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FACTORS AFFECTING THE ADOPTION OF ARTIFICIAL INTELLIGENCE VOICE CONTROL TECHNOLOGY: A CASE STUDY OF XIAOMI SMART DEVICES

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Abstract

The research aims to examine the factors influencing the adoption of artificial intelligence voice control technology. The purposive sampling technique was applied to collect the sample of 400 people who had experience in using Xiaomi smart device. The online questionnaire is the instrument for data collection. Descriptive statistics are used to analyze the respondents' characteristic. The inferential statistics include Confirmatory Factor Analysis *(*CFA*)* and Structural Equation Modeling *(*SEM*)* are applied to disclose the impact of utilitarian benefits, hedonic benefits, symbolic benefits, social presence, and social attraction on the adoption of artificial intelligence voice control technology. The results of this research can be used to improve the voice command technology for future users. Additionally, the study's report can be used for developing voice control systems in smart devices for other business enterprises. Subsequently, the users' concern about the risk of using voice commands would subside and this technology would be widely accepted.

Keywords : Voice Control Technology, Artificial Intelligence, Smart Device, Confirmatory Factor Analysis, Structural Equation Model

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INTRODUCTION

The world is changing rapidly. Artificial intelligence speech-recognition technology is projected to reach $49 billion by 2025 [1] and Gartner estimates that by 2023, application-based system interactions will reach $49 billion by 2025, and 25 percent of services will be used in the form of voice commands. [2] While most chatbots and virtual assistants will still communicate in the form of text messages, artificial intelligence technology is about making a speech into text and converting text back to speech. The adoption of voice-activated technology is expected to grow faster in the future and digital technology will influence the lives of many people. Artificial intelligence will become more involved in human daily life and facilitating. The survey results have confirmed that artificial intelligence voice command technology can help or facilitate consumers.

Consumers can use voice search to find answers or needed information. Since speaking is more convenient than typing and voice command technology helps users to search for things quickly, recently, voice assistants' system has quickly grown. Artificial intelligence speech-recognition technologies are making a huge difference in people's daily lives [3]. The adoption of the voice command technology will grow even more in the future. In 2021, it was found that as many as 53 percent of Thai people search for information by typing text and speaking via voice command software. Statistics show that Thailand ranked the 4th in the number of the users of voice commands in the world [4]. Businesses are interested in digital technology and have begun to put digital technology in their products and services to meet the customers' needs, to enhance a good experience for consumers, and to increase customers' satisfaction.

Xiaomi is a Chinese start-up company that has business focusing on technological and IoT devices. In 2014, Xiaomi developed smart home devices with an operating system that can control devices and home systems from anywhere via internet networks. However, consumers' privacy risks are major concerns for developers of voice commands in IoT devices. The survey in Figure 1 reports that as many as 48 percent of the users in Thailand are concerned about their privacy [5].

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Some users are reluctant to use voice commands because of the fear of the privacy risks since the smart devices can listen to people's conversations and the information could be, then, disseminated to someone else. Hence, the company must build trust to alleviate its customers' privacy concerns. Additionally, the company should demonstrate its responsibility for protecting the users' personal data [5].

The researchers are interested in understanding the factors that impact privacy risk and the factors that influence the adoption of artificial intelligence voice control technology of Xiaomi smart devices. The research results should help the developer to be able to create more trust for the voice command users, increase the adoption of user rate on this technology, and promote the entry of the Virtual Assistants era in the future.

