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The Determinants of Mobile Operator Switching and Policy Implications in Developing Countries: A Case Study of Thailand

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Abstract

This paper presents the analyses of the determinants of mobile carrier switching behaviour based on the idea that such the behaviour is the evidence of competition in the mobile market. Indeed, with the possibility to change a mobile service provider, there will be less concentration of customers towards any particular operator, and more distribution of market share among all competitors because the newcomer company can offer its competitive services and gain more subscribers. In order to extract the factors affecting switching decision, both quantitative and qualitative analyses are employed. Binary logit estimation is used as the quantitative method, while qualitative outcomes are derived from the composition of responses regarding carrier switching intention. This study uses a modified estimation model incorporating carrier-related switching costs inspired by Grzybowski (2008). Nevertheless, it is the analysis of a developing country in which Thailand is selected as ground for investigation. The data is collected from surveys randomly distributed within the whole country.

The quantitative results from binary logistic estimation point out that metropolitan residency, night time and smart phone users have a potential to switch while older citizen tend to stay with their current operator. Carrier-provided services such as SMS, Internet, or other cellular-based services create a possibility to switch while general services such as SNS and mobile gaming make the customers stay. Only mobile radio services generate a positive impact on switching behaviour. In terms of customer satisfaction, it turns out that the customers perceiving efficient customer services tend to stay with their current carrier. An interesting result is that the switching cost of the incumbent mobile operator (AIS) has a relatively high negative impact on operator change compared to that of the competitor.

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Even though the economic factor is not statistically significant, cost saving is selected as the first reason for customers who intend to change a carrier in the qualitative results. Apart from that, better signal, better services, better technology, and value added services (VASs) are considered drivers for operator switching intention, respectively.

Key policy implications are proposed based on the idea that Telecommunications-related public organisations are normally required to ensure public interests and benefits for all the customers within their authority. Private telecommunications enterprises progressively seek to increase their network size to assure a certain point of investment return as well as profit.

If the relevant public authority attempts to endorse market mechanism and realises the change of carrier as existence of competition in the mobile market, it should provide measures to monitor and control mobile operator' behaviours in order to ensure that every customer can switch to another carrier without any technical difficulties. Taking into consideration the determinants of carrier switching, the public agent should accommodate the operator change by promoting competitive pricing, expansion of signal coverage as well as quality, and regulating operator-specific offers such as loyalty and/or penalty programme, which may create bias towards the current provider, in order to lessen the impact of switching costs. In the end, the government or public authority should endorse carrier switching, but should not intervene or influence people's decision towards any particular operator.

For the business side, mobile operators can be aware of the relevant factors influencing customers to switch or stay; thus, focus on the provision of effective promotions to keep existing customers as well as attract prospective ones. They can concentrate the company's resources on the significant activities such as improvement of coverage and signal quality, customisation of pricing schemes, development of new technology as well as corresponding services and applications. If the mobile network provider needs to maintain its competitive advantage and customers, it should fill the right gap by tackling relevant switching determinants instead of taking into account other non-significant factors. The freed-up resources from irrelevant activities can then be used to generate competitive offers attracting new customers. Hence, the operator change determinants help mobile operators to be able to manage their resources efficiently, and provide effective and competitive offers to the customers.

1. Introduction

The necessity of mobile phones for communication purposes has been accepted as a global phenomenon. There are an increasing number of mobile phone users in every part of the world. The figure sharply rises across different groups of countries. According to the statistics, mobile penetration (subscriptions per 100 inhabitants) for the whole world increases from 34 to 85 percent within six years, during 2005 – 2011, while there is a tremendous rise of nearly 55 percent for developing countries – an increase from 23 to 78 percent – against steady growth of 37 percent, or from 82 to 119 percent, for developed countries.[1] It is obvious that the demand for mobile telecommunications is high and increasing. The mobile market is still growing in developing countries while it is subject to slight saturation in developed nations as seen in more than 100 percent penetration. Nevertheless, the interesting point is that the growth of mobile communications has also been driven by advancements in wireless technology as well as dynamic competition.

This study focuses on the mobile operator switching as it is an important evidence of competition in the market. Indeed, mobile service providers always compete for customers in order to gain more revenue resulting in a variety of products and services being offered to the market. Usually, newcomers or small operators are not able to compete with the incumbent carriers because of barriers to entry. The possibility of mobile carrier switching eliminates the problem of lock-in that used to be the factor anchoring customers to a particular network provider to which they had initially been subscribed. Without the lock-in effect, the barrier to entry for new or small mobile service providers is lowered. Mobile users can purchase services offered by the newcomer, or small carrier, and switch an operator easily. The market share will not be concentrated in the incumbent or large carrier anymore. It will be distributed among all mobile operators. Hence, the change of mobile carrier is considered important as it opens doors for competition leading to several benefits to the mobile market.

Indeed, the study of mobile operator switching is considered important as it will provide relevant information that conveys development of the mobile market. In order to understand the switching behaviour of mobile customers, one needs to know what matters in such decision-making. The aim of this study is to find the determinants of mobile operator switching within a developing country where Thailand is selected as ground for investigation. With the survey data from mobile phone users in the whole country, the analysis utilises binary logistic estimation to point out the switching determinants. Moreover, a qualitative analysis is conducted in order to capture some

[1] See ITU (2013)

issues that cannot be explained by the statistical estimation. The discussion is derived from the results of both kinds of analyses. Policy implications are also proposed.

The structure of this study is organised as follows. Part 2 consists of previous literatures relevant to the issue. Part 3 provides some information about Thai mobile market and switching behaviours of the customer. Part 4 presents the underlying hypotheses for this study. Part 5 shows the data and its sources as well as research methodology. The results are provided in Part 6 while the discussions are elaborated in Part 7. Policy implications are proposed in Part 8 leading to the conclusion in Part 9.

2. Literature Review

Most of the literatures regarding the switching of mobile service provider are associated with demand-side analyses. Indeed, surveys are usually conducted and data of individual consumers are analysed using statistical approaches in order to be able to extract the factors influencing switching behaviour as well as intention. There are also a number of studies pointing out the existence of switching costs that can generate stagnation in mobile operator switching.

Although similar researches have been witnessed, different methodologies, namely mathematical models or qualitative questions, as well as dataset are used resulting in different outcomes. For quantitative researches, it is the difference in estimation models as well as inclusion of variables corresponding to the researcher's hypotheses that provides rooms for further studies employing altered models incorporating a different set of variables based on data availability that is proper for interested research grounds. For qualitative studies, there are a lot of differences in the way that questions are framed in a particular survey. Some of the researches are focused on psychological reasons, while the others consider carrier-related technical reasons as important factors influencing switching behaviour or intention.

To begin, it is wise to obtain some experiences from other countries so that the reader may have some ideas about how the mobile market works and what have been regarded as switching determinants, or switching costs. Fullerton (1998) did a research in the US showing different regional mobile markets and corresponding market structure. His analyses were conducted by the presentation of constructed indices, namely price performance index (PPI), price difference index (PDI), segmentation index (SI), and service differentiation index (SDI). The remarkable characteristic of the mobile market in the US at that time was that it was made up of hundreds of local duopolies. The results show that out of the 28 markets studied, eight had low competition, 13 had moderate competition, and seven had high competition. He concluded that if an open market was unattainable, public authorities might find duopoly an effective policy as it was suggested to result in a certain degree of competition in the mobile market. Even though the prices may not be lowered that much compared to the case of a fully competitive market, duopoly structure as well as regulated monopoly may eliminate the problem of resource misallocation. Moreover, Valletti and Cave (1998) provide very interesting information about UK mobile carriers' strategies as well as the development of competition. They studied the UK mobile market for 13 years starting from 1985. Similarly, the duopoly market structure existed in the first phase of the study, while later on four operators entered the market. There

was a collusive behaviour witnessed in the first phase and only intensive business users were subject to high prices during then. Indeed, the two carriers were not allowed to sell directly to the public during the first phase of study – 1985-1993. The UK mobile operators' strategies discussed in their research can be categorised into product differentiation, switching costs, and imperfect information. The switching costs such as penalties for contract breaches, impossibility of number portability, and links with specific third-party services are considered important for an operator to retain its customers. In addition, the customer's imperfect information encourages the operator to easily strategise price discrimination. Because of the fact that the studied period was when mobile phones were still at an initial stage of diffusion, a majority of users did not recognise their own demand and usage patterns resulting in customer exploitation in terms of price dispersion and market split-up to extract more revenues. Furthermore, there are also some studies in the developing country regarding mobile communications. Song and Kim (2001) analysed the Korean mobile telephone industry and pointed out economic incentives for industry restructuring. They used simulation modelling to study the carriers' profitability and M&A-induced cost reduction following intense competition among five mobile operators in 1997. On the other hand, Choi, Lee, and Chung (2001) suggested that there are three players in the Korean mobile market, namely a differentiation advantage seeker, cost advantage seeker, and ordinary carrier that has no clear tendency towards any type of advantage. Their research was done during similar period as the previous one; however, their findings are different. Although there was a sharp rise in subscriber growth, there was no evidence of price competition except handset subsidies. After that new restrictions were established in order to cope with the handset subsidy issue. They pointed out that such the regulations favoured the differentiation seeker in the expense of the cost advantage seeker; hence, overall deregulation was necessary in order to increase the level competitiveness in the Korean mobile phone industry as well as consumer welfare.

