Original Article

IEEPJ Vol. 6, No. 4, 2024, 1-16

http://ieepj.hormozgan.ac.ir/

Iranian Evolutionary and Educational Psychology Journal

IEEPJ

Telemedicine Deployment Model Validation; Study Case: selected hospitals in Zahedan

Hossain Shojaei Farahabadi[1], Nour Mohammad Yaghoubi[2]*, Masoud Dehghani[3], Yousef Mehdipour[4]

1- Phd Student of Public Administration, Islamic Azad University Zahedan Branch, Zahedan, Iran.

2- Professor, Faculty of Management and Economics, University of Sistan and Baluchestan, Zahedan, Iran

3- Assistant Professor, Faculty of Management, Velayat University, Iranshahr, Iran

4- Associate Professor, Medical Sciences Research Center, Torbat Heydarieh University of Medical Sciences, Razavi Khorasan, Iran

*Corresponding author's Email: yaghoubi@mgmt.usb.ac.ir

Abstract: The rise of telemedicine signifies the dawn of a transformative era in healthcare delivery, offering innovative solutions to surmount geographical barriers, enhance patient care, and optimize resource allocation. In this context, the present study endeavors to introduce and validate a telemedicine deployment model within selected hospitals in Zahedan. This research employs an applied mixed-methods approach, involving the analysis of 47 telemedicine papers through a Meta-analysis synthesis study model, followed by the extraction of related dimensions and codes through content analysis. The subsequent prioritization of these dimensions is carried out using the Shannon entropy analysis method. The research encompasses all employees of the chosen Zahedan hospitals, selected using the Cochran formula, resulting in a sample of 321 individuals who completed the research questionnaire. Confirmatory factor analysis, executed through SMART PLS version 3, is utilized for research data analysis. The findings indicate that the extracted indexes from the papers are categorized into five main classes: cultural, human, institutional empowerment, strategy, and infrastructure and knowledge management. Notably, infrastructure is further subdivided into technical, security, software and hardware, legal, network, and organizational aspects. Among these dimensions, infrastructure, strategy, knowledge management, empowerment, and culture are shown to explain 93%, 84%, 83%, 70%, and 54% of the variance in telemedicine, respectively. Furthermore, the results of the confirmatory factor analysis reinforce the validity of all components within the research model, achieving a high level of confidence at 99%. In essence, this study lays the foundation for a comprehensive telemedicine implementation framework, offering invaluable insights for healthcare organizations striving to seamlessly integrate telemedicine into their daily operations.

Keywords: Telemedicine deployment model, Healthcare delivery, Mixed-methods approach, Validation study, Zahedan hospitals

Introduction

Like all other areas, information and communication technology (ICT) effectively played a revolutionary role in health (Sayal et al., 2019). In the last decade, tremendous progress has been made to improve high-quality health and treatment services, and many efforts have been made to develop various technologies to accurately diagnose diseases, properly deliver services, and easily access patient records (Cortine and Sorfenio, 2019). Later, information technology application development in health services led to a new concept named "telemedicine"; the main idea of which is based on information and telecommunication technology to provide healthcare where the service provider and receiver are both in different places or times (Mehdizade and Ismaeili, 2014). According to Dong et al (2019) telemedicine

Article information: Received: 2023/05/10 | Accepted: 2023/09/10 | Published: ----------. https://doi.org/10.52547/ieepj.6.2.2

is a communicative medium and knowledge that connects healthcare centers and doctors (Dong et al., 2019). The importance of telemedicine with the advent of the COVID-19 pandemic is that telemedicine can be divided into two pre-Covid-19 and post-Covid-19. In the pre-Covid-19 period, telemedicine was almost run slowly and intermittently by young people in large cities; whereas, with the outbreak of the Covid-19, spread fast, states and medical communities substituted inpatient care with telemedicine and e-care responding to the medical center high visits (Deker et al., 2020). Lucas et al (2020) claimed that telemedicine progress during the Covid-19 pandemic has dramatically changed medical service delivery and has led to decreased discrimination and higher access of the larger population to medical services (Lucas et al., 2020). Therefore, in recent years, one of the major challenges of healthcare organizations aimed at improved work processes, reduced costs, improved quality, and service providing was to identify effective factors in telemedicine deployment (Scot et al., 2018). The countless benefits of telemedicine, including resource management in transportation, crisis management in the healthcare sector, and chronic disease control, were the main cause of its development in recent years. Telemedicine leads to a decreased rate of travel in natural and critical situations and largely contributes to improved service delivery and developed health during natural disasters as well as hard-to-reach areas. In addition, since many chronic diseases including diabetes require consistent and long care, telemedicine would make follow-up and treatment of such diseases much easier and less expensive (Saeidi Tehrani and Norouzi, 2015). Therefore, reduced cost of healthcare services is another merit of telemedicine, which saves energy and reduces household expenses through fewer intra-city and inter-city trips and preventing unnecessary referrals (H. Gellam, 2005). Health service providers may also manage their costs through optimized and centralized resources, as well as less education costs, updating expert quality through distance education and access to databases (Tucker et al., 2013). Moreover, telemedicine largely contributes to improving patient care and medical care access and provides better, faster, and much easier access to doctors (Smith et al., 2005). Online platforms are far beyond geographical boundaries, where there is no distance between doctors and patients all over the world. All doctors and patients may benefit from advice and data from other doctors all around the world merely by pressing a button. A consistent and systematic communication framework is an effective step in enhancing the health system (Ganapsi and Ravinda, 2009). However, high functional costs, legal issues, and the distance between doctor and patient are counted as some demerits. Economic costs are an effective factor in applying telemedicine. This communication medium may demand communication infrastructures and equipment, which are usually costly and need policy-making for reimbursement (Khodadade et al., 2014). In addition, it is still unclear how to deal with lodging claims in case of any medical errors for telemedicine files. Thus, telemedicine requires legal infrastructures including the establishment of pertinent laws,

