

Factors Determining Online Activities and Technology Use Among Older Adults in Thailand

Tanpat Kraiwanit*, Kris Jangjarat and Areeya Srijam

Faculty of Economics, Rangsit University, Pathum Thani, 12000, Thailand

ABSTRACT

In the digital era, the use of technological tools and platforms has become increasingly prevalent among people, including older adults, for various daily activities such as social interactions, online payments or shopping, entertainment, and information seeking. The prudent use of technology by older adults provides several benefits, allowing them to undertake useful or convenient activities easily. Moreover, older adults with functional and up-to-date technological skills have better employment prospects, enabling them to remain financially independent, economically active, and contribute to the national economy. This study investigates whether demographic factors and internet-related behaviour influence online activities among older adults in Thailand. Data were collected through an online survey, and discriminant analysis was utilised to evaluate the hypothesis. The study's findings suggest that gender, education, career, income, time spent online, online media platforms, and preferred online content can predict older citizens' online activities but not marital status. Therefore, to ensure older Thai citizens remain active, well-informed, and connected, this study recommends increasing education, improving the appeal and reliability of digital news and information, and providing income support for older adults.

Keywords: Ageing population, older adults, online activities, seniors, technology access

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E-mail addresses:

tanpat.k@rsu.ac.th (Tanpat Kraiwanit)

kris.ja64@rsu.ac.th (Kris Jangjarat)

areeya.s60@rsu.ac.th (Areeya Srijam)

*Corresponding author

INTRODUCTION

In 2019, the Foundation of Thai Gerontology Research and Development Institute (2019) conducted research that revealed the older population in Thailand exceeded that of children, accounting for one-fifth of the total population. As the global population ages, it is essential to develop technologies that adequately support older people's lifestyles

(Electronic Transactions Development Agency, 2016). Electronic gadgets and information and communication technology (ICT), such as smartphones and mobile applications, aim to enhance individuals' lives, including older adults (Blok et al., 2020; Sitthipon et al., 2022). Smartphones and social networks facilitate connectivity, while personal computers and the Internet aid personal and corporate tasks, such as online banking, entertainment, shopping, and access to news and information (Taneja, 2021). These technologies make life more convenient, improve the quality of life for older adults and help them overcome physical limitations. For example, internet communication can enable older adults to interact with family and friends when travelling to certain regions is inconvenient or difficult due to health issues (Yellowlees, 2001). Furthermore, digital technology enables the involvement of older adults in numerous activities, strengthens family relationships, and bridges the gap between generations. Therefore, emphasising the acquisition of new information technology skills can improve the quality of life for the older population, allowing them to live independently and comfortably based on their technical abilities (Boz & Karatas, 2015; Niemthong, 2018).

ICT significantly contributes to the individual benefits of older adults and national economic growth. The fundamental economic structure involves the number of employees and the amount of capital, and the amount of labour generated directly impacts the sustainability of the economy. In this

process, technologies are utilised to increase the efficiency of labour supply (Rotz et al., 2019). As evident from the substantial increase in Internet users among the elderly, older adults are now more receptive to embracing technology than in the past (Morrow-Howell et al., 2020). This trend underscores the need for modifications to ICT to fulfil the needs of the growing older adult clientele. In addition to enhancing the quality of life, as previously noted, ICT empowers older adults to continue working under more flexible employment conditions even after reaching retirement age. Being an active part of a community and participating in job processes can boost self-confidence, health, and the overall quality of life in an ageing society (Vanajan et al., 2020). Furthermore, ICT can enhance the potential of older adults, reduce pension and healthcare expenditures, and address concerns about long-term care for older people (Heng, 2009). Research conducted by Auer and Fortuny (2002) highlights that a decline in geriatric productivity is not just a consequence of ageing but also due to outdated job skills and waning enthusiasm for one's chosen career path. Therefore, companies must adjust their organisational structures to provide training to assist older staff when adopting new technologies. As a result, these talented elderly workers can significantly enhance an organisation's performance, leading to long-term economic growth.

Numerous factors influence older individuals' engagement in online activity, and various research studies have

investigated these associations. Education and age are considered the primary factors that impact the web traffic of older adults. Berner et al. (2014) found that being a member of a younger generation and having a higher level of education influenced the online activities of older adults residing in rural and urban areas of Sweden significantly. Additionally, Ellis and Allaire (1999) found a link between age and computer anxiety, whereas Findahl (2011) showed a correlation between older adults' education level and their interest in and usage of computers. Several studies have explored the relationship between household income and internet access. For instance, Morrell et al. (2000) observed that the high cost of internet access discourages older adults from accessing it. Gender is identified as a factor in older people's computer and internet use (Berner et al., 2013). Furthermore, cognitive skills are crucial in individuals' proficiency in technology-based tasks and internet usage (Czaja et al., 2006; Umemuro, 2004).

