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MOBILES INFLUENCING THE ADOPTION OF E-HEALTH IN MOROCCO: ANALYSIS OF THE TAM AND UTAUT MODELS

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Abstract:
This paper examines the impact of the adoption of new e-health technologies in Morocco. The study focuses on telemedicine and e-health services. It investigates innovation theories and behavioral intention models, while focusing on the Technology Acceptance Model (TAM) and the Unified Theory of Technology Acceptance and Use (UTAUT) to understand the key factors influencing the adoption of these healthcare services. The article seeks to explore how these e-health technologies are redefining interactions between healthcare professionals and patients. The methodology is based on rigorous data collection and analysis, with results interpreted in the context of existing literature. The results predict a growing acceptance of these technologies, with important implications leading to improved access to healthcare and quality of medical services in the region. The conclusion highlights practical implications and proposes directions for future research in this evolving field.

Keywords: telemedicine, e-health, technological innovation, Technology Acceptance Model (TAM), Unified Theory of Technology Acceptance and Use (UTAUT), healthcare systems.

JEL: I15; O33; C83; M15

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1. Introduction

The digital age has revolutionized many sectors, including healthcare. In this article, we explore how e-health technologies in Morocco, such as telemedicine and e-health services, are transforming the interaction between healthcare professionals and patients. We examine innovation theories and behavioral intention models, with a particular focus on the Technology Acceptance Model (TAM) and the Unified Technology Acceptance and Use Model (UTAUT), to understand the key factors influencing the adoption of these innovative healthcare services. The introduction highlights the growing importance of e-health and discusses the various variables specific to e-health services. It aims to fill gaps in the literature by providing a conceptual framework adapted to e-health. Finally, this research aims to elucidate the acceptance of e-health among healthcare professionals by identifying factors predictive of their intention to use these services. In this article, we examine the transformational impact of e-health technologies on service quality while highlighting their crucial role in the modern healthcare sector. The literature review examines previous research on e-health, incorporating key theoretical models such as TAM and UTAUT. We develop a theoretical framework specific to e-health, based on relevant hypotheses and adapted variables. Our approach is based on rigorous data collection and analysis, before we present and interpret the results, comparing them with existing studies. Finally, in the conclusion, we summarize the main findings, highlighting the far-reaching implications and concrete effects on the future of the changing healthcare sector. As this work examines a phenomenon in evolution, it cannot be considered exhaustive. In this context, we have suggested some avenues for future research.

2. Literature review

This literature review focuses on the design of a research model for e-health services, based on the Technology Acceptance Model (TAM). It integrates basic hypotheses and variables specific to e-health services. This literature review focuses on the analysis of factors influencing the adoption of these services, integrating theoretical models such as TAM and UTAUT and highlighting factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions.

2.1 The technology acceptance model: the foundation of the research model

The aim of this research is to study the degree of acceptance of e-health by healthcare professionals by identifying the factors that explain and predict their intention to use e-health services. Analysis of the scientific work already carried out in this field by various authors shows that the Technology Acceptance Model (TAM), as defined by (Davis, 1986), is a well-designed model, explaining and predicting individuals' acceptance of technology. As stated by (Venkatesh, 2000), TAM is rather robust and parsimonious, and demonstrates high predictive power, making it easy to apply to different contexts. The TAM makes it possible to trace the impact of external factors on internal beliefs, attitudes

and intentions (Davis *et al.*, 1989, p. 985). To this end, the theoretical model of the TAM will serve as a basis for the design of our research model, which is the subject of this study.

2.2 Main assumptions: actual use, intention of use and attitude to use

The underlying assumption of the TAM is that intention to use is the key variable for measuring technological acceptance. Davis et al. defined intention to use, as "*the strength of a person's intention to engage in a specific behavior*" (1989, p. 984) is favored over actual use, especially in contexts where technology is still in its infancy, such as e-health (Lanseng & Andreassen, 2007). The causality between the *intention* parameter and the *actual behavior* parameter is well established in the fields of attitudes and information systems (Davis *et al.,* 1989; Ajzen, 1991; Lanseng & Andreassen, 2007). Regarding the role of attitude, a mediating element in TAM, Davis *et al.* draw on Fishbein and Ajzen (1975) to define it as "*an individual's positive or negative feelings about performing the target behavior*" (1989, p. 984). However, the relevance of attitude as a mediator has been questioned, notably by Davis *et al.* (1989), who observed the direct effects of beliefs (perceived usefulness and ease of use) on intention to use. Indeed, Legris *et al.* (2003) found that, of 22 studies applying TAM, few focused simultaneously on attitude and intention to use. Despite these uncertainties, the role of attitude remains included in the study to further explore its potential influence and clarify associated dynamics. In line with previous work, we posit the following hypothesis:

H1: Attitude towards the use of e-health will have a significant positive effect on the intention to use e-health.

2.2.1. Perceived usefulness and ease of use

TAM postulates that all the external variables that influence an individual's acceptance of a particular system are influenced by the two key concepts of perceived usefulness and perceived ease of use.

2.2.1.1 Perceived usefulness

The concept of perceived usefulness in the Technology Acceptance Model (TAM) literature is defined by Davis *et al.* as "*the extent to which a person believes that using a particular system would improve his or her job performance*" (1989, p. 985). This notion is aligned with similar concepts in other theories, such as relative advantage in Innovation Diffusion Theory (IDT), extrinsic motivation, job fit, and outcome expectations. Perceived usefulness has been identified as a major determinant of attitude towards the use of technological systems, with regression coefficients often high, indicating a strong influence (Venkatesh *et al*., 2003; Venkatesh & Davis, 2000). The term "*perceived usefulness*" implies a comparison with existing systems, indicating that a new system is considered superior to its predecessors (Moore & Benbasat, 1991; Rogers, 1995). In his original approach, Davis (1989) links perceived usefulness to improved job performance, but points out that the definition needs to be adapted for non-organizational contexts. Thus,

in fields such as e-health, perceived usefulness would be assessed in terms of the personal or health benefits expected from the use of these technologies, leading to the following hypotheses:

H2: Perceived usefulness will have a significant positive effect on attitude towards the use of e-health.

H3: Perceived usefulness will have a significant positive effect on the intention to use e-health.

The direct impact of perceived usefulness reflects the situation in which the individual does not necessarily have a positive attitude towards using an innovation but because of the benefits expected from its use, intends to use it anyway.

2.2.1.2. Perceived ease of use

Davis (1989) defines perceived ease of use as "*the extent to which a person believes that using a particular system requires no effort*" (Davis *et al.*, 1989, p. 985). This definition is based on the definition of "*ease*" as "*freedom from difficulty or great effort*" (Davis, 1989), and is used in this study. According to Venkatesh *et al.* (2003), the concept of ease of use is related to the complexity (MPCU) and ease of use of the IDT, as well as to the concept of effort expectancy they suggest in their study. In addition, it is related to the concept of behavioral control proposed in the TPB, while being more specific. Compared with perceived usefulness, perceived ease of use has had a much less consistent impact on intentions to use in previous research (Venkatesh and Davis, 2000). Davis (1989) explains that ease of use essentially comprises two dimensions, self-efficacy and instrumentality, which have a different impact on intentions to use. The easier a system is to use, the greater an individual's self-efficacy. Self-efficacy is considered one of the main drivers of intrinsic motivation, and its impact is reflected in the hypothesis of a direct effect of perceived ease of use on attitude (Davis, 1989). The instrumental dimension of perceived ease of use captures the instrumental impact of an easier-to-use system on performance, which is reflected in the hypothesized relationship with perceived usefulness (Davis, 1989). This implies that the easier a service is to use, the more useful it will be perceived to be. The following assumptions are made:

H4: Perceived ease of use will have a significant positive effect on attitude towards using e-health.

H5: Perceived ease of use will have a significant positive effect on perceived usefulness.

It is suggested that its influence is greatest at the outset and becomes less significant over periods of prolonged and sustained use (Venkatesh *et al.*, 2003). In the context of this study, it is likely to be related to an individual's computer skills and level of Internet experience. In addition, its impact may differ depending on whether it is studied before or after adoption. In a re-implementation phase, it is suggested that perceived ease of use has a direct impact on intentions, and in a post-implementation situation, only indirectly through perceived usefulness (Szajna, 1996).

2.2.2. Access and perceived accessibility

The Technology Acceptance Model (TAM) literature highlights the importance of accessibility as a factor influencing technology adoption, particularly in the context of e-health services. Culnan (1984) identified inaccessibility as a likely reason for rejection, and other researchers have followed this lead. In organizational contexts, access to systems is often presupposed, but this changes in the context of the online consumer, where access is not guaranteed. Several studies have incorporated accessibility into their acceptance models, including O'Reilly (1982), Culnan (1984), Rice and Shook (1988), and Davis *et al.* (1992). While Rice and Shook (1988) focus on an objective measure of access, O'Reilly (1982), Culnan (1984), and Karahanna and Straub (1999) address perceived accessibility, which seems more suited to the evaluation of early-stage innovations. Perceived accessibility, defined as a person's expectation of the ease or difficulty of accessing a service (particularly e-health), is considered a powerful predictor of choice of information source, even more so than actual information quality (O'Reilly, 1982; Culnan, 1984; Rice and Shook, 1988). This perception is particularly important at the initial stage of adoption when the experience of information quality is limited. According to O'Reilly (1982) and Culnan (1984), perceived accessibility influences use consistently and independently of other variables. However, Davis *et al.* (1992) found contradictory results regarding its impact, suggesting that the effect of accessibility may vary according to the context of the study. In the context of e-health services, it is postulated that perceived accessibility has a positive and direct impact on the intention to use these services. This impact is considered to be direct rather than attitude-mediated, as a person may have a positive attitude towards a service but not intend to use it due to lack of access. This hypothesis is reinforced by the findings of an exploratory study on the subject. Consequently, we postulate that:

H6: The perceived accessibility of the e-health service will have a significant positive effect on the intention to use the e-health service.

