Adoption of Innovations Affecting the Acceptance of LINE Application among Thai Elderly

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ABSTRACT

Abstract— The advancement of computer technology enables the elderly access information for communication everyday convenience and efficient. The adoption of innovation could affect the intention of using the LINE application which depend on innovation characteristics. This study aimed to study the influence of adoption of innovation that affected the acceptance of LINE application among Thai elderly. This research uses a quantitative research approach. The sample group was 385 elderly people who used the LINE application and live in Bangkok by using multi-stage sampling. The data was collected by questionnaires and data analysis used descriptive statistics and multiple regression analysis. The research results were found that the influence of adoption of innovation in the aspect of comparative advantage, compatibility, complexity, and observability affected the acceptance of LINE application among Thai elderly with statistically significant at F = 54.451, and were able to explain the variance in the application line acceptance of the elderly by 50.69%. The highest multiple regression coefficient was comparative advantage ($\beta = 0.369$), followed by complexity ($\beta = 0.238$), compatibility ($\beta = 0.152$), and observability ($\beta = 0.147$), respectively.

Keywords— Adoption of Innovations, LINE Application, Elderly

INTRODUCTION

The advancement of computer technology and the Internet has resulted in the development to be able to support the needs of widespread use in all areas. As well as, the development of mobile phones, which are the most widely used technology devices, has played a role in the life of the people. These technologies enable everyday convenience and efficient operation. Moreover, these technologies have also played a role for the elderly as a tool to access information in digital form for communication thoroughly, convenient, fast and multi-channel communication (Foundation of Thai Gerontology Research and Development Institute, 2018).

At present, Thailand is considered an aging society according to the definition of the United Nations, which means that Thailand has an elderly population of more than 10% of the country's population. In 2015, Thailand had a population over the age of 60 year as high as 15.6% of the country's population or 10.42 million people. Thailand will step into a complete aged society in 2035, where the elderly population will account for more than 30% of total population. In addition, according to the 2018 data from the National Statistical Office's survey of the elderly in Thailand, it was found that 36.3% of Thai elderly people are employed, or 3.78 million elderly workers (Department of Elderly affairs, 2019)

In addition, the results of the survey of the use of information and communication technology in the household in 2018 by the National Statistical Office (2021), stated that the elderly used the Internet as high as 10 percent of the entire elderly population. Especially early elderly people aged 60-69 years have higher internet usage than other seniors, accounted for 14.8% and older males use the Internet more than female elderly. Internet use behavior of the elderly in Thailand found that most of them use the Internet on smart phone, accounting for 59 percent. The top activities that use the Internet among the elderly are using social media such as LINE, Facebook, Twitter, and Instagram. The elderly was interested in using the LINE application as the first priority because the LINE application has been continuously developed to provide users with benefits and ease of use. The Line has evolved to have a variety of abilities to support the needs of users in many areas through various communication devices. Application users can communicate by typing messages from one communication device to another via internet signal and can also be used voice call, which is like talking on the phone to members on the LINE network without charge while talking. In addition, the highlight that makes the Line application different from other chat applications is the form of stickers that express various emotions and feelings of users.

Technology can act as a facilitator of social engagement, especially for older adults who may be experiencing barriers to maintaining a socially active lifestyle (Bixer et al., 2019). The past few decades have seen the proliferation of various social communication technologies, including Facebook, Twitter, Instagram, and video conferencing software. The continuous development of the LINE application and becoming very popular today shows that the adoption of the LINE application innovation among users is successful. According to the theory of Diffusion of Innovations, Everett M. Rogers (2003) describes the process of accepting innovation as a decision to implement innovation to the fullest extent because they recognize that innovation is the best and has more beneficial. It relies on five innovation characteristics namely as comparative advantage, complexity, compatibility, trialability and observability. The characteristics of these innovations affect the acceptance of innovations which has been greatly used in the study, dissemination and acceptance of innovations in the field of technology.

Therefore, the researcher is interested in studying the attributes of innovation adoption of the LINE application that affect the intention of using LINE application among Thai elderly people. The study will survey older adults who have used LINE app to determine the influence of LINE innovation adoption among Thai elderly. The research objectives were to study the influence of adoption of innovations that affected the acceptance of LINE application among Thai elderly people. The results of the study will be used as a guideline for businesses and government agencies involved in developing innovations of LINE or social media applications that are suitable and meet the needs of the elderly including policy guidelines for developing applications to support the Thailand 4.0 model.

