

The Decision to Use Public Internet Services to Access Digital Content in Thailand

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Abstract

This study applies a multinomial discrete choice model and logistic estimation method to examine factors for determining which free public Internet services that Thai people decide to use to access essential digital content. Thai government currently provides three free services to Thai citizen which are (i) free usage of some applications on mobile broadband, (ii) Internet services provided by the Universal Service Obligation (USO) and (iii) free Wi-Fi on the street. The dataset employed in this study consists of 6,537 observations which are collected from field surveys covering all regions of Thailand. Each observation contains the characteristics of potential users and their decisions toward choices of public Internet service. The results indicate that rural people prefer ICT free Wi-Fi to the mobile networks; 4G because there is no a limitation of a free Wi-Fi on the street. The purposes of usage are earning incomes and receiving news, entertainment and media. The increasing in earning incomes, the multinomial log-odds of preferring a free 4G on a mobile phone to ICT free Wi-Fi is expected to increase. This positive relationship between earning incomes and the preferring a free 4G on a mobile phone is the same for the purpose of accessing to news, entertainment and media as well. To boost the national income growth, Thai government should provide potential network services to people who utilize Internet especially via a mobile phone.

Keywords: decision, public Internet, digital content, Thailand

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1 Introduction

The Thai government promotes the free Internet access to people all over the country by the investment in optical fiber infrastructure to bring broadband Internet to all villages especially in the remote area. The investment uses huge amount of budget. This investment will be wasteful if the Thai people do not use the Internet.

The free Internet access includes three options. First, the usage of some free applications on mobile broadband. For this option, the government subsidizes the usage by paying money to the telecommunications operators according to the amount of usage or the lump sum amount. Second, the establishment of Internet services center which are equipped by personal computers and fixed broadband. This choice is under operation according to the Universal Service Obligation (USO) provided by the National Broadcasting and Telecommunications Commission (NBTC). Third, local government provides a free Wi-Fi on the street along the main highways to certain location in the remote area or tourism destinations.

The Internet, computer, and mobile phones usage of Thailand which was reported from the National statistical office of Thailand (2016) showed the percentages of mobile usage from 2011 to 2015 were 66.4, 70.2, 73.3, 77.2, and 79.3 percent respectively. The percentages of internet usage from 2011 to 2015 were 23.7, 26.5, 28.9, 34.9, and 39.3 percent respectively. The percentages of computer usage from 2011 to 2015 were 32.0, 33.7, 35.0, 38.2, and 34.9 percent respectively. From 2014 to 2015, there were an increasing rate of 2.7 percent for the mobile usage, a high increasing rate of 12.6 percent for the Internet usage, and a decreasing rate of 8.6 percent for the computer usage. Exceptionally, around 90 percent of the Internet users go online via mobile phones far the exceeding rate from other devices. The rate of internet access

via desktops, laptops, and tablets were only 50.1, 24.9, and 15.2 percent respectively, in 2016 (National statistical office of Thailand, 2016).

Since the high growth of Internet usage, the Thai government would encourages and provides a free internet access to people. This would certainly enhance the economy in terms of the efficiently supports for all transactions and activities via devices such as mobile phones, tablets or computers, for an example, an increasing of any e-commerce. From 2015 to 2016, Thailand had a growth rate of the B2B e-commerce, and the B2C e-commerce by 15.53, and 37.91 percent respectively. However, in 2016, the highest shares of the total values of 2.56 trillion THB was B2B with 60.24 percent of shares, the second was B2C with 27.47 percent of shares, and the third was B2G with 12.29 percent of shares (Electronic Transactions Development Agency of Thailand, 2016).

For empirical works, Brown et al. (2009) studied the factors influencing consumer choice of Internet accesses in South Africa. They found the key factors that influencing the consumer choice are costs of access, support and services, advantages, compatibilities, ease of uses, and prior experiences. The studies about factors affecting the consumer choice of the free internet usage in Asia region such as Ida and Kuroda (2006) studied a demand for four internet access services including the narrow broadband (NB), ADSL, CATV internet, and FTTP in Japan using a discrete choice model. The results showed an income rarely influences consumer choice on the broadband services as the high income consumers would decide to use CATV and FTTP instead of ADSL. Although such other individual characteristics as age, gender, and income are not significant, then the study investigated the access speed. The results also presented that the broadband access services were preferred

than nominal speed as their providing an effective speed. In terms of the business purposes to satisfy the consumers' purchase, Keisidou, Sarigiannidis, & Maditinos (2011) suggested consumer characteristics and personal perceived values are important to determine the consumer choice on online shopping. However, some study such as Ratchford, Talukdar, & Lee (2001) suggested that consumers do not use internet only for online purchases but also for information search. This could be clearly to show there are many purposes to use the Internet. To study the factors influencing the Internet users' choice on the Internet uses, the purposes of the Internet usage are also one of the most important determinants.