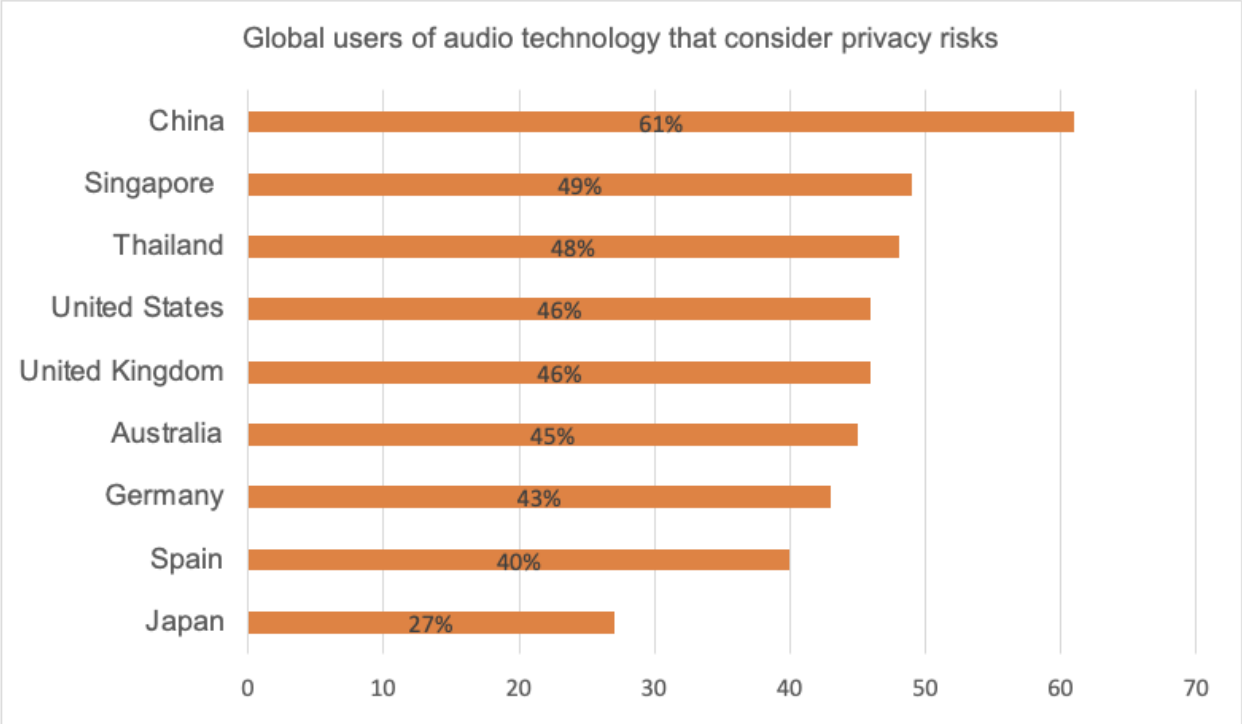

Figure 1. Global users of audio technology that consider privacy risks

LITERATURE REVIEW

The framework of the factors influencing the adoption of artificial intelligence voice control technology (AD) in Figure 2 is based on the following concepts:

1. The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) originally developed by Davis, 1989 [6] is a widely used theory to explain the success of emerging technologies. It is often used to describe the behavior of users of emerging technologies and to describe the factors affecting the decision to use or the adoption of the new technology. The Technology Acceptance Model (TAM)) claims that the fundamental factors that affect users' acceptance of technology or innovation include perceived ease of use and perceived usefulness. These two factors directly affect the usage attitude which is a variable that affects the usage intention. The usage intention, then, affects the actual usage of the users.

2. Uses and Gratification Theory (U&GT)

The Uses and Gratification Theory (U&GT) was developed by Katz, Blumer, & Gurevitch, (1974) [7]. According to the theory, people's mental and social states are different and these two states are the important reasons for people's different needs. People demand different types of media because each type of media have different usefulness for different users. The utilization characteristics of the media also bring about the satisfaction in using media. However, there might be unintended

consequential benefit too. The theory believes that utilization and satisfaction are dependent on the users' certain reasons and motivations in choosing media. Normally, users will deliberately choose what best suits their personal needs.

3.Utilitarian Benefits (UB)

Voice assistants are conceptualized as useful and convenient tools for everyone in finding something such as searching for information or searching for traffic information [8]. In the view of Utilitarianism, a product's utilitarian benefit comes from the use of the product to improve individual's efficiency or living standard.

According to Daniel Katz, the properties or distinctive features of a product which are linked to the functional and emotional benefits of the product are the most recognized quality of the function of attitude [9]. The utilitarian benefits could induce people to use technology and take risk from the use of technology.

H1. Utilitarian benefits positively influence the perceived risk.
H2. Utilitatrian benefits positively influence the adoption of artificial Intelligence voice control technology.

4.Hedonic Benefits (HB)

The perception of Hedonic Benefits received is something that cannot be seen. Consumers create their own emotions, including a mood of fun, entertainment, and imagination. It describes how consumers make decisions about their consumption in response to their own emotions. Hedonic benefits are derived from the use and enjoyment of the goods or services. The benefits from the emotional response mean that the users of products have the positive emotional feeling from the usage or good experience. Hedonic benefits will attract people to take risk in order to use the new technology.

