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Analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT) Technology Utilization Model for Health Information Systems (e-Health)

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ABSTRACT

The implementation of e-Health information systems tends to have the potential to significantly change the perspective on the management of healthcare services and the management of its provision. Although the benefits of e-Health systems have been recognised many times, the massive number of challenges as barriers serves as a benchmark for continued research. The use of references that play a role in the adoption of health information systems (e-health) is implemented using the UTAUT model (Unified Theory of Acceptance and Use of Technology). This research focuses on identifying the main determinants, Supportive conditions, social influences, effort expectations and performance expectations that influence the formation of behavioural intentions towards health professionals and patients towards utilization of e-health systems. The data obtained comes from healthcare professionals and patients reveal that *Performance expectations* are the most significant predictor of behavioral intention, while *facilitating conditions* are crucial for translating intentions into actual use. The findings suggest that, for successful e-Health adoption, both technological factors and human-related aspects—such as user support and training—must be addressed. This paper provides insights for healthcare organizations and policymakers seeking to improve the implementation and utilization of e-Health technologies.

1. INTRODUCTION

Technology has significantly influenced various sectors, including health. One of the most transformative outcomes of these technological advancements is the emergence of Technology-based health services, which is defined as the use of digital tool systems to improve healthcare delivery, access and management [1]. E-Health systems are designed to improve efficiency, effectiveness, and health service standards by providing timely and accurate access to information for healthcare providers, patients, and other stakeholders. As global health systems face increasing demands, e-Health is seen as a critical enabler in addressing challenges such as resource constraints, geographic barriers, and the need for personalized healthcare solutions [2] [3] [4].

The potential that arises in the application of e-Health is often encountered with acceptance or rejection from the side of system users, this is influenced by various factors, including the availability of infrastructure, ease of use, and expected benefits. Thus the importance of understanding various factors in various perspectives is necessary to achieve successful use and implementation of e-Health sustainability. So in applying the research, the UTAUT model accommodates the availability a structured approach to analyzing user behavior when adopting new technologies. [5] [6], the UTAUT model integrates insights from several prominent theories of technology acceptance, offering a comprehensive lens through which to analyze user intentions and behaviors.

The UTAUT model identifies four main categories: performance expectancy (how much users think Adoption is influenced by the belief that the technology improves performance, its ease of use, social norms, and the availability of organizational and technical support. That influence behavioral intentions and actual usage. Additionally, the model incorporates moderating variables such as age, gender, experience, and voluntariness of use, which can amplify or diminish the impact of these constructs [7] [8].

In the context of healthcare, the UTAUT model of e-Health implementation provides valuable discourse and insights into the viewpoints of various factors that encourage or hinder Use of digital medical devices. For instance, understanding the perceived benefits of e-Health among healthcare providers can inform the design of systems that align with their workflows, while addressing concerns about usability can enhance adoption rates among patients. Utilisation of the UTAUT model, barriers can be suppressed and known early to encourage the success of the healthcare system implemented as a solvable solution, and for stakeholders to develop more accurate strategies before implementation.

This study applies the UTAUT model that is specific to the context of e-Health utilisation and adoption. Exploration by various considerations that encourage or inhibit the use of technology. This study focuses on providing sustainability

insights in improving system implementation strategies and minimising any adverse impacts on health services in the future.

2. RESEARCH METHODOLOGY

The following stage delineates the research methodology is described in depth, covering the research design, data collection methods, sampling strategies, and data analysis techniques used to explore e-Health adoption through the lens of UTAUT Theory.[9] [10].

2.1 Design of the research

Quantitative research is used in this research for explore the various Factors that influence the use and acceptance of e-Health. empirical data collection from participants using a survey-based approach, so that the constructs in the UTAUT model can be analysed comprehensively. This design was chosen for its ability to provide generalizable insights and facilitate the measurement of relationships between variables.

