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INFORMATION TECHNOLOGY IN HEALTHCARE: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Aim/Purpose	The aim of this study is to recognize the factors that contributed to the development of IT in the healthcare industry.
Background	The healthcare Information Technology (IT) solutions market has experienced remarkable growth, with the healthcare sector emerging as a $303 billion industry. However, despite its substantial size, the healthcare industry has faced criticism for its slow adoption of innovative technologies. This study aims to explore factors driving the evolution of IT in the healthcare sector.
Methodology	The researchers conducted a systematic literature review, searching the PubMed and Emerald databases for relevant peer-reviewed articles. After filtering based on defined criteria, 433 articles were included for analysis. Thematic analysis was applied to the abstract of articles which spanned the period of 1997 to 2023.
Contribution	This study provides a conceptual framework elucidating the key factors driving the evolution of IT in the healthcare industry. By systematically analyzing the existing literature, the research identifies four overarching themes – government policies, technological potentials, healthcare delivery needs, and organizational motivations – that have propelled the development and adoption of healthcare IT solutions.

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Findings	Based on the analysis in this paper, four themes emerged: government policies promoting IT adoption through initiatives like incentives for electronic health records; technological breakthroughs enabling new healthcare IT capabilities; healthcare delivery needs to drive IT integration for improved quality and safety; and patient experience and organizational motivations to leverage IT for streamlining processes and knowledge management.
Recommendations for Practitioners	The conceptual model can guide practitioners in developing IT solutions aligned with policy drivers, technological capabilities, care delivery needs, and organizational imperatives.
Recommendation for Researchers	The conceptual framework developed in this study offers a lens for researchers across disciplines to continue investigating the role of information technology in the healthcare industry.
Impact on Society	Examining the evolution of IT in the healthcare industry revealed the importance of information technology in enhancing the delivery and affordability of healthcare services and addressing issues of accessibility and inequality.
Future Research	Future research will explore global perspectives showcasing the successful impact of IT on healthcare, as emerging technologies impact healthcare delivery and patient outcomes.
Keywords	eHealth, healthcare information systems, healthcare industry

INTRODUCTION

Information Technology (IT), as a discipline, remains the dominant field. It continues to revolutionize every facet of human society and industry (Imran et al., 2021). The IT discipline and its practice continue to evolve, and its impact is unprecedented. Healthcare IT solutions in 2022 accounted for a market worth 303 billion dollars with a profound impact on the lives of all members of society (Global Market Insights, 2023). However, the healthcare industries have been criticized for the slow adaptation of IT solutions (Gu et al., 2020; Ravitz, 2020; Salazar, 2022; Stegwee & Spil, 2001). Meanwhile, the interactions between patients and healthcare service providers have undergone fundamental changes from what they were in the pre-IT era (Boucher, 2010; Gleiss et al., 2021).

Previous studies have highlighted the significant role of the "avalanche" of data generation in the development of new healthcare IT systems designed to process and utilize this data (Graham et al., 2011). The utilization of technologies such as sensors and portable devices in healthcare has been underscored by previous works (Marques & Ferreira, 2020; Vogenberg & Santilli, 2018). In addition, wearable devices are now being used to collect massive data on the properties of the body and the environment (Vogenberg & Santilli, 2018).

E-health is another growing trend that has received wide attention in the literature (Marques & Ferreira, 2020). In the healthcare industry, the deployment of a digital platform does not only address inefficiencies but facilitates patient orientation (Alt & Zimmermann, 2021). Richman et al. (2013) emphasize the need for organizational innovation in the adoption and adaptation of information technology in the healthcare sector. Moreover, IT usage can positively impact health service delivery in terms of quality and efficiency (Chaki, 2022; S. H. Kim & Song, 2022). While the health sector continues to be shaped by the development of new technologies, it has recorded slow progress (Gu et al., 2020; Stegwee & Spil, 2001).

The Technology Acceptance Model (TAM) has been used widely in healthcare informatics literature to study the adoption of healthcare services such as telemedicine and electronic health records (Holden & Karsh, 2010). TAM was originally developed in 1989 to study workers' acceptance of new

technologies (Davis, 1989). The adaption and extension of TAM in healthcare enabled researchers to study the acceptance of IT by patients, nurses, physicians, and healthcare professionals (Rahimi et al., 2018). These studies are mostly focused on the use of technology at a personal level, consider factors such as anxiety and habits (Rahimi et al., 2018), and assume that perceived usefulness and ease of use of the system leads to acceptance of technology (Krisdina et al., 2022). These factors have been linked to defined theoretical frameworks for analysis of the integration of new healthcare technologies, such as perceived quality of care in mobile health (O'Connor et al., 2020).

To understand the underlying drivers, this research explores healthcare through the lens of information technology, which is a field dedicated to understanding the "needs and solutions" that bridge "people, information, and contemporary technology" (Said et al., 2021). Furthermore, studies often look at specific applications of information technology (AlSideiri et al., 2022; Fu et al., 2022; Ravì et al., 2016; Yakkala et al., 2022) and are not exploring factors impacting healthcare in general. There remains a research gap in comprehensively synthesizing these factors and their impact on the evolving landscape of healthcare. Therefore, the objective of this study is to identify the factors driving the evolution of IT in healthcare based on the following research question:

> *What are the key factors that have influenced the development of information technology in the healthcare industry?*

METHODOLOGY

The research methodology involves adopting a systematic literature review and thematic analysis. The systematic literature review was guided by the protocol developed by Kitchenham and Charters (2007), and the thematic analysis was guided by Basty et al.'s (2023) adoption of the protocol introduced by Thomas and Harden (2008). This algorithm-based analysis, adopted by Basty et al. (2023) for thematic analysis, allowed authors to analyze more articles to increase the generalizability and external validity of the work. In line with Kitchenham and Charters' (2007) proposed guidelines, Figure 1 presents the research flow diagram, including inclusion and exclusion criteria.