decision-making authority, and handling legal issues in this domain (Saeidi Tehran and Norouzi, 2015). In spite of video communication and enhanced patient-doctor relationship, in some cases the communication may be disrupted; or in cases where the patient suffers from hearing or vision impairment, especially the elderly, visual communication may not be properly met. Hence, telemedicine may not be necessarily effective in improving health services providing (H. Gelam, 2005). Telemedicine implementation in developing countries, such as Iran, seems critical provided the necessary infrastructures are available (Noubakht et al., 2018). With numerous rural areas and a lack of specialists in different medical areas, Iran urgently needs technologies such as telemedicine to overcome the obstacles. However, it is only limited to some hospitals, including Masih Daneshvari Hospital, Imam Khomeini Hospital, Naft Hospital, and Jask Hospital (Safi et al., 2019). Sistan and Baluchestan Province, a large and populated county requiring healthcare services, is among the provinces that critically need telemedicine. Due to the uneven distribution of specialized healthcare facilities and specialists, as well as the lack of enough healthcare centers in the urban and rural areas of Sistan and Baluchestan, a rational solution is needed to remove the challenge. Telemedicine in Sistan and Baluchestan, if effectively implemented, may almost solve the uneven distribution of health resources including transferring patients to major medical centers, transit subsidies, medical expenditures, wasting time, rework, and road accidents, etc. The main advantage of telemedicine in Sistan and Baluchestan is better accessibility and medical care in remote and deprived areas. Thus, the present research intends to identify and validate the dimensions and components of telemedicine deployment in Zahedan city.

Material and Methods

This is an applied research in term of purpose and a mixed-method research in term of data. In the first research phase, literature was reviewed using Meta–analysis synthesis method. Meta-analysis is a qualitative study reviewing similar literature. Determining common categories and creating a conceptual framework from the background are the significant potentials of Meta-analysis (Ehteshami et al., 2022). Hence, Meta-analysis requires scholars to deeply and review literature in details and to mix qualitative research findings. The most common models used in Meta-analysis include Noblit and Hare's three-step model (1988), Walsh and Downe's six-step model, and Sandelowski and Barroso's seven-step method (2007). The present study applied Sandelowski and Barroso's seven-step method (2007) as shown in Fig.1.

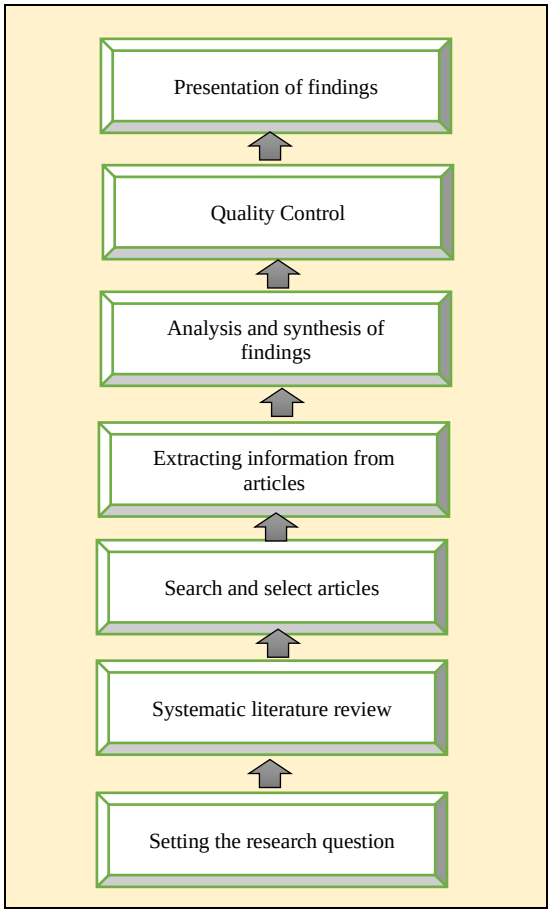


Fig.1. Meth-analysis method steps (Sandelowski and Barroso, 2007)

In the second research phase, research data were collected and the proposed model was validated using field study through a questionnaire. The research questionnaire was designed in five dimensions, six components, and 63 indexes. The research statistical population included 1800 heads, managers, IT experts, doctors, and nurses of given hospitals in Zahedan with at least one year of working experience, 321 of which were selected as research samples through Cochran Formula, and a research questionnaire was distributed. In the end, 310 questionnaires were filled and returned. Research data were analyzed using SMART PLS 3.

Results

Telemedicine factors, dimensions, and indexes were determined by Meta–analysis synthesis method, consisting of seven steps. Each step is summarized in the following.