Despite an internet access providing, the government needs to find a proper provider who provide a free Internet efficiently and satisfied the users' wants. This study investigates whether the Thai are willing to use these public Internet services. The proper providers are able to provide the suitable channels and speeds of the Internet to satisfy the users' utilities. Therefore, this paper will construct the individual characteristics and the purposes of the Internet usage to be the determinants of the consumer choice. A quantitative method is also applied to quantify the factors influencing the decisions to use the services. The results from this study may inform the government to direct the public Internet services onto a more efficient way to attract people to use the services. Hopefully, suggestions from the study may make this huge investment of telecommunications networks fully utilized.

2 Methodology

To analyze the choice of Internet users in this study, the multinomial logistic regression is applied. Since, the Internet users make a choice on several providers that provides the greatest utility. Then, we apply this method to answer the question

of how people who are provided a free Internet make a choice on a network service provider (4G or Edge on a mobile phone) relative to a free Wi-Fi by Internet service centers if they live in the different areas, they are different ages, and they use Internet with different purposes. The model specification and advantages would be discussed in section 2.1.

2.1 Multinomial Logistic Regression

The discrete choice models applied in economics studies for predicting an individual choices between two alternatives called binary discrete choice models or more than two alternatives called multinomial discrete choice models. The discrete alternatives are, for an example, a decision to make a choice for using or not using an internet services, or a decision on choosing among the free Internet providers via the different devices. This study applies the multinomial logistic regression to analyze an unordered individuals' choice of free Internet providers among the different individuals' living areas & ages and the different purposes of Internet usage. The formulation of the multinomial logit model is described in Green (2012), also Rodríguez (2007).

The multinomial logistic regression model is an extension of logistic regression model. Logit model will be applied to analyze the binary dependent variable problems which express the effect of the predictors on the probability in terms of the rate of changes. While, the multinomial logit model will be used to analyze the dependent variables which more than two unordered categories. We express the effect of predictors on the probability for each category relative to the baseline (reference outcome).

Suppose the probabilities p_{ij} and assume the log-odds of each response y_i follow a linear regression, then

$$\log \frac{P_{ij}}{P_{iJ}} = \alpha_j + x_i' \beta_j \tag{1}$$

where α_j is a constant term. x_i is a vector of covariates associated with the i^{th} group. β_j is a vector of coefficients.

This log-odds model can be transformed to the probabilities p_{ij} in the multinomial logit model as

$$p_{ij} = \frac{e^{x_i' \beta_j}}{\sum_{k=1}^J e^{x_i' \beta_k}} \tag{2}$$

for $j = 1, 2, \dots, J$. The probability of each category will be evaluated by maximum likelihood estimation. We can express the effect of predictors on the probability for each category relative to the reference outcome.

Although, the multinomial logistic regression assumes the dependent variable choices to be independence, no correlations among the independent variables, and non-perfect separation of a group of categories, it has a beneficial use. Mostly, it does not assume a linear relationship between the dependent and independent variables. It survives the restriction of the choice sets and the parameters are the same (irrelevant subset of the choices can be omitted). It does not assume a normal distribution of the error terms. It does not require the homoscedasticity.

We now introduce the variables used to examine the factors influencing the choices of free Internet providers of Internet users in the section 2.2.

2.2 Data

The dataset is from the survey of Internet users. They are from six regions of Thailand collected in 2018. From World Bank (2017), the statistics show the Internet users of Thailand are about 52.9 percent of total population or 36.52 million. Then we would determine the

sample size (n) following Yamane (1967).