2.2.3. Production quality

Presented by Venkatesh and Davis (2000) as an antecedent of perceived usefulness in the TAM2, the quality of e-health outcomes was considered the most important by respondents to the exploratory study. Originally defined as "*people's perception of how well the system performs its tasks*" (Venkatesh and Davis, 2000), outcome quality in the context of consumer services reflects a person's perception of the quality of the result of using the service. In the case of e-health, this refers to the quality of the response to the healthcare request and the health information obtained. Moreover, Song *et al.* (2006) assert that information quality is the most important attribute for users of health information. Venkatesh and Davis (2000) argue that outcome quality is distinct from perceived usefulness, as it involves a different judgment process. We agree with Venkatesh and Davis (2000) and assume that the quality of e-health outcomes will positively influence perceived usefulness. We therefore put forward the following hypothesis:

H7: The quality of results will have a significant positive effect on perceived usefulness.

2.2.4. Demonstrability of results

According to Venkatesh and Davis (2000), there is a clear link between positive results and use. However, Venkatesh and Davis (2000) argue that if a system is to produce relevant, positive results, these must be obvious to the individual. This aspect is taken into account in the concept of demonstrability of results, defined as "*the tangibility of the results of using the innovation*" (Moore and Benbasat, 1991, p. 302). We therefore put forward the following hypothesis:

H8: The demonstrability of results will have a significant positive effect on perceived usefulness.

2.2.5. Subjective standard

The Technology Acceptance Model (TAM) has been criticized for its lack of consideration of social influences, a component present in theories such as the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), and later versions of TAM, notably TAM2 (Chen *et al.*, 2002). In these models, social influence is often represented by the concept of subjective norms. Venkatesh and Davis (2000) define subjective norm as the influence of accepting another person's information as evidence of reality, emphasizing the impact of the social environment on the decision to use an innovation. They explain that individuals may intend to use an innovation even if they do not have a favorable attitude towards it, simply because they believe that their social environment expects such use from them (Venkatesh and Davis, 2000). This relationship between subjective norm and intention to use illustrates compliance in situations where use is perceived as obligatory, such as in an employment context. However, Venkatesh and Davis (2000) distinguish compliance from internalization, the latter reflecting the influence of others' opinions on the perceived usefulness of an innovation. Internalization leads to a direct effect of the subjective norm on perceived utility. In the context of e-health services, where use is not compulsory, and compliance situations are less common, the direct relationship between subjective norms and intentions to use may not apply. Nevertheless, the impact of internalization could be relevant, as some people consider the opinions of others to be important, as the results of an exploratory study revealed, although these results were somewhat inconsistent. Therefore, in line with Venkatesh and Davis (2000), we propose the following:

H9: The subjective norm will have a direct positive effect on perceived utility.

2.2.6. Compatibility

Compatibility, defined as "*the extent to which an innovation is perceived to be consistent with the existing values, past experiences and needs of potential adopters*" (Rogers, 1995, p. 224), has already been incorporated into the TAM model in the context of e-service acceptance (e.g. Chen *et al.*, 2001; An, 2005; Wu and Wang, 2005) and has been shown to have a significant

direct impact on attitude to use. Chen *et al.* (2001) and Wu and Wang (2005) have even found compatibility to be a more decisive factor than perceived usefulness, and consider it an essential factor in the online environment. It is the ability to reconcile the use of e-health with the style (originally, the work style in the employee context and the lifestyle in the consumer context) of the individual. If an innovation is compatible with the individual's way of doing things, it becomes more familiar and its use less uncertain (Rogers, 1995). In line with Chen *et al.* (2001), we hypothesize that the compatibility of e-health use with an individual's beliefs, values and needs will positively affect their attitude towards e-health use. Hence this hypothesis:

H10: Compatibility will have a significant positive effect on attitudes towards the use of e-health.

According to Rogers (1995, p. 224), "*an innovation may be compatible or incompatible with (1) sociocultural values and beliefs, (2) previously introduced ideas, or (3) customers' needs for innovation*". Moore and Benbasat (1991) consider that the notion of "*compatibility with needs*" overlaps with that of relative advantage (i.e. perceived utility) and, therefore, simply excludes the term "*needs*" from the initial definition of compatibility. However, perceived usefulness is more of a service/technology-oriented concept, whereas compatibility (while still representing the service being evaluated) represents the fit between e-health use and the individual's experiences, beliefs and needs. While we acknowledge the existence of a relationship between the two concepts, in this study, the hypothesis is rather that compatibility affects perceived usefulness. A person who perceives the use of e-health as compatible with him or herself is more likely to consider the service useful. The effect of compatibility on perceived usefulness has already been studied and found to be significant (e.g. Chau and Hu, 2001; Chen *et al.*, 2002; Wu and Wang, 2005). We therefore consider that:

H11: Compatibility will have a significant positive effect on perceived usefulness.

2.2.7. Perceived risk

The exploratory study showed that individuals are concerned about certain risks associated with the use of e-health, which influence their decision whether or not to use e-health. The risks mentioned include the risk of misunderstanding or misinterpreting the information provided, which can have serious consequences. Furthermore, in cyberspace, it is difficult to assess the quality of the information provided, which constitutes a risk. In addition, privacy and security concerns have been expressed both by respondents and in previous literature. Perceived risk has been studied by Pavlou (2003) and van der Heijden *et al.* (2003) in online transactions, by Bauer *et al.* (2005) in the context of mobile marketing acceptance, and by Curran and Meuter (2005) in the context of self-service adoption. Curran and Meuter (2005, p. 105) define perceived risk as "*the probability of certain outcomes based on a behavior, and the danger and severity of negative consequences of these behaviors*". Risk perception in the online context essentially refers to two forms of uncertainty: environmental uncertainty (linked to the technology - the Internet) and behavioral uncertainty (linked to the provider and the service/product)

(Pavlou, 2003). Curran and Meuter (2005) found that this concept was the only predictor of attitude towards the use of the electronic service they studied (self-service banking). However, this could be highly context-specific. Because of the obvious risks associated with using an e-health service (misinterpretation of information, erroneous information, privacy and security breaches, etc.), it is important to bear in mind that the use of e-health can be very risky:

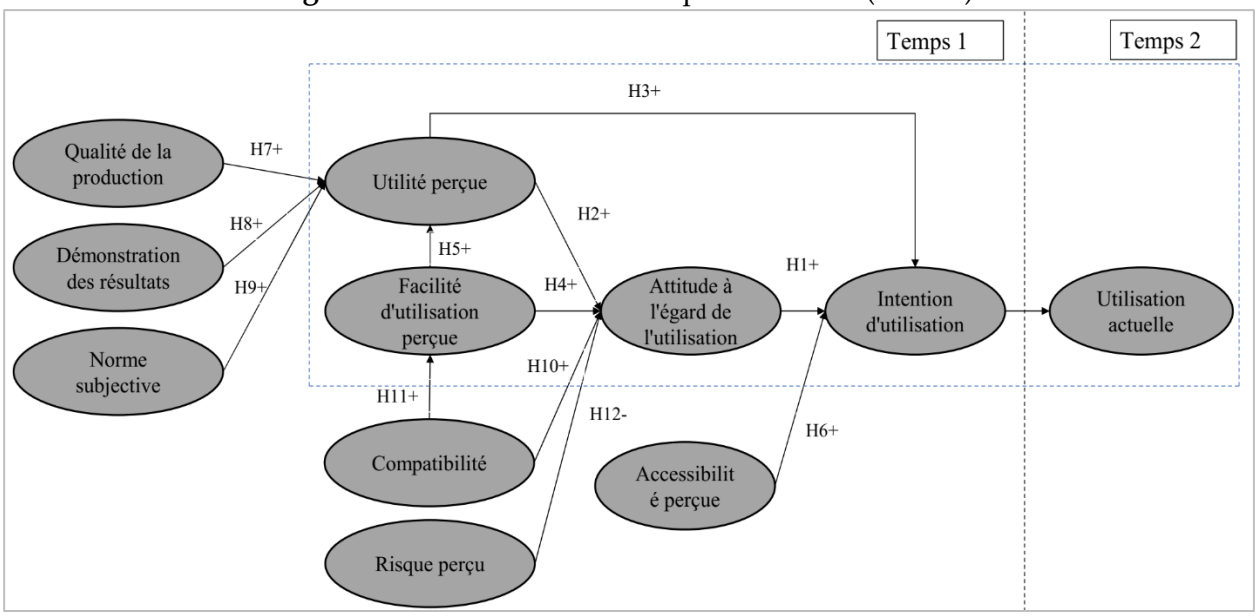
H12: Perceived risk will have a significant negative effect on attitude towards the use of e-health.

