Health Technology Perception: A Case Study of Telemedicine Systems

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Abstract

This research aimed to study health technology perception through a case study of telemedicine systems and the influence of health technology perception. The researchers collected data from a total of 400 respondents, employing convenience sampling. The results of hypothesis testing by multiple regression analysis (MRA) revealed that the digital technology perception factors in four main topics were: 1) content quality, 2) operating system quality, 3) health service quality and 4) value perception was positively correlated with perception of digital technology at a statistically significant level of 0.01. This affected the willingness to use health technology services. Health service quality had the highest influence on intention to use, followed by perceived value and operating system quality. This research may be useful for governments and entrepreneurs, who can use the research results as a guideline to increase the level of intent of using health technology. Further research should explore more factors affecting intention to use other telemedicine systems, such as attitude and motivation factors for each telemedicine application.

Key words: Perception, Health Technology, Telemedicine

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1. Introduction

In the last few decades, Thailand has developed its economy and industry. In the first phase, the Thailand 1.0 model was used to focus on driving the country's economic sector through agriculture as well as agricultural exports. In the second phase, Thailand adopted the Thailand Model 2.0, which enters the light industry era. This started with the developing manufacturing industry to replace imports and was followed by the Thailand 3.0 model, which focuses more on the development of heavy industry and production for export. However, Thailand Model 3.0 has yet to break Thailand out of the middle-income trap, inequality trap and imbalance trap. Therefore, the Thailand 4.0 model is an important tool in leading Thailand towards becoming a leading country that is prosperous and sustainable. Thailand has evolved from a middle-income country to a high-income country by restructuring its economy, driven by improving industrial productivity, to an innovation-driven economy (Jones & Pimdee, 2017; Lee et al., 2020).

The COVID-19 pandemic led to 513 million cases and 6.23 million deaths worldwide (Charoon, 2022). Therefore, technology can be used to help manage medical services so that doctors, nurses, and medical personnel can provide comprehensive patient care services. In particular, telemedicine technology may be applied to provide public health services to the public through technology and video conference communication to exchange useful information for diagnosis, treatment and prevention of disease without time and place restrictions. Many hospitals in Thailand have begun to adapt their treatment, especially during the COVID-19 outbreak. This further encourages hospitals to turn to telemedicine treatments to better respond to treatment during these periods. It is convenient for people to travel, save time in queues, reduce the need for patients to leave the house, and reduce the number of people in the hospital (Haleem et al., 2022; Limna et al., 2022; Wattanapisit et al., 2022). Telemedicine is a critical

topic to study. Hence, it is vital to investigate the factors influencing perceptions of telemedicine. The results may help those concerned to know the factors affecting public perception and accessibility and use them as a guideline to improve the development of telemedicine health technology to meet the needs and expectations of the people as much as possible and lead to the real use of telemedicine in Thailand.

2. Objectives

1. To study the factors of perception of digital technology that affect the decision to use health technology services.

2. To study the influence of digital technology perception factors affecting decision-making to use health technology services.

3. Literature Review

Concepts and Theories about the Perceived Use of Technology

Roger (2003) stated that the process of adoption of innovation is the decision to fully implement the innovation, thinking that innovation is the best and most useful way than the attributes of innovation affecting acceptance. This can be distinguished by five characteristics, including relative advantage, compatibility, complexity, trial ability, and observativables. Relative advantage means the recipient of innovation thinking that innovation is better, more useful than the old one or practiced by replacing it with new innovation. Compatibility means how the innovation acceptor feels or thinks that innovation is compatible or compatible with past values and experiences without conflicting with values, social and cultural beliefs, ideas, or experiences about innovations in the past. It includes the innovative needs of the target audience that are compatible with past ideas or experiences. Complexity means that innovative users see innovation as easy to understand and apply. The problem with the easy adoption of

innovations is that innovations are generally very complex, making them difficult to understand and affecting the length of time to accept them. Sometimes, complexity may cause the innovation to be rejected. Trial ability means the receipt of the innovation in small quantities. The innovation can be broken down for experimentation, which will help to create a sense of reducing the risk of accepting innovations among the target audience. Observativables mean that the results of an innovation are visible to the members of society. The easier it is for society to see the consequences of innovation, the easier it will be to accept it.

