Journal of Knowledge-Research Studies

Identification and Ranking of Digital Transformation Components in Medical Sciences University Libraries in Iran

Mohammadreza Azadifar[1], Afshin Hamdipour[2], Rasoul Zavaraqi[3], Hashem Atapour[4]

Received: April, 6, 2025; Revised: June, 12, 2025
Accepted: June, 13, 2025; Published: Nonember, 1, 2025

Abstract

Purpose: This study aimed to identify and rank the key components of digital transformation from the perspective of librarians working in Iranian medical sciences university libraries (IMSU).

Methodology: Adopting a descriptive-survey design, the study population consisted of 220 librarians from IMSU, selected through a complete census method. Data were collected using a 46-item Likert-scale questionnaire after confirming its validity and reliability. The data were analyzed using exploratory factor analysis (EFA) as well as Friedman and Wilcoxon tests in SPSS version 26.

Findings: The results of the EFA revealed eight components that together accounted for 76.630% of the total variance: (1) Intelligent services and process digitization, (2) staff competencies, (3) digital resource access and management, (4) information security and user interaction, (5) technical capabilities for data analytics and digitization, (6) legal awareness related to digital content, (7) digital leadership and innovation, and (8) technological infrastructure. The Friedman test indicated that "professional competencies of staff" had the highest mean rank (3.69), suggesting it as the most important component , while "technological infrastructure" had the lowest mean rank (2.92), reflecting a lower priority from the librarians' perspective. Post hoc Wilcoxon tests, adjusted using the Bonferroni correction, confirmed significant pairwise differences among these components.

Conclusion: Successful digital transformation in IMSU libraries requires an integrated approach that simultaneously emphasizes digital leadership and innovation as strategic dimensions, while strengthening technological infrastructure, enhancing professional staff competencies, and advancing process digitization as operational dimensions.

Value: By identifying the core factors influencing digital transformation in IMSU libraries, this study provides a f practical framework to support the design, implementation, and evaluation of digital transformation initiatives in academic library setting.

Keywords: ***Digital Transformation, Digital Transformation Components, Technology Transfer, Medical Sciences Libraries***

How to Cite:

Azadifar, M., Hamdipour, A., Zavaraqi, R., & Atapour, H. (2025). Identification and Ranking of Digital Transformation Components in Medical Sciences University Libraries in Iran. *Journal of Knowledge-Research Studies*, 4 (3): 92-120.

Doi: 10.22034/jkrs.2025.19967

URL: https://jkrs.tabrizu.ac.ir/article_19967.html?lang=en

Article Type: Original Article

 Publisher: University of Tabriz **E-ISSN: 2821-045X**

1. PhD Candidate, Department of Knowledge and Information Science, University of Tabriz, Tabriz, Iran.
2. Associate Professor, Department of Knowledge and Information Science, University of Tabriz, Tabriz, Iran. (Corresponding Author) hamdipour@tabrizu.ac.ir
3. Professor, Department of Knowledge and Information Science, University of Tabriz, Tabriz, Iran.
4. Associate Professor, Department of Knowledge and Information Science, University of Tabriz, Tabriz, Iran.

Extended Abstract

Introduction: In recent years, digital transformation has emerged as a novel paradigm in academic and educational environments (Sandhu, 2018; Nouri et al., 2019). University libraries—particularly those serving the medical sciences—have been compelled to redefine their services and operational processes in response to the rapid expansion of information and communication technologies (Gates and Dale, 1997; Gong et al., 2024). Numerous studies have emphasized the importance of digital leadership and the professional competencies of staff in ensuring the success of this transformation process (Azadifar et al., 2025; Khoeini et al., 2024). Moreover, information and communication technology infrastructure and data security are considered fundamental prerequisites for achieving digital transformation (Mendhurwar & Mishra, 2021). Accordingly, this study was conducted to identify and rank the components of digital transformation in Iranian medical sciences universities (IMSU).

Purpose: The primary aim of this study is to identify and prioritize the key components of digital transformation within IMSU, thereby enabling managers and policymakers in this domain to strategic plans based on clearly defined and evidence-based priorities.

Methodology: This study employed a descriptive–survey design. The statistical population comprised all 220 librarians working in the libraries of IMSU, all of whom were included through a complete census approach. Data were collected using a 46-item questionnaire designed on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The content validity of the questionnaire was confirmed by five faculty members specializing in information science and social sciences, and its reliability was verified using Cronbach's alpha coefficient ($\alpha \geq 0.70$). Data collection was carried out during the second half of 1403 (Iranian calendar) using both electronic and paper-based questionnaires. For data analysis, exploratory factor analysis (EFA) was initially conducted in SPSS version 26 to identify the underlying component structure. Subsequently, the Friedman test was applied to rank the extracted components, and finally, the Wilcoxon signed-rank test with Bonferroni correction was employed to examine pairwise differences among the identified components.