First step: Research questions

Table 1. Defining research questions

Interrogative parameters		Answer
What thing	What	Determining telemedicine factors and dimensions, and validating research model
Context	Who	All research related databases, domestic and foreign publication
Time constraints	When	From 2010 to 2022
How to do	How	Content analysis and Meta–analysis synthesis

Second step: Systematic literature review

The present study reviewed databases, journals, and different search engines focused on telemedicine literature from 2010-2022. Since the existing research findings in this time period mirror telemedicine findings, it was selected for qualitative research. To search articles, various keywords were used, including telemedicine, online medicine (e-medicine), technology-oriented medicine, and telehealth. Finally, 184 papers were found using the research key terms.

Step three: Search and select proper papers

Primary qualitative studies were validated by the Critical Appraisal Skills Program (CASP). Hence, data were screened based on heading, abstract, content, and research methodology parameters. Finally, 47 papers were selected for Meta–analysis synthesis. Fig 2 shows the algorithm for selecting final papers.

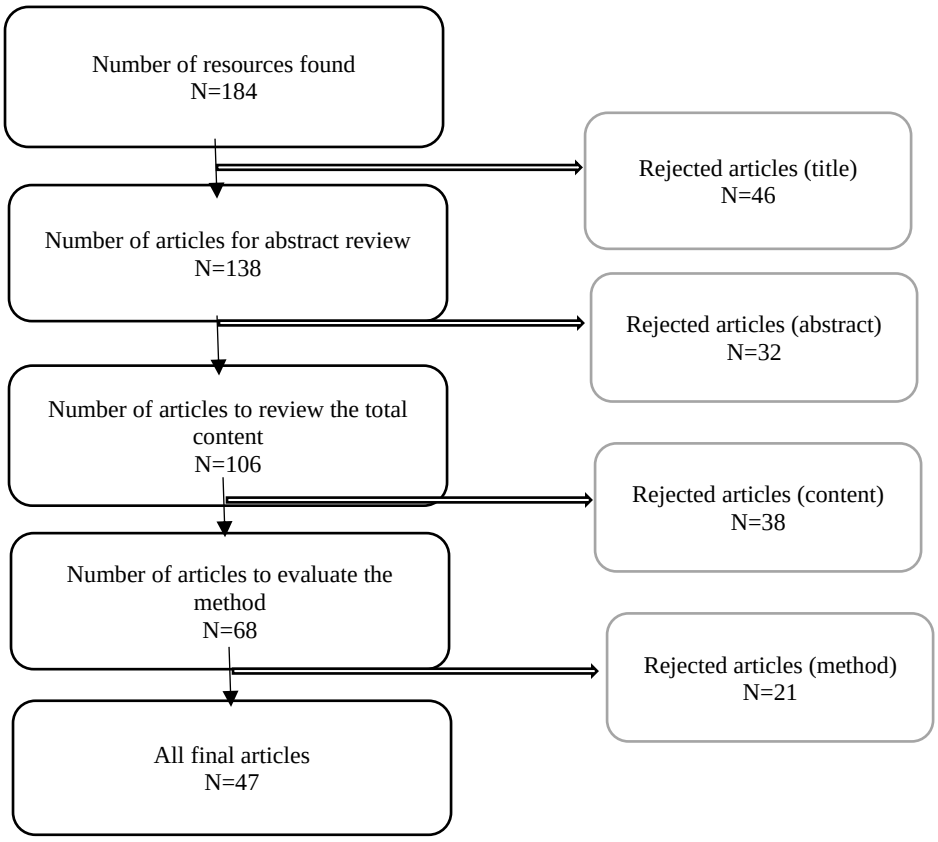


Fig.2. Final paper selection algorithm

Fourth step: Extraction results

Articles were classified according to the relevant reference including the author's last name and year of publication. Unnecessary and irrelevant literature was excluded. Table 2 represents a coding sample.

Table 2. Examples of conceptual codes extracted from some papers

Title	Author	Extracted codes example
Designing high-secured health e-record in telemedicine based on IOT	Rabieifar et al (2022)	Security protocols, information exchange security
Telemedicine awareness and adoption in surgery	Sicar et al (2020)	Continuous education, empowering universities and medical centers
Personnel perception of telemedicine emergency service and home service	Ican et al (2017)	Responsibility, commitment, and accountability
Designing, development, and deployment of telemedicine system in a developed country	Cumbi et al (2015)	Telemedicine promotion, technology adoption
Offering telemedicine implementation model: case study, Jundishapur University of Medical Sciences, Ahvaz	Torabipour et al (1400)	Charter of patient rights, transparent laws, intellectual property

Fifth step: Qualitative findings analysis

In this study, all obtained factors were initially coded. Next, each code was conceptually classified in similar categories determining research concepts. For instance, confidentiality, information exchange security, security protocols, classified access, and e-authentication were identified in five codes, which were combined to create security infrastructures. Acquiring required knowledge, sharing information, data mining, documenting experience, data maintenance, medical documents, and records were similar codes from which the knowledge management component was formed. Accordingly, based on the content analysis of 47 selected final articles in the telemedicine domain, five dimensions, six factors, and 63 indicators were totally discovered and labeled as telemedicine dimensions and factors. Table 3 illustrates the research finding categorization.

