ปัจจัยที่มีอิทธิพลต่อการยอมรับการเรียนรู้ผ่านเครือข่ายสังคมออนไลน์บนอุปกรณ์พกพา สำหรับการศึกษาในระดับอุดมศึกษาในแต่ละกลุ่มผู้ยอมรับนวัตกรรม

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บทคัดย่อ

เนื่องจากนวัตกรรมและเทคโนโลยีสามารถเพิ่มประสิทธิภาพการเรียนรู้ของผู้เรียนได้ เครือข่ายสังคมออนไลน์บนอุปกรณ์พกพาจึงน่าจะเป็นเครื่องมือที่เป็นประโยชน์ที่ผู้เรียนสามารถแบ่งปันข้อมูล แลกเปลี่ยนความคิดเห็น สื่อสารและเข้าถึงข้อมูลหรือทรัพยากรการเรียนรู้ได้ทุกที่ทุกเวลา อย่างไรก็ตามความสำเร็จของการใช้เทคโนโลยีในการศึกษาขึ้นอยู่กับการยอมรับและใช้งานของผู้ใช้ Rogers ยังได้กล่าวว่าผู้ที่รับเอานวัตกรรมนั้นมีลักษณะเฉพาะที่ต้องระบุด้วย ดังนั้น การศึกษาครั้งนี้จึงมีวัตถุประสงค์เพื่อ 1) ศึกษาปัจจัยที่เกี่ยวข้องกับการยอมรับการเรียนรู้ผ่านเครือข่ายสังคมออนไลน์บนอุปกรณ์พกพาในระดับอุดมศึกษาสำหรับผู้ยอมรับนวัตกรรมแต่ละกลุ่ม และ 2) เปรียบเทียบการยอมรับในกลุ่มผู้ยอมรับนวัตกรรมที่แตกต่างกัน การศึกษาครั้งนี้ได้นำเสนอกรอบการวิจัยตามแนวคิดทฤษฎีส่วนขยายของการยอมรับและใช้งานเทคโนโลยี (UTAUT2) โดยมีการเก็บข้อมูลด้วยแบบสอบถาม หลังจากกระบวนการกรองข้อมูลแล้ว มีผู้ตอบแบบสอบถามจำนวน 113 คน การวิเคราะห์ถดถอยพหุคูณได้นำมาใช้เพื่อศึกษาการยอมรับของผู้เรียน ซึ่งงานวิจัยสรุปได้ว่านวัตกรกลุ่มผู้ยอมรับนวัตกรรมก่อนผู้อื่น และกลุ่มคนส่วนใหญ่ที่ยอมรับนวัตกรรมยอมรับปัจจัยที่แตกต่างกัน

คำสำคัญ: เครือข่ายสังคมออนไลน์บนอุปกรณ์พกพา, ทฤษฎีส่วนขยายของการยอมรับและใช้งานเทคโนโลยี, กลุ่มผู้ยอมรับนวัตกรรม

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Factors Affecting the Adoption of Learning through Mobile Social Networks for Higher Education in Different Innovation Adopter Categories

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Abstract

As innovation and technology can improve students learning performance. Mobile social networks can be a useful tool as it has allowed users to share information, exchange ideas, communicate, and access information or learning resources anytime anywhere. However, the success of implementing technology in education is depend on users' acceptance and use. Rogers also verified that those adopting an innovation have variant characteristics that must be addressed. Thus, this study aims to 1) investigate the factors associating students' adoption of learning through mobile social networks for higher education in different groups of innovation adopters, and 2) compare the adoption in different groups of innovation adopters. The study proposed the research framework based on a modified Unified Theory of Acceptance and Use of Technology 2 (UTAUT2). The questionnaire was conducted to collected data. Following the data screening process, 113 responses were used for the analysis. The multiple linear regression was performed to determine students' adoption. The study concludes that innovators, early adopters, and early majority perceive the proposed factors differently.

Keywords: mobile social networks learning, UTAUT2, innovation adopter categories

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1. Introduction

The internet has opened up an opportunity for people to communicate across vast distances. And, online social networks (OSNs) have dramatically expanded in popularity around the world [1]. According to a 2017 digital yearbook report of Hootsuite and We Are Social, 37% of world population used OSNs. In Thailand, internet users in 2017 are 67% penetration, which also used OSNs. Moreover, 62% of the users go online via a mobile device. The number of OSNs users grew by 24%, up to 8 million compared to 2016. And, mobile OSNs users grew by 24 % in 2017 [2].