2.3. The proposed research model

2.3.1. The a priori eHealth acceptance model (eHAM)

By putting the pieces together and integrating the additional variables and hypotheses proposed in the previous sections into the original TAM, the research model for this study emerges. We call it the eHealth a priori acceptance model (eHAM). The a priori eHAM model is illustrated in Figure 1. As explained above, although several hypotheses concerning previously identified moderating effects are suggested, all eHAM paths will be examined in terms of the moderating effects of prior use, internet experience, age and gender. Please note that, for the sake of clarity, these moderating effects are not shown in Figure 1.

Figure 1: A Prioi's eHealth acceptance model (eHAM)



Source: Created by the author.

3. Methodology

In the methodology section, we adopted a quantitative approach using the Structural Equation Model (SEM) to examine the factors influencing the adoption of e-health technologies. This method enables in-depth analysis of causal relationships between

variables. To ensure data reliability and validity, we used statistical tests such as Cronbach's Alpha for reliability, and confirmatory factor analysis for validity. SEM model estimation was carried out using advanced statistical software, and results were carefully analyzed and interpreted to understand the underlying dynamics of e-health technology adoption. This methodical approach ensures the rigor and accuracy of the research results.

3.1 Background to the study

In the study, the sample analyzed for the demographic analysis is made up of healthcare professionals in Morocco. The gender breakdown shows a slight predominance of women. The age of participants varies, with a notable concentration among young professionals. The professional distribution includes nurses, doctors, pharmacists and others, indicating a diversity of roles in the healthcare system. The study sample comprised 540 respondents.

3.2 Sample size

A structured process was adopted for the deployment of the questionnaire in this study. The questionnaire was distributed primarily via online platforms, taking advantage of the extensive reach and accessibility of digital networks. Invitations to participate were sent by e-mail and shared on professional networks targeting healthcare professionals. This method enabled data to be collected quickly and efficiently and encouraged a high response rate due to the ease of access to the questionnaire. Reminders were also sent out to increase the participation rate. The sample size, determined by the response to the questionnaire (540 responses), is essential to ensure the representativeness and validity of the study results.

4. Results and discussion

4.1 Analysis demographics

Examining demographic characteristics is a fundamental aspect of any quantitative survey, as it provides a frame of reference for the sample under analysis and ensures that it is an adequate representation of the target population (Ritchie, Lewis, Nicholls & Ormston, 2013). In the following section, we explore the demographic elements of the sample, with particular emphasis on key variables such as age, gender, education, occupation and other relevant factors, summarized in Table 1.

Table 1: Gender of healthcare professions

Category	**N**	**Frequency (%)**
Woman	281	52.04%
Men	259	47.96%
Total	**540**	**100%**

Source: Created by the author.

The table illustrates a relatively balanced gender distribution in Morocco's healthcare professions. It shows a slight predominance of women, who represent 52.04% of the sample, against 47.96% for men. This almost equal distribution may reflect a growing trend towards gender parity in Morocco's healthcare professions. It could also be indicative of growing acceptance and opportunity for women in the medical and healthcare sectors. Understanding gender distribution can have important implications for healthcare research and practice. For example, it can influence policy design, training, and recruitment, ensuring that opportunities and resources are equitably distributed between the sexes. Distribution can also reflect elements of Morocco's cultural and social context. It should be noted that these figures are based on a specific sample and may vary according to the target population and study methodology. In addition, a more in-depth analysis of occupational sub-categories may reveal more nuanced differences in gender distribution.

Table 2: Age of healthcare professions

Category	**N**	**Frequency (%)**
20 - 26 years old	147	27.22%
41 - 50 years	125	23.15%
27 - 40 years	122	22.59%
51 - 60 years	96	17.78%
60 years to go	50	9.26%
Total	**540**	**100%**

Source: Created by the author.

The distribution shows a notable concentration in the 20-26 age bracket, representing 27.22% of the sample. This may reflect a new generation of healthcare professionals entering the Moroccan job market. This trend may be linked to the growth of educational institutions and increased accessibility to medical and paramedical studies. The 27 to 50 age group (45.74%) makes up almost half the sample, which may reflect professional maturity and considerable experience in the healthcare field. The 51-60 age group represents 17.78%, while professionals over 60 make up 9.26% of the sample. This distribution may indicate a continuing presence of experienced, highly qualified professionals in the sector. This age distribution may have implications for human resources planning in the healthcare sector, particularly with regard to training, mentoring, retirement and succession. An understanding of age dynamics can contribute to effective management and response to the healthcare needs of the population. As with any analysis, it is important to recognize that this breakdown is based on a specific sample and may vary according to the target population, region and study methodology. As previously mentioned, the collection and analysis of these data must be conducted in accordance with ethical research standards, ensuring anonymity and confidentiality (Resnik, 2015).

Table 3: Occupation and profession in the health sector

Category	N	Frequency (%)
Nurses	136	25.19%
Doctors	105	19.44%
Pharmacists	86	15.93%
Psychologists	67	12.41%
Dentists	53	9.81%
Other	49	9.07%
Physiotherapists	44	8.15%
Total	**540**	**100%**

Source: Created by the author.

With a frequency of 25.19%, nurses constitute the largest professional category in the sample. This trend may be indicative of the structure of the Moroccan healthcare system, where nurses play a key role in providing direct patient care. Doctors and pharmacists represent 19.44% and 15.93% of the sample, respectively. This may reflect the traditional distribution of roles in the healthcare sector, with a strong presence of these professions. These categories, although smaller, reflect the diversity and specialization within the healthcare system. Their presence indicates a more holistic and multidisciplinary healthcare offering. The "Other" category (9.07%) could include a variety of paramedical and support professionals. Physiotherapists, representing 8.15%, show the growing importance of rehabilitation and physical care. This distribution may have significant implications for human resource planning, medical education and health policy in Morocco. Understanding professional structure can help identify training needs, opportunities for inter-professional collaboration, and areas requiring further investment or development. As always, it should be noted that these figures are based on a specific sample and may vary according to various factors such as region, target population, and study methodology. The collection and analysis of these data must be conducted in accordance with ethical principles, ensuring the confidentiality and anonymity of participants (Resnik, 2015).

4.2 Descriptive statistics

In this study, descriptive statistical analysis of questionnaire responses, carried out with SPSS version 23, reveals a general tendency for respondents to agree with the statements. The mean, exceeding the mid-point of the scale, suggests a positive inclination of responses. Nevertheless, the variability implied by the unspecified standard deviations may reflect a diversity of opinions. The mean values of all overt variables were above the midpoint of the scale used (3 on a scale of 5), indicating that respondents tend to agree or strongly agree with the statements in the questionnaire. Measures of dispersion, such as standard deviation and range, provide an idea of the variability of the data. A lower standard deviation indicates that responses are concentrated around the mean, while a higher standard deviation indicates that responses are more dispersed. It's worth noting that mean values for all variables were above 3, suggesting that respondents generally tend to agree with questionnaire statements. This is an important point as it may indicate

a social desirability bias, where respondents are inclined to respond positively to present themselves in a favorable light. However, this bias can be controlled using techniques such as anonymization of responses and randomization of question order (Paulhus, 1991). Standard deviation values, although not explicitly mentioned, should also be studied carefully. Higher standard deviations could indicate greater variability in responses, which could make it more difficult to determine a clear overall trend. However, greater variability is not necessarily a bad thing, as it may also indicate a greater diversity of viewpoints among respondents (Altman and Bland, 2005). Overall, the results of the descriptive statistical analysis indicate that respondents generally tend to agree with the statements in the questionnaire, but with significant variability in their responses.

Table 4: Question coding

Variables	Coding	Question
Usefulness – How useful do you think an online health guide is?	UT1	An e-health service would make it easier to obtain health information.
	UT2	An e-health service would make health information more accessible.
	UT3	An e-health service would enable me to find answers to my health questions more quickly.
	UT4	An e-health service would improve my efficiency in healthcare management.
	UT5	An e-health service would be useful for managing my healthcare.
	UT6	An e-health service would make it easier for me to get the health information I want.
	UT7	An e-health service would provide additional health information.
	UT8	The advantages of an e-health service far outweigh the disadvantages.
Results – What do you think is the likely outcome of using an e-health service?	RES1	I'd have no trouble telling others about the benefits of using an e-health service.
	RES2	I would be able to communicate to others the results of using an e-health service.
	RES3	The advantages of using an e-health service seem obvious to me.
Quality of results – How would you rate the quality of the information you get from an e-health service?	RQ1	The quality of the information I get from an e-health service would be high.
	RQ2	An e-health service would be very effective.
	RQ3	An e-health service would provide good information.
	RQ4	An e-health service would provide precise information.
	RQ5	An e-health service would provide up-to-date information.
	RQ6	An e-health service would provide relevant information
Subjective standard – What would your friends and family think of your	SN1	The people who influence me would think I should use an e-health service.
	SN2	People who are important to me would think I should use an e-health service.