Hence, exploring the factors influencing the online activities of older individuals is of significant interest. This study investigates the factors affecting online activities among older Thai adults. The study's findings could offer a comprehensive understanding of the online activities in which older adults are involved. It could be useful in developing technology skills among the elderly population to facilitate independent living and participation in the workforce.

LITERATURE REVIEW

The media demands of an ageing population are unique, and their online activity may

be influenced by personal characteristics such as personality, taste, skill, education, society, marital status, economic status, and physical aspects like health and dwelling. The most popular online activities among baby boomers (people born during the post-World War II baby boom between 1946 and 1964), according to Electronic Transactions Development Agency (2016), are accessing social media, sending emails, reading e-books, and watching YouTube. LINE is the most popular social media platform, followed by YouTube and Facebook. Although older adults make up a minority of internet users compared to Gen X (individuals born between the mid-1960s to early 1980s) and Gen Y (individuals born roughly between the early 1980s and the mid-to-late 1990s), their use of social networking sites has increased significantly and become increasingly popular among the elderly generations. Social media users are primarily located in metropolitan regions, but seniors living in rural areas may also be effectively reached through radio and television.

Various factors contribute to older individuals' engagement in internet activities, and age is a significant factor that influences older individuals' online behaviours. Several studies have shown that elderly individuals of different ages exhibit varying satisfaction levels with social media use. Banthadthong's (2015) study on social network usage behaviour and older adults' satisfaction in Bangkok found that individuals aged 66 years and older reported the lowest level of

satisfaction with social media use due to health problems, visual impairment, and stiff fingers, which may hinder their participation in social media, leading to dissatisfaction. Conversely, other age groups report higher satisfaction with social networking use. Income may also impact social media usage patterns. Ruengsawat (2010) reported that seniors with incomes between 7,001 and 15,000 THB per month exhibit the highest satisfaction with social media use. Seniors with incomes above 15,000 THB per month often continue working and do not typically use social media.

METHODS

Population and Samples

The age range that constitutes ‘older adults’ or ‘seniors’ may vary across countries and over time, depending on social class disparities or functional capacity related to labour force participation. However, more frequently, it is determined by the current political and economic environment (Reddy & Jyotsna, 2018). A private group, such as a social club or retail store, can establish its criteria for designating ‘senior’ status. In Canada, a person qualifies for a senior discount, typically at 55 (Legalline.ca, n.d.). Several states in the United States define older people as those aged 55 years and above (Fry, 2021). Therefore, for this research, the elderly population is defined as citizens aged 55 years and above.

The population for this study comprised Thai citizens aged 55 years and over who reside in Thailand, have independent internet access, and are still employed or

working. The sample consisted of 840 participants selected through convenience sampling. The formula for calculating the sample size, based on Yamane’s (1973) computation for a confidence level of 95%, is provided below:

$$n = \frac{N}{1 + (Ne^2)}$$

In the formula, ‘*n*’ represents the sample size, ‘*N*’ represents the population size, and ‘*e*’ represents an acceptable error of 0.05 or 5%. The result of this calculation was 399.9969, indicating that the minimum sample size required was approximately 400. However, to ensure greater accuracy in the data analysis, the sample size was set at 840.

Online Survey as a Study Tool

Data for this study were collected through an online survey administered to the sample group. The survey was developed based on a review of relevant literature and in-depth interviews with 18 individuals who shared similar characteristics to the study samples but were not part of it.

Initially, the literature was consulted to identify the dependent and independent variables. The independent variables were categorised into two groups: demographic factors (gender, income, education, career, and marital status) and internet usage behaviour (frequent use of online media platforms, preferred online content, and average daily time spent on online activities). The dependent variables were older adults’ online activities, including e-commerce,

chatting, video watching, game playing, and mobile banking.

