people digital literacy
	31. Strengthening people digital skills
	32. Increasing digital absorption and learning capacity
	33. Identifying digital talent and skills
	34. Providing digital education
Digital culture	35. Creating and raising digital awareness
	36. Innovative digital culture
	37. Process digitization
	38. Establishment of digital enterprise culture
	39. Increasing people participation