Journal Semestre Económico
Vol. 13, No. 2, Month Julio-Diciembre, 2024
ISSN: 2072-0572 (Print version) | 2523-0840 (Digital version)
DOI. 10.26867/se.2024.v13i2.176, pp. 89-101
http://semestreeconomico.unap.edu.pe/index.php/revista/index

ARTÍCULO ORIGINAL

Management of healthcare digitalization under Behavioral Economics: biases, obstacles & barriers*

Gestión de la digitalización de servicios de salud desde la Economía conductual: sesgos, obstáculos y barreras

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(Received June 28, 2024; accepted July 27, 2024)

Abstract
While digitization can make the health industry faster and more efficient, there are many financial, social and organizational obstacles and barriers to its implementation. This article offers a systematic review, with PRISMA method, of the main troubles detected from the scientific literature review. Also there is a proposal of new kind of restrictions to pay attention. Finally, its offer a heterodox reading about the problem analyzed to improve its management.

Keywords: digitalization management; healthcare digitalization; obstacles & barriers; heterodox analysis.
JEL Cod.: I1, I31, K32, O3.

Resumen
Si bien la digitalización puede hacer que la industria de la salud sea más rápida y eficiente, existen muchos obstáculos y barreras financieras, sociales y organizacionales para su implementación. Este artículo ofrece una revisión sistemática, con el método PRISMA, de los principales problemas detectados a partir de la revisión de la literatura científica. También se proponen nuevos tipos de restricciones a las que prestar atención. Finalmente, se ofrece una lectura heterodoxa sobre el problema analizado para mejorar su gestión.

Palabras clave: gestión de la digitalización; digitalización de la atención sanitaria; obstáculos y barreras; análisis heterodoxo.
Codigos JEL: I1, I31, K32, O3.

1. Introduction

The digital age represents a transformative economic and social phenomenon driven by key technologies, including artificial intelligence, Internet of Things (IoT), nanotechnology, biotechnology, and robotics (Moetlhoa et al, 2024). Digitization affects all areas of public and private-life and their kind of management (Alonso et al, 2021; González et al, 2021; Sánchez-Bayón et al, 2023 & 2024): people connect with friends, family, colleagues, and businesses and exchange data with each other every day via apps and platforms (Sánchez-Bayón, 2020 & 2021).

However, digitization in the healthcare sector is lagging far behind (Kajüter et al, 2022). Digital transformation involves using information and communication technology (ICT) in basically new

business capabilities, public administration, and the lives of individuals and society to enable substantial advancements like effective operations, better consumer experiences, or new business models (Inampuid et al, 2024; Sánchez-Bayón, 2019, 2022 & 2023). The tidal wave of digital innovations, which has intensified into a technological tsunami over the past several years, has also impacted the healthcare sectors across the globe (Inampuid et al, 2024).The emergence of digital technologies has significantly impacted efficiency, effectiveness, and reduced healthcare service costs (Moetlhoa et al, 2024). Eventually, as EMR provides proper management of chronic disease and other social problems, it can save up to $142–371 billion per year (Numair et al, 2021). Applying advanced digital technologies can provide real-time accurate information access to healthcare workers (HCWs) and provide decision supports to healthcare professionals for better clinical care provision (Numair et al, 2021). Thanks to digital technologies and tools in Medicine, particularly through e-Health technologies, prevention, diagnosis, treatment, monitoring and administration have been improved (Nikitenko et al, 2023).

Digitalization of health information can help to better patient information management and improve health services (Numair et al, 2021); also to improve the social wellbeing (Peña-Ramos et al, 2021; Sánchez-Bayón et al, 2022). Yet, recent reviews suggested that patients and healthcare providers continue to resist the digital transformation in the health sector despite its several applications and benefits (Inampuid et al, 2024). There are important obstacles to implement these technologies to the health sector in different countries (i.e. Mediterranean countries, Latin American countries, MERCO, 2020). Addressing such implementation challenges is crucial in designing and delivering digital health services. Current researches show that there is a chasm between the current health IT ecosystem and the health IT ecosystem that is needed. Both the technologies themselves and the application of those technologies and the data they contain urgently need improvement to support the transition to value-based care. The existing obstacles are largely not knowledge barriers, but execution barriers (Adler-Milstein et al, 2017). That is, we know what needs to be done but not necessarily how best to do it in terms of which specific actions should be pursued by which specific stakeholders. And while the barriers to successful execution are considerable and require coordinated multi stakeholder action, they could, and should, be tackled with concerted efforts (Adler-Milstein et al, 2017).