Furthermore, the literature regarding customer migration in telecommunications can also be witnessed in various regions. In Germany, customer retention, loyalty, and satisfaction are proved to be causally interlinked by Gerpott, Rams, and Schindler (2001). They use a sample of 684 digital cellular network customers to prove the causality. The customer satisfaction has a significant impact on loyalty as well as customer's intention whether to terminate or extend the mobile service contract – customer retention. In addition, prices, perceptions, and lack of mobile number portability (MNP) also have significant effects on the customer retention. An interesting implication from their study is that efficient MNP can be used as a tool

for regulators to promote competition in the mobile market. This emphasises the fact that mobile competition arises from the possibility of operator switching. Another work of literature on switching of telecommunications service is a contribution of Madden, Savage, and Coble-Neal (1999). They analyse the probability of subscriber churn among a group of Australian ISPs with respect to various customer characteristics and service-related attributes. Their methodology is binary probit estimation which is widely-used when analysing individual decisions having dichotomous patterns. The results show that ISP expenditure has a positive relationship with the churn probability, while household income produces a negative impact. Moreover, pricing schemes such as flat-rate promotions also affect subscribers' preference for a particular ISP. For the literature regarding mobile communications, individual customers take into account network size as one of many other factors affecting their decision to select a mobile carrier in Korea (Kim & Kwon, 2003). The research applies a conditional logit model to a sample of 775 mobile users of five mobile carriers in Korea. It turns out that the consumers prefer operators with a larger number of subscribers, and the impact of the network size can be derived from on-net call discounts and quality signalling effect. Another research in the same country identifies the determinants of subscriber churn and customer loyalty using a different statistical approach called binomial logit estimation on a sample of 973 mobile users (Kim & Yoon, 2004). From the outcomes, it can be stated that the probability of mobile carrier switching depends on the level of satisfaction with respect to service attributes such as call quality, pricing scheme, handsets, brand image as well as the subscriber's income and duration of usage. In terms of the determinants of customer loyalty, only call quality, handset type, and brand image produce an impact, while subscription duration is insignificant. The study also provides some ideas about mobile switching costs as a hindrance for carrier churn.

Additionally, there are also a number of studies regarding switching costs in telecommunications. Knittel (1997) studied long distance telephone services in the US during 1984-1993. Despite the AT&T divestiture, the service prices did not fall as opposed to most literature stating that competition resulted in cheaper services in telecommunications market. He constructs a reduced form equation and applies it to panel data of call rates collected from the three largest long distance carriers. The result is that switching costs and search costs give the carriers market power; hence, generate price rigidity in long distance call services. However, another study in the same territory states that switching costs may have an ambiguous effect on prices if telecommunications firms find it impossible to distinguish between new customers and existing locked-in ones (Viard, 2007). The research attempts to find the impact of

switching costs on price competition under a single price regime using a case of 800-number portability, or the US toll-free services. AT&T and MCI are found to reduce the service prices responding to the number portability. This situation implies that lower switching costs – the existence of the portability – increase competition resulting in cheaper services. For the literature on consumer side, Epling (2002) studied the US long distance telephony market in the post 1996. She points out the evidence of third degree price discrimination among low income and rural customers facing higher service prices. The results from a multi-dimension mixture model suggest that there is heterogeneity in the subscriber switching costs and such the costs are positively related to the service prices. In addition, Grzybowski (2008) applies multinomial and mixed logistic models to a panel dataset of British consumer from 1999-2001 in order to estimate the probability of switching as well as switching costs in mobile market. The outcomes show that consumer characteristics including the way they spend their free time have a significant impact on mobile operator switching. Interestingly, operator-related switching costs also generate a significant effect on the churn.

In summary, from the literature mentioned earlier, telecommunications market starts with low competition as seen in many cases of duopoly while it becomes more competitive over time as more service providers enter the market bringing down the prices not to mention there are some public policies to facilitate competitive practices. It can be derived that telecommunication services, especially telephony services, are always subject to increased demand and more supply is necessary. This results in more carriers and various offers at competitive prices. It is a preferable direction of market development for the consumers. In order to support the competition, one aspect is to allow customer migration. The study of the determinants of carrier switching or selection provides a great deal of contribution to the issue. Most of the literatures suggest that the switching and selection of telecommunication service provider are dependent on customer characteristics, service-related attributes, service prices, satisfaction, network size, duration of usage, and switching costs.

This research, however, takes into account previous literature as well as specific characteristics of the mobile consumers in the interested country; hence, produces a new model with a different set of variables in order to provide a seemly estimation for the determinants of mobile operator switching. More details are discussed in the methodology section.

3. Mobile Operator Switching in the Thailand

The Thai mobile market is being served by six operators which are AIS, DTAC, True Move, CAT-Hutch, DPC, and TOT. There is an independent regulator whose authority is to regulate the mobile market in the way that competition is realised. Indeed, despite the penetration rate of more than 100 percent, the competition level is still low for mobile communications as seen in a high value of HHI (Herfindahl–Hirschman Index) as well as an evidence of market share concentration in the incumbent, or big network operator (AIS) (Keesookpun, 2011). In response to that, the independent regulator establishes a number of policies and regulations to promote competition within the market. Mobile carrier switching is also considered an important factor for the development of competition as seen in some regulations targeting the elimination of switching barriers for mobile customers.

First, it is the regulation that neutralises the price of on and off-net calls[2]. This regulation is considered vital to the switching behaviour because it eliminates a part of economic barrier to switch. Indeed, it has always been witnessed that mobile carriers try to acquire and maintain customers by offering cheaper on-net calls, while charging high rates for off-net calls. This situation is an obstacle to the development of competition as the customers of an incumbent, or large operator as well as the first mobile service provider then become bias towards cheaper call charges and tend to remain with the operator. In the long run, there will be no incentive for another operator to enter the market as it would not be able to obtain a certain number of customers to break-even its costs. Without many firms competing for customers, there will not be enough investment for the development of infrastructure of mobile communications. In addition, the problem of traffic bottleneck will occur because one carrier is not able to serve the demand coming from the whole country. The act to neutralise the price of the two kinds of call results as facilitation for mobile carrier switching as well as competition in the mobile market.

Second, there is also a notification of the establishment of MNP (Mobile Number Portability) announced in August, 2009 for the first time in Thai telecommunications market[3]. Similarly, this policy is to accommodate mobile carrier switching by allowing the customers to use their current mobile phone number with services of another carrier. In fact, it eliminates a lot of number-related obstacles of switching. Most people are not willing to change their number because the problems such as losing as well as maintaining contacts will occur. With such the policy being

[2] For more information, see Keesookpun (2011)
[3] See NBTC (2013)

implemented, it is beneficial to customers especially those having to maintain their contact to purchase offers from different mobile operators. The result is an increase in the number of mobile carriers offering various promotions; hence, competition will prevail.

Even though there have been no consumer statistics of switching behaviour as such the behaviour is still at an early stage and the independent regulator has been established for less than a decade, the authority puts a lot of interests in the mobile carrier switching as it is believed to be the key to the promotion of competition in the market. Therefore, the study of the determinants of mobile operator switching in Thailand is considered vital, especially when it can provide some information from the consumer side as a contribution that will be useful for policy makers of both business and public sector.