LITERATURE & THEORY

Diffusion of Innovation Theory

Diffusion of Innovation Theory, developed by E.M. Rogers (1983), is one of the oldest social science theories. It originated in communication to explain how, over time, an idea or product gains momentum and diffuses through a specific population or social system. The end result of this diffusion is that people, as part of a social system, adopt a new idea, behavior, or product. Adoption means that a person does something differently than what they had previously such as purchase or use a new product, and acquire and perform a new behavior (Bixer et al., 2019). The key to adoption is that the person must perceive the idea, behavior, or product as new or innovative. It is through this that diffusion is possible. Roger (1995) proposed the innovation diffusion theory to explain the product purchasing and adoption process. According to this theory, the production adoption process is divided into five stages, knowing the product, being persuaded of a need to buy the product, deciding to purchase the product, using the product, and accepting or regretting the decision to purchase the product (Li & Luximon, 2018).

The attribute factor of innovation is also a component of the diffusion of innovation, which depends on the recipient's perception of innovation. Accepting Innovations decides to accept innovations based on the recognition of innovation properties (Roger, 2003) as follows:

Comparative advantage refers to the idea that the innovation recipient thinks the innovation has advantages or can see the benefits more clearly than anything else at the time or something that is similar has a clear advantage over the original product. The perception that innovation is better and more useful than conventional practice will make it more likely to be accepted.

Compatibility means innovation is consistent with current practices and values. The recipient of innovation feels that innovation is aligned with values, trend, and user experience. If any innovation is consistent with the original idea, it will likely increase acceptance.

Complexity means innovation is not complicated and easy to implement. The recipient of innovation feels that innovation is understandable or how easily it can be used. If the innovations used are very complex, acceptance will be less. Especially, if the people who are implementing those innovations are more difficult, it creates resistance.

Trialability means that innovation can try it before accepting. Being able to experiment with some of the innovations until they are accepted increases the acceptance rate because it makes the recipient feel less at risk.

Observability means that innovation can observe the consequences were clear, it will increase the weight of acceptance. The result of innovation is easily visible or concrete will be accepted more easily than innovations that are abstract or just imaginary.

RELATED WORKS

The elderly's use of social media showed that older adults with computer experience were less concerned with social media use than those with no computer experience (Maliheh et al., 2015). The elderly who use social media are the elderly who use the Internet continuously, such as sending emails to communicate with other people. Experiences from using computers resulted in elderly understanding how to use communication devices (Vosner et al., 2015). Social media is like a channel that allows elderly to communicate with other people, get in touch with old friends and new friends, reduce feelings of loneliness, access health information more easily, expand the experience and improve the memory of the elderly. However, the elderly faced barriers to adaptation based on computer use and physical changes such as vision, memory, etc. Therefore, the elderly had a positive attitude towards social media. in learning and increasing confidence in the elderly (Gonzalez et al., 2012). Moreover, the use of social media such as Facebook and Twitter have made the elderly feel less childish and feel like an adventure with something new, and more confident. The use of social media via mobile devices such as tablets, mobile phones, etc. is another factor in the convenience and speed of use, as it can reduce the physical limitations of the elderly (Begona et al., 2015).

Rogers (2003) suggested diffusion as a process through which innovation is communicated through certain channels between users of society. Innovation variables have a direct influence on users' willingness to use new technology services. But it also found that innovation had a very direct influence on the expectations of doing business. This also includes work performance expectations, effort and compatibility (Oliveira et al., 2016). The beliefs about an innovation's effectiveness can be more important than knowledge of actual outcomes, again suggesting that who has previously adopted an innovation can be more important for decision makers than what was previously adopted and what effects it had (Bixer et al., 2019).

From the theoretical possibilities mentioned above, the researcher has set the relationship model of the variables studied in this study as illustrated in Figure 1.
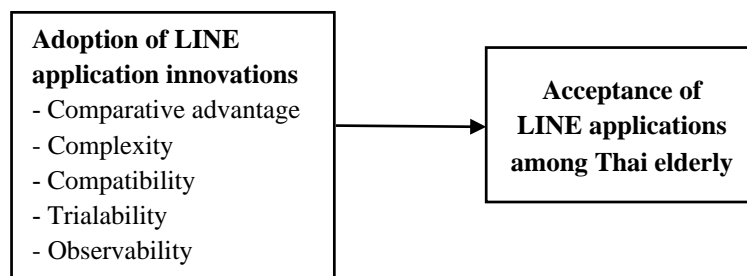
Figure 1
Conceptual framework of the adoption of LINE application innovations affecting the acceptance of LINE applications among Thai elderly

For the hypothesis testing, researcher analyzed the data using multiple regression testing to determine the acceptance of LINE application innovations affecting the acceptance of LINE applications among Thai elderly with the following assumptions:

Hypothesis 1 (H_1): The adoption of comparative advantage innovation affects the acceptance of the LINE application among Thai elderly.

