

Review article

Health information systems with technology acceptance model approach: A systematic review

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ABSTRACT

In the rapidly evolving landscape of information technologies, individuals and organizations must adapt to the digital age. Given the diversity in users' knowledge and experience with technology, their acceptance levels also vary. Over the past 30 years, various theoretical models have been introduced to provide a framework for understanding user acceptance of technology. Among these, the Technology Acceptance Model (TAM) stands out as a key theoretical framework, offering insights into why new technologies are either accepted or rejected. Analyzing user acceptance of technology has thus become a critical area of study. Healthcare organizations aim to assess the perceived efficacy and user-friendliness of a given technology. This will help health organisations design and implement HIS that meet users' needs and preferences. In this context, how does the TAM clarify the acceptance and use of Health Information Systems (HIS)? To address this inquiry, a comprehensive literature review will be carried out. The systematic review involved 29 studies issued between 2018 and 2023 and searched the databases Pubmed, Scopus, Wos and Ulakbim TR Index. The PRISMA flowchart was used to identify the included studies. According to the results, some variables stand out in the acceptance and utilisation of HIS. Among the users of HIS, it can be said that the results relating to nurses stand out. In particular, there are studies which emphasise that 'gender' is a crucial factor in explaining the models. Another crucial finding of the current systematic review is the need to train users in the acceptance and use of HIS.

1. Introduction

Today, individuals and organisations can be forced to use these technologies as a result of the growth of information technologies. Assuming that users' knowledge and experience of information technology is not the same, their acceptance of the technology will not be the same. For this reason, it has become a vital issue to study user acceptance of technology [1].

Over the past 30 years, there has been a need for a framework to evaluate and explain users' acceptance of information technology, and various theoretical models have been recommended. The Technology Acceptance Model (TAM) in its simplest definition, has emerged as a theoretical framework for understanding why new technologies are accepted or rejected. Understanding the factors that impact the adoption

or dismissal of technology is crucial for explaining technology use. To increase the use of new technologies, it is first necessary to increase technology acceptance; it is necessary to scrutinize the future implications of individuals' intentions to utilise this technology [2].

Although the perception that technology enhances user performance can clarify perceived usefulness (PU), the perceived ease of learning and using the technology is closely associated with perceived ease of use (PEAU) [1]. The user's intention to use the technology and their behaviour are modelled as a function of PU and PEAU. The intention is to focus on technology itself through the utilization of technology. Thus, intentions to use technology are transformed into actual usage behaviour [1,3].

The reason for doing this systematic review arises from the necessity to get a thorough understanding of the elements that impact the

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acceptance and rejection of new technologies in healthcare settings, as directed by the Technology Acceptance Model (TAM). The primary aim of this study is to analyze current research in order to determine the main factors and trends in the adoption of Health Information Systems (HIS) using the TAM framework. This review intends to address the following research questions: 1) What are the primary determinants impacting the adoption of Health Information Systems (HIS) among healthcare professionals? 2) What is the influence of demographic characteristics, such as gender and professional function, on the acceptability of Health Information Systems (HIS)? 3) What is the significance of training in the successful deployment and application of Health Information Systems (HIS)? Examining these inquiries can yield useful data for healthcare organizations to optimize their implementation strategy and increase the general adoption of Health Information Systems (HIS).

The “TAM” first emerged when Davis proposed a conceptual model in his doctoral thesis (1985). Davis proposed that user motivation can clarify system usage and identified system characteristics as relevant factors. The user’s motivation is a crucial factor that explains the system’s current usage. Davis stated that there are three fundamental factors that clarify user motivation: “PU, PEAU and attitude towards use” [1,4,5]. Fishbein and Azjen’s “theory of reasoned action” and Azjen’s [6] “theory of planned behaviour” are crucial contributions to Davis’ model [7]. The Theory of Reasoned Action suggests that if an individual’s beliefs, attitudes and intentions are known, their behaviour can be predicted [8]. Azjen [6] extended the theory by adding perceived behavioural control to the Theory of Reasoned Action to form the Theory of Planned Behaviour. Within this theory, attitude towards behaviour, perceived behavioural control and subjective norm have been included as three variables that determine the intention to perform a behaviour [9]. Both models were able to clarify the actual behaviour of individuals, but as they did not provide sufficient results to clarify the acceptance or rejection of information systems, Davis adapted them and proposed the TAM. He did not include the subjective norm in his model and introduced two different variables. For instance, variables that can affect an individual’s acceptance of technology include their perceptions of how useful and easy the technology is to use [5].

The TAM has been recognised as a useful model, but Davis [1] suggests that efforts to improve the underlying construct can have a positive impact on user approval and endorsement of technological innovations. It has been criticised that the basic structure should be integrated into a broader model by adopting the innovation model together with individual and communal adjustment measures [10]. At this point, models and theories explaining technology acceptance behaviour continued to be developed, and the aim was to create a comprehensive perspective of users towards information technologies [11,12].

Since PU is a vital determinant of intention [1,9], Venkatesh and Davis [13] suggested TAM 2, an enlarged exemplary that includes variables that affect PU. This model has emerged in order to scrutinize technology acceptance in more detail and to include more factors. The model aims to identify the external factors (biased criterion, job relevance, image, verifiability of results, output quality and PEAU) that influence PU. In addition, there are two moderator variables in TAM 2, namely experience and volunteering. The impact of the factors in the model on how valuable the outcome is perceived and how likely it is that action will be taken. They are presented in two theoretical contexts: “social influence” and “cognitive instrumental processes” [12,14].