The results of the in-depth interviews were used to develop questions and answers for the online survey following the study's hypothesis and research objectives. Eighteen individuals were interviewed regarding their internet usage, including their online activities, frequency of use, and the type of content they typically consume. These results were used to create the first draft of the online questionnaire, which was then reviewed for appropriateness by an advisor. Subsequently, the online survey was developed further until it achieved the highest accuracy for data analysis. The final version of the online survey was pilot tested with 30 participants who shared similar characteristics to the study's samples but were not part of the samples. This pilot test ensures that the survey includes all study topics and uses understandable language. The questions were more detailed and precise than those of the previous 18 participants and related to internet usage and online activities. Each question's answer option was previously provided based on the findings of the initial in-depth interviews. For instance, the question, "What do they often do online?" had options such as selling items, shopping, chatting, watching movies, playing games, and accessing mobile banking.

Cronbach's alpha was used to assess the reliability of the online survey before its application in data collection. This study's Cronbach's alpha was 0.863, indicating that the online survey was appropriate for data collection.

Discriminant Analysis

Discriminant analysis is a multivariate method of categorising objects into groups based on the linear combination of separating features. While multiple linear regression can predict outcomes, its application is limited in cases involving categorical variables (Alkarkhi & Alqaraghuli, 2019). The discriminant analysis comprises two steps: (1) testing the statistical significance of multiple variables using a multivariate test and (2) investigating significant mean differences across the groups if statistical significance exists (Brunner & Giannini, 2011). At the end of the discriminant analysis, a model is created to predict variables in a group and maximising the distance between groups is necessary to create an effective model. This model explains the relationship between the selected variables and the observed predictor variables, and it allows for the assessment of various types of variable contributions (Alkarkhi & Alqaraghuli, 2019). The equation for the discriminant function is presented below:

$$D = v_1X_1 + v_2X_2 + v_3X_3 \dots v_iX_i + C$$

The equation for the discriminant function is as follows: $D = \sum(v \cdot X) + C$, where D is the discriminant function, v is the discriminant coefficient or weight for that variable, X is the score of a sample for that variable, C is a constant, and i is the number of predictors (Bartholomew, 2010).

RESULTS

This study explored the online activities in which Thai older adults participated as the independent variable. According to Table 1, the top five online activities among older Thai adults were e-commerce, chatting, viewing videos, playing games, and mobile

banking. Chatting was the most popular activity, accounting for 31.8%, followed by video watching (28.6%) and mobile banking (27.4%). Game playing and e-commerce were less popular, accounting for 8.7% and 3.6%, respectively.

Table 1
Thai older adults' online activities

Dependent variables	Frequency	Percentage
E-commerce	30	3.6
Chatting	267	31.8
Video watching	240	28.6
Game playing	73	8.7
Mobile banking	230	27.4
Total	840	100.0

Table 2 displays the collinearity statistics for each independent variable, including the tolerance and VIF. The tolerance values ranged from 0.668 to 0.948, while the VIF values ranged from 1.055 to 1.496. The variation inflation factor (VIF) values were used to evaluate collinearity, with values greater than four or five occasionally indicating moderate to high collinearity and values of ten or more indicating extremely high collinearity (Bock, 2018). According

to the results in Table 2, the independent variable with the highest VIF was time spent online (1.496), and the independent variable with the lowest VIF was preferable online content (1.055). In this study, the VIF values for all independent variables were below five, indicating no significant collinearity among the independent variables. Thus, all variables were appropriate for use in discriminant analysis.

Table 2
Test of collinearity between independent variables

Independent variables	Collinearity statistics	
	Tolerance	VIF
Gender	0.877	1.141
Income	0.717	1.395

Table 2 (Continue)

Independent variables	Collinearity statistics	
	Tolerance	VIF
Education	0.687	1.456
Career	0.785	1.273
Marital status	0.820	1.219
Online media platform	0.862	1.161
Preferable online content	0.948	1.055
Time spent online	0.668	1.496

Before creating the model, we examined the equality of group means to determine the potential of each independent variable. Wilks' lambda evaluated each variable's discriminatory power between groups, with smaller values indicating greater potential (Stella, 2019). Table 3 displays the Wilks' lambda values, degrees of freedom, and significance levels for each independent variable. The values for Wilks' lambda ranged from 0.884 to 0.995, indicating that all variables except marital status had the potential for discriminatory power between groups. The statistical significance of each variable was determined based on a significance level of 0.05. Marital status was

not statistically significant ($p > 0.05$) and was therefore omitted from the discriminant model. The remaining eight variables were all statistically significant ($p \leq 0.05$) and remained in the discriminant analysis: gender, income, education, career, online media platform, favourite online content, and time spent online. Among all the independent factors, career offered the most potential, followed by education, gender, income, time spent online, favourite online content, and online media platform, in that order. This result validates the exclusion of marital status from the model, as it had the least potential.