2.2 Population and Sampling

Health professionals were included in this study population, such as physicians, nurses, and administrative staff, as well as patients who have experience using e-Health systems [13] [14]. A purposive sampling technique is employed to ensure that participants have adequate exposure to and familiarity with e-Health technologies. The use of the Cochran formula was applied in achieving statistical significance with a sample size of 200 respondents used in improving the validity of findings and reliability.

2.3 Data collection

The UTAUT model was used as a basis for developing a structured questionnaire used in data collection., which consists of two parts: [11] [12]:

1. Demographic Information: Includes age, gender, profession, experience with e-Health, and other relevant details.
2. UTAUT Constructs: Measurement of the UTAUT model has four main constructs (supportive conditions, social influence, effort expectations and performance expectations) in addition to behavioural intentions and actual use is also very important in it. responses from each respondent are recorded using a numerical scale of 1 to 5 (Likert scale) which means a value of 5 (strongly agree) to 1 (strongly disagree).

In order to ensure relevance, consistency, and clarity, the questionnaire was administered to a small group of participants. Data collection is conducted through both online and offline surveys, depending on the accessibility and preferences of the target respondents.

2.4 Analysis

Structural Equation Modeling (SEM) was applied to analyze the data, which enabled testing of complex relationships between various variables in three stages. [15] [16]

1. Descriptive Analysis: An overview is given regarding the demographic characteristics of respondents and general perceptions of the e-health system.
2. Reliability and Validity Testing: Cronbach Alpha provides a benchmark for construct validity against confirmatory (CFA).
3. Hypothesis Testing: variables included in it such as the effect of age in moderating the strength of the relationship between variables, gender, and experience are analyzed in examining the relationship of the UTAUT model to its impact.

2.5 Considerations of Ethics

Ethical approval is carried out by an institutional review board that has been granted permission to carry out its duties. Prior to participation, all individuals were presented with informed consent forms detailing the study's objectives, the voluntary nature of their involvement, and assurances of confidentiality regarding their responses. Data security and privacy is ensured by anonymizing all information and storing it securely in accordance with ethical guidelines. [17] [18].

This study employs a methodology designed to produce reliable and practical guided by the UTAUT framework, this study yields valuable insights into the factors driving the adoption of e-Health technologies. These insights will be translated into evidence-based recommendations for stakeholders seeking to improve e-Health systems' adoption and implementation.

3. RESULTS AND DISCUSSION

This stage follows up on the results of the data analysis and discusses the implications that arise in the UTAUT reference for e-Health adoption is shown in Table 1. It discusses the main constructs of the model, among others: moderator variables, facility provider conditions, social influences, effort expectations, performance expectations [30].

Table 1. The demographic details of the people who responded.

Atribut	Classification	n	%
Gender	Male	99	45%
	Female	121	55%
Profession	Healthcare Provider	132	60%
	Administrative Staff	44	20%
	Patients	44	20%
Age Group	18–29	88	40%
	30–44	88	40%
	45 and above	44	20%
Prior e-Health Experience	Yes	165	75%
	No	55	25%

3.1 Descriptive Analysis

This study involved 220 respondents, comprising healthcare professionals (60%), administrative staff (20%), and patients (20%). Respondent demographics show that 55% were woman, and 45% male, with an average age 35 years. Over 75% of the respondents reported prior experience using e-Health systems, primarily for appointment scheduling, electronic medical records, and teleconsultation services.

3.2 Reliability and Validity Testing

The reliability of the measurement scale has been confirmed through Cronbach's alpha coefficient values were greater than 0.7 for all constructs, indicating acceptable internal reliability. Construct validity was verified through confirmatory factor analysis (CFA), with factor loadings

above 0.6, meeting the threshold for acceptable validity. The model fit indices (CFI = 0.93, TLI = 0.91, RMSEA = 0.05) indicate measurement model has a great fit with data is shown ini figure 1.