Concepts and Theories about Perceived Ease of Use

Perceived ease of use is the level of belief that the user expects about the information system being developed and intended to be used, and such a system must be easy to learn and use (Davis, 1989). The term "easy to use" refers to the level of difficulty in understanding and the duration of use. Additionally, perceived ease of use can be measured by the following characteristics: easy to learn, controllable, clear, understandable, flexible, easy to become skillful, and easy to use (Laganiere, 2022; Sitthipon et al., 2022).

Knowledge of Telemedicine

In the 1990s, telemedicine played a huge role in medicine. The World Health Organization (WHO) provides a broad description. Telemedicine is transmission of health services where remoteness is a major factor. Health professionals can use information technology to exchange information in the treatment of diseases, remedies, and prevention of diseases and injuries. This includes medical consultation through this channel (Namsathien, 2020). Currently, telemedicine or telemedicine system is considered as another form of medical service in various fields, such as health consultation, examination and

diagnosis and also medical education. Telemedicine facilitates and develops mechanisms for medical services and health systems in different countries. Furthermore, physicians and health professionals can help people in rural and remote areas access more timely and convenient medical services without the need to go to the hospital on their own. The underprivileged or the poor in rural areas can get medical services without worrying about the cost of each visit to a doctor in a big city by visiting a doctor at a community hospital to access online services with a specialized doctor. In addition, telemedicine brings benefits and promotes the medical education system, particularly in cases where the current medical personnel may not be sufficient for the number of patients in each area. These contexts enable telemedicine to contribute to the further development of not only the medical and public health system, but also public health education (Jiménez-Rodríguez et al., 2020; Kamal et al., 2020; Limna et al., 2022; Siripipatthanakul et al., 2022).

4. Research Methodology
Population and Sample

The samples used in the research to determine the sample size were based on the computational formula of Yamane (1967) at 95% reliability level and gave an acceptable error of 5%. Based on the calculation, the sample was 400 samples. Data was gathered using closed-ended questionnaires. Measurement instruments were tested for reliability and validity. According to Si Dah et al. (2022), it is critical to understand that instrument validity refers to how well an instrument measures the researcher's conceptual framework or hypothesis.

Data Collection

The researchers utilized self-administered online questionnaires and recruited participants through convenience sampling. In this study, a total of 400 participants were selected using convenience sampling. The data was gathered via Google Forms, which was disseminated over internet platforms, such as Facebook and Line.

Study Tool Creation and Validation

To define the scope of a survey, relevant documents and studies were reviewed. The survey was divided into small sections and the questions in these sections had to be in accordance with the hypotheses, objectives, and conceptual framework for the research. A supervisor then reviewed the draft of the survey to ensure that it was appropriate and accurate. To evaluate the reliability of the survey, the revised survey was then conducted on 30 individuals with comparable characteristics to the research samples, but who are not samples. This step ensures that the survey addressed all research subjects and used clear language. The Cronbach's Alpha Coefficient for the rating scale questions was determined, and its value was 0.962, suggesting that this survey is suitable for data collection.

Data Analysis

The data were analyzed using statistics such as frequency, percentage, cumulative percentage, standard deviation, descriptive statistics, inferential statistics. Moreover, multiple regression analysis and correlation coefficient analysis were used to analyze the data and draw conclusions from the research.

5.   Results

Table 1 General information of the sample

Interest in using health services through online channels	Number (Person)	Percentage	Cumulative Percentage
Interested	250	62.5	62.5
Not interested	46	11.5	74.0
Unsure	104	26.0	100.0
Total	400	100	
Used to use health services through online channels	Number (Person)	Percentage	Cumulative Percentage
Ever	161	40.3	40.3
Never	239	59.8	100.0
Total	**400**	**100**	

The results of a study on health technology perception behavior follow. A case study of a telemedicine system from 400 respondents found that most of them were female, 272 or 68.0 percent, the ages of 18 – 30 years old or 87.5 percent, most of them held a Bachelor's degree or 78.3 percent, being student and others or 64.5 percent, income less than or equal to 15,000 Thai baht or 62.5 percent, interested in online health services or 62.5 percent and have used online health services or 40.3 percent.

The researcher analyzed the sample with descriptive statistics, considering means and Standard Deviation (SD), which are values representing the distribution of the data. The results of the opinion level analysis are given in the following table.