use of the e-health service?	SN3	People who are important to me would encourage me to use an e-health service.
	SN4	The people who influence me would think that using an e-health service is a good idea.
Compatibility – To what extent is the use of an e-health service compatible with your way of doing things?	CMP1	Using an e-health service would fit in well with the way I like to do things.
	CMP2	Using an e-health service would fit into my life in style.
	CMP3	Using an e-health service would be compatible with the way I like to do things.
Ease of use – How easy or difficult do you think an e-health service is to use?	EU1	Learning to operate an e-health service would be easy for me.
	EU2	My interaction with an e-health service would be simple.
	EU3	It would be easy for me to become adept at using an e-health service.
	EU4	It's easy to remember how to use an e-health service.
	EU5	An e-health service would be difficult to use.
Risk – Do you think it's risky to use an e-health service?	RI1	Using an e-health service would be very risky.
	RI2	I'd be afraid of becoming a hypochondriac by using an e-health service.
	RI3	I would be concerned about my privacy when using an e-health service.
	RI4	I would feel safe using an e-health service.
	RI5	I would feel safe using an e-health service.
	RI6	There's little risk of anything going wrong when using an e-health service.
	RI7	I'd be afraid of misinterpreting the information obtained in an e-health service.
	RI8	I'd be concerned about the quality of information obtained from an e-health service.
	RI9	I'd be worried about misinformation being provided through an e-health service.
	RI10	The use of an e-health service can result in the incorrect treatment of a health problem.
Accessibility – How easy or difficult would it be for you to access an online health guide?	ACC1	I expect it to be easy for me to access an e-health service.
	ACC2	I don't foresee any problems accessing an e-health service.
	ACC3	An online health guide would be very accessible for me.
Attitude – What is your attitude towards using an online health guide?	ATT1	I'd like to use an e-health service.
	ATT2	I'd feel great if I used an e-health service.
	ATT3	It makes sense to use an e-health service.
Intention to use – Will you use an e-health service in the future?	UI1	I'll be using an e-health service regularly in the future.
	UI2	I predict that I will use an e-health service.
	UI3	I intend to use an e-health service in the future.
	UI4	I would highly recommend using an e-health service to others.

Source: Created by the author.

Descriptive statistics for variables manifested by measures of central tendency and dispersion tested using SPSS 23 are presented in Tables 5 to 15. Mean values for all manifest variables were above the mean (3).

Table 5: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
CMP1	540	3,74	0,806	0,65	-0,537	0,714	1	5
CMP2	540	3,54	0,857	0,735	-0,449	0,457	1	5
CMP3	540	3,91	0,853	0,728	-0,293	-0,534	1	5

Source: Created by the author.

Table 6: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
SN1	540	3,94	0,879	0,773	-0,761	0,751	1	5
SN2	540	3,83	0,852	0,727	-0,363	-0,031	1	5
SN3	540	3,93	0,79	0,624	-0,438	-0,032	1	5
SN4	540	3,8	0,812	0,659	-0,211	-0,09	1	5

Source: Created by the author.

Table 7: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
ACC1	540	3,63	0,938	0,879	-0,745	0,582	1	5
ACC2	540	3,5	0,911	0,829	-0,399	0,119	1	5
ACC3	540	3,59	0,904	0,817	-0,582	0,305	1	5

Source: Created by the author.

Table 8: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
ATT1	540	3,53	0,983	0,966	-0,719	0,42	1	5
ATT2	540	3,41	0,913	0,833	-0,474	0,224	1	5
ATT3	540	3,54	0,916	0,839	-0,617	0,438	1	5

Source: Created by the author.

Table 9: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
EU1	540	3,74	0,874	0,765	-0,536	0,386	1	5
EU2	540	3,41	0,882	0,778	-0,391	0,23	1	5
EU3	540	3,55	0,88	0,775	-0,513	0,38	1	5
EU4	540	3,47	0,838	0,702	-0,204	0,033	1	5
EU5	540	3,62	0,895	0,8	-0,438	0,137	1	5

Source: Created by the author.

Table 10: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
RI1	540	3,58	0,917	0,841	-0,501	0,106	1	5
RI2	540	3,73	0,856	0,733	-0,266	-0,198	1	5
RI3	540	3,81	0,82	0,672	-0,454	0,225	1	5
RI4	540	3,81	0,857	0,735	-0,163	-0,509	1	5
RI5	540	3,89	0,821	0,674	-0,418	0,104	1	5
RI6	540	3,56	0,867	0,752	-0,377	0,379	1	5
RI7	540	3,82	0,855	0,731	-0,411	0,032	1	5
RI8	540	3,53	0,883	0,78	-0,363	0,224	1	5
RI9	540	3,59	0,898	0,806	-0,629	0,577	1	5
RI10	540	3,49	0,958	0,918	-0,588	0,483	1	5

Source: Created by the author.

Table 11: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
UT1	540	3,62	0,888	0,789	-0,535	0,452	1	5
UT2	540	3,53	0,885	0,784	-0,509	0,518	1	5
UT3	540	3,56	0,915	0,836	-0,618	0,442	1	5
UT4	540	3,39	0,956	0,915	-0,45	0,171	1	5
UT5	540	3,56	0,901	0,811	-0,61	0,536	1	5
UT6	540	3,47	0,908	0,824	-0,326	0,219	1	5
UT7	540	3,47	0,936	0,877	-0,653	0,338	1	5
UT8	540	3,46	0,877	0,768	-0,196	0,03	1	5

Source: Created by the author.

Table 12: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
SEN1	540	3,36	1,024	1,05	-0,568	0,073	1	5
SEN2	540	3,49	0,976	0,952	-0,685	0,321	1	5

Source: Created by the author.

Table 13: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
RES1	540	3,57	1,025	1,05	-0,735	0,294	1	5
RES2	540	3,43	0,959	0,921	-0,666	0,324	1	5
RES3	540	3,55	0,947	0,897	-0,711	0,571	1	5

Source: Created by the author.

Table 14: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
RQ1	540	3,64	0,825	0,681	-0,288	0,175	1	5
RQ2	540	3,8	0,804	0,646	-0,246	-0,203	1	5
RQ3	540	3,7	0,867	0,751	-0,31	0,038	1	5
RQ4	540	3,81	0,808	0,653	-0,44	0,278	1	5
RQ5	540	3,74	0,852	0,726	-0,113	-0,359	1	5
RQ6	540	3,69	0,867	0,751	-0,374	0,096	1	5

Source: Created by the author.

Table 15: Item descriptive statistics

	N	Average	Standard deviation	Variance	Asymmetry	Kurtosis	Minimum	Maximum
UI1	540	3,71	0,878	0,771	-0,746	0,838	1	5
UI2	540	3,67	0,864	0,747	-0,27	0,02	1	5
UI3	540	3,76	0,849	0,721	-0,522	0,481	1	5
UI4	540	3,49	0,994	0,989	-0,605	0,316	1	5

Source: Created by the author.

The majority of mean values lie above the mid-point of (3) of the scale, indicating the presence of the characteristics measured by the overt variables. Values distributed around the mean indicate that the sample is suitable for further analysis.

Table 16: Correlation matrix

	CMP	SN	ACC	ATT	EU	RI	UT	SEN	RES	RQ	UI
CMP	1										
SN	0,786υ	1									
ACC	0,374υ	0,261υ	1								
ATT	0,304υ	0,200υ	0,839υ	1							
EU	0,379υ	0,254υ	0,833υ	0,928υ	1						
RI	0,632υ	0,532υ	0,595υ	0,633υ	0,735υ	1					
UT	0,335υ	0,246υ	0,685υ	0,802υ	0,800υ	0,695υ	1				
SEN	0,164†	0,077	0,638υ	0,772υ	0,766υ	0,625υ	0,926υ	1			
RES	0,113†	0,137†	0,648υ	0,757υ	0,732υ	0,636υ	0,826υ	0,883υ	1		
RQ	0,655υ	0,712υ	0,288υ	0,338υ	0,438υ	0,643υ	0,468υ	0,363υ	0,406υ	1	
UI	0,492υ	0,372υ	0,509υ	0,484υ	0,547υ	0,631υ	0,643υ	0,571υ	0,611υ	0,706υ	1

Significance of Correlations: p < 0.100, † p < 0.050, ʠ p < 0.010, υ p < 0.001.

4.3 Reliability assessment

The reliability of the constructs and their items in the final model was carefully examined by testing their Cronbach's alpha and composite reliability, two essential measures for determining the suitability of measurement items to their respective theoretical constructs. Cronbach's alpha, named after Lee Cronbach, who introduced it in 1951, is a measure of the internal consistency of a construct's items and is commonly used in social science research to assess the reliability of measurement scales (Cronbach, 1951). In this study, Cronbach's alpha was analyzed using SPSS version 25 statistical software. The

analysis revealed values above 0.9 for all constructs, a score that far exceeds the 0.7 threshold generally recognized as indicating acceptable reliability (Nunnally, 1978). These high scores are a clear indicator of the excellent level of reliability of the constructs in our model, and provide strong assurance of the internal consistency of the measurement items. With regard to the supply chain performance construct, reliability was also supported by these results, indicating that the set of items measuring this construct operates consistently and reliably (Bernstein & Nunnally, 1994; DeVellis, 2016; Hair *et al.,* 2014; Kline, 2013; Nunnally, 1978). To complete the reliability analysis, the composite reliability (CR) of each construct was calculated. CR is another measure of the internal consistency of the items in a construct, but unlike Cronbach's alpha, it takes into account the difference in factor loadings of the items (Hair *et al.,* 2014). CR analysis was carried out using AMOS version 23 and the results indicated that all CR values were above 0.8, which is well above the conventional threshold of 0.7 and indicates excellent construct reliability (Hair *et al.,* 2014). These results attest to the reliability and consistency of the items in measuring the concepts they are intended to represent, reinforcing the robustness and credibility of our research model. Alongside these reliability tests, the analysis also examined the correlation between constructs. Correlations of less than 0.8 were observed, indicating the absence of multicollinearity problems between constructs (Hair *et al.,* 2014). Multicollinearity, which refers to excessively high correlations between predictors in a regression analysis, can pose problems for the interpretation of results and the estimation of regression coefficients. Consequently, the absence of multicollinearity is another indication of the quality of our research model.