H3. Hedonic benefits positively influence perceived risk
H4. Hedonic benefits positively influence the adoption of artificial intelligence voice control Technology

5.Symbolic Benefits (SB)

Symbolic benefits of a product are from the communication between consumers and other members of the society, as well as communication between consumers and themselves [10]. Consumers want to bridge the gap between reality and the state of their mind; therefore, they are willing to take risk to purchase the product. The purchase is based on the brand to symbolize consumers' status in relation to the nature of non-goods or services and is related to the basic needs of them for social expression or personal expression to build external pride.

H5. Symbolic benefits positively influence perceived risk
H6. Symbolic benefits positively influence the adoption of Artificial Intelligence Voice Control Technology

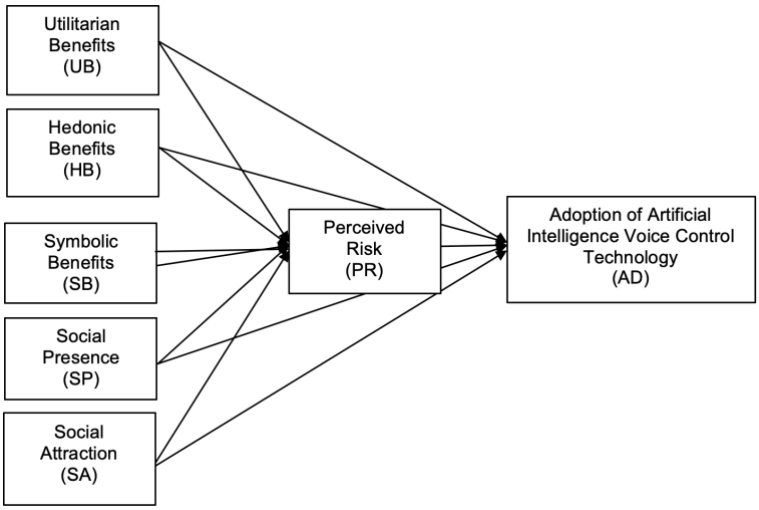

Figure 2. Hypothesis framework

6.Social Presence (SP) and Social Attraction (SA)

Social presence is another form of communication that creates awareness of the presence of the other person or the feeling of being with others [11]. From the development of computers and the Internet system for communication, the computer acts as a communication medium, calling a non-specific nature. Therefore, the mood of communication via the Internet medium is different depending on the medium used for communication. Consumers tend to be more influenced when the received information comes from people. This can eventually lead to brand recognition [12].

Social attraction occurs when the communication become attractive because of the feeling that the participants share some similar characteristics. In other words, consumers tend to be more influenced, willing to take risk, and adopt the product technology by the sellers who could show some similar characteristics to the consumers.

H7. Social presence positively influences perceived risk
H8. Social presence positively influences the adoption of artificial intelligence voice control Technology
H9. Social attraction positively influences on perceived risk
H10. Social attraction will have a positively influences on the adoption of artificial intelligence voice control technology

7.Perceived Risk (PR)

Perceived risk is a factor that results in the users' uncertainty without considering whether it will benefit them or not. The factor directly and indirectly influences the use of product or service. The users' uncertainty negatively affects the use of the service. Although the voice assistant is useful to the users. But advances in technology can pose a threat to a person's privacy [13]

H11. Perceived risk negatively influences on the adoption of artificial intelligence voice control technology

METHOD

The purpose of this research is to study the factors for Adoption of Artificial Intelligence Voice Control Technology and examine the impact of Utilitarian benefits, Hedonic Benefits, Symbolic Benefits, Social Presence, Social Attraction, Perceived risk and Adoption of Artificial Intelligence Voice Control Technology.The sample for the study is the users of voice control technology Xiaomi smart devices in Thailand. Sample size is 400 people, according to Yamane's calculation [14]. The population in this study are the users of voice control technology from Xiaomi smart devices in Thailand. The data were gathered by using an online questionnaire with a closed-ended question format. Data were collected by questionnaire and were measured with a five-point Likert scale.