A rapid rise of OSNs via mobile devices attracts the interest of researchers to study the uses and applying for various purposes. For example, Balatsoukas et al. [3] studied the role of social network technologies in online health promotion. As social support, peer pressure, information sharing via OSNs could affect health behavior. Ventola [4] also studied the uses and benefits of mobile devices and apps for the healthcare professional. The apps that included social networking features can be a useful tool for enabling discussion, consultation, and collaboration. Moreover, in social commerce, Balague and Zhao [5] analyzed the evolution from online social commerce to mobile social commerce. They precisely defined how mobile and social features add value to traditional e-commerce. The use of mobile social network as a learning tool has allowed users to make announcements, share information, discussion, and getting feedback anytime anywhere [6]. The benefits of using OSNs through mobile devices for learning would improve learning performance. In order to design proactively pedagogy for targeted users, we must understand how users adopt and use relating technologies. Hence, this study aims to explore factors affecting users' adoption of learning via OSNs on mobile devices. In addition, the different characteristics of adopters have been taken into account since Rogers [7] verified, those adopting an innovation have variant characteristics that must be addressed [8].

2. Objectives

This study aims to:

2.1 explore the factors affecting the adoption of learning through mobile social networks for higher education in different groups of innovation adopters.

2.2 compare the adoption in different groups of innovation adopters. It is expected that the results of this study would help education providers to design and implement factors influencing students' adoption of learning through mobile social networks in different groups of innovation adopters. The results would in turn help to improve the effectiveness of learning pedagogy.

3. Literature Reviews

3.1 Mobile Social Networks for Education

As the mobile devices become widely used. Hence, most of the OSNs platforms released the mobile applications that allowed users to ubiquitously using their services via mobile devices [1]. In education perspective, mobile social networks provide opportunities such as faster access to information, easier communication and collaboration, varieties of way to learn, and situated learning anytime anywhere [9]. Moreover, mobile learning technology provides students to create the learning community that they can easily share knowledge with other members.

The use of mobile social networks in the learning environment has more advantages when compared to the traditional face to face learning. That is to say, it allowed students to have personal interactions, social collaboration and cooperation that could improve construction and knowledge sharing [10]. Sae-Joo [11] also indicated that the students can cooperate many activities via online social networks as it provides features to collaborative learning management.

3.2 Technology Adoption Theories

Previously, technology adoption theories have been widely used to understand users' acceptance of information technology. One of the well-known theory is the Unified Theory of Acceptance and Use of Technology (UTAUT), which developed in 2003 by Venkatesh et al. [12]. The UTAUT was formulated from eight adoption theories. The UTAUT factors include Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. Later in 2012, Venkatesh et al. [13] extended the UTAUT namely UTAUT2 to study acceptance and use of technology in a consumer context, including three more new constructs: Hedonic Motivation (HM), Price Value (PV), and Habit (HB). Yang [14] integrated the UTAUT2 to understand undergraduate students' adoption of mobile learning. As well as Lewis et al. [15] used the UTAUT2 to study factors influencing the adoption of established and emerging information technology in higher education.

3.3 Innovation Adopter Category

Diffusion is "the process by which an innovation is communicated through certain channels over time among members of social system" [7]. Therefore, as the innovation spread out, social system participants decide whether to adopt it or not. Additionally, innovations are not adopted by all participants at the same time. Rather, they tend to adopt in a time sequence. Thus, the characteristics of adopters adopting innovation must be addressed. Previous research has been applied the innovation adopter categories to explain users' adoption behavior more precisely [8], [16]. Rogers categorized innovation adopters into five groups based on their beginning of adoption, which are presented in Table 1.