The health care industry is one of the most important industries in any society. Therefore, reducing costs, and increasing efficiency and effectiveness using digitalization of this industry is of great importance. In order to succeed in digitizing the healthcare industry, it is necessary to first identify and examine the obstacles that stand in the way of this industry. For this purpose, in this article, we are going to extract the barriers to digitalization of the healthcare industry from the research literature of this field.

2. Literature review

Research on the barriers to digitalization of the healthcare industry in different countries has been conducted by various researchers. These researchers have suggested certain obstacles for the digitalization of the healthcare industry. Some of these researches are as follows:

Nuamir et al (2021) implemented a mother and child health registration system in the study areas of Kenya and Lao PDR to evaluate barriers to digitalization. They conducted in-depth interviews with 20 healthcare workers (HCWs) who used the system and analyzed it qualitatively with thematic framework analysis. The results showed that workload and motivation to maintain high performance were significant obstacles to implementing a digital health system. They recommend enhancing the scope and focus on human needs and satisfaction as a significant factor for digital system durability and sustainability.

Adler-Milister et al (2017) identify a set of focal goals and associated near-term achievable actions that are critical to pursue in order to enable the health IT ecosystem to meet the acute needs of modern health care delivery.

Kajüter et al (2022), with a case study on the German healthcare sector, identified six categories of barriers that inhibit digital linking in healthcare: individual, legal, financial, institutional, technological,

and workforce-related barriers. They were analyzed using the dimensions of level, IT influence, and perception and applying the actor-network theory.

Moetlhoa et al (2024) presents the outcomes of a workshop conducted with key stakeholders, aiming to discern barriers and enablers in implementing digital-connected POC diagnostic models in South Africa. The workshop, a component of the 2022 REASSURED Diagnostics symposium, employed the nominal group technique (NGT) and comprised two phases: Phase 1 focused on identifying barriers, while Phase 2 centered on enablers for the implementation of digital-linked POC diagnostic models. Stakeholders identified limited connectivity, restricted offline functionality, and challenges related to load shedding or rolling electricity blackouts as primary barriers. Conversely, ease of use, subsidies provided by the National Health Insurance, and 24-hours assistance emerged as crucial enablers for the implementation of digital-linked POC diagnostic models.

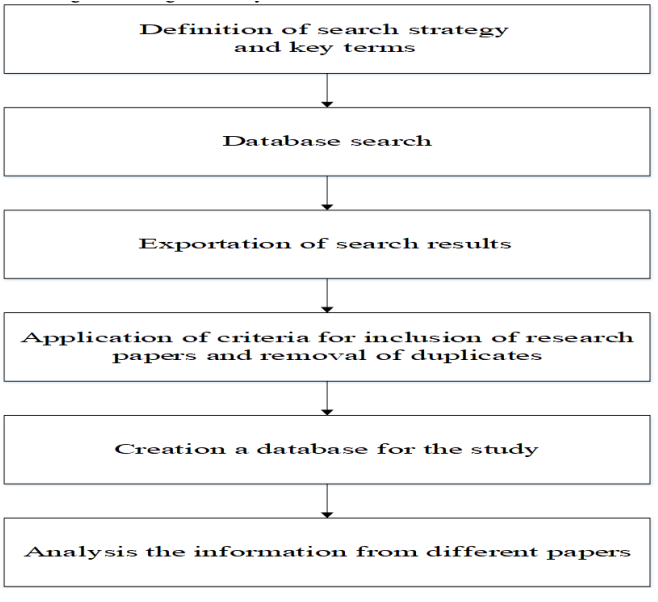
Inampuid et al (2024) attempted to identify the potential barriers to the implementation of digital transformation in the health sector of India. Barriers identified were mainly associated with limited technological and medical infrastructure, data security and privacy, and a lack of physical examination.