Later, a new model was proposed by suggesting that these processes lack a theoretical basis that participates in the formation of judgments about PEAU. Venkatesh and Bala proposed the TAM 3 model by suggesting that there are variables that affect PEAU as well as variables that influence PU. The model was constructed from the combination of TAM, TAM 2 and variables affecting PEAU. Variables like individual self-efficacy, anxiety, perceived control over some external factors and enjoyment of using technology are thought to impact PEAU [14]. More, Venkatesh et al. [12] assembled the Unified Theory of Acceptance and

Use of Technology (UTAUT) model by reviewing a large number of theories and models (Theory of Reasoned Action, Theory of Planned Behaviour, Motivation Theory, Computer Use Model, Diffusion of Innovation Theory, and Social Cognitive Theory, etc.) and selecting the appropriate elements to establish a more extensive aspect of the TAM. The development of models using foregoing analysis and the act of applications in technological knowledge enactment strengthen TAMs [14].

Four basic constructs have been identified in the model: performance and effort expectancy, social impact and aiding circumstances [12]. Contextual factors such as social influence, subjective norms and enabling conditions have been suggested to show a crucial act in users’ decisions to adopt technology [10]. Moderators such as gender, age and experience that may impact the affairs between constructs in the model are also included. It is also crucial to incorporate the personal and organisational characteristics of the users, as well as the dynamic nature of technology adoption, into the model. This model has been validated [12] for its effectiveness in predicting user acceptance in a variety of technologies and contexts.

Two of the models which used widespread in research are the TAM and the Technology Acceptance and Use Combined Model. Both models are used extensively in management information systems and biomedicine informatics [15]. Despite the addition of new variables in the development of the TAM, many studies show that the basic factors of the model (“PU”, “PEAU”, “intention”) remain the most effective variables [16–27].

Today, new information technologies can quickly replace old tools by providing users with tools that are more powerful and faster [28]. HIS have been described as powerful information tools that can help managers manage decision-making processes and increase positive attitudes in healthcare organisations [29]. The practice of knowledge technology in the healthcare field, and exclusively in hospitals, not only improves the quality of service, staff efficiency and effectiveness, but also offers great potential for reducing organisational costs. However, this alternative can only be successful if there is user acceptance and effective use of the systems [30].

This systematic review offers a comprehensive examination of the elements that impact the acceptability of Health Information Systems (HIS), using the Technology Acceptance Model (TAM) framework as a guide. The review provides significant insights for academics and practitioners who want to improve the adoption and use of Health Information Systems (HIS) in healthcare settings.

2. Method

How does the TAM clarify the acceptance and use of HIS? In order to find an answer to this question, the studies in the literature on this topic are scrutinised using a systematic review method.

The study used the systematic review method, which aimed to scrutinize all articles in the national and international literature on the study of HIS utilizing the TAM. Systematic review: in the case of a specific problem, it involves screening all research conducted in that area, deciding on the suitability of the research to be included in the review, and synthesizing the findings [31].

To identify articles for inclusion in the study, Pubmed, Scopus, Web of Science and Ulakbim TR Index databases were searched. The search was conducted by scanning the titles and keywords of the articles in Turkish and English using the keywords “health information technology”, “health information systems” and “technology acceptance model”. The process of searching the databases took place over a period of two (2) weeks (26.06.23–10.07.23). The main criteria used to select studies for admittance in the systematic review are shown in Table 1.

The study used evidence-based review standards called PRISMA. Four databases were searched and the details are shown in Fig. 1 (PRISMA 2009 Flow Diagram). A total of 113 articles -Pubmed (n = 38), Scopus (n = 62), Web of Science (n = 5) and Ulakbim TR Index (n = 8)- were retrieved from the initial search. After exclusion of repetitive

Table 1
Inclusion and Exclusion Criteria.

Inclusion Criteria	Exclusion Criteria
Article on the analysis of the use of HIS with the TAM	Studies in the form of reviews, theses, books and letters to the editor, study protocols, guidelines, pilot studies, congress proceedings
Open access and full text studies that have been published on the topic	Studies that are not open access and not available in full text
Articles published in 2018 and up to and including July (10th) of 2023.	Articles published before 2018 and after July (10th) of 2023.
Articles in Turkish and English	Articles published in languages other than Turkish and English.

Source(s): Table by authors.

studies (n = 27), studies whose full text was not accessible (n = 33), books, conference proceedings, review studies (n = 10) and studies using qualitative research methods (n = 9), 34 full-text articles were identified as suitable according to the inclusion criteria. After a detailed examination of the full-text articles, those suitable for the purpose of the research were preferred and the number of researches admitted in the systematic review (n = 29) was determined. The list of databases where the reviewed articles can be accessed is provided in Table 3 (Appendix A).

3. Findings

29 articles selected according to the inclusion criteria were analysed. The author name and year, study name, study location and design, sample, measurement instrument, study aims and results of all included studies are summarised in Table 2.