4. Research Hypotheses

This part consists of the underlying hypotheses to be tested in this study. Such the hypotheses are formulated in accordance with theoretical or conceptual background derived from previous literature. It is wise to elaborate more on the fundamental of hypothesis setting before moving into each of the hypotheses.

Indeed, the literature provides some insights about the determinants of switching behaviour in mobile market. The theoretical framework for this study is based on such insights. Hence, mobile operator switching is determined by five attributes, namely (1) customer characteristics, (2) economic attribute, (3) mobile services, (4) psychological and (5) unobservable attribute.

This study presents a set of hypothetical components corresponding to each of the theoretical attributes having an impact on switching behaviour. In fact, such components are considered proxies representing the theoretical attributes. Each hypothesis is constructed in order to test whether the hypothetical proxies can be considered as the determinants of switching behaviour in mobile market.

H1: Customer demographics have an impact on mobile operator switching.

It is according to the theoretical background that customer characteristics generate substantial impact on operator switching behaviour. Again, characteristics such as how the customers spend their free time have some influence on the switching behaviour in the UK mobile market (Grzybowski, 2008). This study then attempts to propose an idea that demographic attributes may have an impact on the switching behaviour as well. Such attributes include a variety of customer-specific as well as mobile usage characteristics. They consist of gender, age, education, income, number of household members, area of residency, time of mobile usage, and type of handset.

H2: Mobile usage cost has an impact on mobile operator switching.

Apart from literature remarks, this hypothesis is based on common conceptual insight that most people would consider monetary aspect when they decide to switch a carrier. The mobile usage cost is considered a part of economic attribute and believed to produce some impact on switching behaviour. The measurement of mobile usage cost in this study is the monthly average cost – in local currency (Thai Baht) – of mobile services for an individual customer.

H3: Usage of mobile services has an impact on mobile operator switching.

The third hypothesis is based on the fact that mobile services have an impact on operator switching as seen in the literature. However, this study proposes two kinds of mobile services. First, they are operator-related services. These services are provided by a particular operator through cellular network. Examples include SMS, mobile

internet, and other services, or value-added services (VASs) such as ringtones, calling melodies, specific applications, etc. The other kind of mobile services is different from the first one in the sense that it can be consumed regardless of constraint to which operator the subscription is registered. Indeed, the second one is called general mobile services. They consist of mobile TV, radio, social network sites (SNS), email, chat (via specific applications), gaming, music, and video streaming.

H4: Operator preferences have an impact on mobile operator switching.

The fourth hypothesis is concerned with psychological attribute determining the switching behaviour. On the one hand, a part of it comes from satisfaction regarding to various aspects, while, on the other hand, there are also perception and evaluation involved in the establishment of preference towards a particular carrier. This study proposes operator preferences as a proxy for psychological attribute in the theoretical background. Such preferences cover several relevant aspects of usage of mobile services. These include the preference of cheaper services, area coverage, voice quality, suitable services, efficient customer services, recommendation or suggestion from surrounding people, and no financial burden.

H5: Switching costs have an impact on mobile operator switching.

The last hypothesis attempts to capture the impact of switching costs on the switching behaviour. Switching costs consist of both monetary and non-monetary cost; therefore, difficult to observe (Kim et al., 2004). The switching cost is regarded as unobservable attribute having influence on operator switching behaviour. Taking into account the exertion in observing the switching cost, this study then aims at finding its impact instead of its components. The proxy used in this case is operator-specific switching cost that will provide an insight whether a particular mobile carrier has any impact on the switching behaviour.

5. Data and Methodology

5.1. Data

This study utilises the data obtained from individual surveys randomly collected from the whole kingdom of Thailand. The surveys were distributed among five main parts of the country, namely Middle, North-eastern, North, South, and Bangkok and surrounding areas. The year of data collection is 2011. All surveys were conducted in Thai while relevant information and questions are translated into English by the author in order to be used in this study. After validation and calibration, the total number of operational observations is 3,768 consisting of only mobile phone users. Great appreciation is expressed to the Office of National Broadcasting and Telecommunications Commission (NBTC) for the provision of necessary data and information for the study.

Table 1 Variables and Descriptive Statistics

Variable	Description	Mean	Standard Deviation	Minimum	Maximum
Dependent Variable (DV)					
Operator Switching	=1 if switch; =0 otherwise	0.2059	0.4044	0	1
Demographics (DM)					
Sex	=1 if male; =0 otherwise	0.4658	0.4989	0	1
Age	Age (years)	38.2195	14.2221	15	70
Education	=1 if undergrad or more; =0 otherwise	0.2956	0.4564	0	1
Income	Monthly salary (Baht)	13,089.8300	15,029.9600	0	300,000
No.HH	Number of household members	3.9835	1.6383	1	15
Area	=1 if metropolitan residency; =0 otherwise	0.5579	0.4967	0	1
Night	=1 if use in the night (2201-0800HR); =0 otherwise	0.0441	0.2052	0	1
SP	=1 if use a smart phone; =0 otherwise	0.1903	0.3926	0	1
Economics (EC)					
MnthC	Monthly usage cost (Baht)	473.0958	493.8442	20	7,000
Operator Services (OS)					

SMS	=1 if use mobile Short Message Service; =0 otherwise	0.2816	0.4498	0	1
Int	=1 if use mobile internet; =0 otherwise	0.1839	0.3875	0	1
Oth	=1 if use other cellular-based services (ringtones, calling melodies, applications, etc.); =0 otherwise	0.0939	0.2918	0	1
General Mobile Services (GS)					
TV	=1 if use mobile TV (watching via the phone); =0 otherwise	0.0565	0.2310	0	1
Radio	=1 if use mobile radio; =0 otherwise	0.1616	0.3682	0	1
SNS	=1 if use Social Network Sites (facebook, twitter, etc.); =0 otherwise	0.1391	0.3461	0	1
Email	=1 if use mobile emails; =0 otherwise	0.0772	0.2670	0	1
Chat	=1 if use chatting applications (WhatsApp, Line, ICQ, etc.); =0 otherwise	0.0886	0.2843	0	1
Play/DL games	=1 if play and/or download games via mobile; =0 otherwise	0.0387	0.1930	0	1
Listen/DL songs	=1 if listen and/or download musics via mobile; =0 otherwise	0.0518	0.2216	0	1
Watch/DL videos	=1 if watch and/or download videos via mobile; =0 otherwise	0.0640	0.2447	0	1
Preferences (PR)					
Cheaper	=1 if prefer cheaper	0.5127	0.4999	0	1

service	services; =0 otherwise				
Coverage	=1 if prefer coverage; =0 otherwise	0.5364	0.4987	0	1
Voice quality	=1 if prefer voice quality; =0 otherwise	0.4655	0.4989	0	1
Suitable for needs	=1 if prefer personalised services; =0 otherwise	0.2553	0.4361	0	1
Efficient CS	=1 if prefer efficient customer service; =0 otherwise	0.1369	0.3438	0	1
Recommendations	=1 if prefer suggestion from friends/acquaintances/family; =0 otherwise	0.2168	0.4121	0	1
No PM	=1 if prefer not to pay by oneself; =0 otherwise	0.0252	0.1568	0	1
Switching Costs (SC)					
AIS	=1 if use main number from AIS; =0 otherwise	0.4326	0.4955	0	1
DTAC	=1 if use main number from DTAC; =0 otherwise	0.4183	0.4933	0	1
Number of Observations		3,768			

From the above table, it is to be noted that the dependent variable is also a dummy variable taking the value of either 0 or 1. It is equal to 1 if a particular individual has ever changed a mobile service provider, while 0 means that the individual respondent has never switched to another mobile carrier. This is to satisfy the estimation method discussed later in this section. In addition, there are a number of dummy variables included as independent variables because of the fact that most of the valid responses – mostly answered questions – are a yes-or-no type. There are some numerical variables such as Age, Income, and MnthC.

Remarkably, the youngest individual sample is 15 years old, while the oldest one is 70 years old. This states the fact that the mobile phone usage in Thailand can be witnessed in all generations, namely the young generation, usually unemployed students; the middle generation, or working individuals; and the old generation, mostly retired workforces. Another point is that even though there is a significant gap of income inequality shown by the difference between the lowest sample income of zero and the highest one, 300,000 Baht per month, the usage of mobile phones still exists.