Table 2 Opinions towards the use of health services through online channels

Using health services through online channels	Mean	SD	Interpretation
If there is an opportunity, you will use online health services to find a hospital for treatment.	3.91	0.995	High
If there is an opportunity, you will use online health services to find a medical professional.	3.91	1.063	High
If there is an opportunity, you will use online health services to compare prices on online treatments.	4.00	1.004	High
If there is an opportunity, you will use online health services to find discounts or promotions on treatment.	3.95	1.049	High
If there is an opportunity, you will use online health services to search for health information.	4.11	0.982	High
If there is an opportunity, you will use online health services for general health care.	4.05	1.016	High
If there is an opportunity, you will use online health services to take care of your mental health.	3.92	1.117	High
If there is an opportunity, you will use online health services to take care of your health for a specific disease (eg cancer, heart disease, etc.).	3.62	1.174	High
If there is an opportunity, you will use online health services to take care of your beauty health (eg surgery, skin care, etc.).	3.80	1.134	High

From the results of the analysis of opinion levels towards health services through online channels, it was found that the use of online health services to search for health information was at a high level ($\bar{x}$ = 4.11, SD = 0.982). For the use of online health services for general health care, the mean was at a high level ($\bar{x}$ = 4.05, SD = 1.016) and the use of health services through online channels to compare treatment prices was at a high level ($\bar{x}$ = 4.00, SD = 1.004).

Outcomes of Digital Technology Recognition Affecting Health Technology Service Decisions: A Case Study of Telemedicine Systems

There are four aspects of digital technology perception factors, as follows:

1.   Content quality from overall usage was averaged at a high level ($\bar{x}$ = 4.02, SD = 0.71). The telemedicine system has full details of service fees and payment terms, and treatment fees have been updated. The mean was high ($\bar{x}$ = 4.07, SD = 0.88).

2.   The overall operating system quality from usage was very average ($\bar{x}$ = 4.04, SD = 0.67). Telemedicine systems are designed to provide easy access to information (e.g., shortcuts or search fields) and have always asked for permission from the user to save personal data in the system first. The mean was high ($\bar{x}$ = 4.09, SD = 0.81).

3.   The quality of health services from the overall use was average at a high level ($\bar{x}$ = 4.09, SD = 0.67). Patients who use telemedicine systems can choose treatment with specialists by themselves from the list of doctors in the system. The mean was high ($\bar{x}$ = 4.14, SD = 0.81).

4.   Overall perceived value from use was averaged at a high level ($\bar{x}$ = 4.04, SD = 0.73). Telemedicine systems were self-explanatory and easy to use. The mean was high ($\bar{x}$ = 4.04, SD = 0.84, 0.79, respectively).

Results of a Study on Digital Technology Recognition Factors Affecting Decisions to Use Health Technology Services: A Case Study of Telemedicine Systems

Correlation analysis using the Pearson product-moment correlation coefficient revealed digital technology recognition factors in four key areas: 1) content quality 2) operating system quality 3) health service quality, and 4) perceived value was positively correlated with perceived digital technology at a statistically significant 0.01 level. Content quality was positively correlated with the decision to use health technology services at a moderate level

(r = 0.698**, p-value <0.001). The quality of the operating system was positively correlated with the decision to use health technology services at a moderate level (r = 0.584**, p-value <0.001). Health service quality was positively correlated with the decision to use health technology services at a moderate level (r = 0.658**, p-value <0.001). Perceived value was positively correlated with the decision to use health technology services at a moderate level (r = 0.601**, p-value <0.001).

Results of Analysis of Influence of Digital Technology Perceived Factors on Decisions to Use Health Technology Services: A Case Study of Telemedicine System to the Test Hypothesis

Table 3 The correlation of the variables of content quality, operating system quality, health service quality, perceived value, and intended use with the decision variables in the use of health technology services

	Content Quality	Operating System Quality	Health Service Quality	Value Perception	Intention to Use
Content Quality	1.000	0.834**	0.836**	0.713**	0.702**
Operating System Quality	0.834**	1.000	0.885**	0.743**	0.754**
Health Service Quality	0.836**	0.885**	1.000	0.822**	0.788**
Value Perception	0.713**	0.743**	0.822**	1.000	0.744**
Intention to Use	0.702**	0.754**	0.788**	0.744**	1.000

** The correlation was statistically significant at the 0.01 level. (2-tailed)

The table 3, found that each independent variable of content quality, operating system quality, health service quality, value perception, and Intent of use was linearly correlated with the dependent variable, namely the decision to use health technology services and analyzed using multiple regression analysis with the Enter method.