Table 3. Research finding categorization

Component	Sub-component	Indicator
Cultural	-	Ethics; honest information distribution; public technology adoption; organizational participation and goal adoption by employees and doctors; telemedicine medical satisfaction; supporting diversity, innovation, and initiative; accountability; organization agility; public counseling and education; guideline observance; promoting telemedicine
Human and institutional empowerment	-	Senior management commitment; two-way communication; employee development and productivity; recruiting and hiring expert staff; empowering doctors, employees, and nurses; empowering universities, hospitals, clinics, laboratories, insurance centers, and other clinical centers; permanent or in-service education; continuous assessment
Knowledge management	-	Acquiring required knowledge; sharing information; data mining; documenting experience; data maintenance; medical documents
Strategy	-	High-level document; vision; network governance; operational plans; mid-term and strategic; Comprehensive Electronic Government Document; policies
Infrastructures	Technical	Intellectual intelligence; Internet of Things; cloud computing; electronic prescription; electronic signature; medical equipment (technical, diagnostic, and medical); physical back-up and feeding systems of medical equipment; biomedical engineering; financial and payment systems
	Security	Confidentiality; information exchange security; security protocols; classified protocols; electronic authentication
	Software and hardware	Applications; websites; user interface software; multimedia communication software; information management systems
	Network	Internet; intranet; adequate bandwidth; information exchange protocols in network; access to consistent and secured connection
	Legal	Intellectual property; laws' transparency; service required certificates
	Organizational	Strategic committees; guidelines for dealing with complaints; assessment and monitoring guidelines; organizational architecture according to telemedicine; patients' legal charter

Sixth step: Obtained codes control

Once two raters ranked respondents, Cohen's kappa coefficient was used to assess the agreement between the two raters using SPSS. The significance level was 0.000, and the indicator value was measured at 0.915. Since the significance level is smaller than 0.05, the independence assumption of extracted codes is rejected. Thus, it can be stated that code extraction was reliable. Qualitative data were

analyzed using Shannon's entropy method, which is an innovative approach to content data analysis. The method demonstrates that the research findings are significantly relevant to the literature. To weigh concepts, the concepts' total weight codes were measured and rated in Table 4.

Table 4. Rating and significance of telemedicine deployment codes

Factor	Indicator	Frequency	Uncertainty	Significance factor	Rank in concepts	Total ranks
Cultural	Ethics	۲	۰/۰۰۷	۰/۰۱۷۶	۸	۲۱
	Honest information distribution	٥	۰/۰۰٤	۰/۰۱۳۰	۱۰	۲۷
	Technology adoption in public	٤۱	۰/۰۰٥	۰/۰۳٥۷	۱	۱
	Participation and adoption of organizational purposes by employees and doctors	۱	۰/۰۰٤	۰/۰۳٤۰	۳	٦
	Telemedicine satisfaction	۱	۰/۰۰۲	۰/۰۱٦۳	۹	۲٥
	Supporting diversity, innovation, and initiative	٦	۰/۰۰٤	۰/۰۲۱۹	٥	۱۳
	Responsibility	۱٤	۰/۰۰۷	۰/۰۲۱۹	٥	۱۳
	Accountability	۱۲	۰/۰۱۲	۰/۰۱۸۷	۷	۲۰
	Organizational agility	۲	۰/۰۱۲	۰/۰۲۰۲	٦	۱۸
	Public counseling and education	٤	۰/۰۰۷	۰/۰۱۳۰	۱۰	۲۷
	Commitment to guidelines	۲	۰/۰۰٤	۰/۰۲۳۷	٤	۸
	Telemedicine promotion	۲٦	۰/۰۰۲	۰/۰۳٤٦	۲	٤
Human and organizational empowerment	Senior management commitment	۱	۰/۰۰۱	۰/۰۱۰٥	۷	۲۸
	Two-way communication	۱	۰/۰۰۳	۰/۰۱٥۹	٦	۲٦
	Employee development and productivity	۳	۰/۰۰۸	۰/۰۱٥۹	٦	۲٦
	Recruiting and hiring experts	٤	۰/۰۰۷	۰/۰۱۹۱	٤	۱۹
	Employees, nurses, and doctors' empowerment	۱٥	۰/۰۰۹	۰/۰۲۰۲	۳	۱۸
	Empowering universities, hospitals, clinics, laboratories, insurance and other medical centers	۱	۰/۰۱۲	۰/۰۱٦٦	٥	۲٤
	Permanent and in-service educational programs	۱	۰/۰۰۲	۰/۰۲۰٥	۲	۱۷