With the 95% confident level, the sample size becomes 400 or higher when the population sizes are greater than 10,000. We calculate the sample size by weighting with the proportion of each region population to total population (% of population) as 0.33, 0.31, 0.14, 0.10, 0.07, and 0.05 for Northeastern, Central, Southern, Northern, East, and West, respectively. After the sample size calculation, data cleaning for missing values, the sample contains 6,537 individuals. Each respondent would choose what telecom and Internet service providers by he or she prefer to be provided a free Internet on a mobile phone or by other providers as a dependent variable, namely, (1) the network service providers on a mobile phone e.g. AIS, DTAC, TRUE for some applications and websites, (2) Universal Service Obligation (USO) for all activities on an Internet, (3) ICT Free Wi-Fi for all activities on an Internet, and (4) None of any free Internet. The demographic data of an individual used as dummy variables include (1) Internet users who live in an urban area, (2) female, (3) teenagers who are less than or equal to 20 years old.

The study will explore relationship between the user's choice and the purposes of free Internet usage. The purposes of Internet usage will be determined as explanatory variables in

this study consisting with (1) to generate incomes, (2) to reach knowledge and information, (3) to publish the digital contents, (4) access to news,

entertainment & media e. g. music, movies, online televisions.

The descriptions of variables used in this study are shown in Table 1.

Table 1. The descriptions of variables.

Variables	Name	Descriptions
y1	Choice of any free Internet users	1-Users choose free Internet on a mobile phone
y2		2-Users choose free Internet provided by USO
y3		3-Users choose ICT free Wi-Fi
y4		4-Users choose None of any free Internet
Individual characteristics		
x1	Urbanization	1 if urban people 0 if other
x2	Gender	1 if female 0 if other
x3	Age	1 if teenagers (less than or equal to 20 years old) 0 if other
Purposes of Internet usage		
pur1	Purpose	to generate incomes Scale 0 – 10 (0 = very low and 10 = highly satisfied)
pur2	Purpose	to reach knowledge and information Scale 0 – 10 (0 = very low and 10 = highly satisfied)
pur3	Purpose	to publish the digital contents Scale 0 – 10 (0 = very low and 10 = highly satisfied)
pur4	Purpose	access to news, entertainment & media Scale 0 – 10 (0 = very low and 10 = highly satisfied)

3 Results

3.1 The purposes of free Internet usage

For the empirical results, Table 2 shows the average scores for the importance of several purposes of free Internet uses. The descriptive statistics show that Thai Internet users who willing to be a free Internet provided want to use the Internet for reaching knowledges and information. These purposes of the free Internet users are not quite different with to access to an entertainment and media.

Then, they use the free Internet for generating income as well as publishing the digital contents. These results seem to be the same for male and female users. Moreover, the table also shows the average scores for the positive and negative effects of all Internet uses. The most positive impact for all Internet users is a broadly connectivity. Whereas, the most negative impact for those is the health problems e.g. digital eye strain and pain.

Table 2. Average scores from the respondents who prefer a free Internet provided.

Internet users	Percentages		
Male	38		
Female	62		
	Average Scores		
Purposes	Total	Male	Female
1. to generate income	5.77	5.73	5.80
2. to reach knowledges and information	7.91	7.90	7.92
3. to public the digital contents	4.59	4.45	4.68
4. access to news, entertainment & media	7.87	7.76	7.94
Positive effects of Internet usage	Total	Male	Female
1. broadly connectivity	8.09	8.07	8.11
2. easily access to resources	7.46	7.48	7.44
3. effective improving languages	6.56	6.49	6.60
4. having greater advantages than non-Internet users	7.82	7.88	7.78
Negative effects of Internet usage	Total	Male	Female
1. be always online	2.99	2.80	3.11
2. be not close to a family	2.32	2.20	2.39
3. health problems from the Internet uses	3.88	3.55	4.08
4. an ineffectiveness of working	2.34	2.17	2.44

Scores from the least importance to the most importance is 0 – 10

3.2 The choices of free Internet providers

The multinomial logistic regression model provides the estimates of the parameters. We find out the factors influencing the Internet users’ choice on the different free Internet providers, the base choice (outcome) would be identified by letting the multinomial logit model

choose. The preference outcome is the choice of free Internet providers – Network service providers on a mobile phone, USO, ICT Wi-Fi. The analysis of the relationships between these outcomes and Internet users’ characteristics and the purpose of usage are shown in Table 3.