3. Result and discussion

The methodology used in this study was a Systematic Literature Review (SLR). This framework included planning, which involves the identification of the research questions; conducting the review; searching for relevant literature; and analyzing the literature through selection, extraction, and coding.

Following charts shows the Procedure of Systematic Literature Review.

Figure 1. Stages for a systematic literature review



Source: Tranfield et al., 2003.

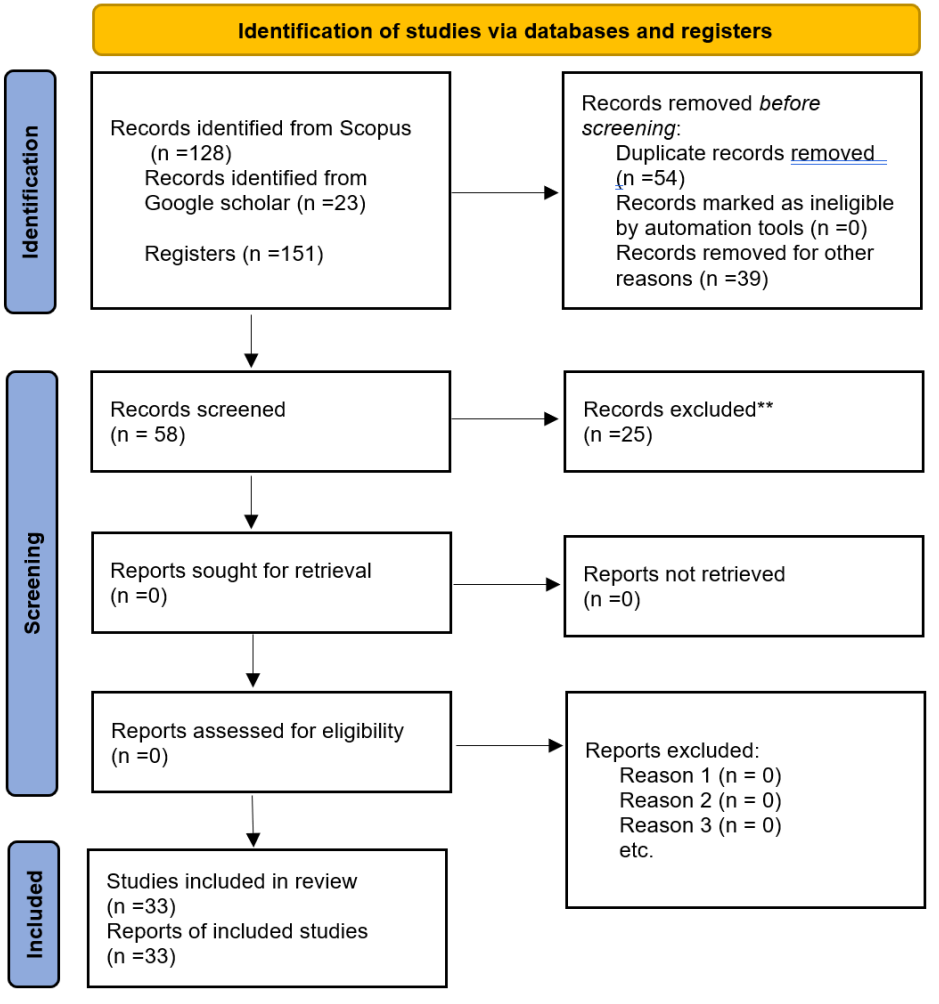
The first step in collecting information involved defining the key terms used in the search. The process of search done on Scopus and Google scholar as follow: a) Search with (healthcare AND digitalization AND obstacles) in Scopus: 31 documents. b) Search with (healthcare AND digitalization AND barriers) in Scopus: 97 documents. c) Search with all-in-title: healthcare digitalization barriers in Google scholar 2 documents. d) Search with all-in-title: healthcare digitalization obstacles in Google scholar 1 document. e) Search with all-in-title: healthcare digitalization challenges: in Google scholar 20 documents.