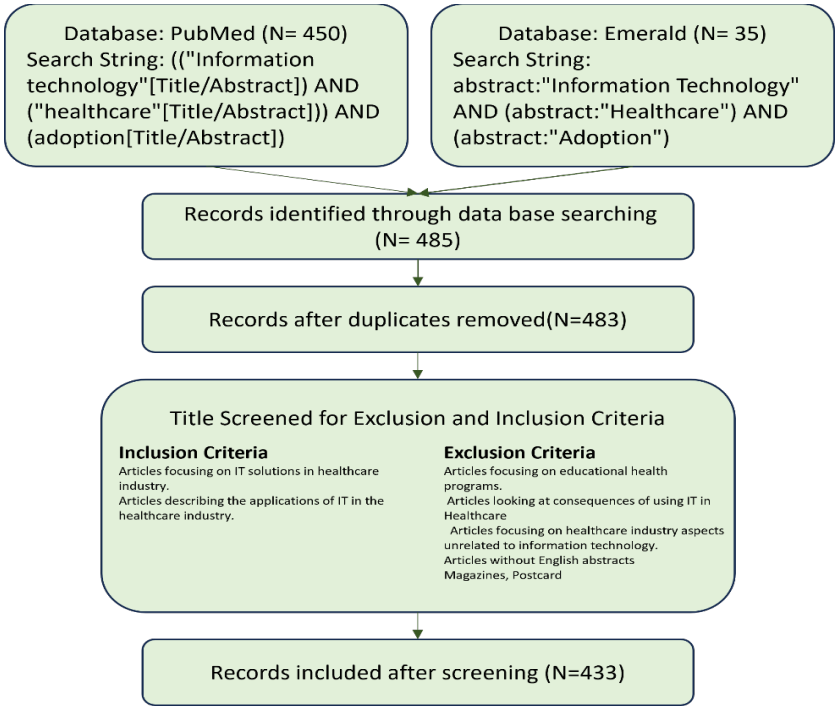

Figure 1. Flow diagram for study selection

This study is conducted in two stages. In the first stage, the data is collected, and in the second stage, the thematic analysis is conducted on the collected data. A thematic analysis approach was followed to identify key factors contributing to the development of the healthcare industry based on work conducted by (Basty et al., 2023).

Search Process

The PubMed library was searched to find relevant study articles, and it has become one of the most popular and reliable libraries for health practitioners and researchers (Falagas et al., 2008). PubMed listed different types of publications covering Technology, Science, and Medicine. The researchers chose PubMed library to find suitable articles to help answer the research question. This library primarily indexes medical and healthcare sector articles (White, 2020), and it helped the researchers improve their results since it decreased errors in the data collection phase. In addition, the Emerald Library was searched to find the answer to the research question from a business perspective since the research focuses on understanding IT in the healthcare industry (Spagnol & Li, 2015). Moreover, Emerald was leveraged by other researchers for literature in healthcare (Ali et al., 2023; Spagnol & Li, 2015).

The final search query was developed after several iterations with the keywords and can be found in Figure 1. The search keywords were selected based on the research question and were applied to search the abstract articles of the selected library. Both directories were searched on October 22, 2023, and the databases returned a total of 485 articles. In addition, Figure 1 shows the exclusion and inclusion criteria used in this study and provides an overview of the research.

To filter articles based on the scope of research, the authors screened the articles based on exclusion and inclusion criteria. In addition, the authors imported articles to the Rayyan online application (Ouzzani et al., 2016) to independently review article titles based on these criteria. Prior to the review, the authors used Rayyan's automatic duplicate record removal feature to filter and remove duplicate articles. Based on the review by each of the authors, 115 articles were marked as "maybe," and 90 were conflicting. "Maybe" is a predefined label in Rayyan.AI, which authors used for labeling articles that they were not able to decide only by reading the abstract, while conflicting articles refer to articles in which the authors had opposing views about the inclusion or exclusion decision.

The authors reviewed the abstract of those articles and then agreed on the articles that met the inclusion and exclusion criteria. At the end of this process, 433 articles of 483 were selected to be included in this study. The list of articles, their abstracts, and quality assessments are publicly available in the GitHub repository (Asadi et al., 2023).

The inclusion and exclusion criteria, as depicted in Figure 1, capture articles focusing on IT solutions in healthcare, applications of IT in Healthcare, and those related to the adoption of such technologies in the industry. The exclusion criteria filtered articles on educational health programs, the consequences of IT use in healthcare, industry aspects unrelated to information technology, and records without English abstracts and non-peer-reviewed articles.