Findings: The results of the exploratory factor analysis identified eight principal components of digital transformation in IMSU, which together explained 76.630% of the total variance. These components included:

1. Provision of intelligent services and digitization of processes
2. Professional competencies of staff
3. Access to and management of digital resources
4. Information security and digital interaction with users
5. Technical capabilities for data analytics and digitization
6. Legal awareness in the use and dissemination of digital content
7. Digital leadership and innovation
8. Technological infrastructure

The Friedman test used to rank these components indicated that *professional competencies of staff* achieved the highest mean rank (mean rank = 3.69). This was followed by *provision of intelligent services and digitization of processes* (mean rank = 3.65) and *access to and management of digital resources* (mean rank = 3.57). In contrast, *technological infrastructure* received the lowest mean rank (mean rank = 2.92), as presented in Table 1. The overall ranking of components was statistically significant ($\chi^2 = 256.097$, df = 7, $p < 0.001$).

Journal of Knowledge-Research Studies (JKRS)

Vol 4

Issue 3

Serial Number 13

Journal of Knowledge-Research Studies

Journal of Knowledge-Research Studies (JKRS)

Vol 4

Issue 3

Serial Number 13

Table 1. Distribution of Digital Transformation Components in Libraries from Librarians' Perspective

Variable	Number of Items	Mean	Standard Deviation	Skewness	Minimum	Maximum
Digital Leadership and Innovation	10	3.28	0.834	–0.721	1.00	4.80
Professional Competencies of Staff	8	3.69	0.616	–0.726	1.33	5.00
Provision of Intelligent Services and Digitization of Processes	7	3.65	0.872	–1.210	1.00	5.00
Access to and Management of Digital Resources	5	3.57	0.855	–0.840	1.00	5.00
Technological Infrastructure	5	2.92	0.907	–0.152	1.00	5.00
Information Security and Digital Interaction with Users	3	3.56	0.949	–1.061	1.00	5.00
Legal Awareness in the Use and Dissemination of Digital Content	2	3.40	0.830	–0.668	1.00	5.00
Technical Capabilities for Data Analytics and Digitization	2	3.32	0.629	–0.339	1.00	4.50

Conclusion: The results indicate that the successful realization of digital transformation in IMSU requires the adoption of a comprehensive and balanced approach—one that simultaneously addresses strategic imperatives, such as *digital leadership and innovation*, and operational requirements, including *professional competencies of staff*, *information security*, and *technological infrastructure*. Although *professional competencies of staff* were identified as the most critical component—and libraries have performed relatively well in this area—the comparatively low mean rank of *technological infrastructure* suggests that many IMSU libraries continue to face limitations in accessing adequate hardware and software resources. Accordingly, policymakers in the scientific domain and senior university administrators can play a pivotal role in advancing digital transformation by developing parallel and coordinated programs aimed at strengthening technological infrastructure, enhancing legal awareness and training, improving the technical skills and professional competencies of librarians, and standardizing information security procedures. The implementation of these measures will not only enable libraries to sustain their traditional functions but will also position them as leading centers for the provision of advanced information services within the higher education health system.

Value: The findings of this study identify the key components influencing the implementation of digital transformation in IMSU libraries. Beyond informing the design and execution of digital transformation initiatives, these components provide a practical framework for assessing the current status of libraries and monitoring progress in this domain. Through effective digital transformation, libraries can move beyond their conventional role as information service providers and assume a central and strategic position in the educational and research processes of medical sciences universities.

References

Aliasghari Jelodar, H., Razavi, A. a., & Tahmasebi Limooni, S. (2024). Identifying the Maturity Dimensions of the Digital Transformation and Its Effect on Librarian

Performance Competence in Medical Sciences Universities of the Country. *Librarianship and Information Organization Studies*. [in press]. https://doi.org/10.30484/nastinfo.2024.3607.2279 [In Persian]

Anuradha, P. (2018). Digital transformation of academic libraries: Opportunities and challenges. *IP Indian Journal of Library Science and Information Technology*, *3*(1), 8-10. https://doi.org/10.18231/2456-9623.2018.0002

Azadifar, M., Hamdipour, A., Zavaraqi, R., & Atapour, H. (2025). An Examination of the Factors Affecting the Adoption of Digital Transformation by Librarians at Medical Universities Based on Rogers' Diffusion of Innovation Theory. *Depiction of Health*, *16*(2), [in press]. https://doi.org/10.34172/doh.2025.13 [In Persian]

Bawack, R. (2019). Academic Libraries in Cameroon in the digital age. *Library philosophy and practice*,5 (*3*),2547 .https://digitalcommons.unl.edu/libphilprac/2547