This is a common situation where unemployed or no-income individuals are getting paid for their mobile phone usage expenses. Indeed, it is a characteristic of the Thai society that most of the time, parents, guardians, or husbands are presumably in charge of such the expenses as well as other necessary expenditures for their children, subordinates, or housewives.

Moreover, there are relevant qualitative responses collected from questions related to individual preferences as shown in the table below. The answers to each question combined with the number of people who have and have not changed a mobile carrier in the past are used to construct qualitative results charts in order to support the statistical outcomes.

Table 2 Reasons of Mobile Operator Switching

Q: Why do you intend to change your mobile operator? (multiple selection allowed)	Category Name
1. It saves expenses/there is a cheaper service from another operator.	Cost Saving
2. The other operator provides better services.	Better Service
3. The other operator has more advanced technology.	Better Technology
4. The other operator has better signal quality.	Better Signal
5. I want to use value-added services (VASs) such as internet, TV, etc.	Value Added Service (VAS)
6. I do not need VASs.	No Need for VAS

One can see that these are the questions to explain the switching behaviour in a clearer way. The category names will be used when constructing the results figure.

5.2. Methodology

The methodology for this study can be divided into two parts according to the purposes of analysis and characteristics of available data. First, the key analysis is a quantitative approach utilising binary logistic estimation to model switching behaviour and its determinants. Second, it is the supportive qualitative analysis that is being considered to have some intuitions regarding the switching behaviour.

For binary logistic regression, the estimation takes place twice. In the first model, there are 5 attributes, while the switching costs are added giving the second model another variable. The inclusion of switching costs as explanatory variables follows similar analyses carried out by Grzybowski (2008), which utilises the random utility theory portrayed by McFadden (1973). According to the theory, the utility that an individual i receives when faced with a choice of mobile operator switching can be expressed as $U_{im} = V_{im} + \epsilon_{im}$ where m denotes the choice of either to switch or not,

V_{im} is the observable part and ϵ_{im} is the unobserved idiosyncratic tastes. The indirect utility function for this study can be derived as follow.

$$U_{im} = U(C_i, S_{im})(m \in \{switch, no\ switch\}) \quad (1)$$

From equation (1), it is to be understood that the utility an individual consumer i obtains is a function of consumer-specific attributes (C_i) and service-specific attributes (S_{im}). The consumer-specific attributes include demographic characteristics such as sex, age, education, income, household size, residency area as well as mobile phone usage. On the other hand, the service-specific attributes include mobile operator-provided services, general mobile services, operator preference as well as unobservable operator switching costs.

$$\Pr(switch|m) = \Pr\left(U_{switch,i} > U_{no\ switch,i}\right) \quad (2)$$

Equation (2) states that the probability of individual consumer i to switch a mobile operator is derived by the higher level of utility received from switching compared to the case of not switching.

Provided that the unobserved part, ϵ_{im}, is distributed independently and identically in logistic distribution, the relationship of the revealed utility and probability of switching can be estimated using binomial logit model – an estimation technique widely-used in academic researches dealing with discrete choice model.

The binary logit model can be expressed as a function below.

$$P_i = Pr\left(Y_i = 1 \middle| X_{ij}\right) = \frac{e^{X_{ij}\lambda}}{1+e^{X_{ij}\lambda}} \quad (3)$$

In equation (3), Y_i is the binary dependent variable taking the value of 1 when there is a switching behaviour of an individual i, while 0 when there is no switching of mobile service provider. In addition, X_{ij} consists of mobile operator dummies – operator j – and consumer attributes as well as service-related factors and preferences. This model is then linearised in order to produce an estimating equation with X_{ij} as explanatory variables. Indeed, the probability of switching given a set of relevant attributes $\left(Y_i = 1 \middle| X_{ij}\right)$ can be estimated. The switching costs are represented in the mobile operator dummies.

Besides the previous researches (Grzybowski (2008), Kim & Yoon (2004)), this study includes a different set of independent variables according to the data availability as well as suitability of the sample group. Another different point is that a large number of observations are collected and the variation of individual sample attributes is assumed to have sufficient explanatory power for the dependent variable. Hence, it is indifferent whether or not to perform time-dependent estimations. Indeed, time is not

considered in this study as the results are assumed identical. The estimating equation for binary logistic analysis is shown below.

$$DV_i = \alpha_0 + \sum_{n=1}^{8} \beta_n DM_{n,i} + \gamma EC_i + \sum_{n=1}^{3} \delta_n OS_{n,i} + \sum_{n=1}^{8} \tau_n GS_{n,i} + \sum_{n=1}^{7} \varphi_n PR_{n,i} + \left\{ \sum_{n=1}^{2} \omega_n SC_{n,i} \right\} + \varepsilon_i$$

The operator switching behaviour (DV) is a binary variable having the value of 1 when the particular individual switched a mobile service operator. The determinants, or independent variables, are categorised into different attributes, namely Demographics (DM), Economics (EC), Operator Services (OS), General Mobile Services (GS), Preferences (PR), and Switching Costs (SC) as shown in the above equation. Each of the attributes is consisted of sub-attributes whose number is written accordingly. The sub-attributes and their explanations are shown earlier. Note that there is only one economic attribute, which is the monthly usage cost. The switching cost is written in a bracket to show that it is included in the second estimation while not presented in the first one. This is to compare whether the inclusion of mobile carrier switching costs have any impact on the estimation based on the current set of data.

Moreover, the qualitative analysis is conducted by gathering the responses regarding individual's reasons of operator switching intention. The process is as follows. First, an individual is asked all of the six yes-or-no questions allowing the selection of more than one alternative. Then all the responses are examined. After that, the valid observations are categorised based on switching behaviour in the past and switching intention in the future.

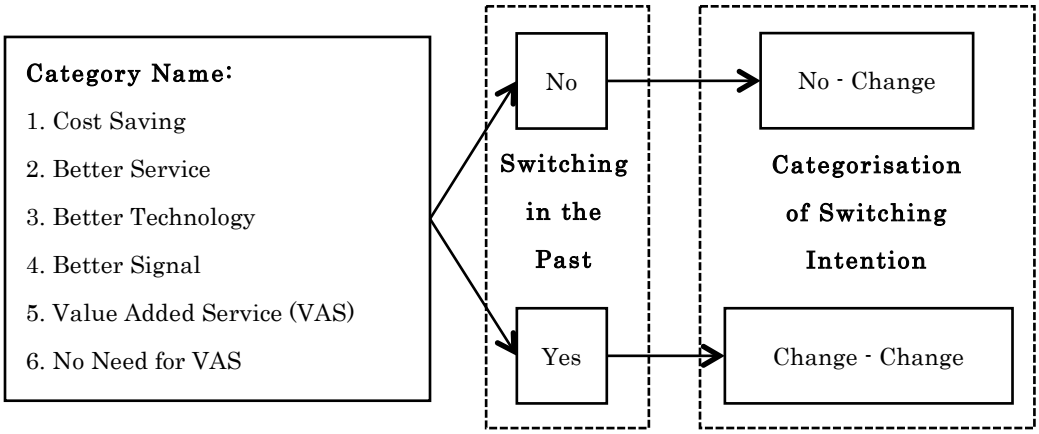

Figure 1 Process of Qualitative Analysis

According to the above figure, the qualitative analysis can be elaborated in a more comprehensive way. Indeed, the category names are used to represent corresponding questions regarding switching intention. This is to shorten the words to be displayed in the results. After all respondents with switching intention are grouped into each category, they are divided into those who have and have not switched a mobile

operator in the past. The results to be shown are the number of respondents with switching intention sorted into each of the categories presenting those who have switched (Change – Change) and who have not switched (No – Change) a mobile operator in the past.

6. Empirical Results

This section elaborates the estimation outcomes of the logistic regression or logit model employed in the analyses of collected data. Apart from the quantitative analysis aforementioned, this section also depicts qualitative results gathered from subjective responses to the related questions of the survey in order to provide substantial endorsement to the quantitative results and following discussions as well as reveal some issues that cannot be captured by the mathematical model.