Some of found documents in search were not relevant and useful for our purpose. So we omitted them. Finally, we investigate relevant papers and searched for the answer to our research questions: What are the obstacles and barriers on healthcare digitalization? And how to improve its management?

The following tables show the obstacles drawn from literature (see table 1 & 2). Many of them are repetitive and others overlap. Therefore, we coded them and presented a new category for barriers to digitalization of the healthcare system.

The literature review of this study based on the PRISMA method can be seen in Figure 2. he Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) has been designed primarily for systematic reviews of studies that evaluate the effects of health interventions, irrespective of the design of the included studies. However, the checklist items are applicable to reports of systematic reviews evaluating other non-health-related interventions (Trifu et al, 2022). Use of PRISMA 2020 has the potential to benefit many stakeholders. Complete reporting allows readers to assess the appropriateness of the methods, and therefore the trustworthiness of the findings (Page et al, 2021).

Figure 2. PRISMA method for obstacles for healthcare digitalization



Source: own elaboration (based on Page et al, 2020).

Table 1. Systematic review of obstacles & barriers for healthcare digitalization (topics & references)

Obstacles & barriers for healthcare digitalization (topics)	References
workload motivation to maintain high performance	Nuamir et al (2021)
Complexity of technology tools. Data used by digital healthcare tools is still insufficient. Telemedicine as a tool has limitations in terms of observation and accurate diagnosis. Provision Medical education is lacking digital literacy fundamentals. Undeveloped legal base. Not sequential digital healthcare strategy. Digital healthcare is still in the early stage of development. Insufficient patient privacy and data security. The use of digital tools may reduce healthcare specialist's skills. Infrastructural barriers. Lack of funding. Cultural and country-specific barriers. Religious barriers limit implementation opportunities. Poor tool functionality. Data inaccessibility. Lack of training. Lack of support. Connectivity Issues. Unawareness of risk management plans. Poor organizational system management. Special skills needed. User ignorance for the Digitalization. Lack of understanding of the tool.	Pukinskytė, S. (2022).
Limited connectivity. Restricted offline functionality. Challenges related to load shedding or rolling electricity blackouts.	Moetlhoa et al (2024)
Lack of network coverage and information technology (IT) infrastructure. High installation and operating cost. Lack of medical records and experts. Lack of physical examination. Data accuracy and misdiagnosis. Data privacy and confidentiality. Language and communication barriers. User barriers, and ethical, legal, and accountability concerns.	Inampuid et al (2024)
common basic rules have not been developed. each region independently followed its own way to digitize, resulting a huge variety of software products used even within one region, which makes electronic document flow between medical institutions difficult and practically impossible between regions. Low basic digital skills in medical workers. low level of digital knowledge and trust among patients creates a low demand for digital technologies among the population. Citizens are concerned about safety of their personal data on digital media. fear of medical errors in society associated with the use of telemedicine technologies.	Grigorieva, Demkina, & Korobeynikova (2024)
Lack of interoperability between systems. Significant risks in digital transformation implementation. Lack of awareness, evidence, and funding for e-health initiatives. Legal hurdles and shortage of qualified human resources in healthcare.	Sushanta, Kumar, Tarai. (2023)
Structural and spatial disparities in medical facilities and practitioners. Exodus of general practitioners and specialists in rural regions.	Rudwan, Masoud. (2022)
Poor standardization of information exchange protocols between sources (devices)	I.A., Shaderkin. (2022).