Table 1 Rogers' Five Innovation Adopter Categories [7]

Category	Characteristics
Innovators	They are very first to try new innovation. The innovator must be able to cope with the high degree of uncertainty about an innovation at the time that the innovator adopts.
Early Adopters	They are more integrated part of a social system comparing to innovators. The early adopter has the greatest degree of opinion leadership that can lead to successful or discrete use of new innovation.
Early Majority	They adopt new innovation just before the average members of a social system but longer than the innovator and early adopter. The early majority need some time to think before completely adopting a new innovation.
Late Majority	They adopt new innovation just after the average member of a social system. Economic necessity and social pressure can be factors influencing their adoption. The late majority adopt the innovation with cautious.
Laggards	They are the last in the social system to adopt a new innovation. They are almost no opinion leadership in innovation. Their decision based on the previous generations. Laggards tend to be frightening of new innovation and change agents. Using new innovation in this group must be careful.

4. Research Framework and Hypotheses

This study aims to identify factors affecting users' attitudes of using mobile social networks learning in different innovation adopter categories. In doing so, the study modified the UTAUT2 and Roger's innovation adopter categories. The research model presented in Figure 1.

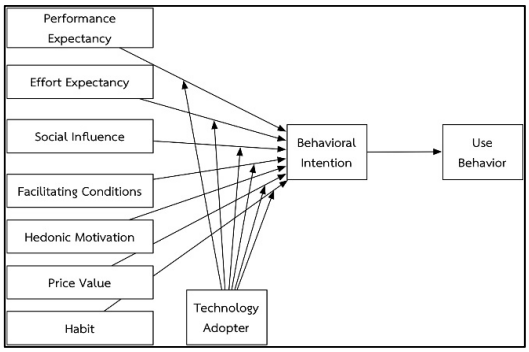

Figure 1 Research Model

Performance Expectancy

In the context of this study, Performance Expectancy (PE) refers to which users believe that using mobile social networks will help them to attain and gain in learning performance. Ismail [17] urged that PE will accelerate behavioral intention of using social networking site to support students' learning activities. PE also plays a significant role in influencing users' Behavioral Intention (BI) to adopt mobile social networks in facilitating learning. Users are more likely to use mobile social networks when they perceive performance gain in terms learning requires [18]. Accordingly, the study hypothesized:

H1: Performance Expectancy has influence on Behavioral Intention of using learning through mobile social networks

Effort Expectancy

Effort Expectancy (EE) is conceptualized in this study to which users believed that using mobile social networks for learning is easy. Deng and Tavares [19] revealed that Facebook has easy to use interface because the news feeds feature. Users can be quickly informed of the new updates and can respond in a timely manner. Wong et al. [18] and Bere [20] indicated that EE has a positive association with BI when using mobile social networks for learning. Based on previous research, this study hypothesized:

H2: Effort Expectancy has influence on Behavioral Intention of using learning through mobile social networks

Social Influence

Social Influence (SI) defined as the degree to which users perceived that important ones believe that the users should use mobile social networks for learning. Escobar-Rodríguez et al. [21] stated that SI is one of the factors affecting students' intention to use social networks during teaching and learning process. Moreover, Thomas et al. [22] found that social factor has positively related to attitude towards mobile learning adoption in higher education. Thus, the important ones such as friends, teachers, or parents would influence students' attitude to use mobile social networks for learning. The following hypothesis is proposed accordingly:

H3: Social Influence has influence on Behavioral Intention of using learning through mobile social networks

Facilitating Conditions

On this research, Facilitating Conditions (FC) defined as the degree to which users believe that variety of things are able to facilitate the

use of mobile social network learning. Facilitating Factors such as Internet connection, device support, the availability of social networks application and etc. have affected with users' behavior intention to use [23]. Ismail [17], and Thomas et al. [22] also showed that FC has influence on behavior intention to use mobile social networks to support learning activities. Thus, the previous research lead to hypothesis as following:

H4: Facilitating Conditions has influence on Behavioral Intention of using learning through mobile social networks

Hedonic Motivation

In this study, Hedonic Motivation (HM) refers to fun and pleasure derived from using mobile social networks to support learning activities. Mobile social networks provide many hedonic features for students. Thus, students value the enjoyment of using mobile social networks should be considered as learning tool [14], [21]. Based on the findings from previous studies, this work also hypothesizes as following.

H5: Hedonic Motivation has influence on Behavioral Intention of using learning through mobile social networks

Price Value

Price Value (PV) in this study refers to the benefits of using mobile social networks for learning that are perceived to be greater than monetary cost and price of using. Venkatesh et al. [13] found that PV has a significant influence of behavioral intention to use of the technology. Therefore, research hypothesizes that.