The researches addmitted in the systematic review were presented between 2018 and 2023, with the highest number of studies published in 2019 (n = 9). When analysing the distribution of outlands where the researches were carried out, 7 researches were carried out in Turkey (1, 4, 5, 6, 20, 24, 27), 5 in Iran (2, 3, 7, 8, 9), 4 in China (10, 14, 15, 23), 3

in Taiwan (12, 13, 17), 2 in Jordan (16, 29), 1 in the USA, Singapore, Indonesia, South Africa, Ghana, Southern Italy, Peru (11, 18, 21, 22, 25, 26, 28). Fig. 2 shows how many studies were conducted in which countries by year.

The complete set of studies within the reviews were quantitative studies and the study design was mostly structural equation modelling. The studies revealed that the smallest sample size used was n = 32 (11) and the maximum number was n = 899 (17). The total number of samples was 9060.

In the reviewed studies, the TAM was used to clarify the acceptance and use of HIS or to test new acceptance models for this purpose (7, 9, 12, 14, 15, 17, 23, 27, 29). Again, it can be concluded that the acceptance and use of HIS are explained within the framework of the variables PEOU, PU and “behavioural intention”, which are among the most significant components of the CQM.

According to the subject distribution of the studies, there are 17 studies (1, 2, 3, 4, 8, 11, 13, 16, 17, 20, 21, 22, 24, 26, 27, 28, 29) explaining the use and acceptance of IS in healthcare institutions by healthcare professionals (doctors, nurses, midwives, administrative staff, technicians); 8 studies (5, 6, 9, 10, 14, 19, 23, 25) explaining the use of different digital health technologies (personal, mobile, health portals, etc.) by users of digital IS; 2 studies (7,12) explaining the use of electronic medical records and 2 studies (7,12) explaining the use of telemonitoring for chronic diseases. There are 8 studies explaining the use of different digital health technologies (personal, mobile, health portals, etc.) (5, 6, 9, 10, 14, 19, 23, 25); 2 studies explaining the use of electronic medical records (7,12) and 2 studies explaining the use of telemonitoring systems used to monitor chronic diseases (15,18).

4. Discussion

The researches included in the systematic review attempted to clarify the use and acceptability of information systems, electronic health records, digital technologies for disease monitoring and/or mobile health applications used in healthcare settings according to different factors.

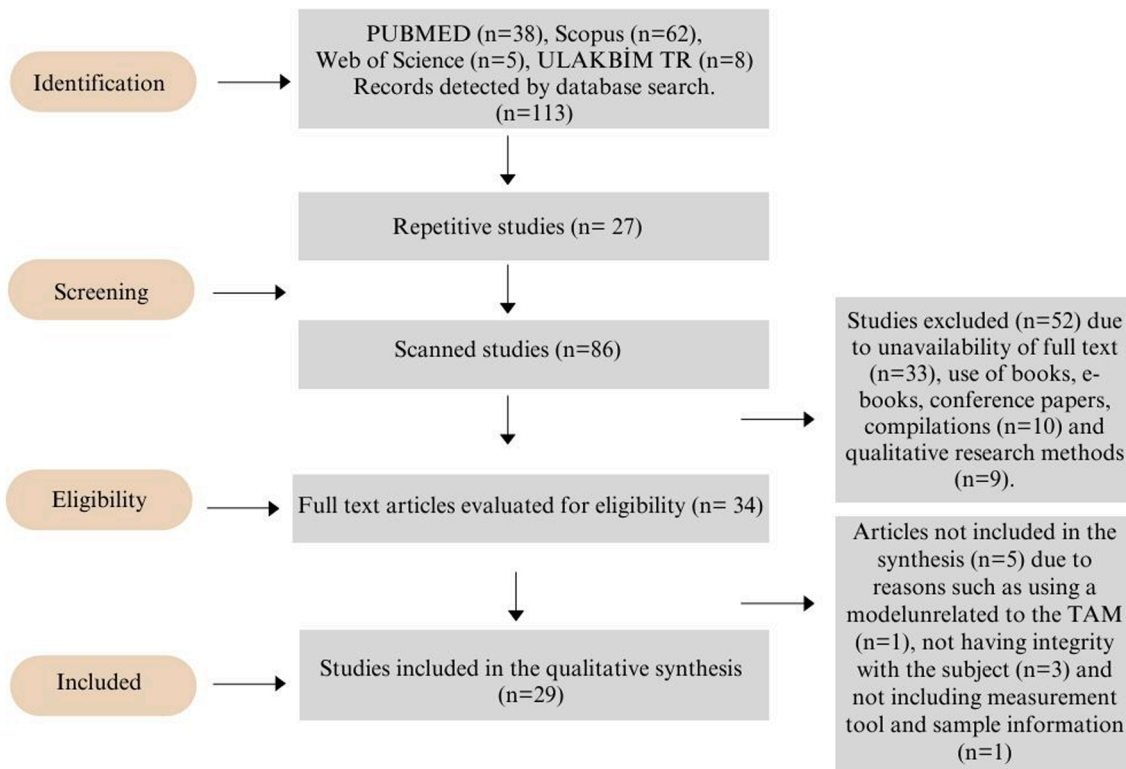


Fig. 1. PRISMA Flow Diagram Source(s): Figure by authors.

Table 2
Review of the Researches Included in the Systematic Review.