Table 3. Parameter Estimates

Multinomial logistic regression					
Reference outcome: y				95% Confidence Interval	
1	β	Std. Error	Sig.	Lower bound	Upper bound
Constant	-0.508	0.113	0.000	-0.729	-0.287
x ₁	0.108	0.053	0.042	0.004	0.211
x ₂	0.007	0.055	0.894	-0.100	0.114
x ₃	-0.051	0.066	0.445	-0.181	0.080
pur ₁	0.028	0.010	0.004	0.009	0.048
pur ₂	-0.003	0.014	0.847	-0.029	0.024
pur ₃	-0.008	0.009	0.330	-0.025	0.008
pur ₄	0.024	0.013	0.057	-0.001	0.049
2					
Constant	-1.364	0.194	0.000	-1.745	-0.983
x ₁	-0.022	0.102	0.829	-0.222	0.177
x ₂	0.013	0.104	0.901	-0.192	0.218
x ₃	0.346	0.119	0.004	0.113	0.579

Table 3. Parameter Estimates (Continued)

Multinomial logistic regression					
Reference outcome: y				95% Confidence Interval	
pur ₁	-0.032	0.019	0.091	-0.069	0.005
pur ₂	0.012	0.025	0.640	-0.037	0.060
pur ₃	0.047	0.018	0.008	0.012	0.081
pur ₄	-0.105	0.022	0.000	-0.147	-0.062
3	(base outcome)				
4					
Constant	-1.554	0.227	0.000	-1.998	-1.109
x ₁	0.283	0.123	0.022	0.041	0.525
x ₂	0.036	0.127	0.780	-0.213	0.284
x ₃	-0.265	0.160	0.098	-0.578	0.049
pur ₁	-0.127	0.022	0.000	-0.169	-0.084
pur ₂	0.027	0.027	0.330	-0.027	0.080
pur ₃	-0.024	0.022	0.270	-0.066	0.018
pur ₄	-0.056	0.025	0.027	-0.105	-0.006
The reference outcome (y) is: 1-Choose free Internet on a mobile phone, 2-Choose free Internet provided by USO, 3-Choose ICT free Wi-Fi, 4-Choose None of any free Internet					

The multinomial logit chose the choice of ICT free Wi-Fi (y_3) as the base outcome. The results of the estimates from Table 3 are interpreted as follow.

The relative for the network service providers on a mobile phone to ICT free Wi-Fi;

The multinomial logit estimate of a preferring the network service providers on a mobile phone to ICT free Wi-Fi for rural people is -0.508 when urban people evaluated at zero with zero female, teenagers, and usage purposes. This would imply that rural people prefer to be provided with ICT free Wi-Fi to the network service providers on a mobile phone.

Moreover, the estimates also show a one unit increase in earning incomes score by one point, the multinomial log-odds of preferring the network service providers on a mobile phone to ICT free Wi-Fi would be expected to increase by 0.028 unit when holding all other variables constant. A one unit increase in opening to receive news, entertainment & media score by one point, the multinomial log-odds of preferring the network service

providers on a mobile phone to ICT free Wi-Fi would be expected to increase by 0.024 unit. These imply that the Internet users who are interested in earning incomes and accessing to news, entertainment & media would prefer the network service providers on a mobile phone to ICT free Wi-Fi.

The relative for USO free internet to ICT free Wi-Fi;

The multinomial logit estimate of a preferring USO free internet to ICT free Wi-Fi for adults is -1.364 when teenagers evaluated at zero with zero urban people, female, and usage purposes. This would imply that adults prefer to be provided with ICT free Wi-Fi to USO free internet.

Also, the estimates also show a one unit increase in earning incomes score by one point, the multinomial log-odds of preferring USO free internet to ICT free Wi-Fi would be expected to decrease by 0.032 unit when holding all other variables constant. A one unit increase in health problems score by one point, the multinomial log-odds of preferring USO free internet to ICT free Wi-Fi would be expected to increase by 0.047 unit. In

addition, a one unit increase in opening to receive news, entertainment & media score by one point, the multinomial log-odds of preferring USO free internet to ICT free Wi-Fi would be expected to decrease by 0.105 unit. These imply that the Internet users who are interested in earning incomes and accessing to news, entertainment & media would prefer ICT free Wi-Fi to USO free internet. Incidentally, Internet users think they will have less health problems when they are provided with ICT free W-Fi.

The relative for None of any free Internet to ICT free Wi-Fi;

The multinomial logit estimate of a preferring None of free Internet to ICT free Wi-Fi for rural people as well as for adults is -1.554 when urban people evaluated at zero with zero female, teenagers, and usage purposes. This would imply that ICT free Wi-Fi is more preferable to None of any free Internet for rural people, and adult as well.