Pilot Testing

The questionnaire was measured the reliability and validity for pilot testing. If Cronbach alpha (CA) is higher than 0.70, the factor is acceptable. The Cronbach alpha (CA) value of Utilitarian benefits (Four items, $\alpha = 0.895$), Hedonic Benefits (Four items, $\alpha = 0.932$), Symbolic Benefits (Four items, $\alpha = 0.928$), Social Presence (Five items, $\alpha = 0.950$), Social Attraction (Four items, $\alpha = 0.922$), Perceived risk (Four items, $\alpha = 0.947$) and Adoption of Artificial Intelligence Voice Control Technology (Five items, $\alpha = 0.951$) are acceptable.

Descriptive Statistics

The researcher used descriptive statistical analysis to investigate the general characteristics of the data of gender, age, status, education, occupation, and income in the form of the distribution of frequency, percentage, mean, and standard deviation.

Inferential Statistics

Inferential statistical analysis is a test to find the relationship between two variables. The two techniques of inferential statistical analysis, including Confirmatory Factor Analysis (CFA) and Structural Equation Model (SEM) was used to test the hypothesis. CFA is used to confirm the elements created from a theoretical study and to determine that which of the newly created elements is less or not important. The criteria are as follows (CMIN/DF) ≤ 3, (GFI) ≥ 0.90, (AGFI) ≥ 0.90, (RMSEA) $\leq .0.05$ or $0.05 < \text{RMSEA} \leq 0.08$. After the CFA analysis, SEM analysis is applied to examine the research hypotheses.

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RESULTS AND DUSCUSSION

Descriptive Analysis

The research data was from 400 questionnaires which are posted on different Facebook groups. The descriptive analysis reports that 54.8% of the samples are male and 45.3% are female. For the age groups, 21 – 30 years old is the largest group and contributes 41.8% of the research samples while 61 years old or older contributes only 2.8%. For marital status, 67.3% of the samples are single, 27% are married, and 5.8% are divorced. For education, people with bachelor's degree are the largest group (62.8%) while doctoral degree group is the smallest (7.3%) group. Office worker group is the biggest group (23%) among the occupational group. For income group, the largest group (24.3%) earns between 30,001between 40,000 Baht/month and the smallest group (9.8%) earns more than 50,000 Baht/month.

Confirmatory Factor Analysis (CFA)

CFA is used to confirm the elements created from a theoretical study and to determine that which of the newly created elements is less important or not significant. The results of CFA are (CMIN/DF=1.073), (GFI=0.953), (AGFI=0.921) and (RMSEA=0.014)

Structural Equation Model (SEM)

Structural Equation Modeling (SEM) was applied to examine the research hypotheses and to test the relationship of the independent variables and the dependent variables. The results of CFA are (CMIN/DF=1.103), (GFI=0.949), (AGFI=0.920) and (RMSEA=0.016).

According to the standardized path coefficients of structural path model in Figure 3., Utilitarian benefits had effect on perceived risk; β = 0.324∗∗∗), hedonic benefits had effect on perceived risk; β = 0.225∗∗∗), symbolic benefits had effect on perceived risk; β = 0.214∗∗∗), Social presence had effect on perceived risk; β = 0.184∗∗∗) and social attraction had effect on perceived risk; β = 0.315∗∗∗), utilitarian benefits had effect on adoption of artificial intelligence voice control technology; β = 0.399∗∗∗), Hedonic benefits had effect on adoption of artificial intelligence voice control technology; β = 0.218∗∗∗), social presence had effect on adoption of artificial intelligence voice control technology; β = 0.158∗∗∗) and social attraction had effect on adoption of artificial intelligence voice control technology; β = 0.181∗∗∗) and statistical significance (p < 0.05) factors affecting on adoption of artificial intelligence voice control technology, First is utilitarian benefits the coefficient is β = 0.399, second is hedonic benefits the coefficient is β = 0.218, Third is social attraction the coefficient is β = 0.181, Lastly, social presence the coefficient is β = 0.158.