6.1. Logistic Regression Results

According to the fact that the aforementioned economic literature incorporating random utility suggests the existence of switching costs as well as persistent preference, or taste, when an individual makes a decision whether to select an alternative being presently considered, the binary logit model is estimated twice. First, it is the model with all covariates except variables that represent switching costs of changing a mobile operator. Second, allowing the existence of operator-related switching costs such as contract cancellation and other psychological costs, operator dummies for the two major mobile operators are included in the model.

Table 3 Binary Logit Results

D.V.: Operator Switching	**Model I**		**Model II**	
Variable	**Marginal Effect**	**Prob.**	**Marginal Effect**	**Prob.**
Demographics				
Sex	0.007290	0.576000	0.006681	0.609000
Age	-0.002710	0.000000	-0.002620	0.000000
Education	-0.001763	0.911000	0.000541	0.973000
Income	0.000001	0.169000	0.000001	0.183000
No.HH	-0.001960	0.623000	-0.002399	0.547000
Area	0.025295	0.057000	0.025780	0.052000
Night	0.062394	0.065000	0.060200	0.074000
SP	0.076257	0.001000	0.075586	0.001000
Economics				
MnthC	-0.000017	0.278000	-0.000015	0.332000
Operator Services				
SMS	0.032554	0.049000	0.031432	0.057000
Int	0.089214	0.010000	0.088343	0.011000
Oth	0.061211	0.014000	0.063012	0.012000

General Mobile Services				
TV	0.007481	0.790000	0.007985	0.776000
Radio	0.042017	0.030000	0.041282	0.033000
SNS	-0.068136	0.013000	-0.068498	0.012000
Email	0.033109	0.335000	0.034066	0.323000
Chat	-0.016698	0.571000	-0.019238	0.511000
Play/DL games	-0.059867	0.042000	-0.059742	0.042000
Listen/DL songs	-0.036557	0.222000	-0.034836	0.247000
Watch/DL videos	-0.008339	0.799000	-0.008705	0.790000
Preferences				
Cheaper service	0.001248	0.926000	-0.006393	0.646000
Coverage	-0.021083	0.134000	-0.012021	0.407000
Voice quality	-0.015976	0.248000	-0.010505	0.453000
Suitable for needs	0.020432	0.192000	0.016960	0.278000
Efficient CS	-0.051715	0.003000	-0.052025	0.003000
Recommendations	-0.004948	0.759000	-0.007222	0.653000
No PM	-0.016906	0.670000	-0.018481	0.639000
Switching Costs				
AIS			-0.053106	0.008000
DTAC			-0.030833	0.094000
Observations	3768		3768	
Pseudo R^2	0.0407		0.0425	
LR Chi^2	156.06		163.00	
AIC	3732.26		3729.31	

From the table of binary logit results above, one can see that the overall robustness increases as mobile operator-related switching costs are allowed in the model as shown by higher R-squared, Log-likelihood Ratio Chi-squared as well as lower Akaike Information Criterion (AIC) in Model II. Indeed, only two operator-related dummies of AIS and DTAC are included in the second model in order to cope with the problem of multicollinearity when more of such the dummy are added. The selection of these two out of five operators is based on number of the customer according to the survey, while changing one or both variables to that of different carriers also yields a similar outcome of a better fitted estimation with presence of operator-related switching costs.

Before moving on to the detail of the results, it is vital to confirm the robustness of the models once again in another aspect. This time it is the interference of

each variable to one another. According to the fact that the data is collected from surveys, some independent variable(s) may have an influence on one another or many others up to the level that can destroy the power of estimation of the dependent variable. In other words, it is the problem of multicollinearity that needs to be proved non-existed in order to be able to produce good estimating models.

Table 4 Multicollinearity Test Results (VIFs)

Variable	VIF	1/VIF
Age	7.37	0.14
No.HH	5.40	0.19
SNS	5.20	0.19
Int	4.90	0.20
AIS	4.03	0.25
DTAC	3.50	0.29
Chat	2.66	0.38
Coverage	2.63	0.38
MnthC	2.52	0.40
Income	2.42	0.41
Area	2.31	0.43
Email	2.27	0.44
Watch/DL videos	2.20	0.45
Voice quality	2.15	0.47
SP	2.08	0.48
Cheaper service	2.08	0.48
Education	1.88	0.53
Listen/DL songs	1.82	0.55
Sex	1.82	0.55
SMS	1.81	0.55
Play/DL Games	1.59	0.63
Suitable for needs	1.48	0.67
Radio	1.39	0.72
Recommendations	1.35	0.74
Efficient CS	1.29	0.78
Oth	1.23	0.81
TV	1.20	0.83
Night	1.11	0.90
No PM	1.06	0.94

Mean VIF	2.51

According to the table of multicollinearity test results, variance inflation factors (VIFs) for each of the interested variables are shown as well as the tolerance values, or 1/VIF, in order to confirm the independence of interference in terms of variance. As a rule of thumb, the accepted value for VIF exhibiting non-significant level of multicollinearity is 10 or less while the tolerance value should be 0.10 or more. Indeed, the lower level of the VIF, or higher the tolerance value, is associated with lower level of multicollinearity, or interference of independent variables. Nevertheless, some literature provides a suggestion that the VIF can be greater and tolerance value lower than the rule-of-thumb values (O'Brien, 2007).

Since all the variables have their VIF values less, and tolerance values more than the rule-of-thumb value, it is confirmed that the inclusion of all interested variables into the models is out of the concern of multicollinearity. Therefore, it is proper to proceed to further explanations of the results.

In the first model (Model I), statistically speaking, it is to be noted that the probability to change a mobile operator decreases as people grow older, that being shown by the significance level of less than 1 percent. However, the people living in metropolitan areas and those using mobile services in the night – after 10.00 p.m. until 8.00 a.m. – have a potential to switch to another carrier with 90 percent confidence level. Interestingly, smart phones (SP) are considered a statistically significant driver of the change of mobile operator at a confidence level second to Age. That concludes the demographic factors leaving behind non-significant variables that are sex, education, income, and number of household member. The only economic factor considered in the model is the total monthly cost (MnthC) of mobile services that an individual has to pay. This factor turns out to be not statistically significant. Nevertheless, one can see that the sign is negative, so the cost of mobile usage may be considered a potential hindrance to the decision to change a mobile operator at further analyses. More discussions will be provided later.

For the mobile service factors, a positive impact to the change of mobile carrier can be derived from the usage of SMS, mobile internet, other services (Oth) – mobile applications and other cellular-based services – and mobile radio. Of all the services that are positively related to the probability to change a mobile service provider the mobile internet is the most influential followed by other services, mobile radio, and SMS with the significance level from 1 to 5 percent according to the logistic results. Remarkably, mobile SNS and gaming – both online and downloaded – reduce operator switching potential substantially at 5 percent statistical significance. The other services

namely, mobile TV, emails, chat, songs and videos browsing/download do not exhibit sufficient significance to be considered having an impact on the operator switching behaviour as endorsed by the estimation model.

The fact that psychological factors also have an important impact to individual's decision making is witnessed here. According to the results, one can see that people who perceive efficient customer service (CS) have a lower tendency to switch to another mobile operator. Indeed, this perception is the most important among all the others as it is the only significant one with 99 percent confidence level. The perceptions of cheaper service cost, good coverage, voice quality, suitability, good word of mouth – recommendations from surrounding people – and no payment (PM) have no influence upon the decision to change a mobile service provider according to the statistical outcomes.

In the second model (Model II), all of the significant factors in the first model remain with same signs indicating similar directions of impact on the dependent variable. However, after allowing the existence of switching costs, the level of significance varies for particular variables. In the demographic factors, Area becomes more significant while Night becomes less significant. Smart phone users have the same level of significance for their parameters in both models. In the service factors, more significant ones include other services and SNS while SMS, internet, and radio become less significant. Interestingly, the mobile gaming factor remains unchanged in its significance level. Similarly, the perception of efficient customer service maintains its significance level equal to that of the previous model. On the other hand, switching costs from the two major mobile service providers – AIS and DTAC – seem to hinder operator switching behaviour as shown by negative signs of the corresponding operator dummies.