Article No.	Author/ Authors	Workplace	Design of the Study	Sample	Measuring Tool	Purpose of the Study	Conclusion
1	[39]	Türkiye	Quantitative	N = 392	Technology Acceptance Scale [1] and Information Systems Success Model Scale.	The aim of the analysis is to recognize the elements influencing the acceptance of Hospital Information Systems (HIS) among staff in public hospitals. This will be accomplished by constructing an integrated model that merges the TAM and Information Systems Success (ISS) models.	The acceptance of HIS is notably enhanced by a positive correlation with system, information, and service quality, as well as PEOU. Additionally, both PU and ease of use exert a positive and significant influence on the adoption of HIS. Among these factors, PU emerges as the most influential variable in the adoption of Hospital Information Systems.
2	[37]	Iranian	Cross-Sectional	N = 45	The survey was created by the author and consists of performance and effort expectancy, facility condition, social influences, and behavioral intention scales.	The research seeks to explore the factors impacting the utilization of Picture Archiving and Communication Systems (PACS) using the Unified Theory of Acceptance and Use of Technology (UTAUT) model.	It has been suggested that measuring “performance expectancy” is sufficient to predict and assess user behavior for web-based PACS. Effort expectancy, social influence, and facilitating conditions were found to be less vital than performance expectancy.
3	[24]	Iranian	Structure Equality Model (SEM)	N = 253	The TKM 2 standard survey has been used to collect data.	The research aims to investigate the primary factors that influence the adoption and use of HIS by users in the laboratory, radiology, and nutrition departments.	This study has contributed to the adoption of HIS by applying TKM 2. It has been noted that cognitive instrumental processes are significant predictors of usage intention. However, there was no significant relationship was identified between social influence processes and users’ behavioral intentions to use the system.
4	[47]	Türkiye	Descriptive	N = 244	The study made use of a Enterprise Resource Planning System (ERPS) Scale.	The purpose of this research is to assess the acceptance and use of the ERPS used in a government hospital by administrative staff and medical secretaries, based on the extended TAM.	It was observed that there is a significant difference between the gender variable and participants’ assessments of the acceptance and usability of the ERPS. The conclusion was reached that the image variable had a low average score, indicating that participants do not consider the ERPS they are using as a symbol of prestige and high status.
5	[41]	Türkiye	SEM	N = 520	A new survey has been created by adapting scales used in the literature.	The aim is to scrutinize the antecedents of consumers’ intention to use innovations in the post-acceptance period within the scope of health technologies, based on the Diffusion of Innovations Theory (DIT) and TAM.	PU has been identified as the most robust positive determinant of usage intention. On the other hand, concerns about the privacy of health information were found to be the most robust negative determinant of usage intention.
6	[46]	Türkiye	SEM	N = 415	A newly developed model, based on the TAM, DIT, Technological Innovativeness, Protection Motivation Theory (PMT), and Privacy Analysis Theory (PAT), has been applied.	The research seeks to explore the factors that impact individuals’ intentions to use “personal smart technologies” in healthcare services, with the objective of developing a new model.	In the hypotheses regarding whether there are differences between genders, it is observed that women add emphasis to trialability, techno stress and high-tech alteration compared to men. All individuals appear to place greater emphasis on convenience, attitude, perceived advantage, and PEOU in adopting technology products in healthcare.
7	[52]	Iranian	SEM	N = 330	A questionnaire developed by [55] and [56] was used.	The objective is to delineate the factors influencing the adoption of electronic medical records by presenting an extensive model.	The TOE and TKM model is apt for pinpointing electronic health records implementation factors. A thorough analysis identified nine key factors affecting end-user behavior. In the updated model, TAM’s PU and PEOU mediate, significantly impacting electronic medical records adoption. The study confirms TAM’s

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Table 2 (continued)

Article No.	Author/ Authors	Workplace	Design of the Study	Sample	Measuring Tool	Purpose of the Study	Conclusion
							external factors significantly influence electronic medical records uptake.
8	[17]	Iranian	SEM	N = 325	The TAM 1–2 and the UTAUT Model served as the foundation for a valid and trustworthy survey.	Its goal was to look into the elements that lead to the usage of HBS.	Nurses in scrutinised hospitals exhibit technology apprehension, largely due to inadequate knowledge. Education positively influences nurses' perception of HIS ease and usefulness. The presence of technical support and guidelines directly and significantly impacts HBS usefulness, ease of use, and nurses' satisfaction.
9	[18]	Iranian	Cross-Sectional	N = 420	A structured survey designed within the scope of the model prepared based on previous studies in the same field, field studies and TAM was used.	Based on the opinions of Iranian users, it is aimed to review previous models and design a new health IT acceptance model for the status quo.	Six fundamental factors-performance expectation, observability, effort expectation, facilitating conditions, reinforcement, and subjective norms-influence attitude and intention to use in the model. The extent to which technology is utilised plays a crucial role in the acceptance and implementation of that technology.
10	[42]	China	SEM	N = 300 +	An expanded TAM include considerations of privacy and trust, was employed, and a structured survey was developed accordingly.	The objective was to analyze the factors influencing the acceptance of e-Health applications among African immigrants in China, as perceived from the patient's perspective.	The intention to use eHealth technologies is notably impacted by factors such as PU, PEOU and privacy. Gender is partially linked to e-Health technology acceptance, while trust is deemed insignificant in influencing intention. This study is crucial for shaping policies and strategies to enhance e-Health services for African expatriates in China.
11	[53]	America	Randomised Controlled Study	N = 32 Clinician 20 cases per clinician.	Measurements adapted from the TAM and Net Promoter Score were used.	The study's objective is to assess how well collective intelligence output can increase patients' trust and accuracy in their diagnosis during primary care and ER visits when they are receiving outpatient care and have diagnostic uncertainty.	Diagnostic errors are acknowledged as a notable public health issue. Utilizing both quantitative and qualitative analyses will aid in pinpointing optimal scenarios and clinical processes for the regular application of collective intelligence in outpatient healthcare.
12	[20]	Taiwan	SEM	N = 119	A questionnaire comprising indicators related to TAM and monetary incentives was developed.	The aim was to identify the factors influencing doctors' intention to use electronic medical records.	Doctors' intentions to use electronic medical records were significantly influenced by their attitude, perceived utility, and financial incentives. Gender and clinical knowledge positively impacted intentions. Theories on electronic medical records adoption should consider these factors.
13	[25]	Taiwan	SEM	N = 110	The survey included demographic questions along with indicators related to the TAM 2 model, facilitating conditions, and measures of personal innovativeness.	The objective was to identify and comprehend the factors influencing the intention of nurses to utilize Tablet PCs.	Nurses' adoption of tablet PCs is influenced by PU, subjective norm, and personal innovativeness. Perceptions of ease of use are influenced by personal innovativeness and facilitating conditions, whereas subjective norm, output quality, and facilitating conditions consistently forecast PU. The impact of personal innovativeness outweighs that of the subjective norm component.