Table 3

Test of equality of group means

	Wilks' lambda	F	df1	df2	Sig.
Gender	0.945	12.182	4	835	0.000
Income	0.957	9.311	4	835	0.000
Education	0.901	22.983	4	835	0.000
Career	0.884	27.498	4	835	0.000
Marital status	0.995	0.979	4	835	0.418

Table 3 (Continue)

	Wilks' lambda	F	df1	df2	Sig.
Online media platform	0.986	2.986	4	835	0.018
Preferable online content	0.980	4.361	4	835	0.002
Time spent online	0.970	6.367	4	835	0.000

The results of Box's test were used to evaluate whether two or more covariance matrices were equal. Table 4 displays the results of Box's test, including Box's M value, F statistic, degrees of freedom, and significance level. The F statistic was approximately 7.530, with degrees of freedom of 90.000 and 1435902.073 and a significance level of 0.000. Contrary to assumptions, the test found variance

differences at the significance level of 0.05 ($p < 0.05$), indicating that the covariance matrices were unequal. Despite the significance of Box's test, the set of variables used in the analysis could be maintained. A larger sample size can help minimise the effects of slight deviations from homogeneity, which may have contributed to the observed variance differences (Agresti, 2007; D'Alonzo, 2004).

Table 4

Box's M tests of equality of covariance matrices

	Box's M	689.583
F	Approx.	7.530
	df1	90.000
	df2	1435902.073
	Sig.	0.000

Wilks' lambda evaluates how effectively each independent variable level contributes to the discriminant analysis model. It is equivalent to the fraction of the overall variation in discriminant scores that group differences cannot explain. Lesser values of Wilks' lambda suggest a function with a stronger capacity for discrimination. The corresponding chi-square statistic tests the hypothesis that the group means of the given

functions are equal. A low significance value suggests that the discriminant function separates the groups more effectively than chance. As seen in Table 5, Wilks' lambda reflects the importance of the discriminant function ($p < 0.05$).

Wilks' lambda measures the extent to which each level of an independent variable contributes to the model in discriminant analysis. It represents the proportion of the

overall variation in discriminant scores that group differences cannot explain. Lower values of Wilks' lambda indicate stronger discrimination power of the function. The corresponding chi-square statistic tests the hypothesis that the group means of the given functions are equal. A low significance value indicates that the discriminant function separates the groups more effectively than chance. As shown in Table 5, Wilks' lambda reflects the importance of the discriminant function in this study ($p < 0.05$). The table

presents the results of Wilks' lambda test of coefficient significance, including the lambda values, chi-square statistics, degrees of freedom, and significance levels for each function. The test was performed for each level of the independent variables, with functions 1 through 4 showing the strongest discrimination power (Wilks' lambda = 0.668, chi-square = 335.158, $df = 36$, $p < 0.001$). The discriminant function effectively separated the groups of older Thai adults based on their online activities.

Table 5
Wilks' lambda test of coefficient significance

Test of function(s)	Wilks' lambda	Chi-square	df	Sig.
1 through 4	0.668	335.158	36	0.000
2 through 4	0.815	170.650	24	0.000
3 through 4	0.913	75.992	14	0.000
4	0.977	19.239	6	0.004

Table 6 shows the results of a back test to compare the projected number of successes with the actual number of successes observed for the four unstandardised equations discussed earlier. The table displays the predicted group membership for each activity, including

e-commerce, chatting, video play, gameplay, and mobile banking. The table indicates that 61.67% of the original grouped cases were correctly classified, demonstrating that the unstandardised discriminant equations could predict group membership with moderate accuracy.

Table 6
Classification results

Activities	Predicted group membership					Total
	E-commerce	Chatting	Video play	Gameplay	Mobile banking	
E-commerce	18 (60%)	6 (20%)	0 (0%)	0 (0%)	6 (20%)	30 (100%)

Table 6 (Continue)

Activities	Predicted group membership					Total
	E-commerce	Chatting	Video play	Gameplay	Mobile banking	
Chatting	26 (9.74%)	122 (45.69%)	46 (17.23%)	22 (8.24%)	51 (9.10%)	267 (100%)
Video play	6 (2.50%)	20 (8.33%)	188 (78.33%)	8 (3.33%)	18 (7.50%)	240 (100%)
Gameplay	8 (10.96%)	8 (10.96%)	0 (0%)	49 (67.12%)	8 (10.96%)	73 (100%)
Mobile banking	22 (9.57%)	21 (9.13%)	16 (6.96%)	30 (13.04%)	141 (61.30%)	230 (100%)