Table 17: Reliability tests

Built	CR	Cronbach's Alpha	Number of elements
UI	0,745	0,741	4
RQ	0,849	0,846	6
RES	0,809	0,807	3
SEN	0,781	0,78	2
UT	0,904	0,905	8
RI	0,846	0,846	10
EU	0,831	0,828	5
ATT	0,793	0,792	3
ACC	0,794	0,793	3
SN	0,788	0,787	4
CMP	0,502	0,527	3

Note: CR = Composite reliability; Cr. Alpha = Cronbach alpha
†All correlation coefficients are significant at $p < 0.001$.

Factor loadings, also known as loading weights, represent the correlation between an observed item and a latent factor or construct. They are essential indicators of the construct validity of a structural equation model (SEM) (Hair *et al.,* 2014). In our study, we examined the significance of factor loadings for each item to confirm their reliability. According to commonly used recommendations, standardized factor loadings should be

at least above 0.5, but ideally above 0.7 to consider an item as having a significant contribution to its construct (Hair *et al.*, 2014). A factor load greater than 0.7 indicates that the item shares more than 50% of its variance with the construct, i.e. more than half of the item's variability can be explained by the construct (Hair *et al.*, 2014; Jöreskog & Sörbom, 1982). Thus, the higher the factor load, the more the item is considered a good indicator of the latent construct. Our analyses revealed that the majority of measurement items had factor loadings above 0.7, indicating that they share a higher variance with their respective constructs than the error variance. These items therefore retain high convergent validity, which is a measure of the extent to which items in a construct are positively correlated (Hair *et al.*, 2014; Jöreskog & Sörbom, 1982). The results also showed that all factor loadings were statistically significant. The statistical significance of these factor loadings offers further evidence of their validity, indicating that they are not the result of chance, but reflect a significant relationship between the items and their constructs (Anderson & Gerbing, 1988; Hair *et al.*, 2014). For the few items whose factor loadings were closer to the threshold of 0.5 than to the ideal parameter of 0.7, we carefully examined their contribution to construct validity. Even if these items have lower factor loadings, they can still make a valuable contribution to construct measurement, especially if they measure a unique facet of the construct that is not well captured by the other items.

4.4 Assessment of construct validity

The average variance extracted (AVE) is an essential statistic for determining the convergent validity of a construct in a structural equation model (SEM) (Hair *et al.*, 2014). In our analysis, AVE was calculated for each construct by summing the squared factor loadings of the items (which are representations of the squared multiple correlations between the items and their respective constructs) and dividing this sum by the total number of items for the given construct (Fornell & Larcker, 1981; Hair *et al.*, 2014). AVE values above 0.5 are commonly accepted as indicating adequate convergent validity, as this means that more than 50% of item variance is explained by their respective constructs (Bagozzi & Yi, 1988; Fornell & Larcker, 1981; Hair *et al.*, 2014). In our analysis, all AVE values were above this threshold, confirming the convergent validity of all constructs in our model. Even for the supply chain performance construct, which had the lowest AVE among all constructs, the AVE was still above 0.5, indicating adequate convergent validity (Fornell & Larcker, 1981; Hair *et al.*, 2014). However, adequate convergent validity is only part of the equation. It's also important to check discriminant validity, which assesses the extent to which a construct is distinct from other constructs in the model (Hair *et al.*, 2014). To check this, we performed a nested model comparison using confirmatory factor analysis (CFA). By limiting the correlations between each pair of study constructs in each comparison model to 1, we were able to test whether the constructs were distinct from each other (Anderson & Gerbing, 1988; Bagozzi & Yi, 1988; Hair *et al.*, 2014). If the chi-square (x^2) test shows a significant difference between the two models, this supports the discriminant validity of the constructs (Bagozzi & Yi, 1988; Hair

et al., 2014; Huo, 2012). Although this method of comparing nested models confirmed the discriminant validity of our items, as shown in Table 28, we recognize that this method does not offer strong evidence of discriminant validity in all cases. For example, correlations as high as 0.9 between constructs can still produce a significant difference in fit, even if they suggest a lack of distinction between constructs (Hair *et al.*, 2014). For this reason, we also tested discriminant validity by comparing the AVE of each construct with the squared correlations of the other constructs in the model. This method, proposed by Fornell and Larcker (1981), states that the AVE of a construct must be greater than the squared correlations between that construct and all other constructs in the model. If this is true, it means that the construct explains more variance in its items than the variance it shares with the other constructs, confirming its discriminant validity (Fornell & Larcker, 1981; Hair *et al.*, 2014).

Table 18: Discriminant validity test

	AVE	MSV	MaxR(H)	CMP	SN	ACC	ATT	EU	RI	UT	SEN	RES	RQ	UI
CMP	0,243	0,618	0,515	**0,493**										
SN	0,482	0,618	0,793	0,786υ	**0,694**									
ACC	0,563	0,705	0,799	0,374υ	0,261υ	**0,751**								
ATT	0,561	0,861	0,797	0,304υ	0,200υ	0,839υ	**0,749**							
EU	0,497	0,861	0,84	0,379υ	0,254υ	0,833υ	0,928υ	**0,705**						
RI	0,355	0,54	0,848	0,632υ	0,532υ	0,595υ	0,633υ	0,735υ	**0,596**					
UT	0,542	0,858	0,908	0,335υ	0,246υ	0,685υ	0,802υ	0,800υ	0,695υ	**0,736**				
SEN	0,641	0,858	0,781	0,164†	0,077	0,638υ	0,772υ	0,766υ	0,625υ	0,926υ	**0,8**			
RES	0,586	0,78	0,815	0,113†	0,137†	0,648υ	0,757υ	0,732υ	0,636υ	0,826υ	0,883υ	**0,766**		
RQ	0,485	0,506	0,855	0,655υ	0,712υ	0,288υ	0,338υ	0,438υ	0,643υ	0,468υ	0,363υ	0,406υ	**0,697**	
UI	0,423	0,498	0,752	0,492υ	0,372υ	0,509υ	0,484υ	0,547υ	0,631υ	0,643υ	0,571υ	0,611υ	0,706υ	**0,651**

Significance of Correlations: † p< 0.100, † p < 0.050, ɖ p < 0.010, υ p < 0.001

In this analysis, several statistics were calculated for each construct, including average variance extracted (AVE), maximum shared variance (MSV), and maximum square root of shared variance (MaxR(H)). AVE is a measure of the amount of variance in the items of a construct that is captured by the construct itself, while MSV is a measure of the amount of variance in a construct that is shared with other constructs in the model. MaxR(H) is another measure used to assess discriminant validity. According to Fornell and Larcker (1981), to confirm discriminant validity, the AVE of a construct must be greater than the squared correlations between that construct and all other constructs in the model. If this is true, it means that the construct explains more variance in its items than the variance it shares with the other constructs, thus confirming its discriminant validity. Examination of Table 18 shows that all constructs have AVE values greater than the squared correlations with the other constructs, confirming the discriminant validity of all constructs in the model. This means that each construct in the model is distinct and captures a unique facet of the phenomenon under study that is not captured by the other constructs. However, it is important to note that although this nested model comparison method confirmed the discriminant validity of the items, the authors acknowledge that this method does not offer strong evidence of discriminant validity in all cases.

4.6 Structural model and hypothesis testing

After confirming the measurement theory by testing the relationship of the indicator variables to the theoretical constructs and checking the reliability, validity and invariance of the measurements, the conceptual relationship of the structural relationship or structural theory was tested by examining the paths in the structural model. First, the saturated model was tested and compared with the fit indices of the CFA measurement model. Saturated structural models are considered inferior due to their inability to discover beyond the full measurement model (Hair *et al.*, 2014). The fit statistics of the saturated theoretical model were identical to those obtained from the measurement model, confirming the correct transition from the measurement model to the structural model (Hair *et al.*, 2014).