	Continuous assessment	۳۸	۰/۰۰۷	۰/۰۲۲۸	۱	۱۱
Knowledge management	Acquiring required knowledge	۲	۰/۰۰۷	۰/۰۲۱۸	۳	۱٤
	Sharing information	۲	۰/۰۰۲	۰/۰۲۲٦	۱	۱۲
	Data mining	۲	۰/۰۰٤	۰/۰۲۱۹	۲	۱۳
	Documenting experiences	۱	۰/۰۰٥	۰/۰۱٦۸	٤	۲۳
	Medical documents and data maintenance	۱۰	۰/۰۰۳	۰/۰۲۱۹	۲	۱۳
Strategy	High-level documents	٥	۰/۰۰۹	۰/۰۲۳۳	۳	۹
	Vision	۱۸	۰/۰۰۷	۰/۰۲۲٦	٤	۱۲
	Network government	۱	۰/۰۰٤	۰/۰۲۳۷	۲	۸
	Operational, mid-term, and strategic programs	۲	۰/۰۰٥	۰/۰۲۲٦	٤	۱۲
	Comprehensive Electronic Government Document	۹	۰/۰۰٥	۰/۰۲۲٦	٤	۱۲
	policies	٥	۰/۰۰۷	۰/۰۲۳۹	۱	۷
Technical infrastructures	Artificial intelligence	۱	۰/۰۰٤	۰/۰۱٦٦	۷	۲٤
	Internet of things	۱	۰/۰۰۷	۰/۰۲۰٥	٦	۱۷
	Cloud computing	۲	۰/۰۰۱	۰/۰۲۰۸	٤	۱٥
	Electronic prescription	۲۱	۰/۰۰۲	۰/۰۲۲٦	۳	۱۲
	Electronic sign	۹	۰/۰۰٥	۰/۰۲۳۹	۲	۷
	Medical equipment	۳	۰/۰۰٤	۰/۰۳٤۰	۱	٦
	physical back-up and feeding systems of medical equipment	۱۷	۰/۰۰۲	۰/۰۲۰٦	٥	۱٦
	biomedical engineering	۱۷	۰/۰۰۲	۰/۰۲۰٦	٥	۱٦
	Financial and payment systems	۱٤	۰/۰۰٥	۰/۰۲۳۹	۲	۷
Security infrastructures	Confidentiality	۲۱	۰/۰۰٤	۰/۰۳٥۳	۱	۲
	Information exchange security	۲۱	۰/۰۰٥	۰/۰۲۱۹	٤	۱۳
	Security protocols	٤	۰/۰۰۷	۰/۰۲۳۹	۳	۷
	Classified access	٦	۰/۰۱۲	۰/۰۳٤۰	۲	٦
	Electronic authentication	٥	۰/۰۰٦	۰/۰۲۳۹	۳	۷
Hardware and software	Application	٤	۰/۰۰۲	۰/۰۲۱۹	۱	۱۳
	Websites	۱	۰/۰۰۸	۰/۰۲۰٥	۲	۱۷
	User interface software	۲٥	۰/۰۰۲	۰/۰۱۷۲	۳	۲۲
	Multimedia communication software	۱۰	۰/۰۰٤	۰/۰۲۱۹	۱	۱۳
	Information management system	۱٤	۰/۰۰٤	۰/۰۱٦٦	٤	۲٤
Network	Internet	۱۹	۰/۰۰٤	۰/۰۲۲٦	۱	۱۲

	Intranet	١٤	٠/٠٠٧	٠/٠٢١٩	٢	١٣
	Adequate bandwidth	٢٢	٠/٠٠٤	٠/٠١٨١	٤	٢١
	Information exchange protocols in network	٢٦	٠/٠٠٢	٠/٠١٨٦	٣	٢٠
	Access to secure and permanent internet	١٦	٠/٠٠٦	٠/٠١٨٦	٣	٢٠
Legal infrastructure	Intellectual property	٣	٠/٠٠٧	٠/٠٣٤٢	١	٥
	Transparent laws	١	٠/٠٠٥	٠/٠٣٤٢	١	٥
	Service providing certificates	٢	٠/٠٠٢	٠/٠١٦٣	٢	٢٥
Organizational infrastructure	Strategic committees	٩	٠/٠٠٩	٠/٠٣٤٢	٢	٥
	grievance procedure	٩	٠/٠٠٤	٠/٠٣٤٨	١	٣
	Assessment and monitoring guidelines	٩	٠/٠٠٥	٠/٠٣٤٢	٢	٥
	Telemedicine organizational architecture	٢	٠/٠٠٢	٠/٠٣٤٨	١	٣
	Patient legal charter in telemedicine	١٩	٠/٠١٢	٠/٠٢٢٩	٣	١٠

According to Table 4, it can be stated that technology adoption by the public, continuous assessment, sharing information, policies, medical equipment, confidentiality, applications, multimedia communication software, internet, intellectual property, transparent laws, complaints guidelines, organizational architecture for telemedicine showed the highest significant factor, indicating that these issues were majorly focused in telemedicine deployment. Thus, these factors are considerably important in telemedicine deployment.

Seventh step: Findings

The selected 47 articles were investigated by the scholar, and the required data were identified. Mixed findings were presented in five dimensions, six factors, and 63 indicators (Fig3).