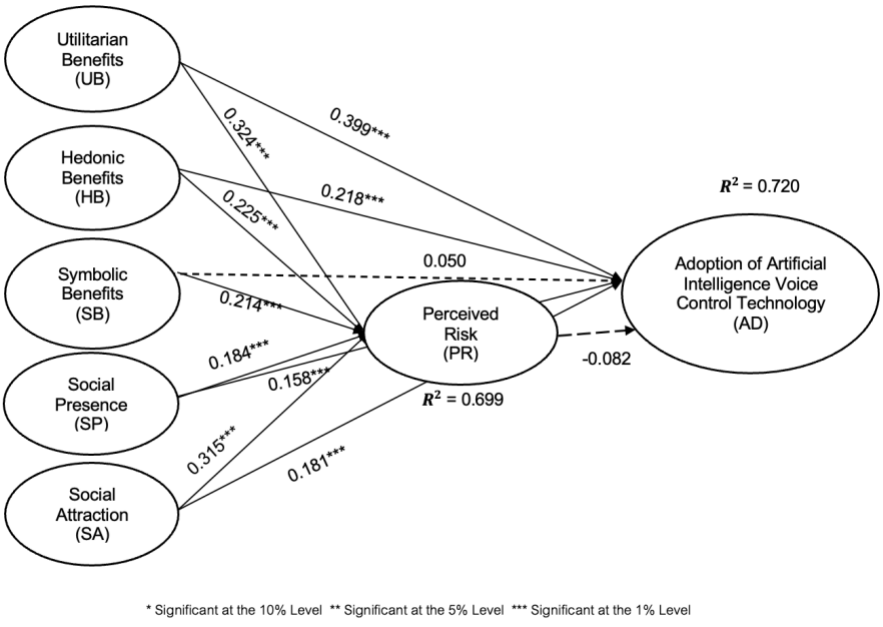

Figure 3. Structural Path Model with Summary of Findings

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Table 1. Summary of Hypothesis Testing

Path of Relationship	Regression Weight	P-value
UB ---> PR	0.324	***
HB ---> PR	0.225	***
SB ---> PR	0.214	***
SP ---> PR	-0.184	***
SA ---> PR	0.315	***
PR ---> AD	-0.082	0.126
UB ---> AD	0.399	***
HB ---> AD	0.218	***
SB ---> AD	0.050	0.451
SA ---> AD	0.158	***
SA ---> AD	0.181	***

* Significant at the 10% Level
** Significant at the 5% Level
*** Significant at the 1% Level

Table 1 summarizes the research examination. The results support for most hypotheses including H1, H2, H3, H4, H5, H7, H8, H9, and H10. Non-significant results were found in H6 and H11 between Perceived Risk and Adoption of Artificial Intelligence Voice Control Technology (Perceived Risk → Adoption of Artificial Intelligence Voice Control Technology; β = -0.082). Thus, the results affirm that perceived risk does not have a negative impact on the adoption of artificial intelligence voice control. The reason for less privacy concerns was found in the use of voice assistants because it will make life easier and more comfortable. This makes a person have the effect of reducing concerns about voice control technology. And Symbolic Benefits and Adoption of Artificial Intelligence Voice Control Technology (Symbolic Benefits → Adoption of Artificial Intelligence Voice Control Technology; β = 0.050). Thus, it affirms that individuals do not use voice assistants to express their personal image to others in society.

CONCLUSIONS

According to the analysis on factors affecting the adoption of artificial intelligence voice control technology: A case study of Xiaomi smart devices in Table 1, utilitarian benefits have an impact on adoption of artificial intelligence voice control technology because the voice command technology can be used anywhere and at any time while the users are doing other activities. Hence, this technology brings about the users' convenience. It is the most significant factor and is consistent with The Technology Acceptance Model (TAM) [5] which states that the adoption or decision-making of a technology depend on the perceived ease of use and perceived usefulness. Besides, unitarian benefits also affects the attitude towards use. The hedonic benefits have an impact on the adoption of artificial intelligence voice control technology because using technology gives users a sense of enjoyment. The result is consistent with the U&GT theory [6] which states that utilization and satisfaction are based on the idea that users have certain reasons and motivations to choose media and deliberately choose the best suits for their personal needs. Finally, social attraction and social presence have an impact on the adoption of artificial intelligence voice control technology because people communicate with voice assistants in the same way as when they communicate with other humans. Although the feelings or experiences received are different from humans, the chatbot communication is understandable and benefits individuals. Perceived risk does not influence the adoption of artificial intelligence voice control technology and overcomes the privacy concerns because the use of voice control makes life easier and more comfortable. Additionally, the individual believes

that the company will not misuse their privacy information. As a result, users are concerned with less privacy risks. However, privacy risks should be taken with special care.

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