Figure 2: The eHealth acceptance model (eHAM)

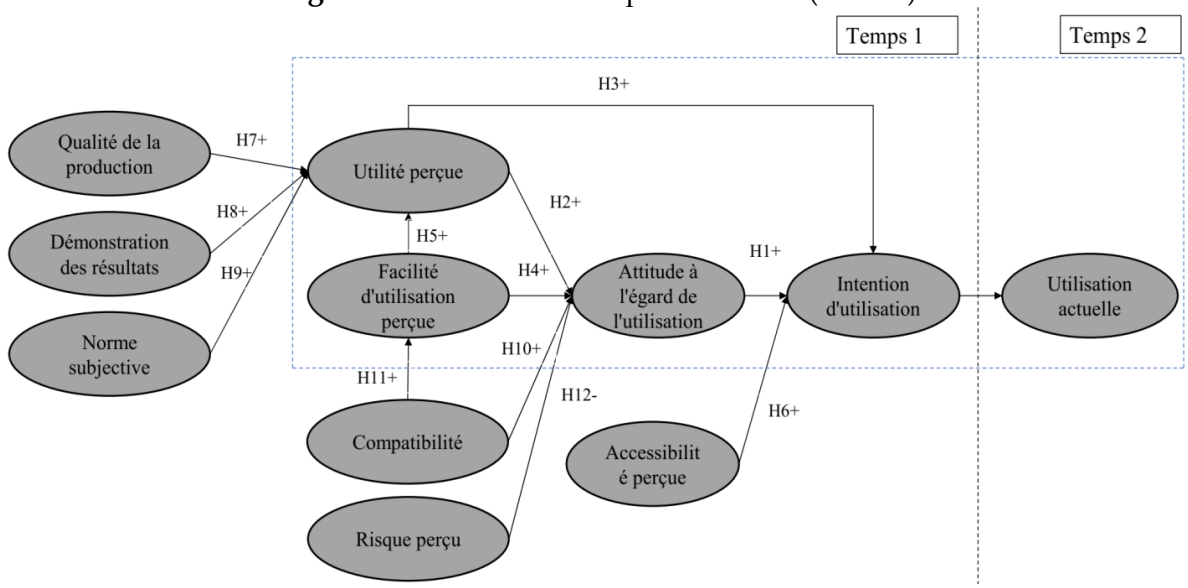
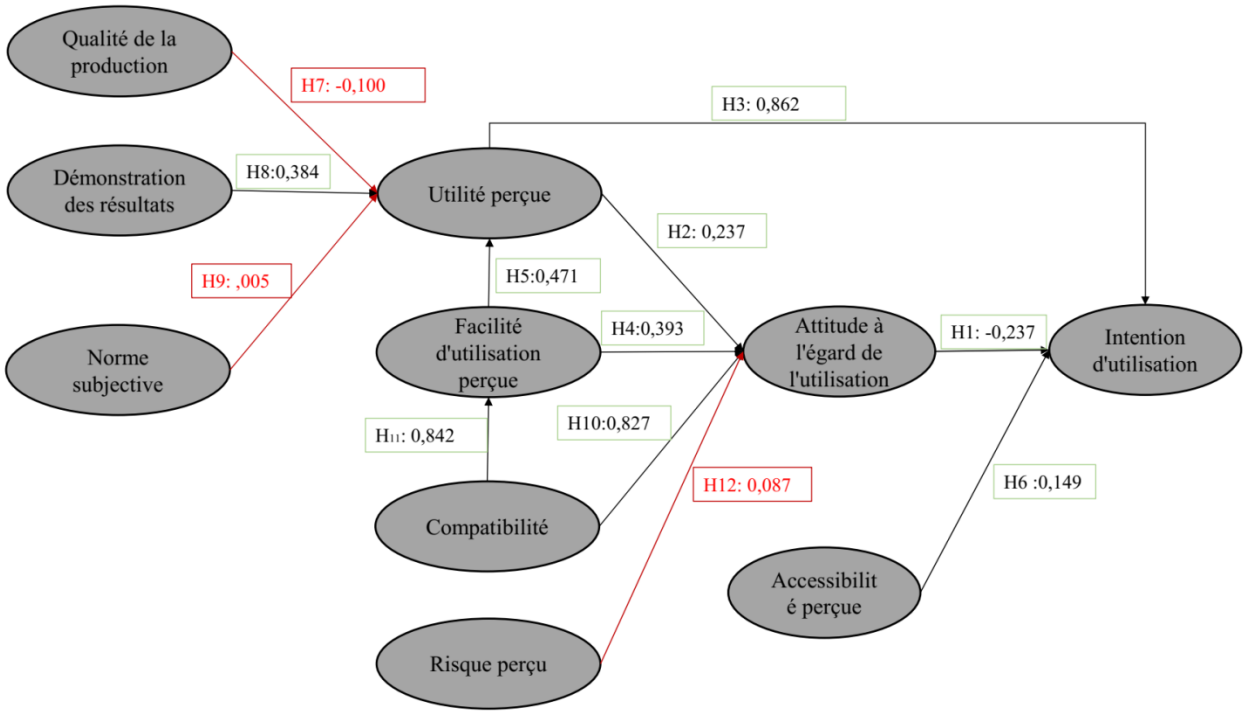


Table 19: Estimation results for the e-health acceptance model (eHAM)

Assumptions				Estimate	S.E.	C.R.	P	sig
H_1	UI	<---	ATT	-,237	,104	-2,284	,022	Accepted
H_2	UT	<---	RQ	,237	,056	4,261	***	Accepted
H_3	UI	<---	UT	,862	,114	7,548	***	Accepted
H_4	ATT	<---	UT	,393	,069	5,665	***	Accepted
H_5	UT	<---	EU	,471	,052	9,081	***	Accepted
H_6	UI	<---	ACC	,149	,062	2,384	,017	Accepted
H_7	ATT	<---	RI	-,100	,062	-1,619	,106	Rejected
H_8	UT	<---	RES	,384	,037	10,459	***	Accepted
H_9	UT	<---	SN	,005	,039	,134	,894	Rejected
H_{10}	ATT	<---	EU	,827	,090	9,234	***	Accepted
H_{11}	EU	<---	CMP	,842	,192	4,385	***	Accepted
H_{12}	ATT	<---	CMP	,087	,126	,696	,486	Rejected

Figure 3: Estimation results for the e-health acceptance model in Morocco



6. Results and discussion

The results presented are linked to a study on the acceptance of e-health in Morocco by healthcare professionals. Here is a detailed interpretation of the results in the context of the Moroccan healthcare sector:

6.1 H1 (UI <--- ATT, Accepted)

This hypothesis shows a significant negative relationship between attitude (ATT) and intention to use (IU). This may indicate that healthcare professionals' negative attitudes towards e-health technology may reduce their intention to use it. Hypothesis 1 (H1) of our study concerns the relationship between attitude (ATT) and intention to use (IU) e-health by healthcare professionals in Morocco. Specifically, the results show a significant negative relationship between these two variables, with an estimate of -0.237, a standard deviation of 0.104, a C.R. value of -2.284, and a significant p-value of 0. 022.This negative relationship suggests that the more negative the attitude towards e-health, the lower the intention to use e-health. This may seem counterintuitive in many models of technology acceptance, where a positive attitude is generally associated with higher intention to use (Davis, 1989; Venkatesh *et al.*, 2003). The finding could indicate that negative attitudes towards e-health among healthcare professionals in Morocco could be a major barrier to its adoption. Decision-makers may need to focus on understanding and modifying these attitudes to increase acceptance of e-health. There could be cultural or contextual factors specific to Morocco that influence this negative relationship. For example, concerns about reliability, security, or lack of training may contribute to these negative attitudes.

Hypothesis 1 may require deeper investigation to understand the underlying mechanisms of this negative relationship. Qualitative studies, such as interviews or focus groups with healthcare professionals, may offer additional insights. It would also be useful to compare these results with similar studies in other regions or countries to determine whether this negative relationship is unique to the Moroccan context. If attitude proves to be a key factor in intention to use e-health, targeted interventions, such as training, demonstrations, or awareness campaigns, may be needed to change these attitudes. Hypothesis 1 of our study reveals a complex and unexpected relationship between attitude and intention to use e-health in the Moroccan context. Understanding why this relationship is negative, and what can be done to address this issue, will be key to promoting the successful adoption of e-health in Morocco.

6.2 H2 (UT <--- RQ, Accepted)

Outcome quality (RQ) is positively related to utility (UT), suggesting that improving the quality of e-health outcomes may increase its perceived utility among healthcare professionals in Morocco. Hypothesis 2 (H2) of your study examines the relationship between outcome quality (RQ) and utility (UT) in the context of e-health in Morocco. The results show a significant positive relationship between these two variables, with an estimate of 0.237, a standard deviation of 0.056, a C.R. value of 4.261, and a significant p-value (marked by "***<0.001"). The positive relationship between outcome quality (IQ) and usefulness (UT) implies that if healthcare professionals perceive e-health to produce high-quality outcomes, they are more likely to see this technology as useful. This positive relationship highlights the importance of outcome quality in perceived usefulness. E-health systems that deliver accurate, timely and relevant information may be seen as more useful by healthcare professionals. Designers and decision-makers may need to focus on ensuring that e-health systems deliver high-quality results. This may include measures to ensure the accuracy, reliability, and relevance of the data and information provided. The significance of this relationship in the Moroccan context may be linked to specific needs or challenges in the country's healthcare system. For example, the focus on quality may be a response to earlier concerns about the quality of healthcare or access to quality medical information. This positive relationship is consistent with many models of technology acceptance, where perceived usefulness is often linked to positive outcomes or performance quality (Davis, 1989; Venkatesh *et al.*, 2003). As with any research, there may be limitations that require future attention, such as the need for further studies to understand how and why outcome quality specifically influences utility in this context. Hypothesis 2 reveals an important understanding of what drives acceptance of e-health in Morocco. Outcome quality emerges as a key factor in perceived usefulness, which may have important implications for the design, implementation and promotion of e-health in this region.