Hypothesis 2 (H_2): The adoption of complexity innovations affects the acceptance of the LINE application among Thai elderly.

Hypothesis 3 (H_3): Adoption of compatibility innovations affects the acceptance of the LINE application among Thai elderly.

Hypothesis 4 (H_4): Adoption of trialability innovations affects the acceptance of the LINE application among Thai elderly.

Hypothesis 5 (H_5): Adoption of observability innovation affects the acceptance of the LINE application among Thai elderly.

METHODS

Target population and sample

The target population used in this research was the elderly people which has a total of 1,063,871 people as of December 31, 2020. The sample group used in this research consisted of 385 elderly people aged over 55 years who used the LINE application and lived in Bangkok. The researcher calculated the sample size based on the known population size and information from past research that the number of users of the LINE application accounted for about 60% of the population in Bangkok. The sample size was calculated using the W.G. Cochran formula (1977), at 95% confidence level and error less than 5%, a sample of 380 people was used. The sampling method uses the principle of probability sampling by using the multi-stage sampling method.

Research instrument

The instrument used in this research was a questionnaire created in accordance with the operational definition which were the characteristics to be measured. The questionnaire was divided into 2 parts: *Part 1 Demographic data* including gender, age, status, education level, occupation and average monthly income, and *Part 2 Opinions on adoption of LINE application innovation.* The opinions were rated using a five-point Likert scale where (1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree and (5) Strongly agree. The researcher has tested the validity and reliability of the questionnaire in order to obtain accurate research results and achieve the stated objectives with providing a pre-test of 40 sets. The confidence values of each question were between .758-.904 which pass the criteria that must be greater than .8 (Hair et al., 2010), therefore the questionnaires could be used to collect data.

Statistics used in data analysis

For data analysis, the researcher used descriptive statistical analysis such as frequency, percentage, mean and standard deviation in order to distribute the properties of the studied variables. Inferential statistical analysis was used to test the hypothesis using statistics such as multiple regression analysis.

RESULTS

Descriptive Analysis

The sample consisted of 385 elderly people aged over 55 years who used the LINE application and lived in Bangkok. Mostly were female, ages were between the of 55–60 years, 45.14%, were married, 45.14%, had the highest level of education at the bachelor's level, 39.73%, and 81.89% were unemployed, as well as their average monthly income was between 10,001-20,000 baht, 28.38%.

The characteristics of adoption innovation of LINE application for Thai elderly, the overall aspects were at a high level. If considering each aspect, the sample group agreed on the importance of accepting comparative advantage innovation the most, followed by observability, compatibility, complexity and trialability which all aspects were at high level. In addition, the acceptance of the use of the LINE application among the elderly was at a high level. When considered individually, the sample group would likely to continue to use the LINE application in the future at the highest level, followed by they would recommend the LINE application to friends who are interested, and plan to use the LINE app to keep in touch with close people. As well as if there was a training on the new knowledge of the LINE application, they were interested in participate regardless of the situation, respectively.

Hypothesis Testing

An analysis of the influence of the adoption of innovations affecting the acceptance of the LINE application among Thai elderly, researcher used Multiple Regression Analysis to determine the influence of 5 independent variables on one dependent variable. The independent variables are namely: comparative advantage, compatibility, complexity, trialability and observability. The results of the multiple regression analysis are shown in Table 1.

Table 1

Multiple regression analysis of the adoption of innovation affecting the acceptance of LINE application among Thai elderly.

Adoption of innovation Attributes	b	β	t	p-value
Constant	3.241	-	37.165	.000**
Comparative advantage	.374	.369	6.274	.000**
Compatibility	.158	.152	2.431	.040*
Complexity	.245	.238	3.622	.018*
Trialability	.052	.050	1.052	.164
Observability	.152	.147	2.358	.036*
R = .712, R^2 = .5069, S.E.=.064, F=54.451				

** Significant level at .01, * Significant level at .05

From Table 1, the multiple regression analysis revealed that adoption of innovation in the aspect of comparative advantage, compatibility, complexity and observability, jointly predicted the adoption of the LINE application among Thai elderly at statistically significant at F = 54.451, with 5 variables explaining the variance in the acceptance of LINE application among Thai elderly (R^2) at 50.69 %. The results of the hypothesis testing were consistent with the 4 research assumptions (H_1-H_3, H_5) that adoption of innovation in the aspect of comparative advantage, compatibility, complexity, and observability, affected the acceptance of the LINE application among Thai elderly. While the result of the hypothesis testing was inconsistent with the research assumption (H_4) that adoption of innovation in the aspect of trialability did not affect acceptance of LINE applications among Thai elderly.