Up to this stage, the logistic results are considered sufficient to provide answers to the hypothesis testing. According to the fact that age, area of residency, time of mobile usage, and type of mobile handset are statistically significant, customer's demographics have an impact on the switching behaviour. Hence, H1 is accepted. However, it turns out that the cost of mobile usage has no influence on the switching behaviour as seen in the insignificant variable representing monthly usage cost of mobile services. This means that H2 is rejected. In terms of mobile services, the statistical outcomes clearly show that both operator-related services – SMS, mobile internet, and other services – and general mobile services, namely mobile radio, SNS, and gaming, produce a significant impact on the switching behaviour. Thus, H3 is accepted. For customer's preferences towards a particular operator, efficient customer

services are considered significant among all other aspects leading to the fact that H4 is also accepted. Finally, the switching cost of both of the sampled operators – AIS and DTAC – produces a significant and negative impact on the switching behaviour. Then the last hypothesis, H5, is accepted. All the results are displayed in Table 5.

Table 5 Results of Hypothesis Testing

Hypothesis	Significant Determinant	Result
H1: Customer demographics have an impact on mobile operator switching	Age, Area, Night, SP	Accepted
H2: Mobile usage cost has an impact on mobile operator switching	MnthC	Rejected
H3: Usage of mobile services has an impact on mobile operator switching	SMS, Int, Oth, Radio, SNS, Play/DL games	Accepted
H4: Operator preferences have an impact on mobile operator switching	Efficient CS	Accepted
H5: Switching costs have an impact on mobile operator switching	AIS, DTAC	Accepted

6.2. Qualitative Results

In order to provide robust discussions in the following section, the responses from subjective questions are gathered and analysed. All the results are presented in the form of consolidated illustrations for comprehensive purposes. Before moving on to the results, it is to be remarked that the responses used to generate the result charts are based on intention to change one's operator.

Basically, the data is obtained from answers to questions regarding the reason that makes an individual intend to change to another mobile network provider. Then the illustrations are constructed incorporating the data whether a particular individual has ever changed a mobile operator in the past. In summary, there are four cases, namely (1) an individual who has not changed and does not intend to change the current mobile operator (No-No), (2) an individual who has changed and does not intend to change the current mobile operator (Change-No), (3) an individual who has not changed and intends to change the current mobile operator (No-Change), and (4) an individual who has changed and intends to change the current mobile operator (Change-Change).

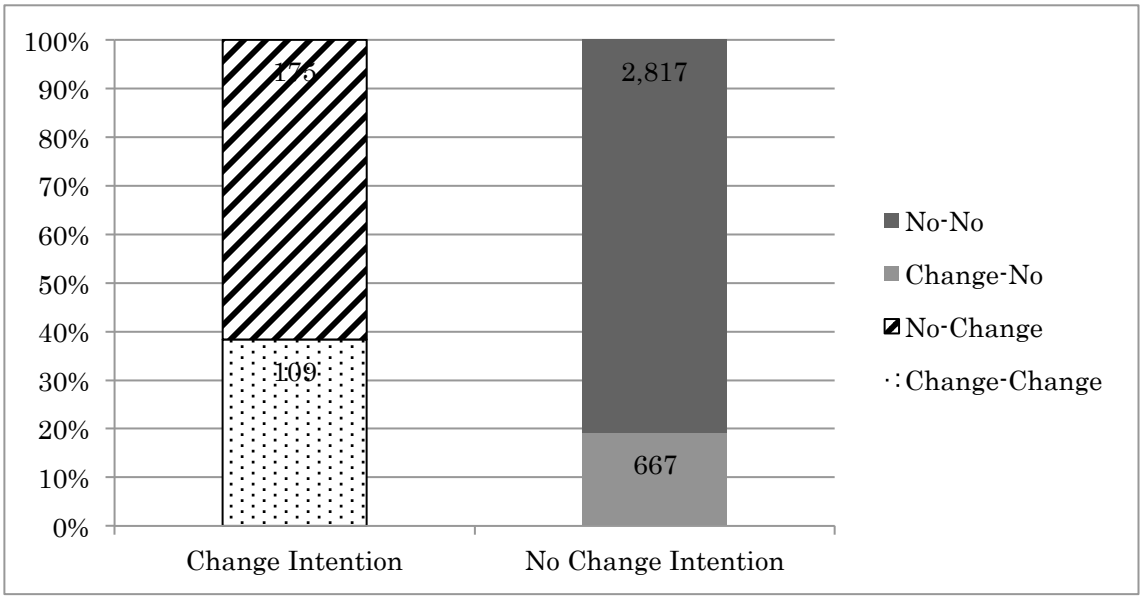

Figure 2 Operator Switching Behaviour and Intention by Number of Respondents

The above figure depicts an interesting fact about the characteristic of the respondents. Indeed, one can see that most of the people have no intention to change their mobile network operator as shown by the number of more than 3,000, while approximately 280 respondents intend to change to another provider. Within the group that does not intend to change their current carrier, almost 20 percent, or 667 people have once or more switched while the rest 80 percent, or 2,817 people have never changed a provider before. However, within the group wishing to switch an operator, almost 40 percent, or 109 people have tried changing and more than 60 percent, or 175 people have never engaged in operator switching in the past.

Nevertheless, the focus of this research is on those individuals with operator change intention despite their relatively low number of respondents. The following figure provides more details on this particular group by depicting number of respondents according to their reasons for the change intention.

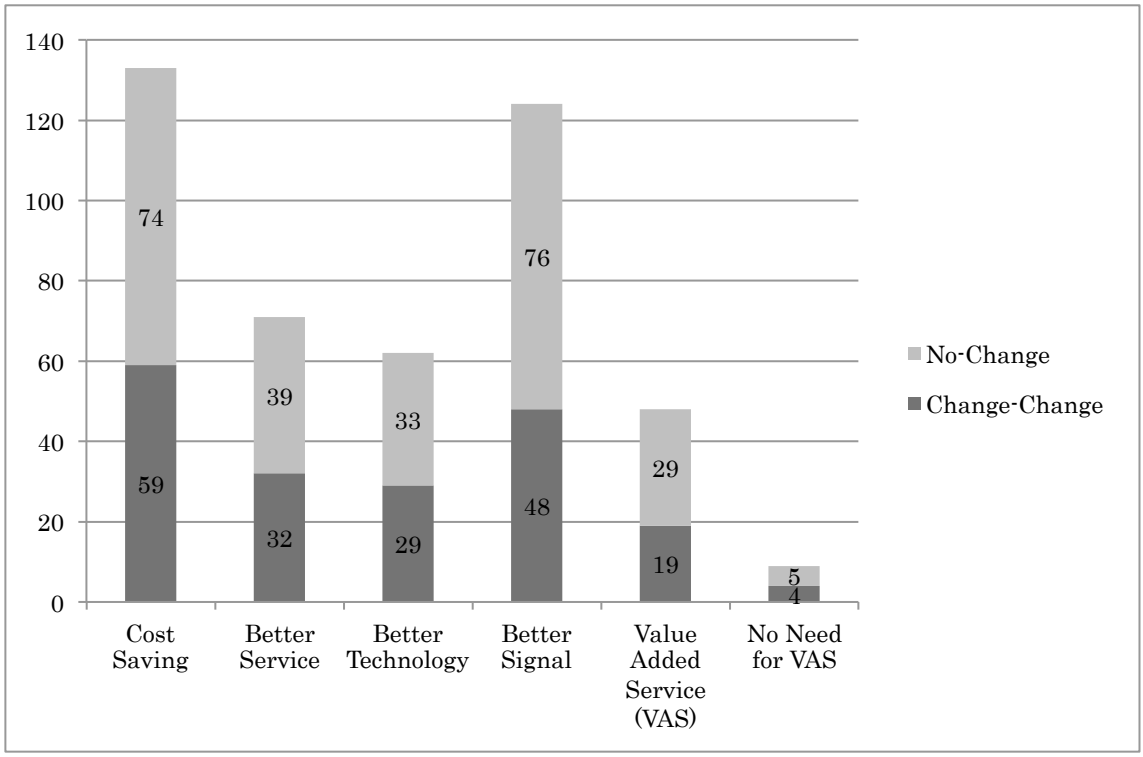

Figure 3 Respondents and Reasons for Operator Change Intention

The answers from questionnaires are translated into English and combined into 6 categories of reasons for operator change intention with corresponding number of respondents being allowed to select more than one choice. In terms of selection frequency, top three reasons are, respectively, cost saving, better signal, and better service.