Quality Assessment

Table 1 presents a quality assessment of the included articles. Based on the quality assessment criteria, the authors assess to what extent the articles focus on the application of information technology in healthcare. The authors, therefore, reviewed each article's title and abstract to determine their relevance to answering the research question. This quality assessment provides insight into the literature's relevance and applicability to the specific research topic of exploring the role and implementation of information technology solutions within the healthcare industry. A significant ratio of the articles, 74.2%, is directly focused on answering the research question, while 17.5% fall under semi-focused, and 8.3% not focused did not concentrate on this aspect. This analysis helps establish the quality of the reviewed literature concerning the research question or objectives.

Table 1. Quality assessment of included articles

Question	1 = Not focused	2 = Semi-focused	3 = Fully focused
To what degree does the article focus on the application of information technology in healthcare?	8.3%	17.5%	74.2%

THEMATIC ANALYSIS

Thematic analysis is a research method for "identifying, analyzing, and reporting" patterns within data association (Thomas & Harden, 2008). The text analysis algorithm of Basty et al. (2023) was employed to identify the most repeated words within the text corpus. In line with this practice, the abstracts of these papers were added to a .txt file. After that, the script used by Basty et al. (2023) was adapted to analyze the file. The entire script is presented in Appendix A.

This script iteratively scanned each line of the articles to identify frequently occurring words across the abstracts. Through multiple rounds of analysis and refinement, the script was optimized to extract words repeated over 90 times. To reduce publication bias, the authors used the threshold to include potential factors that were noticed during the review of the article abstract. This threshold enabled the detection of both prevalent terms discussed extensively in the literature and less common but potentially significant factors. Although the algorithm cleaned the stop words from the text, the authors decided to follow the practice of K. Kim et al. (2022) to clean the text from the additional stop words that can act as noise.

The words that are part of research questions and general words common in academic publications are considered by authors to be the noise in this process. By using the Notepad application, the text was searched, and the words "Results, healthcare, information technology, paper, adoption, authors, development, challenges, findings, author, purpose, research, abstract, method, conclusion, lack, conclusions, literature, factors, objective, benefits, conducted, identified, background, studies, key, related, significant, approach, design, studies, level, model, based, evidence, key, primary" were removed, and the R Studio was used again to process the text file.

To gain an in-depth understanding of the generalizability of this research, a Python script, which is presented in Appendix B, was developed to calculate occurrences of countries in the abstracts. Results were entered into MS Excel to create a visual representation of geographic distribution. The script analyzes each abstract word-by-word to identify country names mentioned in the abstracts.

RESULTS

As illustrated in Figure 2, the articles selected in this study covered a range of 47 countries, making the research inclusive of the perspectives and experiences of a wide geographic distribution. The color gradient from light pink to red indicates the frequency of publications by country, with darker shades representing higher numbers of publications. The largest share of studies originated from the United States. The bar chart in Figure 3 illustrates the distribution of publication years for articles that were included in this study. Each bar on the chart represents the number of articles published in a given year from 1997 to 2023.

To get a sense of the top keywords in the selected articles, the text corpus containing 433 abstracts represented as 100,512 words was analyzed to identify key themes. A total of 60 keywords that appeared at least 90 times each were extracted, as depicted in Appendix C. Some keywords could not be assigned to a group without additional context, so the text was searched to determine an appropriate grouping. The keywords were narrowed down to 52 because the plural and singular forms of a word, such as "systems and system," were combined before sub-theme development.