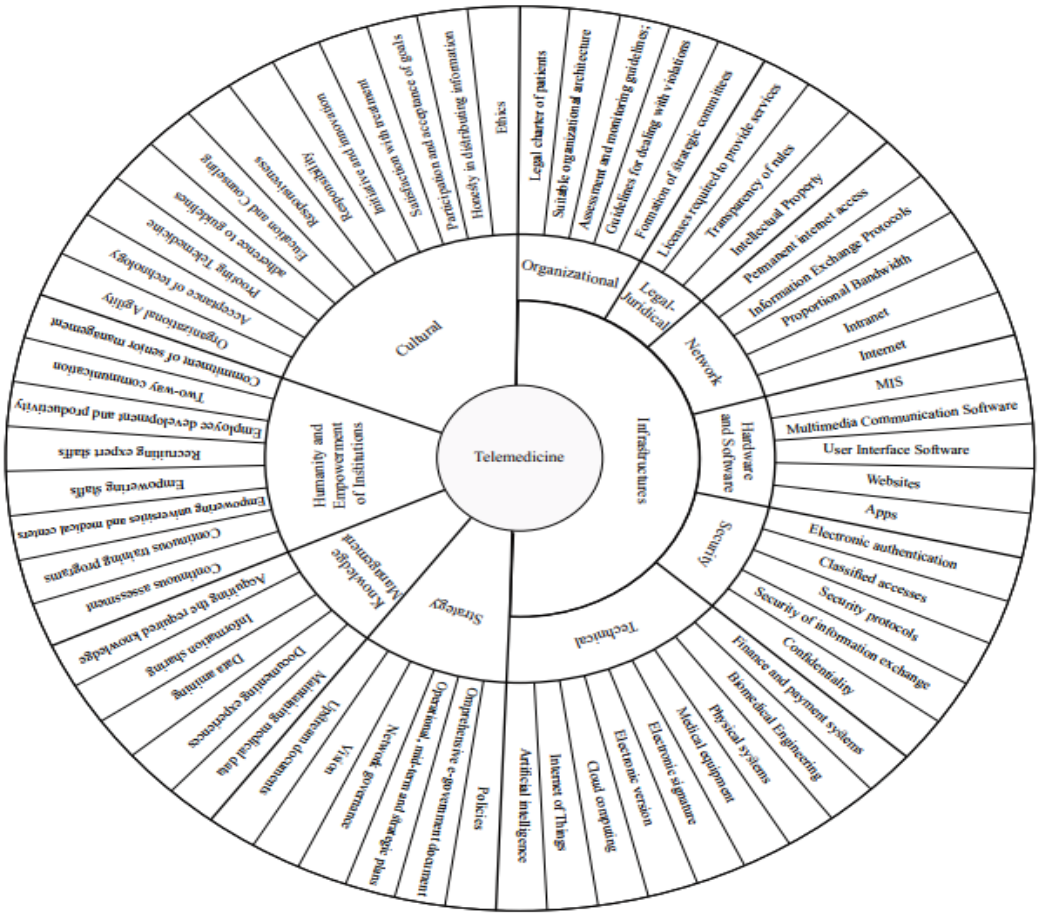
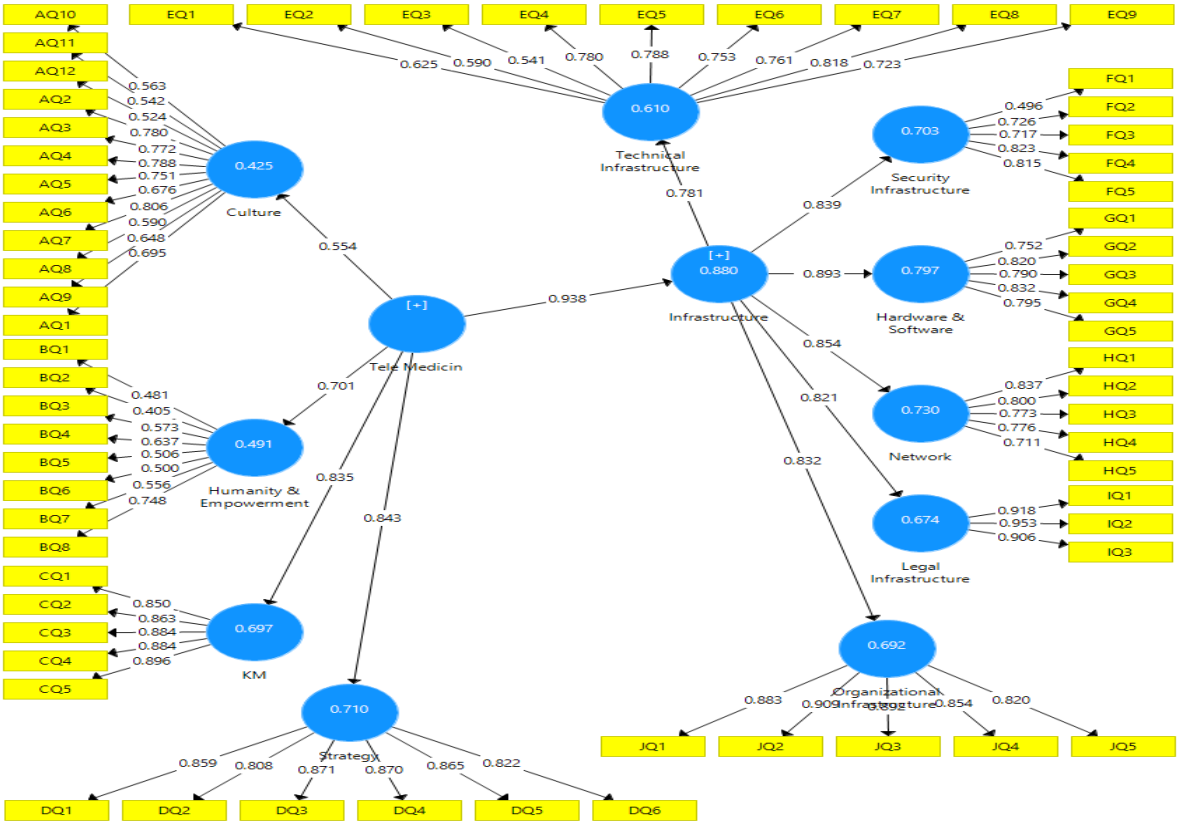


Fig. 3. Researcher-made qualitative findings model

In the second phase, the research model was validated using confirmatory factor analysis and structural equation modeling through SMART PLS 3. The confirmatory factor analysis output in standard estimation mode is illustrated in Figure 3, showing factor loadings. The larger and closer factor loadings close to 1, the better the component may explain the latent variable. If the factor loading is less than 0.3, it would be a poor relationship, which should be ignored. Factor loadings within 0.3-0.6 is acceptable; if it is larger than 0.6, it would be desirable. As seen in Figure 4, the factor loadings of all indicators are larger than 0.3; thus, indicators can properly explain the desired variable.