Indeed, most people intending to change an operator put in their decision a lot of weight whether another provider could help lower their mobile service expenditure as well as provide better quality signal. Both of these two reasons account for almost 260 observations, while adding the third reason – better service – the total number of observations reaches more than 300, which is more than the actual number of respondents having intention for operator change.

One can see that technology is also considered in the decision to switch a mobile operator as shown by more than 60 observations. However, value-added services (VAS) such as online services, operator-customised applications, and broadcasting services seem to be considered at a lower extent. In fact, people who intend to switch in order to use another provider's VASs account for less than 50 observations while those deciding to switch to avoid using future VASs account for only 9 observations, which is the lowest.

An interesting feature of the results is that the observations are distributed

quite fairly at a ratio of 50 – 60 percent in each category. People who have no experience of operator switching provide slightly more responses than experienced users.

7. Discussions

This section provides comparative discussions of the results. To begin, the logistic regression results lead to interesting facts of operator switching determinants within the randomly-selected sample from the whole country.

7.1. Demographics

For the demographic aspect, it turns out that the operator switching behaviour cannot be predicted by looking at an individual's gender, level of education and income, and size of family.

However, the fact that older people tend to stay with their current provider suggests two issues. First, it is that most Thai like to keep things the way it used to be. As time goes by, people gradually adapt to their carrier and may find it burdensome to start over with another mobile service provider, not to mention some time-dependent benefits such as loyalty discounts, and priority promotions offered to current customers, which have been witnessed now and then in the Thai mobile market. Second, younger users are eager to try new things. Indeed, they have relatively higher tendency to change to another carrier because they can most of the time try new services offered by another operator even if they have to change their current mobile phone number. It is to be remarked that at the moment Mobile Number Portability (MNP) has not been fully realised yet. That can be considered another factor preventing older people to switch as they do not want to change their mobile number and inform everybody in the contact of the new one.

Urban users are likely to change a mobile service provider because these people get full access of relevant information regarding new promotions, service reviews, and after-sale services. In fact, the information on any product and service is usually being distributed online. Provided that the internet literacy rate and coverage are lower in the rural areas, the people living there do not likely to exhibit operator switching behaviour because of lack of updated information from other mobile operators. Most of the time, they only get new information about promotions and discounts through service centres or postal mail, which are typically customised to their usage pattern of the current mobile service provider. They hardly get information from their operator's competitor, while those living in areas with sound internet access can acquire such the information online instantly. Besides, there are relatively not many service centres in a rural community, so the local would easily become locked in to the present carrier. Apart from information disparity, there is an inequality of network quality. Mobile users in the rural areas generally get to accept what is being offered. They would not switch to another carrier because there is no better one in terms of signal or connection stability

in their area. This is also shown in the qualitative results that better signal is ranked the second reason in terms of frequency when engaging in switching intention.

Similarly, the switching behaviour witnessed in the group of people using mobile phone in the night as well as those using smart phones can be considered an endorsement to the fact that network quality also has an important role. After 10.00 p.m., a majority of people are off work and able to use their mobile services intensively so it can be construed that most of the traffic, in other words, congestion, occurs in the night. The people using the mobile services in the night normally encounter bottleneck problem and tend to change to another provider offering smoother connection, or having better bandwidth management. In the same manner, smart phone users are also sensitive to network quality and always utilise both voice and data service at a greater rate compared to users of ordinary mobile phones. They are always selective and willing to switch to another carrier with better connectivity. In addition, they also seek better, or more advanced technology in order to be able to utilise their device at full capacity.

7.2. Economic Attribute

In terms of economic consideration, a majority of people intend to switch to another mobile operator if it would lower their usage expenditure as seen in the qualitative result figure. The results from the statistical estimation do not show this fact because the effect of the cost over operator switching behaviour – the dependent variable – is probably being distributed among other explanatory variables such as those representing different mobile services; hence, it is underestimated. Another interesting discussion is that when comparing between the two models, the inclusion of operator-related switching costs makes the monthly cost variable less significant. This can be explained by the fact that a part of the switching costs is monetary cost creating partial impact on the switching behaviour.

Nevertheless, there is a more comprehensive interpretation that leads to a remarkable insight of the insignificant impact of economic attribute on the switching behaviour. To recall, the statistical estimation is done on actual data of switching behaviour, while the qualitative results are drawn from switching intention. In the former analysis, past switching behaviour of an individual mobile customer is treated as the dependent variable. On the other hand, the latter one incorporates the response regarding switching intention in the future. One should be able to distinguish between the two as they produce contradictory outcomes. In this case, it is apparent that monthly usage cost is not one of the determinants of switching behaviour as portrayed by the logistic results. The interpretation begins with customer side. In fact, when it comes to actual situation that a Thai customer needs to choose whether to switch or

stay, he takes into account other factors such as specific services, customer services, and switching costs, rather than the usage expenditure. Moreover, for the supply side, it is the case that most of the mobile services in Thailand are being offered at competitive prices. The difference of the prices of voice and non-voice services provided by major mobile carriers – AIS, DTAC, and TRUE MOVE – is slightly low. Indeed, the market share of these carriers combined is more than 95 percent. For instance, on average, the most expensive voice call is about 0.69 Baht, or 0.02 USD per minute offered by TRUE MOVE, which is ranked the third mobile carrier in terms of market share, while the cheapest one is 0.45 Baht, or 0.01 USD per minute offered by DTAC. The difference is only 0.24 Baht, or 0.01 USD per minute. For non-voice services, the most expensive SMS is offered by AIS at 0.52 Baht, or about 0.02 USD per message, while the cheapest one is provided by TRUE MOVE at 0.40 Baht, or 0.01 USD per message giving price difference of only 0.12 Baht, or 0.01 USD for an SMS message. Similarly, the difference between the most expensive and cheapest MMS is around 1 Baht, or 0.03 USD per message, while it is about 0.77 Baht, or 0.02 USD per hour for GPRS and EDGE service (NBTC, 2011).[4]

7.3. Mobile Services

The next discussion goes to mobile services. For the operator-provided services, the reason people using SMS or Internet tend to change their carrier is that these users seek good quality of connectivity required for messaging and web browsing. Again this is supported by the fact that most people intend to change their operator because of better signal they would get from another provider shown by the qualitative results. Indeed, at the moment of the survey advanced mobile data communications has yet to be fully deployed. Therefore, cellular services have been substantially provided through bandwidth-limited 2G technology, namely EDGE or GPRS (3GPP, 2013). Signal quality is considered to have a significant influence on switching behaviour. In addition, customers using other cellular-based services are those who potentially switch because these are the ones looking for value-added services (VAS) as a reason for switching. In fact, a variety of VASs are being offered by an operator. Such services include downloads of ringtones, call waiting melodies, SMS news clips, gossips, or even fortune telling messages. Some people are willing to change to another operator that can satisfy their intensive use of the VASs. The qualitative result just supports and emphasises the importance of the VAS as a driver of switching behaviour shown in the logistic regression results.

[4] The exchange rate is 0.032 USD/THB on 11 July 2013 according to the bank of Thailand.

For the general mobile services, it turns out that listening to news and information provided through mobile radio generates a possibility to switch an operator. It is because the people consuming such media are those seeking for information. They would have sufficient information about different offers and promotions of other mobile service providers; hence, be able to consider switching as soon as they realise perceived advantages provided by another operator. However, users of entertainment services such as SNS or mobile gaming are not willing to change to another provider because of psychological and technical reason. First, it may be the case that most of the time the usage is carried out through mobile applications that needed to be installed into the phone. Although changing a mobile operator in Thailand does not always mean changing a handset as most 2G devices are interoperable, it is perceived as inconvenient and troublesome for most people whose usage patterns are mainly concentrated on entertaining purposes because they have to engage in uninterested activities like new establishment of a contract, selection of a new plan, and acceptance of connectivity problems. Thus, they are willing to stay with the current operator to maintain their activities without having to face their perceived complexities in the changing. Second, in the case of 3G-compatible mobile devices, the explanation of the results is more obvious. According to the fact that the two major mobile operators, namely AIS and DTAC, provide their 3G (HSPA) services over different frequencies, 900 MHz for AIS and 850 MHz for DTAC (Keesookpun, 2011), the 3G handsets are not interoperable between the two carriers. With pre-installed mobile applications for SNS or gaming, it is burdensome to switch an operator as a new handset is required.