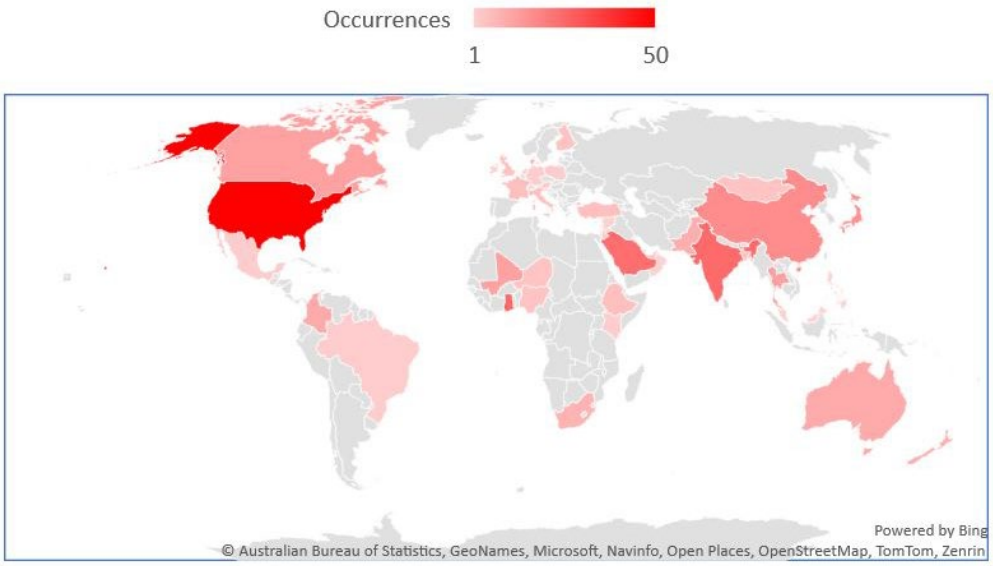

Figure 2. Map of publications by country

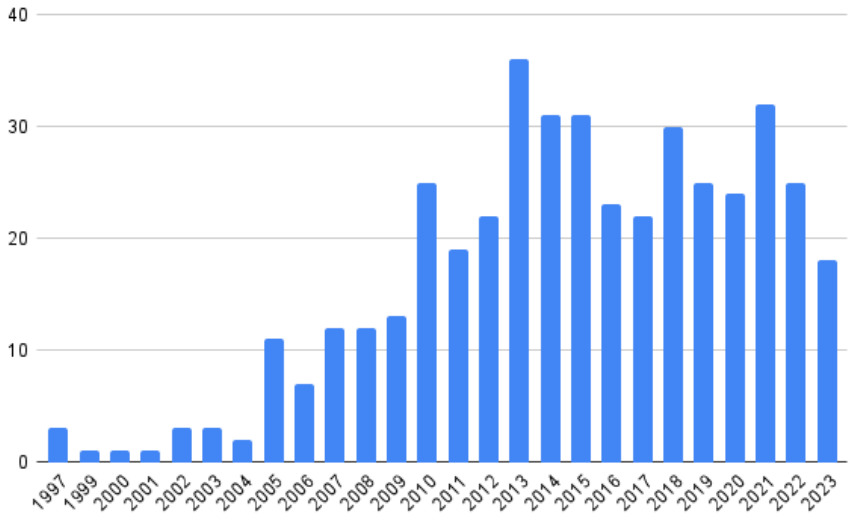

Figure 3. Included articles by publication year

These 52 keywords were identified as initial codes in the thematic analysis process. The first and second authors independently reviewed the initial codes to evaluate similarities and differences. Through a collaborative process, this examination aimed to ensure coding reliability. This collaborative and iterative process resulted in the emergence of 19 distinct subthemes that are named by using initial codes.

Next, the identified subthemes were then scrutinized within the context of the abstracts using the Rayyan AI web application. This step was crucial to ascertain the relevance and consistency of the subthemes and to understand the meaning of the codes in their natural context. Finally, four main themes emerged from the analysis of these subthemes.

The analytical process and its outcomes are depicted in Figure 4, which presents the subthemes derived from the initial codes. Figure 5 conceptualizes the interconnectedness and overlaps that form the basis of our thematic structure. These figures illustrate the primary relationships between themes

and subthemes. This interconnectedness was observed during the analysis of keywords within the context of abstracts.

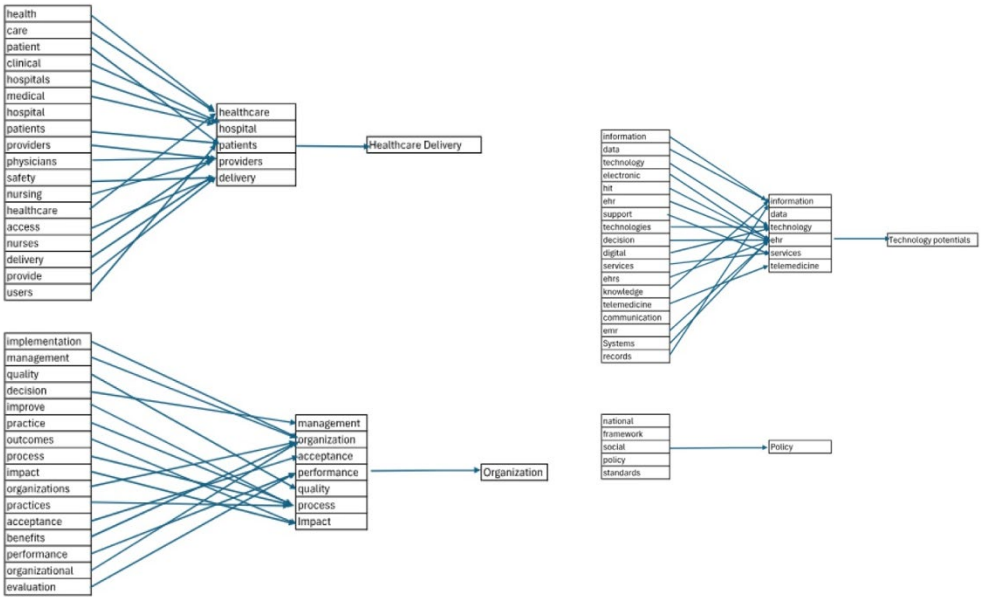

Figure 4. Thematic analysis and coding overview

DISCUSSION

The results identify four major themes that have contributed to the development of healthcare information technology: government policies, organizational factors, healthcare delivery, and technological potential. These key themes present the primary area of impact. As depicted in Figure 5, these themes overlap with one another. In the following paragraphs, the authors synthesize the results from the collected data to reflect on the research question through the lens of themes identified in the previous step.