H6: Price Value has influence on Behavioral Intention of using learning through mobile social networks.

Habit

Habit (HB) in defined as users tend to perform behavior intention to use mobile social networks for support their learning because of their daily life using it. Lewis et al. [15] revealed that habit is an important factor that affects users' intention to use technology in higher education.Therefore, the following hypothesis is postulated:

H7: Habit has influence on Behavioral Intention of using learning through mobile social networks

Behavior Intention

Behavioral Intention (BI) in this research refers to the degree of users' attitudes about the target behavior, predicting actual use behavior of learning through mobile social networks Venkatesh et al. [12] identified that behavioral intention has direct effect to usage. Thus, it is hypothesizing as follows:

H8: Behavioral Intention has influence on actual use of learning through mobile social networks

5. Methodology and Result

5.1 Data Collection

The data were collected from students in the faculty of computer science, Ubon Ratchathani Rajabhat University, Thailand. Data were collected via questionnaire. A total of 123 participants were surveyed. However, following the data screening and cleaning, 113 participants were used to analyze (Male = 50, Female =63).

The participants were divided into different categories of innovation adopters based on Roger's scheme [7]. The classification items for five adopter categories were utilized from Jin that slightly modify from previous research [24]. The classifications set out in this study used a

five-point Likert Scale, 16 items domain-specific innovativeness scale. The scores range from 16-80, with higher scores indicating greater innovativeness adopter. In this study the scores of 25 innovators were between 68 and 80, those of 61 early adopters were between 55 and 67, those of 19 early majorities were between 42 and 54, those of 5 late majorities were between 29 and 41, and those 3 laggards were between 16 and 28.

5.2 Measurement of Constructs

In this study, the questionnaire was modified from UTAUT2 by Venkatesh et al [13]. Pretest was administered before the formal survey. The reliability of the questionnaire was conducted using Cronbach's alpha coefficient, which values greater than 0.7 is acceptable [25]. The reliability tests have been carried out to evaluate the internal consistency of constructs as shown in Table 2.

Table 2 Reliability of Constructs

Constructs	Cronbach's Alpha
Performance Expectancy	0.855
Effort Expectancy	0.955
Social Influence	0.933
Facilitating Conditions	0.897
Hedonic Motivation	0.872
Perceived Price	0.961
Habit	0.917
Behavioral Intention	0.911
Use Behavior	0.940

5.3 Tests of Hypotheses

Multiple Linear Regression has been used to test the hypotheses, which determine the relationship between independent and dependents variables. However, 2 categories of innovation adopters (late majority and laggard) have too small participants. Therefore, this study presents only the factors affecting the adoption of learning through mobile social networks in innovator, early adopter, and early majority group. In this study, 5% ($p<0.05$) or lower p-value is considered to be statistically significant [26]. The Table 3-5 below illustrate the results of hypotheses testing.

Table 3 Regression Analysis Result Summary (Innovator)

Dependent Variables	R^2	Predictor Variables	β	Standard error of β	*t*	*p*
UB	0.840	**BIT**	**0.917**	**0.080**	**10.991**	**0.000**

As shown in Table 3, the behavioral intention to use mobile social networks for learning significantly predicted 84 % (R^2=0.840) of variance on the usage behavior of learning on mobile social networks. Additionally, the behavioral intention to use mobile social networks for learning proved to be the statistically significant predictors ($p<0.001$). The β values explain that the behavioral intention to use mobile social networks for learning increase the usage behavior by 0.917 (H=8).

Table 4 Regression Analysis Result Summary (Early Adopter)

Dependent Variables	R^2	Predictor Variables	β	Standard error of β	*t*	*p*
BIT	0.735	**PE**	**0.445**	**0.477**	**3.875**	**0.000**
UB	0.942	**BIT**	**0.971**	**0.029**	**31.085**	**0.000**

According to Table 4, about 73.5% of the variation in behavioral intention to use mobile social networks for learning can be explained by PE, EE, SI, FC, HS, PV, and HB ($F = 21.002$, $p<0.000$, $R^2=0.735$). The PE was found to be statically significant predictors for the intention to use mobile social networks for learning ($p < 0.001$, $\beta_{PE}=0.445$ (H1)). Multiple linear regression was performed to predict the usage behavior of learning on mobile social networks. About 94.2 % ($R^2=0.942$) of the variation is explained. The behavioral intention had significant positive regression weight ($p < 0.001$, $\beta_{BIT} = 0.971$(H8)), indicating that the behavioral intention increases, the usage behavior of mobile social networks for learning will also increase.