Borangiu, T., Trentesaux, D., Thomas, A., Leitão, P., & Barata, J. (2019). Digital transformation of manufacturing through cloud services and resource virtualization. *Computers in Industry*, *108*, 150-162 .https://doi.org/10.1016/j.compind.2019.01.006

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate behavioral research*, *1*(2), 245-276. https://doi.org/10.1207/s15327906mbr0102_10

De la Boutetière, H., Montagner, A., & Reich ,A. (2018). *Unlocking success in digital transformation*. https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Organization/Our%20Insights/Unlocking%20success%20in%20digital%20transformations/Unlocking-success-in-digital-transformations.pdf

Deja ,M., Rak, D., & Bell, B. (2021). Digital transformation readiness: perspectives on academia and library outcomes in information literacy. *The Journal of Academic Librarianship*, *47*(5), 102403. https://doi.org/10.1016/j.acalib.2021.102403

Eriksson, K. (2010 .(Concept determination as part of the development of knowledge in caring science. *Scandinavian Journal of Caring Sciences*, *24 Suppl 1*, 2-11. https://doi.org/10.1111/j.1471-6712.2010.00809.x

Gates, B., & Dale, J. (1997). The road ahead. *Canadian Social Studies*, *32*(1), 24-32. https://www.proquest.com/openview/b3c54d32516f4ffb8fff10064bce0bc4/1?pq-origsite=gscholar&cbl=47422

Gong, C., Parisot, X., & Reis, D. (2024). The Evolution of Digital Transformation. In D. Schallmo, A. Baiyere, F. Gertsen, C. A .F. Rosenstand, & C. t. A. Williams, *Digital Disruption and Transformation* Cham. Springer. https://doi.org/ 10.1007/978-3-031-47888-8_1

Goran, J., LaBerge, L., & Srinivasan, R. (2017). Culture for a digital age. *McKinsey Quarterly*, *3*(1), 56-67. https://lediag.net/wp-content/uploads/2018/05/0-Culture-for-a-digital-age.pdf

Grammenis, E., & Mourikis, A. (2019). Academic libraries in the digital era: An assessment of the Institutional Repository role in supporting research as a digital service. Linnaeus Student Conference on Information Technology (LSCIT), Linnaeus University. https://doi.org/ 10.15626/lscit2019.02

Haddadi Harandi, A. A., Rezaeifard, M., & Esmaelii, s. (2022). Digital Transformation Maturity Model; Areas and Trends of Research in Iran. *Digital Transformation*, *2*(2), 43-72. https://doi.org/10.22034/dtj.2022.340076.1061 [In Persian]

Heilig, L., Lalla-Ruiz, E., & Voß, S. (2017). Digital transformation in maritime ports: analysis and a game theoretic framework. *NETNOMICS: Economic Research and Electronic Networking*, *18*(2), 227-254. https://doi.org/10.1007/s11066-017-9122-x

Henriette, E., Feki, M., & Boughzala, I. (2015). The shape of digital transformation: a systematic literature review. *MCIS 2015 Proceedings*, *10*. https://aisel.aisnet.org/mcis2015/10

Kari, K. (2020). Digital transformation of information and its impact on libraries. *World Journal of Innovative Research (WJIR)*, *9*(1), 26-30. https://www.wjir.org/download_data/WJIR0901033.pdf

Journal of Knowledge-Research Studies (JKRS)

Vol 4

Issue 3

Serial Number 13

Khoeini, S., Noruzi, A., Naghshineh, N., & Sheikhshoaei, F. (2024). Developing a model of digital transformation of university libraries based on meta-synthesis. *The Electronic Library*, *42*(4), 681-699. https://doi.org/10.1108/EL-02-2024-0046

Kislov, E. (2016). Digital transformation: history, present, and future trends. https://auriga.com/blog/2016/digital-transformation-history-present-and-future-trends/

Kouroubali, A., & Katehakis, D. G. (2019). The new European interoperability framework as a facilitator of digital transformation for citizen empowerment. *Journal of biomedical informatics*, *94*, 103166. https://doi.org/10.1016/j.jbi.2019.103166

Liere-Netheler, K., Packmohr, S., & Vogelsang, K. (2018). Drivers of digital transformation in manufacturing. https://aisel.aisnet.org/hicss-51/in/digital_supply_chain/2 /

Liman, Y. A., & Aliyu, M. M. (2023). Digital transformation and innovation of academic libraries: a content analysis. *Samaru Journal of Information Studies*, *23*(1), 1-15. https://www.ajol.info/index.php/sjis/article/view/252140