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Table 2 (continued)

Article No.	Author/ Authors	Workplace	Design of the Study	Sample	Measuring Tool	Purpose of the Study	Conclusion
14	[26]	China	Quantitative	N = 201	A lab-based usability test was created. It was designed by adapting from validated scales.	Its purpose is to clarify why young people who use the internet accept health information portals.	A model incorporating social cognitive theories related to portal access accounts for 56 % of the variance in behavioral intention and consumer acceptability. Notably, “application-specific self-efficacy” may regulate the connection between subjective usability and PEOU.
15	[38]	China	SEM	N = 119	A measurement tool has been developed by adopting the TAM and the Theory of Planned Behavior.	The goal was to investigate behaviors that influence the acceptance of a computer-based self-monitoring system among patients with type 2 diabetes and/or hypertension.	The findings of the study highlight that the acceptance of new technologies by patients is influenced by a combination of societal factors, technological aspects, and patient characteristics.
16	[16]	Jordan	SEM	N = 313	The TAM and habit scale used in this study have been adapted from studies conducted in the literature on HIS or information technologies.	The aim of the research is to investigate the attitudes of experienced healthcare professionals towards continuing to use HIS.	It was concluded that attitude is the most crucial determinant in continuing to use hospital information systems.
17	[43]	Taiwan	SEM	N = 222	TKM 3 survey designed by Venkatesh and Bala was used along with demographic questions.	Its goal was to scrutinize the factors that users' acceptance of clinical care plan systems.	The modified TAM 3 has been recognised as an innovative assessment tool that can increase administrators' adoption of health information technology and help nurses understand the acceptance of HIT in nursing practice.
18	[45]	Singapore	Cross-Sectional Observational	N = 899	A survey form based on affect demographic, clinical variables, technological literacy, and the Health Information Technology Acceptance Model (HITAM) was used.	The aim of the research was to identify the variables influencing patients with Type 2 Diabetes and/or hypertension's readiness to use telemonitoring in two primary care clinics that do not currently use it.	Approximately 52.5 % of patients have expressed their willingness to adopt Tele-Monitoring. Perceived effectiveness, convenience of use, cost savings, privacy preservation, and satisfaction with care provided by Tele-Monitoring have all been weighed against in-person medical consultations.
19	[32]	There is no country information.	SEM	N = 450	TAM with integrated perceived risk concept has been used.	It is aimed to understand the increasing demand for applications of consumer-oriented HIT.	Perceived utility and ease of use in consumer-oriented HIS are independent of age and education. Smartphones, with their user-friendly features, portability, and connectivity, significantly predict interest and usage. Simplicity in usage is a key factor shaping customer behavior in seeking health-related information, while perceived risk can contribute to a negative perception due to customer apprehension.
20	[19]	Türkiye	Descriptive, Methodological	N = 763	A study was conducted to adapt the TAM scale for use in the HIS field.	The objective was to assess the acceptance levels of healthcare professionals towards Hospital IS.	Employees exhibited neutral perceptions on the use of HIS, with identified areas for improvement. PU ranked highest among perception variables, while intention towards use scored the lowest. The conclusion suggests that users require adequate time, training, and awareness to embrace the system.
21	[50]	Indonesia	SEM	N = 217	A survey served as the tool for collecting data in this study.	The objective is to formulate a model for the adoption of Maternal and Child Health Information Systems (HIS) at the Ngawi Regency Health Office.	The main intervening variable of the indirect effects of perceived organizational support and personal characteristics on actual system use is enjoyment, while the main intermediate variable of actual system use is perceived organizational support.