Table 5 Regression Analysis Result Summary (Early Majority)

Dependent Variables	R^2	Predictor Variables	***β***	Standard error of ***β***	*t*	*p*
BIT	0.978	**PE**	**0.197**	**0.075**	**2.446**	**0.032**
		EE	**0.318**	**0.079**	**4.078**	**0.002**
		SI	**1.723**	**0.147**	**11.250**	**0.000**
		FC	**0.498**	**0.077**	**5.894**	**0.000**
		HM	**1.154**	**0.128**	**7.956**	**0.000**
		PV	**0.982**	**0.104**	**7.680**	**0.000**
		HB	**0.789**	**0.087**	**6.568**	**0.000**
UB	0.825	**BIT**	**0.908**	**0.073**	**8.947**	**0.000**

As shown in Table 5, all predictors of the adoption accounted for 97.8% of the variation in the behavioral intention to use mobile social networks for learning ($F = 69.857$, $p <0.000$, $R^2 = 0.978$). PE, EE, SI, FC, HM, PV, HB proved to be strong statistically significant predictors for the behavioral intention to use ($p<0.05$, $\beta_{PE}=0.197$ (H1); $p<0.01$, $\beta_{EE}=0.318$ (H2); $p<0.001$, $\beta_{SI}=1.723$ (H3), $\beta_{FC}=0.498$ (H4), $\beta_{HM}=1.154$ (H5), $\beta_{PV}=0.982$ (H6), $\beta_{HB}=0.789$ (H7)). Additionally, the behavioral intention proved to be a statistically significant predictor of the usage behavior about 82.5 % ($p<0.001$, $\beta_{BIT} = 0.908$ (H8), $R^2=0.825$). So, as behavioral intention increases, usage behavior also increases.

6. Discussions and Conclusions

The current study investigated factors that influence students' behavioral intention to adopt mobile social networks for learning in different categories of innovation adopters. The findings indicated that only 3 categories of innovation adopters (innovator, early adopter, early majority) can be explored, as later majority and laggard have too small participants to analyze. This because of the most participants are generation Z who are digital natives likely to be familiar with using technology. Generation Z requires engaging and interactive learning via technology [27]. However, the innovator, early adopter, and early majority influence the factors affecting behavioral intention to adopt mobile social networks to support learning activities differently.

In this study, the innovators prefer to use mobile social networks for learning only when

they intend to use the service. Other factors did not significantly influence their perception. A possible explanation for this might be that students in this category are interested to try new technology whatever how complex and uncertainty it is [7]. So that the students accept mobile social networks for learning because of their desire without any proposed factors associating.

In addition, the students categorized themselves as early adopter is the largest group in the current study. The study finds that performance expectancy was found to be the important factor influencing the adoption behavior of learning on mobile social networks. The results also agree with the previous studies, which showed that students as digital native were more positively interested in electronic learning [28]. As well as the usefulness of the service would affect the behavioral intention, because early adopter group has better visualize the potential benefits of using technology [29].

In the early majority group, performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit were positively related to the adoption of learning through mobile social networks. This result may be explained by the fact that early majority adopt a new technology when they compelling evidence of its value [8]. Therefore, each factor has value for this group.

Thus, when focusing to provide innovation and technology to improve students' learning performance, institutions should concern on providing factors influencing these categories of innovation adopter categories. Since innovators, early adopters, and early majority have potential to lead others in social systems to use innovation and technology [7]. Therefore, they would have potential to persuade their classmates to adopt and user mobile social networks for learning purpose.

The limitation of this study is that the respondents are from the faculty of computer science. They may be familiar with the technology. Thus, further research can be applying this current research model to wider population and others context. The results should be useful for providers to conduct the appropriate innovation and technology in various areas.

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