When considering the multiple regression coefficients in the standard score form, it was found that the predictors with the highest multiple regression coefficients were comparative advantage ($\beta = 0.369$), followed by complexity ($\beta = 0.238$), compatibility ($\beta = 0.152$), and observability ($\beta = 0.147$). The forecast equation which could be generated to predict the adoption of the LINE application among Thai elderly was as follows:

Acceptance of LINE application among Thai elderly = 3.241 + .374 (Comparative advantage)

+ .158 (Compatibility) + .245 (Complexity) + 0.152 (Observability)

CONCLUSION AND FUTURE WORK

Conclusion and Discussion

From the findings of the research results, the researcher brought important issues to discuss the results according to the followings.

Firstly, level of innovation acceptance factor that Thai elderly pay attention to the acceptance of LINE application by the elderly found that all aspects were at a high level. If considering each aspect, the first is to recognize innovation in comparative advantage as the most valuable, followed by the complexity, compatibility and observability. Recognizing innovation in comparative advantage in the highest order, it shows that the LINE application has more advantages or noticeable benefits than other types of social media that exists at the time. Elderly people are aware that using the LINE application brings benefits to both a more convenient and faster lifestyle. For example, Line helps to communicate in daily life faster, LINE facilitates more effective communication, and communicating via LINE is more cost-effective compared to other online media. This is consistent with the research of many researchers such as Prasert (2014), Intamusik (2017), Somvatsan (2016), and Chaichuay (2017). The elderly found that the application Line is suitable for their group and thought it is useful in conversation and exchange of information including using Line makes people modernize and fashionable. As well as LINE encourages positive relationship-building behaviors with people inside and outside of the family without the constraints of time and space and Line is a great tool for solving loneliness and most people are satisfied with using the LINE app.

Secondly, the results of the analysis of the influence of all factors affecting the acceptance of the use of the LINE application among Thai elderly, it was found that the comparative advantage, complexity, compatibility and observability affected the acceptance of the LINE application among Thai elderly was statistically significant

which is consistent with the research hypothesis. The comparative advantage factor was the most influential, followed by complexity, compatibility and observable abilities, respectively. It can be explained by the diffusion theory of innovation and the theory of acceptance by the attributes of Rogers (1995). It shows that the comparative advantage affects the elderly who are the recipients of innovation and see that innovation is more beneficial than disadvantage. The benefits can be comparatively economic or social. The greater the benefit of innovation, the higher the rate of adoption of innovation (Roger, 1995). This is consistent with the research of Sonphrom (2020) found that the most influential factor related to the behavior of the elderly's intention to use the LINE application for quality of life was the expectation on the benefit of using the LINE application. As well as, Boonprasert (2017) found that the factor influencing the highest acceptance of the use of the LINE application among the elderly was the perception of the usefulness of the LINE application.

Thirdly, the aspect of complexity affected the adoption of the LINE application, which was consistent with the diffusion theory of innovation and the theory of acceptance with attributes of Rogers (1995). The complexity feature states how difficult it is for the recipient of innovation to feel that innovation is incomprehensible or difficult to implement, the acceptance will be less. The LINE application has features which are not complicated such as having a clear function, easy-to-understand process, and easy-to-remember. Therefore, the complexity has resulted in the increasing adoption of the LINE application among the elderly (Gonzalez et al., 2012; Vosner et al., 2015).

Lastly, the results of the analysis revealed that the aspect of compatibility and observability did not affect the adoption of the LINE application among Thai elderly. It is inconsistent with the research hypothesis. The absence of testability factors did not affect the adoption of the LINE application among older adults. This may be due to limitations in learning and use of the elderly in terms of physical readiness. In addition, according to the theory of diffusion of innovation (Roger, 1983), the use of the elderly line cannot belong to the Pioneer group, which is a front-line group that accepts and uses new innovations before others (Gonzalez et al., 2012). In the aspect of observability refers to the degree of effect of innovation in an application line that can be seen by others. The more innovation results can be seen, the more innovations are accepted. This may be due to the elderly's learning and use limitations on physical readiness, as well as trialability factors (Bixer et al., 2019), consequently, the results of using the LINE application are not complete.

Recommendations and Future Work

Recommendations obtained from applying the research results, the research results were found that the comparative advantage and compatibility affects the acceptance of the LINE application among Thai elderly. Therefore, businesses that are involved in the development of LINE applications should be developed the applications which are more aware of the needs and usage conditions of the elderly. In addition, functionality that is difficult to use should be improved to provide procedures and methods of use that are easier and in accordance with the ability to use among the elderly, such as fixing errors in case of misuse and application settings, etc. Moreover, relevant government agencies can use the research findings as a guideline to develop and encourage the elderly to use the correct LINE application such as developing learning materials about the LINE application or continuous training to educate the elderly.

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