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Table 2 (continued)

Article No.	Author/ Authors	Workplace	Design of the Study	Sample	Measuring Tool	Purpose of the Study	Conclusion
22	[44]	South Africa	Descriptive	N = 160	A questionnaire adapted from TAM was used.	The aim was to outline and clarify the acceptance and utilization of health information technology within the context of primary care nursing.	It has been highlighted that nurses who provide primary health care do not have access to computers or the internet.
23	[40]	China	SEM	N = 241	An extended UTAUT model was used where perceived risk was included.	The aim was to investigate the factors influencing users' intention to use a digital HIS.	Users' sustained use of the digital Health Information System (HIS) is influenced by their intention and facilitating conditions. Effort expectancy, social influence, PEOU and perceived enjoyment positively contribute to continued use, while perceived risk and cost exert a negative impact.
24	[54]	Türkiye	Relational	N = 463	Technology Acceptance Level Scale and Medical Error Perception Scale were used.	The aim was to unveil the evaluations of nurses, active users of the system, regarding the systems employed in EMRAM Level 7 digital hospitals.	It was found that nurses perceived the system as useful, easy to use, and effective in reducing their workload, although they found it less understandable.
25	[22]	Ghana	SEM	N = 645	A survey based on the TAM was developed.	The goal is to explore the factors that influence the adoption of mobile health services by citizens.	The study determined that PU and PEOU are crucial predictors for the intention to use mobile health services. Perceived risk, despite being negative, significantly impacts usage intention and recommendation.
26	[23]	Italy	SEM	N = 160	National cultural values that influence user behavior were included as moderators of technology acceptance relationships.	The objective is to investigate the impact of national cultural values on technology acceptance behavior within hospital settings.	The bureaucratic model that characterizes the Italian healthcare sector significantly influences the technology adoption choices of businesses and employees.
27	[51]	Türkiye	SEM	N = 212	A modified TAM-based questionnaire was used, including socio-psychological and cognitive factors.	It was aimed to evaluate the level of adoption of HIT by Turkish physicians.	The findings indicated that commitment is a strong predictor of HIT use, while motivation and resilience do not have a significant impact on HIT use.
28	[27]	Peru	Observational Cross-Sectional	N = 272	The measurement scale used was derived from Venkatesh and Davis' initial concepts for assessing IS in a broad sense.	It was aimed to determine the predictors of doctors' behavioral intentions to use SINADEF.	The use intention of SINADEF was linked to perceptions of its user-friendliness, the belief in its enhancement of physicians' task performance, and the training received for completing death certificates.
29	[21]	Jordan	SEM	N = 218	A model is proposed that integrates factors from TAM and Information Systems Success Model (ISSM) theories.	It is aimed to create a model that predicts Jordanian healthcare providers' intention to continue using Clinical Decision Support Systems (CDSS) in the future.	It was concluded that system quality, information quality and satisfaction have a significant impact on intentions to continue using CDSS.

Source(s): Table by authors.

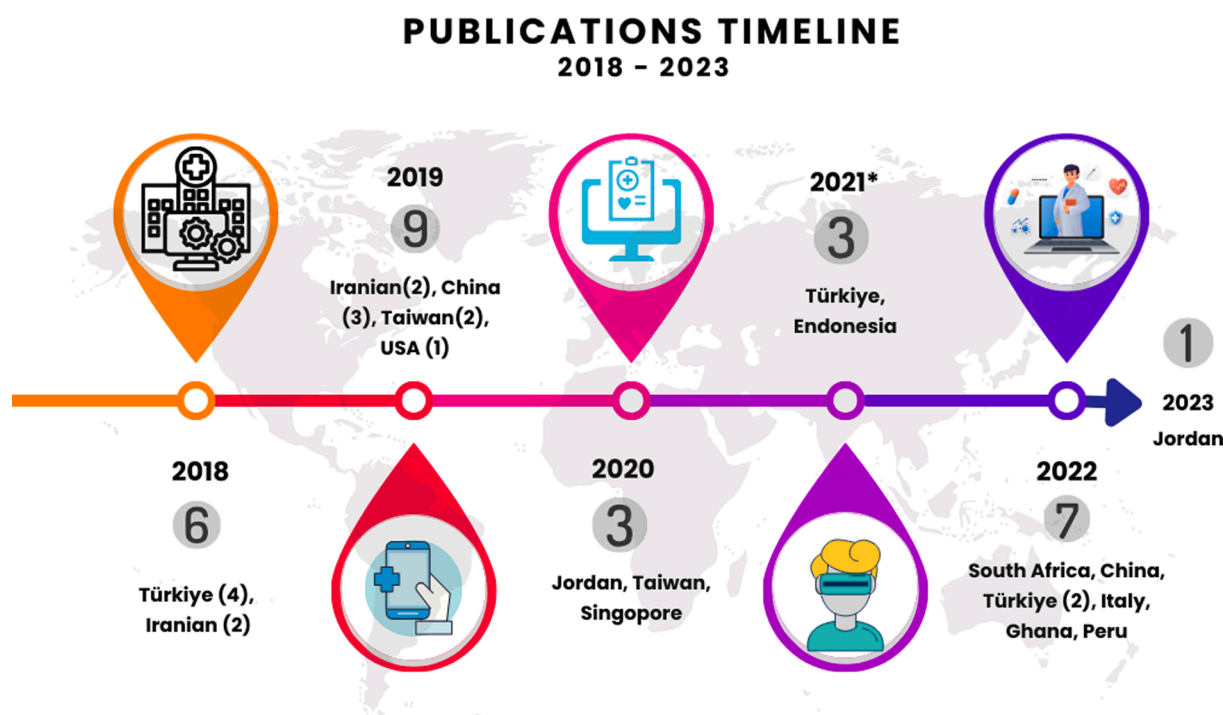


Fig. 2. Publications Timeline Source(s): Figure by authors. (*one study has no country information.).

This can reveal the acceptance and use of different HIS, both by health professionals in an organisational context and by individuals.