Discussion

The purpose of the present research is to identify telemedicine factors and indicators and to validate the research model. 47 telemedicine articles were examined using meta-analysis synthesis, and the relevant codes and factors were obtained by content analysis. According to the research findings, effective factors of telemedicine deployment were classified into five factors infrastructure (organizational, legal, network, software and hardware, security, and technical), empowerment, knowledge management, strategy, and culture. According to weighting indicators by Shannon's entropy method, technology adoption by the public, continuous assessment, sharing information, policies, medical equipment (technical, diagnostic, and treatment), confidentiality, applications, multimedia communication software, internet, intellectual property, transparent laws, complaints rules and regulations, and organizational architecture for telemedicine showed the largest significant level and rated the highest; meaning that these subjects were more investigated in the area of telemedicine.In the second phase, the research model was validated using confirmatory factor analysis. Research variable measurement model in the standard estimation mode revealed that the factor loadings for all indicators were larger than 0.3; hence, the indicators effectively explain the desired variable. According to the research findings, telemedicine deployment requires focusing on all existing indicators. Based on the literature review, it

can be also stated that the present research could be a proper roadmap for telemedicine deployment by offering a comprehensive framework for telemedicine (Fig2). The results are relevant to Rabieifar et al., (2022) showing that information security is a critical management function in e-health, which plays a major role in increasing customer trust in the quality of provided service. Torabipour Hamedani et al (2021) presented need assessment and service prioritization, service feasibility, service strategy, organizational infrastructures for deployment, training medical staff, insurance infrastructures, and implementation pricing, legal and ethical infrastructures, technical, security, and confidentiality infrastructures, as well as service monitoring and assessment as the 12 main axes of telemedicine deployment. In addition, this study is also relevant to Badi and Rahbar (2021), Sikar et al. (2020), Fosaroo et al. (2018), Combi et al. (2015), …Considering the importance of using appropriate equipment and infrastructures for successful telemedicine implementation, all medical centers having telemedicine techniques must follow the required frameworks; however, it needs structured cooperation among engineers, doctors, managers, nurses, and technicians. Moreover, authorities must also concentrate on sufficient disbursement, creating motivation and a sense of cooperation using explanatory and educational sessions. It is also necessary to adopt effective security measures to protect the privacy and confidentiality of patient information over telemedicine, provided that the necessary methods and executive instructions are identified and introduced so that authorities are enabled to take security measures. The technology adoption is influenced by doctors' admission of the ease of using telemedicine technologies. Doctors believe that the technologies they can work with are more efficient. Culture, structure, and organizational design are effective factors in successfully implementing telemedicine at hospitals and other healthcare centers. In terms of organizational and national culture, such organizations have the ability to adopt the strategy of change and successfully use telemedicine technology. Therefore, it may seem necessary to restructure organizations according to existing cultural trends among specialists in hospitals and other medical centers. Doctors as health experts play a leading role in using new technologies. So, prior to any implementation and investment, it is necessary to provide the required platforms for technology adoption. Financial and managerial empowerment of doctors may influence their positive attitude toward change, which decreases doctors' resistance to telemedicine services. Furthermore, the technical potential of doctors in telemedicine implementation is also considerably effective in developing telemedicine technology. Since a study must shed light on further studies, future scholars are recommended to conduct a similar study with larger samples, time, and space. Also, in line with the creation of modern technologies, including telemedicine, it is suggested that transforming the process of traditional to modern organizations is clearly defined in policy-making packages. Therefore, future researchers are suggested to conduct a comparative study between domestic and foreign

organizations and compare telemedicine feasibility and deployment factors. It is obvious that removing limitations and obstacles of any field study is the foundation of further studies, leading to science flourishment. The present research also faces some limitations: 1. Telemedicine was merely formulated based on a literature review; other methods like interviews may provide more comprehensive results. 2. The research model was validated using a questionnaire, which brings its limitations.

Conflict of interest: There is no conflict of interest associated with this research.

Financial sponsor: This research was conducted without any financial support and with the researcher's personal funds.

Acknowledgments: The researcher would like to express their gratitude to all the participants, as well as the professors and friends who provided support throughout this research endeavor.

References

Aiken, A. R., Gomperts, R., & Trussell, J. (2017). Experiences and characteristics of women seeking and completing at-home medical termination of pregnancy through online telemedicine in Ireland and Northern Ireland: a population-based analysis. *BJOG: An International Journal of Obstetrics & Gynaecology*, *124*(8), 1208-1215.

Badi, Arshia; Rahbar, Farhad (2021). Telemedicine system development during pandemic outbreaks using social media. *Journal of Health and Biomedical Informatics,* 8(4), 359-377.