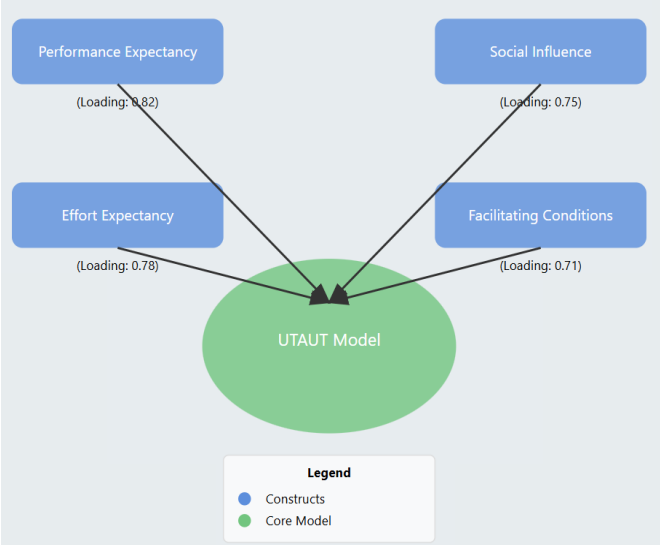

Figure 1. CFA Results for UTAUT Constructs

3.3 Hypothesis Testing

To understand the relationship between UTAUT constructs and eHealth intention, structural equation modeling (SEM) was used. The results of this analysis are summarized below in table 2. [19] [20]:

Table 2. SEM Results

Set up	Path	(β)	p	Significance
Expectation of achieving a desired result	Expectation of Performance → Intention	00.42	< 0.01	Significant
Anticipation of the amount of effort required	The Expectancy of Effort → Intention	00.31	< 0.01	Significant
The effect or impact of others in society	Influence of Society → Intention	00.25	< 0.05	Significant
Conditions that aid or assist	Conducive Environments → Intention	00.28	< 0.05	Significant
	Conditions that Facilitate → Usage	00.36	< 0.01	Significant

3.3.1 Anticipation of Performance Achievement

Performance expectations have been shown to have provide significant benefits intentions to act (β = 0.42, p < 0.01). Respondents perceived that e-Health systems improved their efficiency, reduced administrative burdens, and enhanced patient outcomes. These results are consistent with previous research highlighting perceived benefits as a key factor in technology adoption. [21] [22] [23].

3.3.2 Effort Expectancy

Estimated level of effort also has has a strong positive influence on intention act (β = 0.31, p < 0.01). Ease of use, user-friendly interfaces, and intuitive system navigation were identified as critical factors for encouraging adoption among healthcare professionals and patients. These results highlight the need for e-Health developers to prioritize usability during system design [24] [25].

3.3.3 Impact of Social Environment

Social influence shows a moderate but significant impact on intention to act (β = 0.25, p < 0.05). Peer recommendations, organizational encouragement, and endorsements from healthcare leaders were noted as key drivers of adoption. The findings suggest that social and professional networks play an important role in shaping attitudes toward e-Health [26].

3.3.4 Facilitating Conditions

Supportive conditions were found to have is a significant predictor of intention to act (β = 0.28, p < 0.05) and actual usage of e-Health systems (β = 0.36, p < 0.01). Respondents emphasized the importance of adequate training, technical support, and infrastructure availability in ensuring successful implementation and sustained use of e-Health technologies [27].

3.3.5 Moderating Variables

Age and experience moderated the effects of expectancy the easier an action is perceived and the greater the support available, the stronger the intention to do it. Younger users and those with prior exposure to technology were more likely to perceive e-Health systems as easy to use. Gender, however, did not exhibit a significant moderating effect, consistent with findings in other UTAUT-based studies [28] [29]

3.4 Discussion

The results of this study underline the relevance exploring e-Health adoption with the help of UTAUT model. Performance expectancy emerged as the strongest predictor, suggesting that emphasizing perceived benefits, such as higher efficiency and better patient outcomes, significantly contribute to acceptance among users. Effort expectancy highlights the importance of designing intuitive and accessible systems, particularly for users with limited technical proficiency.