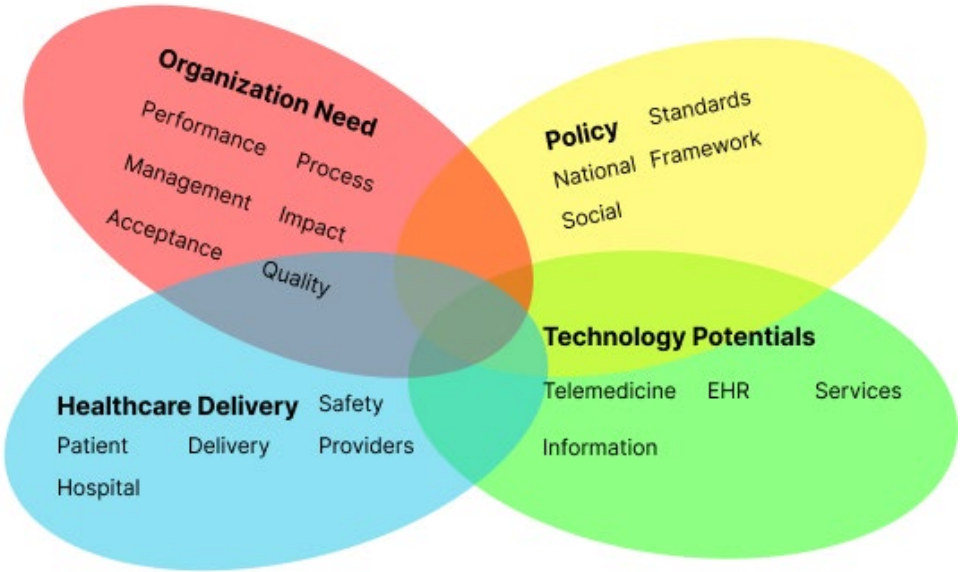

Figure 5. A thematic conceptualization of IT development in the healthcare industry

Government Policies

Government policies played an important role in the adoption of Electronic Health Records (EHR), which can be considered an important factor in grounding IT development in the healthcare industry. For instance, the US government has spent 19 billion dollars on the Health Information Technology for Economic and Clinical Health Act (HITECH) (Kruse et al., 2014) to incentivize electronic health records. Similarly, in Japan, government policy drove the adoption of IT to make healthcare delivery processes more efficient. These health information technology policies aim to improve insurance claims, reduce patient data entry input time, improve healthcare quality, and provide incentives to expand the use of EHR and EMR systems (Abraham et al., 2011).

The role of policy instruments, such as standards in innovating Healthcare through IT, is aligned with a previous study (Richman et al., 2013). They emphasized the role of policymakers in the adoption of innovation in healthcare, including IT-based disruptive innovations.

In addition, the Covid-19 pandemic pushed policymakers to accelerate the adoption of digital health tools (Blount et al., 2023), which paved the way for further development of new health information technology services such as teleradiology (Rackimuthu et al., 2022). The push from Federal and State governments in a study in the United States during the pandemic increased the use of digital health tools (DHTs), which address the region's health disparities, health, and social inequities (Blount et al., 2023).

In general, initiatives driven by national policies have promoted the adoption of HIT (Furukawa et al., 2017). The authors anticipate that the future directions of HIT will be influenced by new government policies. The Drug Supply Chain Security Act (DSCSA), which was passed in 2013, created an opportunity for utilizing blockchain in the supply chain of prescription drugs. This law intended to develop a standard for tracing changes in custody of drugs to protect consumers from counterfeit drugs by the end of 2023. This law created a potential market in the pharmaceutical industry for using blockchain, which led to the development of blockchain-based databases such as BRUINchain in 2020 (Chien et al., 2020).

Furthermore, the evolution of IT in healthcare, as depicted in Figure 5, shows that policy initiatives such as standards, frameworks, and social-related initiatives drive the adoption of information technology to provide effective and efficient healthcare services. The key themes suggested that governments worldwide look at policy initiatives to drive the adoption of IT in the healthcare sector. Due to the criticality and sensitivity of the healthcare sector, governments encourage standards in healthcare delivery. APPI is an example of a guideline in Japan for safeguarding privacy while ensuring appropriate measures in dealing with personal information for entrepreneurs in medical or nursing care. The same applies in the United States, where the security of healthcare technology is essential for protecting the personal data of the patient (Abraham et al., 2011). Moreover, social influence is a significant influence when pertaining to technology use and adoption of technology such as mHealth technology (Liu et al., 2023). Social influence refers to the degree to which a person is influenced by important people like family or friends to use a new system (Venkatesh et al., 2003), and this factor can be influenced by social policies. This could be a driving factor in the adoption of IT in healthcare delivery and quality of services.

Technology Potentials

The emergence of technological breakthroughs and continuous progress in the fields of computer science and electronic engineering, such as artificial intelligence, big data, blockchain, and wearable devices, continue to impact new IT solutions development (Li & Liang, 2023; Rackimuthu et al., 2022). These new solutions created new avenues for improving care delivery that did not previously exist, such as EHR and telemedicine (Rackimuthu et al., 2022; Sujan et al., 2020). For instance, wearable IoT device adoption in healthcare service delivery opens new opportunities by empowering patients to take part in decision-making and enhancing their engagement in healthcare service delivery

(Bhatt & Chakraborty, 2023). The actual and potential benefits of ICT implementation informed policymakers and encouraged governments to invest in HIT (S. H. Kim & Song, 2022; Sands & Diaz-Buxo, 2011).

In addition, the new technologies have the potential to enhance healthcare solutions. Utilizing mobile devices, wearable medical technologies, and Internet of Things (IoT) sensors creates opportunities to provide smart care through continuous remote patient monitoring and treatment (Zeadally et al., 2020).

The adoption of information technology in healthcare services spanned beyond service delivery to data analytics. Delivering healthcare services to millions requires an innovative strategy, such as telemedicine and an electronic health records system that facilitates healthcare reachability and accessibility beyond physical buildings. The adoption of technology has led to the possibility of collaboration among healthcare professionals, patients, and doctors without onsite visitation. Healthcare professionals using various technologies have allowed patients to book visitation without needing them to visit the hospital. In addition, healthcare professionals now leverage technology for remote monitoring of their patients.