Regulatory requirements and legal uncertainties	Lea, Meier., Kevin, Tippenhauer., Murat, Sariyar. (2021).
sociological, economical, and infrastructure obstacles.	Joshi, S., & Sharma, M. (2023).
Ethical Issues of Digitalization in Healthcare Organizations.	Larisa, Pătru, (Grigorie)., C., Patru. (2023).
Doctors claim that EHR distracts them from their regular clinical effectiveness. They believe that their time spent on EHR could have been better used on patients.	Rahul, Lamba. (2019).
Data transparency, traceability, immutability, audit, data provenance, flexible access, trust, privacy, and security.	Alhamzah, et al (2022).
rigger fears and insecurities in patients	Guido, Lerzynski. (2021).
Regulatory, commercial, and technical barriers hinder healthcare digitalization adoption. Potential obstacles include digital divide, cybersecurity risks, and biased algorithms. Educate patient about healthcare digitalization.	Brenda, et al. (2022)
Data breaches, malware, viruses, legacy systems, and network security risks. Poor quality and validation of clinical data. Lack of understanding and underdevelopment of analytic tools.	Ramar et al (2022). Amitava, et al. (2018).
Cost management	Monferdini et al (2024)
IT Infrastructure of a country. functionality problems of the service. Low compatibility (not all healthcare facilities can provide the required network access). A lack of data often leads to poor data integrity and quality. barriers resulting from workflow deficiency. lack of integration in the clinical work. issues around physicians include that they simply have no time for non-patient related concerns. Hierarchical deficiency includes missing top-management support, low change management, and scattered key players that operate independently within the organization causing unclear roles and responsibilities	Gleiss, & Lewandowski (2022)
Cultural barriers which evolve around the issue of differences in adopting and accessing digital resources. Barriers occur on an individual, like attitude toward technology or devoid intrinsic motivation and knowledge. Low perceived usefulness and confidence in technology in general. Mistrust toward their technologies. fear of more transparency about the medical processes, which results in a loss of control and strengthens the patient's position. Fear and doubts also arise from missing social contact when switching to digital solutions such as online consultations. lack of business education of healthcare professionals often leads to ignorance toward anticipated healthcare benefits. Monetary problems concerning digital innovations range from verification issues to missing public funds. market-entry barrier for startups. Costs are a barrier, because high implementation costs often represent a deterrent, and the amount of lifecycle costs is sometimes difficult to estimate. general lack of (external) financial incentives for the introduction and use of digital innovations in healthcare. Data security and privacy issues are relevant for both users and providers. differences in legislation at federal and state levels even increase the legal complexity structural barriers. issues of standardization, certification, approval, and cooperation. high costs lack of interoperability of technology frequent software Updates	Saxena & Godfrey (2022)

privacy concerns technological disruption network coverage issues	
ethical challenges related to patient privacy and data security algorithm understanding	Lerzynski (2021)
Challenges in methodology, implementation, and evaluation Lack of digitally qualified workforce	Lapão (2019).
Technological cyber security challenges	Mahajan et al (2022)
digitalized analysis and process medical data sharing infrastructure resources regulation and constraints operational issue The dearth of expertise in digitalization shortcomings of inadequate experience limitations of traditional realization and storage of relational data regulation and responsibilities	Lu et al (2021)
Health barriers support networks application interface/design digital literacy lack of awareness online security access to digital devices and the internet relationship with healthcare provider in-person preference	Aslan, Mold,Marwijk and Jo Armes (2024)
trust in technology financial Barriers	Van Drumpt et al (2024)
Rules Data collection challenges	Krefting et al (2023)
Lack of practitioners' awareness' lack of education. lack of clinical evidence.	Radwan et al (2023)
low level of digital literacy among health care providers. low level of motivation to make changes in organizational processes. significant gaps in basic digital skills among health professionals. low level of digital knowledge and patients'	Grigorieva et al (2024)
Standardization and interoperability among various healthcare systems, devices, and platforms. Data Governance and Security. Infrastructure and Technical Requirements. Governance and Stakeholder Engagement. Adoption and Implementation Support. Regulatory barriers. Lack of infrastructure. Funding and investment. Data privacy and security Concerns. Cultural and organizational factors. Organizational barriers. Lack of digital literacy among healthcare specialists. deficiency in legal regulations.	Dimitrova et al (2023)
structural problems. timing of the introduction. insufficient information and communication measures.	Rau, Tischendor & Mitzscherlich (2024)
human, technical, ethical–legal, and economic barriers	Kalman et al (2024)
management technologies, data security, organizational structure, and societal acceptance	Chen & Raun (2024)
Source: own elaboration (based on Tajodin et al, 2024).	