In this sense, when evaluating the results of the research, it can be said that among the studies scrutinised, not only a single TAM was used, but also TAM 2 (3, 13), TAM 3 (17), UTAUT (2, 23), HITAM (9, 18), and several models together (8, 29).

It is noticeable that the variables “PU”, “PEAU” and “intention” are the most effective variables and stand out in many studies in these studies published between the period considered (2018–2023) [16–27,32].

The acceptance of HIS, as explained by the TAM, is influenced by various factors specific to geopolitical contexts. For example, Holden and Karsh [2] explored the acceptance of EHRs among healthcare professionals and found that regulatory requirements, such as the HITECH Act, significantly influenced the PU of EHRs in the United States. Additionally, training and support were crucial for enhancing PEOU. Similarly, Rahimpour et al. [33] examined the acceptance of telehealth systems among patients with chronic conditions in Australia. They found that perceived usefulness was strongly associated with improved health management and reduced hospital visits, while perceived ease of use was linked to user-friendly interfaces and technical support.

In Germany, Ammenwerth et al. [34] focused on the acceptance of HIS among healthcare providers in hospitals. Their findings emphasized the importance of system interoperability and data security in influencing PU, while comprehensive training programs were vital for PEOU. Kim et al. [35] investigated the adoption of mobile health applications among Korean patients and found that cultural factors, such as high mobile phone penetration and tech-savviness, enhanced both PU and PEOU. Government initiatives promoting digital health also played a significant role.

Furthermore, Li et al. [36] studied the acceptance of EHRs in Chinese hospitals. They highlighted that PU was enhanced by improved patient management and access to information, while PEOU was influenced by the simplicity of the system interface and technical support. This systematic review demonstrates that the acceptance of HIS, as explained by TAM, is shaped by a variety of factors, including regulatory requirements, cultural contexts, government initiatives, and technical

support, which vary across different regions.

One of the key determinants of success for IT in the healthcare industry is the rate at which users accept and adopt the technology [37]. It can also be argued that technology acceptance is influenced by patient characteristics, technology characteristics and social influences [38].

Perceptions of system, information and service quality, and ease of use have a positive and substantial impact on the PU of using HIS [39]. According to the research results obtained, the attitudes and habits of healthcare professionals significantly increase their perception of the system as useful and easy to use [16]. On the other hand, it has been concluded that perceived risks negatively affect consumer attitudes and it is still assumed that consumers fear these technologies [32,40].

Similarly, user intention is other significant variables in the acceptance and use of HIS, and it is supported by studies that these three variables influence each another. Similar studies have shown that system quality, information quality and satisfaction have a significant effect on intention to use HIS [21]; and that job relevance, output quality, PEAU and PU are crucial predictors of intention to use [24,41].

PU, PEOU and privacy have substantial impacts on intention to use eHealth technologies [42]; and they are crucial predictors of behavioural intention to use mobile health services and recommend adoption of mobile health services [22]; PU and attitude significantly affect physicians' intention to use electronic health records [20].

A study conducted on nurses revealed that nurses' evaluations of “perceived norm, PEAU and PU had statistically significant positive impacts on their behavioural intention to utilise the care planning system [43]. Gök and Ekiyor [54] highlighted in their study that nurses found the systems they used to be useful, simple to operate, alleviated their work, but lacking clarity. In this regard, it can therefore be said that training has a positive and significant effect on doctors' [27] and nurses' perceptions of the ease and usefulness of HIS.

In the assessment of hospital HIS perception, PU received the highest scores, while “intention to use” had the lowest scores. Adequate time, training, and awareness are recommended for users to embrace the system [19]. Moreover the availability of technical guidelines has a direct impact on nurses' satisfaction [17].

It also shows that computer and internet access is an additional factor

affecting healthcare professionals' use of IS [44]. Comparing telemonitoring systems to face-to-face consultations, it was concluded that patients' perceptions of effectiveness, ease of use, cost savings, privacy, and satisfaction with care influenced their preference for telemonitoring [45]. It also shows that the smartphone is a strong predictor of interest in and use of consumer health information technologies, due to the ease of use, portability and connectivity of smartphones. In addition, the ease of use of these technologies has been found to be another critical factor influencing consumers' health information seeking behaviour [32].

It can be said that the use of the TAM in the researches included in the systematic review was scrutinised in the context of different demographic characteristics. In particular, there are studies emphasising that "gender" is a determinant variable in explaining the models [20,21,42,46,47]. It is acknowledged that the role of gender in technology adoption is widely accepted in the pertinent literature [48].

There are differences between men and women in terms of their perceptions and manners towards adopting new technologies [49]. When it was tested whether there was a difference in technology acceptance according to gender, it was found that women gave importance to trialability, technology anxiety and technological innovation compared to men [46].

Among the researches included in the systematic review, gender has a significant difference in the acceptance and use of an enterprise resource planning system in a hospital [47], gender is partially related to explaining the use of e-health technologies [42], gender has a positive effect among the factors influencing physicians' intention to use electronic records [20], and in a study in Jordan, gender has a mediating effect on healthcare providers' intention to use a system in the future.