Furthermore, the amount of information being generated by healthcare facilities requires some tools for its analysis, hence the adoption of information technology in healthcare for data analysis that can provide insight for healthcare professionals to deliver quality healthcare services.

Healthcare Delivery

This study identified key themes that show how healthcare leveraged information technology, such as patient safety, delivery of patient-centered services, and delivery of superior quality of services while allowing hospitals to make proper planning and design on resource management and productivity. According to Thielst (2010), the adoption of digital technologies facilitates delivering better healthcare quality by reducing response times, decreasing patient costs, enhancing the experience of clinicians, and delivery of service to the patient (Afable et al., 2018; Laurenza et al., 2018; Tuan Soh et al., 2022).

Health information technology presents new opportunities to improve healthcare quality by increasing patient safety (Poon et al., 2006), such as reducing medication errors (Furukawa et al., 2017) and improving compliance with practice guidelines (Alotaibi & Federico, 2017).

Moreover, healthcare markets and consumers are pressuring healthcare providers to use information technology to record, communicate, and access clinical and financial information across all service delivery (Stricklin & Struk, 2003). This demand for health IT integration is also highlighted in the context of major technology companies like Apple, which greatly impact the healthcare industry (Gleiss et al., 2021). Delivering smart health services by these platforms is expected to reduce hospitalization (Singh et al., 2017).

Organization Needs

Organizational factors such as performance tracking, process improvement, management efficiency, impact measurement, and quality of service delivery have contributed to the development of IT in the healthcare industry. The higher executives of the healthcare industry have embraced IT in healthcare in order to improve the efficiency of business processes and practices.

Digital technologies provide opportunities to better manage healthcare workflows and improve quality of service (Laurenza et al., 2018). Improving workflow or healthcare processes eliminates waste and error, thereby improving services and customer satisfaction. The nature of healthcare operations involves multiple actors that are acting in different capacities. Without the adoption of information technology, the operations of the healthcare system may be impacted, leaving a bad reputation and poor quality of services. This aspect is aligned with the findings of previous studies (Krisdina et al., 2022; Rahimi et al., 2018) about the importance of technology acceptance model attributes such as

ease of use, perceived usefulness, and perceived quality of care in the adaption of IT solutions in the healthcare sector.

In addition, information technology plays an important role in the knowledge management of healthcare by providing new opportunities for knowledge sharing through conferencing and expert databases (Whiddett et al., 2012). In the context of US hospitals, IT-based lean management has gained momentum due to the promise of better financial performance (Lee et al., 2024). Adoption of IT solutions aids hospitals in reducing the wasteful complexities of hospital business processes.

Furthermore, healthcare systems benefit from the adoption of information technology beyond knowledge management to data analytics that drives decision-making. As a result, the study demonstrated that organizations need to drive why healthcare is leveraging digital technologies to improve healthcare service delivery.

Limitations

This study has multiple limitations that should be considered. The authors only included articles with English abstracts in two academic publication databases, PubMed and Emerald. Limiting the search to only these databases may have overlooked potentially relevant studies published in other journals or non-English languages. The exclusion of other databases and non-English articles could result in an incomplete representation of the existing literature on the topic, and it decreases the generalizability of findings for international audiences that are not represented in the analyzed data.

Moreover, the study relied solely on peer-reviewed journal articles, including other publications such as government reports, industry whitepapers, or practitioner perspectives, which could increase generalizability.

Furthermore, the manual process of analyzing, grouping, and categorizing the identified keywords into overarching themes introduces the potential for researcher bias. Despite efforts to maintain objectivity, the researchers' perspectives, interpretations, and subjective judgments could have influenced the organization and labeling of the themes, potentially leading to a misrepresentation or oversimplification of the underlying concepts.

It is also important to note that this study focused on investigating the factors influencing healthcare IT development but did not empirically examine the relative importance or weigh the impacts of each identified factor. A more comprehensive understanding of these factors' interrelationships, magnitudes of influence, and their respective contributions to the evolution of Healthcare IT would require further empirical investigation and quantitative inquiry.

Concluding Remarks and Future Works

The healthcare industry has seen significant adoption of information technology because of government policy development and its potential in the delivery of healthcare services that are patient-driven. Information technology has the potential to increase access to healthcare, lower costs for patients, and reduce inequalities in care delivery. The study demonstrates that information technology has the potential to address needs and connect healthcare people to information and services.

Given these potentials, an area for future research could be examining how emerging digital health technologies can be leveraged to further improve healthcare equity, affordability, and accessibility, exploring global perspectives showcasing the successful impact of IT on healthcare, emerging technology's impact on healthcare delivery, and patient outcomes. In addition, future work may explore articles not limited to the English language, integrating scientific databases such as Web of Science and Scopus, as well as grey literature, such as white papers and industry reports.

Understanding the long-term impact of emerging digital health technologies in enhancing the well-being of society, which can help improve the life condition of people with less access to preventive care and routine checkups, is a discovered gap in the literature.

Finally, the conceptual framework creates an overall model for studying and designing future IT projects in the healthcare industry. Moreover, the study could be beneficial to hospitals that are looking to develop healthcare solutions that drive safety and cost reduction.