Note. 61.67% of original grouped cases were correctly classified

DISCUSSION

In this study, chatting is the most popular online activity among older Thai adults. When determining the factors that affect the online activities of older Thai adults, the results indicate that participation is influenced by several factors, including gender, income, education, career, online media platform, preferred online content, and time spent online. This finding is consistent with numerous studies suggesting that socio-demographic characteristics, such as age, gender, and education level, can affect older adults' online activities. For instance, previous research indicates that older adults with higher education and income levels are more likely to participate in online activities, including social networking, online shopping, and accessing health information (Choi & Dinitto, 2013). Additionally, age is a significant factor influencing older adults' online activities. As individuals age, they tend to have lower levels of digital literacy, making accessing

and using online resources more challenging. However, research has shown that age alone does not determine online activity levels, as individuals who maintain an active lifestyle and engage in social activities tend to have higher levels of online engagement (Czaja et al., 2019). Moreover, gender also plays a role in older adults online activities. Women are generally more active online than men, with higher social media usage rates and communication with family and friends (Anderson & Perrin, 2018). Digital literacy, which refers to the ability to use technology effectively, is another crucial factor influencing older adults' engagement in online activities. Research has found that older adults with higher levels of digital literacy are likelier to engage in online activities, such as social media, online banking, and email (Xie, 2012).

According to the study's findings, three key aspects could encourage older Thai individuals to participate in online activities and use technology: supporting education,

enhancing the interest and dependability of online news and information, and providing funds.

Firstly, since education is essential for older Thai people to participate in online activities, they require educational assistance to improve the accessibility of such activities. While older adults have fundamental technological abilities, there are alternative courses that could upskill and reskill them, such as e-commerce, trade, finance, cookery, and yoga. According to the Future of Jobs Report 2020 by the World Economic Forum, it was projected that half of the global workforce would require reskilling by 2025 (Schwab & Zahidi, 2020). The rapid advancement of automation and new technologies before the COVID-19 pandemic had already created a pressing need for large-scale upskilling and reskilling, as noted by Li (2022). The current situation has further highlighted the criticality of this need. Therefore, the public and commercial sectors must offer courses in both traditional and online formats to facilitate the integration of the elderly population with modern technology and online activities.

Secondly, favoured online content is one of the significant factors influencing the online activities of older adults. Improving the attractiveness and dependability of online news and information could encourage older adults to engage in online activities. If the content of news and information on online platforms can attract the attention of older individuals, they are more likely to obtain

digital news and information. It would enable internet platforms to dominate the media and become the primary means of obtaining and disseminating news and information. If older citizens want to obtain news and information online, the credibility of such content becomes a challenge. When digital material is accurate, older individuals will access it with more trust. Government agencies may develop dependable digital platforms for posting accurate and appealing digital material to attain this objective. For instance, the Ministry of Health may develop an e-health application to provide health and medication-related information and e-health services for the older population.

Thirdly, income is another issue that affects the online activities of older adults. Therefore, expanding prospects for better salaries among older people must be considered. This study examined the online activities of seniors and found that e-commerce was the least popular. Promoting e-commerce among older Thai adults may be useful so that they can make more money and live independently of younger family members. The public sector and organisations might provide short in-person or online courses to educate seniors with necessary and valuable information. Older e-commerce business owners should be granted incentives, such as tax deductions, to stimulate the formation of new e-commerce enterprises.

It is important to note that this study was conducted during the COVID-19 pandemic, which may have affected the participants'

behaviours. Since most individuals were quarantined and working from home, their behaviours may differ from their typical daily routine. Those at home may have had more time to play online games and view movies than at work. Therefore, when the COVID-19 crisis is over and people are back to their normal work schedules, the assessment may need to be repeated and compared to this research to see if the results have changed.

CONCLUSION

In conclusion, this study indicates that various factors such as gender, income, education, career, online media platform, preferred online content, and time spent online can influence the online activities of older Thai individuals, including e-commerce, chatting, playing videos or online games, and mobile banking. However, there is no correlation between marital status and participation in internet activities among older Thai adults. In today's digital age, everyone, especially older individuals, must rely on technology for everyday activities, including mobile banking, online shopping, online meal delivery, and online information. Seniors can easily engage in a wide range of activities through online platforms, which can enhance their quality of life, provided they use technology responsibly. Additionally, seniors with effective technology skills have numerous opportunities to continue contributing to the workforce and the national economy, such as delaying retirement.

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