As another determinant, it can be said that organizational support can be considered one of the main determinants of the acceptance of an IS [50]. It has been suggested by [23] that cultural values such as tendency to avoid risk and a future-oriented approach have an impact on the intention to use through communal norms, not the perceived aspect usefulness. Again, the study by Turan and Koç [51] concluded that employee engagement is a strong predictor of HIT use, but motivation does not exert a significant effect on the use of HIT. Jahanbakhsh et al. [37] also highlighted that measuring performance expectations may also be sufficient to measure user behaviour.

5. Conclusion

Within the scope of the research, studies focusing on the acceptance

and use of health information systems/technologies with the technology acceptance model were discussed and scrutinised with different technology acceptance models and different variables. Although studies have been carried out with different health professionals among the users of HIS, it can be said that the results related to nurses in particular, and the results related to gender among the demographic characteristics used in the studies, come to the fore. In addition, the prominence of the need for training in the acceptance and use of HIS by users is a crucial finding of the current systematic review.

It is evident that elements such as PU and PEAU are positively and significantly influenced and stand out in the evaluation and use of the systems after the relevant training of the employees on the specified issues. In this direction, the limitation of the research is the evaluation of the TAM within the framework of the research criteria determined within the scope of the research. In this direction, it has been observed in the relevant literature that there is a need to proceed differently in future research.

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CRediT authorship contribution statement

Gözde Tetik: Writing – review & editing, Writing – original draft, Resources, Formal analysis, Data curation, Conceptualization. **Serkan Türkeli:** Writing – review & editing, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Conceptualization. **Sevcan Pinar:** Writing – review & editing, Software, Resources, Project administration, Formal analysis. **Mehveş Tarım:** Visualization, Validation, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. List of article access

Table 3

List of Article Access.

Article No.	Article	Database			
		PUBMED	SCOPUS	WoS	ULAKBİM
1	E-Government Adoption: An Application in the Field of Health				✓
2	A study of picture archiving and communication system adoption in one hospital: Applying the unified theory of acceptance and use of technology model	✓			
3	Factors Affecting Acceptance of Hospital Information Systems Based on Extended Technology Acceptance Model: A Case Study in Three Paraclinical Departments	✓	✓		
4	Evaluation of Admission And Use of Institutional Resource Planning Systems in Hospitals by Enhanced Technology Acceptance Model: Ankara Sample				✓
5	Determinants of Consumers' Personal Health Technology Usage Intentions				✓
6	Evaluating The Use Of Personal Smart Technologies For Health Purposes				✓
7	Determinant factors in applying electronic medical records in healthcare	✓	✓		
8	Adoption of Hospital Information System Among Nurses: a Technology Acceptance Model Approach	✓	✓		
9	Iranian Health Information Technology Acceptance Model (IHITAM) from Users' Views	✓	✓		
10	Investigating Factors Impelling the Adoption of e-Health: A Perspective of African Expats in China		✓		

(continued on next page)

Table 3 (continued)

Article No.	Article	Database			
		PUBMED	SCOPUS	WoS	ULAKBİM
11	Evaluation of a Health Information Technology-Enabled Collective Intelligence Platform to Improve Diagnosis in Primary Care and Urgent Care Settings: Protocol for a Pragmatic Randomized Controlled Trial	✓	✓		
12	The Differing Effect of Gender and Clinical Specialty on Physicians' Intention to Use Electronic Medical Record	✓	✓		
13	Exploring critical factors influencing nurses' intention to use tablet PC in Patients' care using an integrated theoretical model	✓	✓		
14	Integrating usability and social cognitive theories with the technology acceptance model to understand young users' acceptance of a health information portal	✓		✓	
15	How habit affects continuous use: evidence from Jordan's national health information system	✓	✓		
16	A 12-week pilot study of acceptance of a computer-based chronic disease self-monitoring system among patients with type 2 diabetes mellitus and/or hypertension	✓	✓		
17	Determining Factors Affecting Nurses' Acceptance of a Care Plan System Using a Modified Technology Acceptance Model 3: Structural Equation Model With Cross-Sectional Data	✓			
18	Assessment of willingness to Telemonitoring interventions in patients with type 2 diabetes and/or hypertension in the public primary healthcare setting	✓			
19	Acceptance of Consumer-Oriented Health Information Technologies (CHITs): Integrating Technology Acceptance Model with Perceived Risk			✓	
20	Evaluation of Acceptance Level of Healthcare Professionals to Hospital Information Systems: An Empirical Study				✓
21	Acceptance Model of a Mandatory Health Information System in Indonesia	✓	✓		
22	Perceived technology use, attitudes, and barriers among primary care nurses	✓	✓		
23	Understanding Users' Continuance Usage Behavior Towards Digital Health Information System Driven by the Digital Revolution Under COVID-19 Context: An Extended UTAUT Model	✓	✓		
24	Electronic Medical Record Adoption Model Level-7 In Digital Hospitals, Examination of Technology Acceptance Level and Medical Errors Perception by Nonlinear Canonical Correlation Analysis				✓
25	Understanding the Drivers of Ghanaian Citizens' Adoption Intentions of Mobile Health Services.	✓	✓		
26	Explaining users' technology acceptance through national cultural values in the hospital context	✓	✓		
27	Health information technology adoption and acceptance of Turkish physicians-A model proposal and empirical assessment	✓	✓	✓	
28	Physicians' Perceptions as Predictors of the Future Use of the National Death Information System in Peru: Cross-sectional Study	✓	✓		
29	Clinical Decision Support Systems' Usage Continuance Intentions by Health Care Providers in Jordan: Toward an Integrated Model		✓	✓	

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