Another would be the IT practitioners when it comes to building solutions that connect patients to solutions and healthcare services. Likewise, it could be of immense value to decision-makers and organization executives to know the impact of policies and the role they play in measuring the success of the deployment of IT solutions in the healthcare system. Collectively, these themes form a comprehensive model for developing IT solutions in healthcare and help IT practitioners and researchers create solutions that meet demands such as quality, safety, performance, and service delivery.

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APPENDICES

APPENDIX A: THEMATIC ANALYSIS SCRIPT

```
# Import libraries
library(dplyr)
library(tidytext)
library(ggplot2)
library(wordcloud)
#check articles

data <- readLines("C:/Thematic/slr.txt")
#n is the total number of lines in the text file of abstracts
head(data, n = 871)
data1 <- tibble(Text = data)
#convert
head(data1, n = 871)
words <- data1 %>% unnest_tokens(output = word, input = Text)
words <- words %>% anti_join(stop_words)
```

```
wordcounts <- words %>% count(word, sort = TRUE)
head(wordcounts)
#n is minimum frequency here
wordcounts %>%
  filter(n >= 90) %>%
  mutate(word = reorder(word, n)) %>%
  ggplot(aes(word, n)) +
  geom_col() +
  coord_flip() +
  labs(x = "Themes \n", y = "\n Count ") +
  geom_text(aes(label = n), hjust = 1.2, color = "white", fontface = "bold") +
  theme(
    plot.title = element_text(hjust = 0.5),
    axis.title.x = element_text(face = "bold", colour = "red", size = 10),
    axis.title.y = element_text(face = "bold", colour = "red", size = 10)
  )
wordcloud(wordcounts$word, freq = wordcounts$n, min.freq = 90)

library(knitr)

table_data <- wordcounts %>%
  filter(n >= 90) %>%
  arrange(desc(n))

# Print the table using kable
kable(table_data, caption = "Words and Their Number of Occurrences")
```

APPENDIX B: GEOGRAPHICAL DISTRIBUTION ANALYSIS SCRIPT

```
import pycountry

# Function to get a list of country names using python pacakges
def get_country_names():
    countries = list(pycountry.countries)
    country_names = [country.name for country in countries]
    return country_names

# Function to count country frequency in a string variable
def count_country_occurrences(input_string, country_names):
    country_counts = {}
    for country_name in country_names:
        count = input_string.lower().count(country_name.lower())
        if count > 0:
            country_counts[country_name] = count
    return country_counts
```

```
if __name__ == "__main__":
    # Specify the path to the uploaded text file
    file_path = '/content/slr3.txt'

    with open(file_path, "r") as file:
        input_string = file.read()

    country_names = get_country_names()
    country_counts = count_country_occurrences(input_string, country_names)

    for country, count in country_counts.items():
        print(f"{country}: {count} occurrence(s)")
```