6.3 H3 to H5

These results show a significant positive relationship between usefulness (UT), attitude (ATT), ease of use (EU), and intention to use (UI). This implies that if e-health systems are perceived as useful and easy to use, they are more likely to be adopted by healthcare professionals. Hypothesis 3 (H3) of your study explores the relationship between perceived usefulness (UT) and intention to use (IU) of e-health among healthcare professionals in Morocco. The data indicate a significant and positive relationship between these two variables, with an estimate of 0.862, a standard deviation of 0.114, a R.C. value of 7.548, and a highly significant p-value (marked by "***"). The positive relationship between perceived usefulness (PU) and intention to use (IU) suggests that the more healthcare professionals in Morocco perceive e-health as useful, the more they intend to use it. The strong positive relationship reinforces existing theories such as Davis' (1989) Technology Acceptance Model (TAM), where perceived usefulness is a key predictor of intention to use. This confirms that usefulness remains a determining factor in different contexts, including the Moroccan healthcare sector. eHealth policymakers and system developers can use these findings to design interventions that highlight the usefulness of eHealth. By showing how e-health can improve patient care, save time, or increase efficiency, they can encourage wider adoption. In the Moroccan context, where e-health adoption can be influenced by a variety of cultural, economic, and institutional factors, perceived usefulness can serve as a lever to increase acceptance. The strength of this relationship in relation to other variables in the model can also offer insights. For example, if perceived usefulness has a stronger influence on intention to use than other variables, this may guide the allocation of resources and efforts in promoting e-health. As always, further research may be needed to explore these findings in depth. Understanding the specific mechanisms by which utility influences intention to use in this particular context could offer even more nuanced insights. Hypothesis 3 offers strong and significant confirmation of the central role of utility in technology adoption, consistent with existing theories in the field. In the specific context of e-health in Morocco, this highlights the importance of communicating and demonstrating the usefulness of these systems to encourage adoption by healthcare professionals. Hypothesis 4 (H4) of your study addresses the relationship between utility (UT) and attitude (ATT) towards e-health among healthcare professionals in Morocco. The relationship was found to be positive and significant, with an estimate of 0.393, a standard deviation of 0.069, an R.C. value of 5.665, and a p-value marked by "***". The positive relationship between utility (UT) and attitude (ATT) demonstrates that the perceived usefulness of e-health is linked to a more favorable attitude towards its use. In other words, if healthcare professionals perceive e-health as useful, they are likely to have a more positive attitude towards it. This relationship is in line with theoretical models such as the Technology Acceptance Model (TAM) (Davis, 1989), where usefulness is a major predictor of attitude towards technology use. The focus on utility may be particularly relevant in the Moroccan healthcare context, where professionals may be looking for ways to improve efficiency, quality of care, and access to information. Understanding this relationship may help

stakeholders involved in the deployment of e-health in Morocco to develop strategies to highlight the usefulness of the technology in order to create a more positive attitude. Studying how usefulness influences attitude may also reveal links with other variables such as intention to use. It would be relevant to further explore how and why utility influences attitude in this specific context. Qualitative studies or different methodological approaches could enrich understanding. Hypothesis 4 sheds light on how perceived usefulness influences attitudes towards e-health among healthcare professionals in Morocco. This provides insights for the promotion of e-health in this region, highlighting the need to clearly demonstrate how the technology can meet the needs and goals of healthcare professionals. Hypothesis 5 (H5) of your study focuses on the relationship between ease of use (EU) and perceived usefulness (UT) of e-health among healthcare professionals in Morocco. The relationship is significantly positive, with an estimate of 0.471, a standard deviation of 0.052, a C.R. value of 9.081, and a p-value marked by "***". The positive relationship between ease of use (EU) and usefulness (UT) indicates that the more healthcare professionals perceive e-health as easy to use, the more useful they find it. This relationship underlines the fact that the simplicity and accessibility of a technology can contribute to its effectiveness and perceived value. This finding is in line with Davis (1989) Technology Acceptance Model (TAM), where ease of use is recognized as a factor directly influencing perceived usefulness. In a context where technology may be new to some healthcare professionals, ease of use may be a key factor in determining whether the tool will be perceived as useful and, consequently, adopted. Designers and implementers of e-health systems in Morocco can focus on creating intuitive, easy-to-use platforms. Careful attention to the user interface and user experience can lead to an increased perception of usefulness. The relationship between ease of use and usefulness can impact other variables, such as attitude and intention to use, forming a more complex path to technology adoption. Further research could explore the specific mechanisms by which ease of use influences usefulness in the Moroccan healthcare context, perhaps using qualitative methods or case studies. Hypothesis 5 illustrates an important connection in e-health acceptance, revealing that ease of use is a significant predictor of perceived usefulness. This understanding can guide the development and implementation of e-health technologies in Morocco, ensuring that user-centered design is at the heart of initiatives to promote adoption.

6.4 H6 (IU <--- ACC, Accepted)

Accessibility (ACC) is positively related to intention to use (IU), suggesting that easy access to e-health systems may encourage their use. Hypothesis 6 (H6) in your study addresses the relationship between accessibility (ACC) and intention to use (IU) of e-health among healthcare professionals in Morocco. The results indicate a positive and significant relationship, with an estimate of 0.149, a standard deviation of 0.062, an R.C. value of 2.384, and a p-value of 0.017. The positive relationship between accessibility (ACC) and intention to use (IU) suggests that the more accessible e-health is for healthcare professionals, the more likely they are to intend to use it. This highlights the

importance of accessibility in promoting e-health adoption. Although ease of access is not always a standard variable in technology acceptance models such as TAM, it aligns with the concept of ease of use and can be a key element in specific contexts such as this (Venkatesh and Davis, 2000). Morocco, like many other developing countries, can face challenges in terms of infrastructure and access to technology. This relationship highlights the importance of ensuring that e-health is easily accessible to healthcare professionals, both in terms of hardware and software. To promote the adoption of e-health in Morocco, decision-makers and implementers need to focus on improving accessibility. This can include investment in technological infrastructure, the provision of necessary equipment, and the creation of accessible interfaces. The definition and measurement of accessibility may vary according to context. Future studies could explore the specific aspects of accessibility that are most relevant to usage intent in the Moroccan healthcare sector. Understanding how accessibility interacts with other variables such as perceived usefulness, attitude, or ease of use may enrich understanding of the complex dynamics leading to e-health adoption. Hypothesis 6 highlights a crucial aspect of e-health acceptance in Morocco: accessibility. Confirmation of this hypothesis suggests that easy, barrier-free access to e-health is a fundamental element in encouraging healthcare professionals to adopt this technology. Efforts to increase accessibility may therefore be an essential lever for the successful implementation of e-health in this region.

6.5 H7 (ATT <--- RI, Rejected)

There is no significant relationship between risk (RI) and attitude (ATT). This may mean that risk perception does not significantly affect attitude towards e-health in this population. Hypothesis 7 (H7) in your study deals with the relationship between risk (RI) and attitude (ATT) towards e-health among health professionals in Morocco. The results show a negative but non-significant relationship, with an estimate of -0.100, a standard deviation of 0.062, a C.R. value of -1.619, and a p-value of 0.106. Consequently, the hypothesis was rejected. Hypothesis 7 suggests that perceived risk (IR) has no significant effect on attitude (ATT) towards e-health among health professionals in Morocco, although the direction of the relationship is negative. This could mean that risk concerns are not a major determinant in the formation of attitudes towards e-health in this specific context. In many behavioral models, perceived risk is often associated with a more negative attitude towards technology (Featherman & Pavlou, 2003). The rejection of this hypothesis may indicate a unique dynamic in the Moroccan healthcare sector. It is possible that Moroccan healthcare professionals are more concerned about other factors, such as accessibility or usefulness, rather than the potential risks associated with the use of e-health. Decision-makers and e-health developers in Morocco can focus less on reducing perceived risk and more on improving other aspects, such as utility and ease of use. It would be beneficial to explore in more detail why perceived risk is not a significant factor in this context. Qualitative methods, such as interviews or focus groups, could help to understand this dynamic. It is also possible that cultural or contextual factors specific to Morocco influence how risk is perceived and incorporated into attitudes towards e-

health. Hypothesis 7 reveals an interesting aspect of e-health acceptance in Morocco, showing that perceived risk does not appear to be a determining factor in shaping attitudes towards this technology. This finding may have important implications for the design and implementation of e-health systems in the region, guiding attention to other aspects that may be more influential in the adoption process.