Lu, Y., & Lin, S. (2025). How Can We Promote Digital Transformation in College Libraries? A Study on Readers' Intention to Adopt Digital Services. *Sustainability*, *17*(8), 3504. https://doi.org/10.3390/su17083504

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & information systems engineering*, *57*, 339-343. https://doi.org/10.1007/s12599-015-0401-5

Mendhurwar, S., & Mishra, R. (2021). Integration of social and IoT technologies: architectural framework for digital transformation and cyber security challenges. *Enterprise Information Systems*, *15*(4), 565-584. https://doi.org/10.1080/17517575.2019.1600041

Möller, D. P. (2023). Cybersecurity in digital transformation. In *Guide to cybersecurity in digital transformation: Trends, methods, technologies, applications and best practices* (pp. 1-70). Springer. https://doi.org/10.1007/978-3-031-26845-8_1

Mostafayi, B., Emari, H., Beigzadeh, Y., & Beikzad, J. (2024). Developing Digital Transformation Strategies in Universities: University of Tabriz Case Study. *Journal of Knowledge-Research Studies*, *3*(2), 31-52. https://doi.org/10.22034/jkrs.2024.61570.1083 [In Persian]

Nadkarni, S., & Prügl, R. (2021). Digital transformation: a review, synthesis and opportunities for future research. *Management review quarterly*, *71*, 233-341. https://doi.org/10.1007/S11301-020-00185-7

Nakaziba, S., & Ngulube, P. (2024). Harnessing digital power for relevance: status of digital transformation in selected university libraries in Uganda. *Collection and Curation*, *43*(2), 33-44. https://doi.org/10.1108/CC-11-2023-0034

Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management. *MIS quarterly*, *41*(1), 223-238. https://eclass.aegean.gr/modules/document/file.php/TNEY202/digitalinnovationmisq%20copy.pdf

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

Oxford English Dictionary. (2025). Digital. In *Oxford English Dictionary*. https://www.oed.com/dictionary/digital_n

Sandhu, G. (2018). The Role of Academic Libraries in the Digital Transformation of the Universities. 2018 5th International Symposium on Emerging Trends and Technologies in Libraries and Information Services (ETTLIS), Noida, India. https://doi.org/10.1109/ETTLIS.2018.8485258

Schallmo, D., Williams, C. A., & Boardman, L. (2020). Digital transformation of business models—best practice, enablers, and roadmap. In *Digital Disruptive Innovation* (pp. 119-138). World Scientific. https://doi.org/10.1142/9781786347602_0005

Journal of Knowledge-Research Studies (JKRS)

Vol 4

Issue 3

Serial Number 13

Schwertner, K. (2017). Digital transformation of business. *Trakia Journal of Sciences*, *15*(1), 388-393. https://doi.org/10.15547/tjs.2017.s.01.065

Singh, B. (2018 .(Digital Transformation of library services in the Mobile World: The future trends. *Publishing Technology and Future of Academia*, 335-349. https://www.academia.edu/download/57949015/Digital_Transformation_of_library_services_in_Mobile_World_in_India_NLU.pdf

Stolterman, E., & Fors, A. C. (2004). Information technology and the good life. *Information systems research: relevant theory and informed practice*, 687-692. https://doi.org/10.1007/1-4020-8095-6_45

Tarutė, A., Duobienė, J., Klovienė, L., Vitkauskaitė, E., & Varaniūtė, V. (2018). Identifying factors affecting digital transformation of SMEs. https://aisel.aisnet.org/iceb2018/64 /

Trenerry, B., Chng, S., Wang, Y., Suhaila, Z. S., Lim, S. S., Lu, H. Y., & Oh, P. H. (2021). Preparing workplaces for digital transformation: An integrative review and framework of multi-level factors. *Frontiers in Psychology*, *12*, 620766. https://doi.org/10.3389/fpsyg.2021.620766

Upadhyay, A. (2024). *Cost of Digital Transformation: What to Expect and How to Prepare*. https//:www.talentelgia.com/blog/cost-of-digital-transformation/

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, *122*, 889-901. https://doi.org/10.1016/j.jbusres.2019.09.022

von Leipzig, T., Gamp, M., Manz, D., Schöttle, K., Ohlhausen, P., Oosthuizen, G., Palm, D., & von Leipzig, K. (2017). Initialising Customer-orientated Digital Transformation in Enterprises. *Procedia Manufacturing*, *8*, 517-524. https://doi.org/10.1016/j.promfg.2017.02.066

Zaki, M. (2019). Digital transformation: harnessing digital technologies for the next generation of services. *Journal of Services Marketing*, *33*(4), 429-435. https://doi.org/10.1108/JSM-01-2019-0034

Journal of Knowledge-Research Studies (JKRS)

Vol 4

Issue 3

Serial Number 13