APPENDIX C: CHART OF ALL KEYWORDS WITH COUNTS OF NINETY AND ABOVE

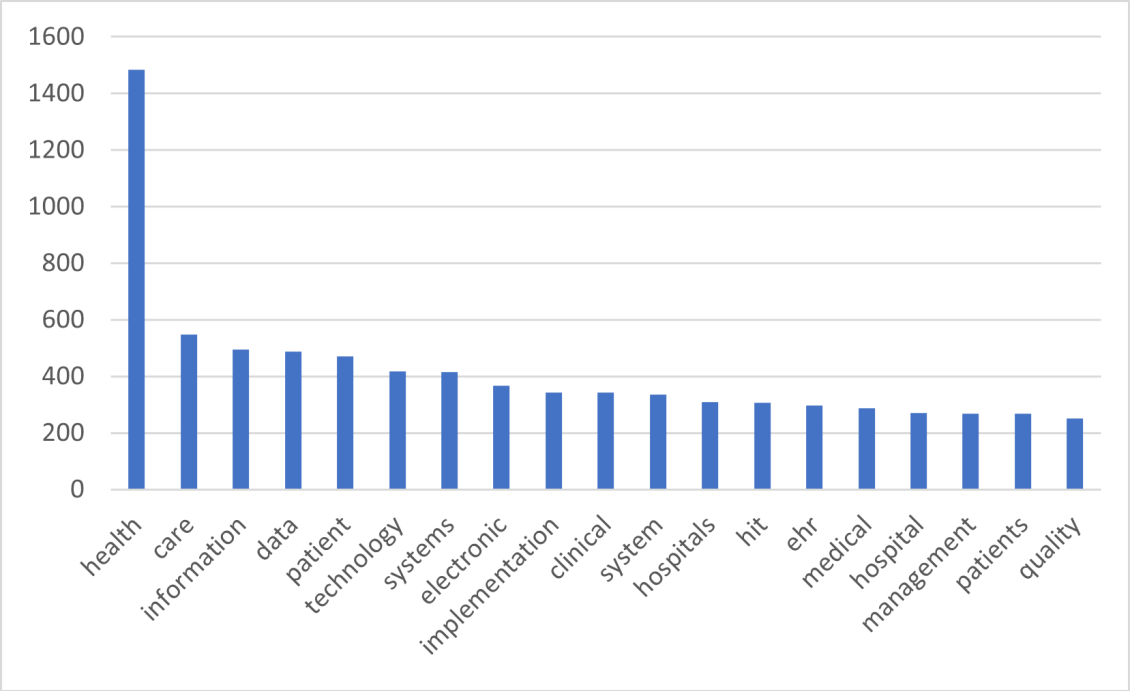

Figure C1. The frequency of keywords: between 252 and 1400

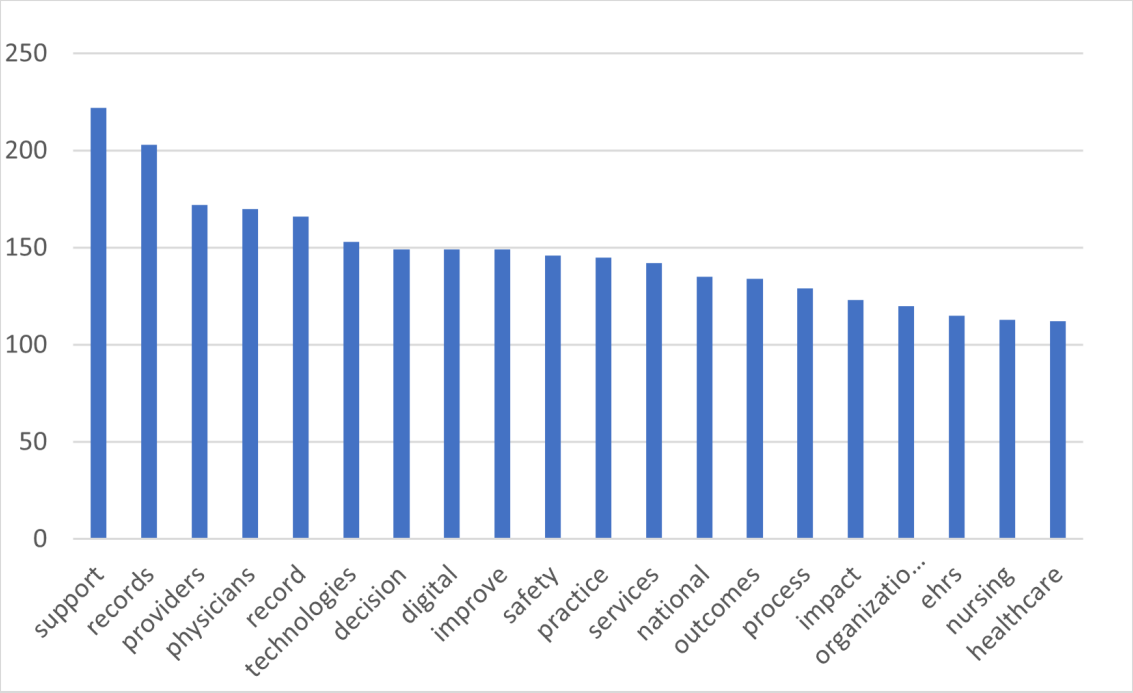

Figure C2. The frequency of keywords: between 112 and 222

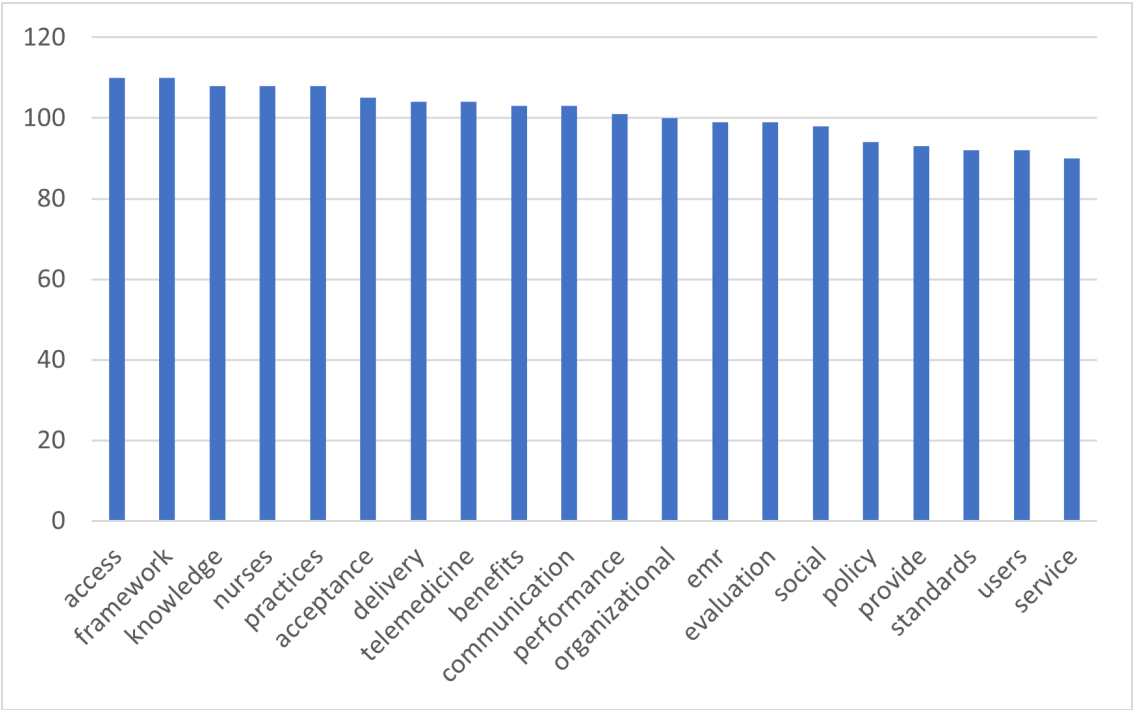

Figure C3. The frequency of keywords: between 90 and 110

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