6.6 H8 (UT <--- RES, Accepted)

Outcomes (RES) are positively related to utility (UT), indicating that positive outcomes of e-health use may increase its perceived utility. Hypothesis 8 (H8) of your study examines the relationship between outcomes (RES) and utility (UT) in the acceptance of e-health by healthcare professionals in Morocco. The results show a positive and significant relationship, with an estimate of 0.384, a standard deviation of 0.037, a C.R. value of 10.459, and a highly significant p-value (***). The hypothesis was, therefore accepted. Hypothesis 8 confirms a positive relationship between outcomes (RES) and perceived usefulness (UT). This suggests that the more health professionals in Morocco perceive positive outcomes from the use of e-health, the more useful they perceive this technology to be. This relationship aligns with the fundamentals of the Technology Acceptance Model (TAM), where perceived usefulness is a key determinant of technology adoption (Davis, 1989). In a context where e-health adoption can be influenced by a variety of cultural, economic and infrastructural factors, understanding that concrete, tangible outcomes increase perceived usefulness can be essential for e-health development and implementation. Decision-makers and developers can highlight the concrete benefits and positive outcomes of e-health to improve the acceptance and adoption of this technology by healthcare professionals in Morocco. Understanding which types of outcomes are most influential and how they are measured can be an important step towards the practical application of these findings. Future studies could focus on these aspects. Understanding how outcomes relate to utility in the specific context of Morocco may require further exploration of the needs and expectations of healthcare professionals in this region. Hypothesis 8 confirms an important link between results and perceived usefulness, strengthening the understanding of what motivates the adoption of e-health by healthcare professionals in Morocco. Policymakers and practitioners can use this information to design more effective interventions and communications, highlighting the tangible benefits of e-health to encourage its acceptance and use.

6.7 H9 (UT <--- SN, Rejected)

There is no significant relationship between subjective norm (SN) and usefulness (UT), which may indicate that social pressures or the expectations of others do not affect the perceived usefulness of e-health. Hypothesis 9 (H9) of your study addresses the relationship between subjective norm (SN) and utility (UT) in the context of health professionals' acceptance of e-health in Morocco. The results of this hypothesis indicate a non-significant relationship, with an estimate of 0.005, a standard deviation of 0.039, a

C.R. value of 0.134, and a p-value of 0.894. Consequently, the hypothesis was rejected. Hypothesis 9 suggests that the subjective norm (SN), i.e. the beliefs and expectations of significant others, has no significant effect on the perceived usefulness (UT) of e-health by healthcare professionals in Morocco. This finding may seem at odds with some models of behavior, such as the Theory of Planned Behavior (Ajzen, 1991), where subjective norm is often an influential factor in technology adoption. The result may indicate that healthcare professionals in Morocco are more influenced by pragmatic considerations, such as usefulness and effectiveness, rather than by the expectations or opinions of their colleagues and supervisors. Decision-makers may find that focusing on demonstrating the functional utility of e-health is more effective than attempts at social influence to encourage its adoption. It may be worth exploring further why the subjective norm has no effect in this context. Is it due to specific cultural factors, the study methodology, or other reasons? Understanding how culture and professional norms in Morocco may influence this relationship could offer further insights. Hypothesis 9 reveals that, in the context of e-health in Morocco, the subjective norm does not appear to influence perceived usefulness. This may have important implications for how e-health adoption is encouraged and supported in this region, focusing on more tangible and measurable factors rather than social influence.

6.8 H10 and H11

These hypotheses show a significant positive relationship between ease of use (EU), attitude (ATT), and compatibility (CMP). This implies that if e-health is compatible with professionals' needs and values, and is easy to use, this may positively influence their attitude towards it. Hypothesis 10 (H10) of your study addresses the relationship between ease of use (EU) and attitude (ATT) towards e-health among healthcare professionals in Morocco. The results show a positive and significant relationship, with an estimate of 0.827, a standard deviation of 0.090, a C.R. value of 9.234, and a highly significant p-value (***). Thus, the hypothesis was accepted. Hypothesis 10 confirms a strong positive relationship between perceived ease of use (EU) and positive attitude (ATT) towards e-health. This indicates that the more Moroccan healthcare professionals perceive e-health as easy to use, the more favorable their attitude towards this technology. This result is in line with the Technology Acceptance Model (TAM), which states that ease of use directly influences attitudes towards the use of a technology (Davis, 1989). The strong relationship observed may reflect the particular importance of ease of use in the Moroccan healthcare context, where professionals may face specific challenges such as limited training or time constraints. This result suggests that efforts to improve the acceptance of e-health in Morocco should focus on simplifying the user interface and reducing technical barriers. This may include training, technical support, and user-centered design. The measurement of usability and attitude may vary according to context and technology. Future studies could explore these relationships in different areas of e-health or with different populations of healthcare professionals. The strong relationship may also reflect cultural values and norms specific to Morocco, such as the

importance of efficiency and practicality in the workplace. Hypothesis 10 demonstrates a significant relationship between ease of use and positive attitudes towards e-health in Morocco. This underlines the importance of making e-health accessible and user-friendly to encourage its adoption by healthcare professionals. Efforts to improve ease of use may contribute to more positive attitudes and, consequently, wider adoption of e-health in this region. Hypothesis 11 (H11) of your study focuses on the relationship between compatibility (CMP) and ease of use (EU) in the context of healthcare professionals' acceptance of e-health in Morocco. The results show a significant and positive relationship, with an estimate of 0.842, a standard deviation of 0.192, an R.C. value of 4.385, and a highly significant p-value (***). The hypothesis was therefore accepted. Hypothesis 11 establishes that the compatibility (CMP) of e-health with existing values, past experiences and the needs of Moroccan healthcare professionals has a positive and significant effect on perceived ease of use (EU). The result is consistent with previous research showing that the compatibility of a technology with existing needs and values positively influences perceived ease of use (Rogers, 2003). The finding indicates that if e-health is consistent with the existing needs, values and experiences of healthcare professionals, it will be perceived as easier to use. This may be particularly relevant in Morocco, where the integration of technology into existing practices may be crucial to acceptance. Designers and decision-makers should strive to make e-health compatible with the current practices of healthcare professionals in Morocco. This could include adjustments in interface design, customization of functionality, and targeted training. While the result is significant, further research could examine how different aspects of compatibility (e.g. cultural or organizational compatibility) influence ease of use in different contexts or groups of healthcare professionals. Understanding how Moroccan culture and professional norms in the healthcare sector may influence this relationship may enrich the interpretation of these results. Hypothesis 11 reveals a positive and significant relationship between compatibility and ease of use of e-health in Morocco. This highlights the importance of making e-health compatible with the existing needs, values and experiences of healthcare professionals to facilitate its adoption.

6.9 H12 (ATT <--- CMP, Rejected)

There is no significant relationship between compatibility (CMP) and attitude (ATT). This may mean that compatibility with existing systems has no major impact on attitude towards e-health. Hypothesis 12 (H12) of your study examines the relationship between compatibility (CMP) and attitude (ATT) towards the use of e-health by healthcare professionals in Morocco. The results show a non-significant relationship with an estimate of 0.087, a standard deviation of 0.126, a C.R. value of 0.696, and a p-value of 0.486. Consequently, the hypothesis was rejected. Hypothesis 12 suggests that there is no significant relationship between e-health compatibility (i.e., its alignment with existing values, past experiences, and the needs of healthcare professionals) and their attitude towards this technology in Morocco. This result is somewhat surprising, as Diffusion of Innovations theory (Rogers, 2003) generally suggests that the compatibility of an

innovation with existing needs and values can influence attitudes towards it. It is possible that, in the Moroccan healthcare context, other factors, such as ease of use, quality of results, or subjective norms, have a greater impact on attitude than compatibility. The way in which compatibility was measured in this study may not fully reflect the complexity of this construct. A more nuanced definition or different measures might reveal a significant relationship. Rejecting this hypothesis suggests that interventions to improve attitudes towards e-health in Morocco may not need to focus as much on compatibility. This may help guide e-health implementation and adoption efforts in this region. As the hypothesis was rejected, future studies could explore whether this lack of relationship persists in different subgroups of healthcare professionals or in other cultural or organizational contexts in Morocco. It may also be useful to compare this result with other study hypotheses, such as Hypothesis 11, which showed a significant relationship between compatibility and ease of use. Further analysis of these differences may offer insights into the mechanisms underlying e-health adoption. Hypothesis 12, contrary to some theoretical expectations, revealed no significant relationship between compatibility and attitude towards e-health in Morocco. This result raises interesting questions and may guide both future practice and research by highlighting the factors that are most relevant to e-health acceptance in this specific context.

7. Conclusion

The conclusion of this in-depth study on the acceptance of e-health in Morocco highlights several crucial factors influencing the adoption of this technology by healthcare professionals. While negative attitudes towards e-health reduce the intention to use it, the quality of results and their perceived usefulness prove to be important drivers of its adoption. The study highlights the importance of ease of use and accessibility, while noting that risk perception and compatibility with existing systems do not have a significant impact on professional attitudes. These findings suggest that to effectively promote e-health in Morocco, it is essential to focus on improving the perception of its usefulness and ease of use. In addition, these findings offer avenues for future research and interventions aimed at overcoming barriers to e-health adoption and harnessing its potential to improve access to healthcare and the quality of medical services in Morocco.

Conflict of Interest Statement

I certify that I have NO affiliation or involvement with any organization or entity having a financial interest (such as honoraria, educational grants, participation in speakers bureaus, membership, employment, consulting, stock ownership or other ownership interests, and expert testimony or patent licensing agreements), or a non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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