Social influence was moderately impactful, indicating that organizational and peer support can positively shape perceptions of e-Health. Facilitating conditions, including training and technical support, proved critical for translating behavioral intentions into actual usage. This finding reinforces the need for comprehensive implementation strategies that address both technological and human factors is shown in figure 2.

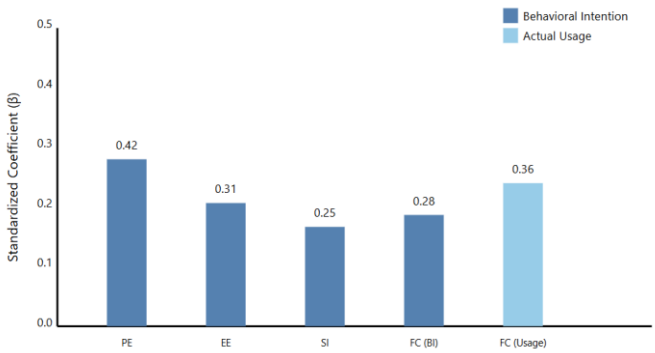

Figure 2. Relative Impact of UTAUT Constructs on e-Health Adoption

The moderating effects of age and experience suggest that targeted interventions, such as tailored training programs for older users or those with limited prior exposure to e-Health, can enhance adoption rates. These results align with previous research and offer useful recommendations for those involved in maximizing the effects of e-Health systems. The findings, taken together, validate UTAUT suitability for e-health use. By addressing the identified factors and leveraging the insights provided, healthcare organizations and policymakers, this can improve acceptance and utilization of e-Health technology, which in turn will result in a more efficient health care system and improve the quality of life of patients.

4. CONCLUSION

To understand the elements that influence the adoption and utilization of e-health technologies, this study intends to explore the application of the Integrated UTAUT. This study identifies key factors that significantly influence e-Health adoption among healthcare professionals and patients, using the UTAUT framework. This study highlights the importance of performance expectancy, effort expectancy, social influence, and enabling conditions in e-Health adoption. In addition, moderating variables such as age, gender, and experience also have significant effects.

The findings of this study confirm that performance expectations significantly predict intention to use e-Health technology, emphasising the need to demonstrate clear benefits in improving efficiency as well as patient outcomes. *Effort expectancy* was also found to be significant, highlighting the need for user-friendly systems that facilitate easy adoption, particularly for those with limited technological experience. *Social influence* showed a moderate effect, suggesting that peer and organizational support can influence individuals' attitudes toward e-Health adoption. Furthermore, provide training tailored to user needs and reliable technical support, were critical in translating behavioral intentions into actual usage. These findings contribute to the literature on technology adoption in the healthcare sector and provide valuable information for stakeholders in the development and implementation of e-Health systems. It is submitted that healthcare organisations can increase The likelihood of success adoption and implementing of e-Health technologies by addressing the factors found in this study. The ultimate outcome of this endeavour will be improved service quality and health outcomes.

In conclusion, the UTAUT model was found to be a valuable instrument in comprehending the e-Health adoption process. The design and implementation of e-Health systems must consider both technological and human aspects, as this study shows. A better understanding of the role of contextual factors, such as organizational culture and policy support, is needed to increase e-Health adoption, and future research should focus on this, in influencing e-Health technology adoption. Furthermore, longitudinal studies can provide more profound insights into how perceptions and usage evolve over time, thereby offering a more comprehensive understanding of the factors that encourage or inhibit continued usage.

By leveraging the insights from this research, policymakers, healthcare providers, and technology developers can create strategies It is evident that the widespread adoption of e-Health is encouraged, which ultimately benefits both healthcare professionals and patients alike.

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