7.4. Operator Preferences

Another discussion is the emphasis of the importance of customer service as an influential factor preventing people from switching to another mobile service provider. Indeed, most people intend to change their mobile operator for a better service. This states the fact that most customers also consider operator-specific non-technical services such as after sale services as part of their switching decision.

Even though the coverage and voice quality variable is not statistically significant, a better signal is selected in the top 3 major reasons of switching intention. Indeed, the statistical estimation incorporates various variables which may draw away the impact of the coverage variable. Therefore, the qualitative results are necessary to explain the fact that most people also intend to change a mobile operator in search for a better signal. Moreover, it is to be remarked that word of mouth has no influence on the switching behaviour as seen in the insignificance of Recommendation variable in the regression results. Thus, it is usually the case that most people decide to switch or stay

based on their own experiences of the current operator rather than what they hear from the others.

7.5. Switching Costs

After allowing the existence of operator-related switching costs, it is found that customers of the incumbent mobile operator, AIS, have a lower potential to switch compared to those of DTAC. This is explained by the fact that AIS has been the first one providing mobile telecommunication services and this operator provides loyalty benefits to existing customers. Hence, it is perceived as unwise for a particular customer to discard the accumulated benefits and start over with another operator. Relatively speaking, DTAC customers also perceive the switching costs more than those of TRUE – the third largest mobile operator in terms of number of subscribers. The switching costs may include mainly the necessity to use same mobile number, perceived complexities in the switching process, and other time-related fringe benefits offered to customers with continuous usages. Moreover, the fact that AIS customers have a relatively high switching cost compared to those of DTAC may be elaborated as an evidence of disparity in signal quality or coverage. Until the time of the survey, more than 90 percent of the mobile users have voice rather than data services as their main usage pattern. AIS has been providing its 2G or voice communications over 900 MHz while DTAC customers make voice calls through the operator's granted frequency of 1,800 MHz (DTAC, 2013). In terms of technical issue, a 900 MHz spectrum can travel farther than that of 1,800 MHz as of lower frequency; hence, generates the higher AIS-related switching cost of signal issue especially for the customers living in remote and mountainous areas. In summary, one cannot estimate a carrier switching behaviour without consideration of carrier-related switching costs because they are important and can produce a better model if included in the analysis.

7.6. Actual Behaviour and Switching Intention

Furthermore, an interesting issue that can be derived from both the quantitative and qualitative results is twofold. On the one hand, it is the consistency between actual behaviour and intention of mobile carrier switching in many aspects. Indeed, from the logistic results, most of the variables having an impact on the switching behaviour are also reflected in the qualitative responses. For example, area of residency, time of mobile service usage, type of handset as well as usage of SMS, mobile internet, mobile SNS, and download of mobile games are associated with signal quality, which is the second reason of switching intention in terms of frequency. Besides, those using mobile radio to gather relevant information before switching are the ones looking for better services, similar to those who prefer efficient customer services. Smartphone

users can be considered in the group that prefer better technology, while the usage of operator-provided services can be categorised into the need for VAS. On the other hand, there is inconsistency when economic aspect is considered. One should be aware that the customers may not actually behave the way they initially intend. In this case, when asked about the reasons to switch, most customers want cheaper services. However, when the customers are faced with actual situation in which there are several other factors involved as well as there is a little variation in prices of mobile services, the usage cost is not important anymore. This is quite common in mobile market when most customers do not end up with operators offering the cheapest services, but rather with the ones providing reliable connectivity with reasonable price.

The structure of the number of people with operator change intention states rationality in decision-making of Thai mobile users. Indeed, people would gather required information regarding the services offered by different providers before deciding to change their current operator. Hence, most of the time the change of operator leads to a higher level of satisfaction resulting in a relatively low number of people having changed a mobile operator intending to switch again.

8. Policy Implications

This study provides noteworthy implications for both public and private sector. Public organisations such as government units, or independent regulators, aim to increase the welfare for the people. Telecommunications-related public organisations are normally required to ensure public interests and benefits for all the customers within their authority. Private telecommunications enterprises progressively seek to increase their network size to assure a certain point of investment return as well as profit. These telecommunication service providers are always competing for new customers while maintaining existing ones.

If the relevant public authority attempts to endorse market mechanism; and realises the change of operator as the existence of competition in the mobile market, it should provide measures to monitor and control mobile operator' behaviours in order to ensure that every customer can switch to another operator without any technical difficulties. Taking into consideration the determinants of operator switching, the public agent should accommodate the operator change by promoting competitive pricing, expansion of signal coverage as well as quality, and regulating operator-specific offers such as loyalty and/or penalty programme, which may create bias towards the current provider, in order to lessen the impact of switching costs. The reason for the promotion of price competition is to increase variation in the price of mobile services so that the customers have more choice provided that signal quality is guaranteed up to a sufficient level to handle major traffic. In the end, the government or public authority should endorse operator switching, but should not intervene or influence people's decision towards any particular operator.

For the business side, mobile operators can be aware of the relevant factors influencing customers to switch or stay; thus, focus on the provision of effective promotions to keep existing customers as well as attract prospective ones. They can concentrate the company's resources on the significant activities such as improvement of coverage and signal quality, customisation of pricing schemes, development of new technology as well as corresponding services and applications. If the mobile network provider needs to maintain its competitive advantage and customers, it should fill the right gap by tackling relevant switching determinants instead of taking into account other non-significant factors. The freed-up resources from irrelevant activities can then be used to generate competitive offers attracting new customers. Moreover, in the case of small carriers, customer satisfaction from sound after-sale services may be considered a wise instrument to compete with the other operators as it lowers the probability to switch. This is considered a good strategy, especially in the initial stage

where the network development is not fully realised. An emphasis should be put on pricing strategy. Indeed, even though the switching behaviour in the past does not depend on the usage cost, it is true that the customers are willing to switch because of cheaper services they wish to obtain from the prospective operator. Therefore, if any particular mobile carrier makes the service prices substantially low, it will be able to effectively attract new customers. In sum, the operator change determinants help mobile operators to be able to manage their resources efficiently, and provide effective and competitive offers to the customers.

In summary, the public authority such as relevant government agency, or independent regulator, should eliminate the obstacles of mobile carrier switching while mobile telecommunications businesses should attract and maintain customers by improving their relatively lacked factors affecting carrier change as well as offer competitive services. Eventually, competition will prevail in the mobile market.

9. Conclusion

This study states the relevance of mobile operator switching as an evidence of competition. The determinants of operator switching are analysed based on random survey data from the whole country in which Thailand is selected as ground for investigation. Such the data are analysed by an econometric method called binary logit in order to extract the factors affecting the possibility of operator switching. Moreover, the responses from qualitative questions regarding switching intention are also presented so that the statistical results can be supported, and used to produce sound discussions as well as implications.

The quantitative results from binary logistic estimation point out that metropolitan residency, night time and smart phone users have a potential to switch while older citizen tend to stay with their current mobile operator. The operator-provided services such as SMS, Internet, or other cellular-based services create a possibility to switch while general services such as SNS and mobile gaming make the customers stay. Only mobile radio services generate a positive impact on switching behaviour. In terms of customer satisfaction, it turns out that the customers perceiving efficient customer services tend to stay with their current operator. An interesting result is that the switching cost of the incumbent mobile operator has a relatively high negative impact on operator change compared to that of the competitor.

Even though an economic factor is not statistically significant, cost saving is selected as the first reason for customers who intend to change a mobile service provider in the qualitative results. This shows that there is inconsistency between actual behaviour and switching intention. Most customers want cheaper services, while they do not actually consider mobile usage cost when switching. One reason is because, in reality, there is a little variation in the prices offered by each carrier. Apart from that, better signal, better services, better technology, and value-added services (VASs) are considered drivers for carrier switching intention, respectively.

Policy implications can be derived from both quantitative and qualitative results of operator change determinants, namely age, mobile services and applications, customer satisfaction, usage costs, signal quality and technology. The public authority should accommodate the switching while refrain from mandated intervention in order to ensure market mechanism. On the other hand, mobile operators should allocate their scarce resources to the development and improvement of the relevant factors so that they can maintain current customers as well as attract new ones. As a result, in the mobile market, competition will be witnessed as a variety of effective products and services are commercialised together with supporting public policies for carrier change.

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