Combi, C., Pozzani, G., & Pozzi, G. (2016). Telemedicine for developing countries. *Applied clinical informatics*, *7*(04), 1025-1050.

Courtine, G., & Sofroniew, M. V. (2019). Spinal cord repair: advances in biology and technology. *Nature medicine*, *25*(6), 898-908.

Danaeifard, Hassan; Alvani, Mehdi; Azar, Adel. (2016). Qualitative research methodology in management: a comprehensive approach. *Tehran, Safar Eshraghi*.

Dang, L. M., Piran, M. J., Han, D., Min, K., & Moon, H. (2019). A survey on internet of things and cloud computing for healthcare. *Electronics*, *8*(7), 768.

Dekker, P. K., Bhardwaj, P., Singh, T., Bekeny, J. C., Kim, K. G., Steinberg, J. S., ... & Fan, K. L. (2021). Telemedicine in the wake of the COVID-19 pandemic: increasing access to surgical care. *Plastic and Reconstructive Surgery Global Open*, *9*(1).

Ehteshami, M., Golzari, Z., & Fathi, L. (2022). Designing a Model of Professional Development Courses for Faculty Members of Farhangian University with a Flipped Learning Approach: A Meta-Synthesis Study. *Iranian Evolutionary and Educational Psychology Journal, 4*(4), 0-0.

Fusaro, M. V., Becker, C., Pandya, S., Mcbride, W., Alizadeh, K., Iannotti, V., ... & Scurlock, C. (2018). International teleconsultation on conjoined twins leading to a successful separation: a case report. *Journal of Telemedicine and Telecare*, *24*(7), 482-484.

Ganapathy, K., & Ravindra, A. (2009). Telemedicine in India: the Apollo story. *Telemedicine and e-Health*, *15*(6), 576-585.

Hjelm, N. M., & Julius, H. W. (2005). Centenary of tele-electrocardiography and telephonocardiography. *Journal of telemedicine and telecare*, *11*(7), 336-338.

Khodadade, Maryam; Keshvari, Hamid; Minagar, Maede; Pournik, Omid. (2014). Studying legal challenges and requirement for telemedicine system implementation. *Hospital quarterly*,13(5), 1-10.

Lukas, H., Xu, C., Yu, Y., & Gao, W. (2020). Emerging telemedicine tools for remote COVID-19 diagnosis, monitoring, and management. *ACS nano*, *14*(12), 16180- 16193.

Mehdizade, Hamed; Esmaeili, Nafise (2014). Telemedicine application in skin disease diagnosis: *a review on clinical results*. 1(1),63-73.

Noubakht, Samin; Bagheri, Somayeh; Mehraeen, Ismaeil; Shamsabadi, Ahmadreza (2018). Feasibility of telemedicine in selected hospitals in Iran. *Journal of Payavard Salamat.* 12(1), 25-33.

Rabieifar, Fatemeh; Radfar, Reza; Tolouei Ashlaghi, Abas. (2022). Designing high-secured electronic health record model in IOT-based telemedicine. *Helathcare managemen*t,13(1) , 7-22.

Safi, S., Ahmadieh, H., Katibeh, M., Yaseri, M., Nikkhah, H., Karimi, S., ... & Kheiri, B. (2019). Modeling a telemedicine screening program for diabetic retinopathy in Iran and implementing a pilot project in Tehran suburb. *Journal of ophthalmology, 11(9),251-325.*

Saeedi Tehrani, Saeeide; Norouzi, Mahshad. (2015). Telemedicine: a review on advantages, disadvantages and ethical challenges. *Iranian Journal of Medical Ethics and History,* 8(2), 29-40.

Saikar, A. A., Badve, A., Parulekar, M. P., Patil, I., Belsare, S. S., & Deshmukh, A. A. (2020). Medco: An Emergency Tele-Medicine System for Ambulance. In *Virtual and Mobile Healthcare: Breakthroughs in Research and Practice* , 1004-1026.

Sandelowski, M., Barroso, J., & Voils, C. I. (2007). Using qualitative metasummary to synthesize qualitative and quantitative descriptive findings. *Research in nursing & health, 30*(1), 99-111.

Scott Kruse, C., Karem, P., Shifflett, K., Vegi, L., Ravi, K., & Brooks, M. (2018). Evaluating barriers to adopting telemedicine worldwide: a systematic review. *Journal of telemedicine and telecare, 24*(1), 4-12.

Siyal, A. A., Junejo, A. Z., Zawish, M., Ahmed, K., Khalil, A., & Soursou, G. (2019). Applications of blockchain technology in medicine and healthcare: Challenges and future perspectives. *Cryptography, 3*(1), 3.

Smith, A. C., Bensink, M., Armfield, N., Stillman, J., & Caffery, L. (2005). Telemedicine and rural health care applications. *Journal of postgraduate medicine, 51*(4), 286.

Thaker, D. A., Monypenny, R., Olver, I., & Sabesan, S. (2013). Cost savings from a telemedicine model of care in northern Queensland, Australia. *Medical Journal of Australia, 199*(6), 414-417.

Torabipour hamedani, Amin; Minaei, Forough; Jahanbani veshare, Efat; Zarei, Javad. (2021). Telemedicine implementation model; case study: Jundishapur University of Medical Sciences, Ahvaz. *Journal of Modern Medical Information Sciences,* 7(4), 4-13.