After omitting the duplicate and overlaps obstacles, our systematization offers 20 categories of barriers on healthcare digitalization (including new types detected):

Tabla 2. Main categories of obstacles on healthcare digitalization

1	Obstacles related to high cost of digitalization
2	Obstacles related to the fear of healthcare industry employees of reducing accuracy and productivity with the use of technology
3	Obstacles related to quantity and quality of data
4	Obstacles related to security and privacy of patients data
5	Obstacles related to complexity of using technology
6	Obstacles related to limitations of digital tools
7	Obstacles related to lack of education, skills and knowledge about digitalization
8	Obstacles related to inappropriate rules
9	Obstacles related to lack of strategy
10	Obstacles related to Infrastructure
11	Obstacles related to country culture and organizational culture
12	Obstacles related to lack of support
13	Obstacles related to lack of integrity and connectivity between technological tools
14	Obstacles related to healthcare management
15	Obstacles related to rolling electricity blackouts and internet weakness
16	Obstacles related to ethical concerns
17	Obstacles related to organizational structure
18	Obstacles related to workload and time limitation
19	Obstacles related to motivation of healthcare employees
20	Obstacles related to supply chain of technologies providers and healthcare organizations

Source: own elaboration (based on Tajodin et al, 2024).

Although the obstacles and barriers to the digitalization of the health industry vary in different countries, many of these troubles are in common among all of them. In various studies, these obstacles have been examined and various categories have been made for them. Some of these barriers are related to the structure and culture of health organizations and the lack of skills to use digital tools in these organizations. Others are related to the culture of society and the degree of social acceptance of digitalization and technology. Another category of these obstacles is related to the cost of setting up and updating technologies. While the other part of these obstacles and barriers are related to the weakness of technology tools, the other is related to the lack of government and shareholders' support for digitalization. There are also concerns about patient data security and lack of appropriate rules to protect patient privacy. Various studies have suggested a variety of solutions to eliminate these barriers, the most common of which are the regulation of protocols and frameworks for protecting patient data and training the skills needed to digitize health care to industry employees.

4. Conclusions

Why there are not more improvements in the digitalization of the healthcare industry? According to the mainstream literature, the main obstacle and barriers are exogenous factors, related with the state of the art of technology and its popularization (to become part of the business culture and the labor relations). Under a heterodox analysis (specially, Austrian Economics and New-Institutional Approaches) the troubles are others: the main obstacle and barrier is the public interventionism, with bureaucracy and resistance to the change (Sánchez-Bayón et al, 2024). Maybe, the problem is linked with the think-tanks of healthcare sector, because in Europe, the main patron is the public sector, for this reason there is not enough critics to the current system and proposals to improve it. There is a synchrony between the official speech and the literature review, as it was confirmed in this research.

After analyzing the obstacles and barriers for healthcare digitalization and confirming their persistence and increase, a threat is now posed in this regard, such as the neo-Luddite risk. It turns out that, as long as it is applied the Neoclassical Synthesis and the welfare state model, with the incentives

oriented towards public interventionism, especially with the mainstream consideration of Keynesian schools (including neo-Keynesians and post-Keynesians). This implies resistance to change and distrust of digitalization, for fear of technological unemployment, as Keynes announced in the 1930s (Keynes, 1930, 1936 & 1937). Hence we speak of the neo-Luddite risk or attack and control of technological advances that would favor the digital transition (Sánchez-Bayón et al, 2024). As in all previous industrial, technological and energy revolutions, adjustments have been necessary, but for each obsolete and disappeared job, others have emerged, it is enough to pay attention to the readjustment effect (Sánchez-Bayón, 2023), which in the care of the health would mean starting by reducing the obstacles and barriers to digitalization, so that new jobs adapted to change can emerge.

Author Contributions

Asefeh Tajodin: Conceptualización, Investigación, Análisis formal, Metodología, Administración del proyecto, Redacción – borrador original, Redacción – revisión & edición.

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