The multinomial logit estimates show a one unit increase in earning incomes score by one point, the multinomial log-odds of preferring None of any free Internet to ICT free Wi-Fi would be expected to decrease by 0.127 unit when holding all other variables constant. A one unit increase in accessing to news, entertainment & media score by one point, the multinomial log-odds of preferring None of any free Internet to ICT free Wi-Fi would be expected to decrease by 0.056 unit. It is consistency to other response which showing people prefer the free internet rather than getting nothing.

4 Discussion

Recently, the number of Internet users are dramatically increasing. The uses of Internet on a mobile phone are extraordinary increasing. From the statistics presented by Ministry of Digital Economy and Society (2018) show that people go online Internet via mobile

phones about 94.7 percent, by personal computers and laptops only 38.8 and 16.6 percent, respectively.

From the results, Internet users who often use Internet for earning incomes and accessing to news, entertainment & media would prefer to choose either free 4G on a mobile phone or a free Wi-Fi. If Thai government would like to increase a potential of trades and e-commerce values, it could encourage the private sectors and exporters easier to access the free Internet on a mobile phone. Even though, urban people do not care much about a free 4G on a mobile phone because of limitations for some applications. For the same reason, people living in rural areas prefer ICT free Wi-Fi to free 4G on a mobile phone because of no limitations of use. Since it is not only convenient and easier to access Internet but also close to the community and habitation. Some households living in rural areas have no mobile phones as well.

The results also confirm that Thai government should provide any free Internet or Wi-Fi to people. It would be more beneficial than people getting nothing. At least, they are able to connect to each other and utilize the Internet for exchanging any useful information, the digital contents, and any “how to” from social networks such as the sharing of health literacy, relationships in the family, how to grow up the babies, how to take an exercise, how to take a photograph, etc. However, people should be acknowledged both advantages and disadvantages of Internet uses by government officials. Eventually, Thai government should support and encourage the development of the network platforms for Internet of everything to serve to people.

5 Concluding Remarks

This study aim to find out the suitable free Internet providers that are appropriated to the utilization of Internet users. Internet users will make a different choice of the providers, consequently, we

set up more than two choices for Thai people to make a suitable one to themselves. The multinomial logit model would be applied to analyze these responses. We do the field surveys by interviewing and giving the questionnaires to the respondents who frequently use Internet. The factors influencing the choice of free Internet providers are living areas, gender, ages, and the purposes of usage. The results of the study show that users who living in

rural areas prefer to be provided at least a free Wi-Fi. It can be either mobile networks or a free Wi-Fi. ICT free Wi-Fi is the most preferable for rural people, however, a free 4G for some applications is not so meaningful for urban people. Finally, the main purposes of Internet usage are earning incomes and accessing to news, entertainment & media. Thai government could provide free Internet to increase and stimulate the economic activities for income growth.

References

- Brown, I., Letsididi, B., & Nazeer, M. 2009. Internet Access In South African Home: A preliminary Study on Factors Influencing Consumer Choice. *The Electronic Journal on Information Systems in Developing Countries*, 38 (2), 1-13.
- Corral, P., Terbish, M. (2015). Generalized maximum entropy estimation of discrete choice models. *The Stata Journal*, 512 -522.
- Greene, W. H. 2012. *Econometric Analysis*. 7th ed. Upper Saddle River, NJ: Prentice Hall.
- Ida T., Kuroda T. 2006. Discrete choice analysis of demand for broadband in Japan. *Journal of Regulatory Economics*, 29(1), 5–22.
- Judge, George et al. 1988. *Introduction to the Theory and Practice of Econometrics*, 2nd ed. New York: John Wiley & Sons.
- Keisidou, E., Sarigiannidis, L., & Maditinos, D. (2011). Consumer characteristics and their effect on accepting online shopping, in the context of different product types. *International Journal of Business Science & Applied Management (IJBSAM)*, 6(2), 31-51.
- National Broadcasting and Telecommunications Commission. (2018). Value of e-Commerce Survey in Thailand 2018.
- Ministry of Digital Economy and Society. (2018). Quarterly report of Information and Communication Technology Survey in Thailand in 2018.
- Ratchford, B. T., Talukdar, D., & Lee, M. S. (2001). A model of consumer choice of the Internet as an information source. *International Journal of Electronic Commerce*, 5(3), 7-21.
- Rodríguez, G. (2007). The multinomial logit model. *Lecture Notes on Generalized Linear Models*, <http://data.princeton.edu/wws509/notes>.
- Yamane, T. (1967). Determining sample size for research activities. *J. Educ. Psychol. Meas.*