Table 4 Analysis of the relationship between digital technology perceived factors influencing decisions to use health technology services

	Unstandardized Coefficients		Standardized Coefficients	t	p-value
	B	Std. Error	Beta		
Constant	0.398	0.213		1.872	0.063
Content Quality (X)	0.050	0.093	0.050	0.545	0.587
Operating System Quality (X1)	0.233	0.114	0.219	2.038	0.043
Health Service Quality (X2)	0.338	0.131	0.320	2.591	0.010
Value Perception (X3)	0.275	0.080	0.282	3.438	0.001

R R^2	Adjusted R^2	Std. Error of the Estimate	F	p-value
0.814[a] 0.663	0.654	0.42050	76.161	0.000[b]

** Statistically significant at the 0.05 level

The results of this table show that digital technology perception factors in terms of content quality, operating system quality, health service quality and value perception affect health technology service decision-making, with significant implications. statistically significant at the 0.05 level. An increase in the mean score on operating system quality by 1 resulted in a 0.233 point increase in the mean score per decision to use health technology services (B = 0.233, p-value < 0.05). An increase in the mean score of health service quality by one point resulted in a 0.338 point increase in the mean score per decision to use health technology services (B = 0.338, p-value < 0.05). An increase in the mean score on perceived value by 1 resulted in a 0.275point increase in the mean score per decision to use health technology services (B = 0.275, p-value < 0.05). As shown in Table 4 and the equation can be written as follows:

Y = 0.398 + 0.233X1 + 0.338X2 + 0.275X3

By   X1 means operating system quality

              X2 means health service quality

              X3 means perceived value

6. Discussion

The results of a study on the influence of digital technology perception factors on health technology service decisions: a case study of telemedicine systems. Health service quality influenced decision-making to use health technology services: case studies of telemedicine systems were the most important, followed by perceived value and operating system quality. The findings are in line with Kaewbuadee and Kraiwanit's (2021) research, which found usability to be the primary driver of telehealth use or disuse, followed by the security of users and reliability of the service provider. For example, the benefit of managing sickness and increasing the patient's life is often initiated by telehealth services. In addition, research has shown that having telehealth knowledge and its benefits can help heart failure patients to be more accepting of telehealth (Seto et al., 2010; Rahimpour et al., 2008; Demiris et al., 2001). The findings are consistent with research of Limna et al. (2022) and Siripipatthanakul et al. (2022) that the four key dimensions of the UTAUT model (performance expectancy, effort expectancy, social influence, and facilitating conditions) influence individuals' intentions to use telemedicine during the COVID-19 pandemic.

The potential benefits of telehealth that patients perceive are increased access to treatment, increased knowledge, time savings for both nurses and patients, and greater convenience. This is consistent with research by Bull et al. (2016), who found that students are more likely to adopt telehealth for the following reasons: 1) the system works efficiently, 2) the convenience of

telehealth, and 3) access to health services. Trust in providers is consistent with research by Tsai (2014), who indicated that social trust, health institution trust and social engagement have a significant positive effect on perceived ease in use and perceived benefits. This affected the intention to use telehealth. In addition, willingness to use telehealth was associated with social influence and privacy concerns.

7. Suggestions for applying the research results

1. Perceived quality of health services influencing health technology service decisions: a case study of telemedicine system as a key factor driving startup for health technology service: a case study of telemedicine system. Therefore, both the public and private sectors can use the information obtained from this research to develop the awareness of the benefits of public relations in using the service to encourage people to use health technology services, which will enhance Thailand's access to public health services.

2. Additional factors and concepts should be studied, such as attitudes and motivations for using each telemedicine application; for example, ChiiWii provides services: Health advice (emphasis on women's, mother and child health, family mental and physical health), Ooca Services: Consult a Psychiatrist and Psychologist, Doctor Anywhere Thailand Services: Consult a doctor. Each application has a specific service to meet the needs of customers, which affect the decision to use telemedicine.

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