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Relationship of Over-the-top (OTT) Communications and Traditional Telecommunications Services: the Case of Thailand

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Abstract

This paper focuses on the relationship between over-the-top (OTT) and traditional communications services. Many analysts have stated OTT communications services might soon replace other communication services; however, the empirical study of this assumption is scarce, especially in the case of Thailand. This study thus aims to investigate the actual effects of OTT communications services on traditional communications services and whether OTT communications services can substitute or complement traditional communications services. The data used in this paper were collected in 2019 and comprised 1,052 observations. After the Probit analysis, the results stated the relationship between the two services depends on tariff type: they are complementary under a flat rate plan but substitutable under a use-dependent scheme. With respect to messaging feature, OTTs and short message services (SMS) and multimedia messaging services (MMS) are independent. The results contribute to the field of telecommunications and provide evidence of the substitution and guidelines for telecommunications policy makers in Thailand. Regulators and mobile operators should encourage the flat rate plan. For economic reasons, the regulation similar to traditional telecommunications might not be suitable; however, regulation regarding other issues should be addressed in further study.

Keywords: Over-the-top (OTT) communications services, substitution, mobile telephony, messaging, Thailand

1. Introduction

Over-the-top (OTT) services have been one of highlighted issues in the telecommunications field nowadays. As a new actor in the market, OTT is considered a disruptive innovation affecting the structure of the ecosystem. Consequently, OTT is the center of debate in various aspects, such as its impact on traditional services, threat or opportunity to investors in the industry, and regulatory framework. Compared with traditional services, namely terrestrial television and mobile telephony, OTT functions on a very similar basis yet requires a more complex step to use and an Internet connection. Users may consider OTTs as the “substitute services” to the traditional. Recently, OTT users or subscribers and also revenue are steeply rising, which emphasizes the assumption of many analysts stating that OTT is replacing traditional services and is a threat to traditional services.

In addition to traditional services, OTT also poses a threat to Internet services providers (ISPs), as the latter are forced to bear the burden of a higher load of data traffic and the cost of maintenance, which are the basic requirements to maintain customers’ quality of experience (QoE). At the same time, some analysts propose that OTT has the potential to be an opportunity for ISP because user demand for Internet adoption may increase demand for OTT. OTT is controversial not only on the business side but also with regulators and governments. Due to regulation imbalance between OTT and traditional services, which encourages OTT’s growth, many people require the regulatory framework for OTT as well as traditional services.

Thailand is one such country where a regulatory framework has not been concretely established. The regulation should be determined by the actual impact of OTTs in the market. The

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empirical research on this issue in Thailand is scarce. Thus, this research aims to empirically investigate the impact of OTT and its relationship with traditional services, mobile telephony, mobile short message services (SMS), and mobile multimedia messaging services (MMS) in Thailand. The results are expected to help guide regulators and players in the field of telecommunications.

The remainder of this paper is organized as follows. Section 2 introduces the characteristics and business model of OTT services. Section 3 provides the current situation of the telecommunications market, including OTTs and traditional telecommunications services in Thailand. Section 4 describes the literature review. Section 5 proposes the methodology and identifies the variables. Section 6 presents the results. Section 7 discusses the underlying outcomes. Section 8 concludes the paper.

2. Characteristics and business model of over-the-top services

Several explanations posit that OTT players offer their services through the Internet “without any involvement with internet services providers or telcos” (e.g., EPRS, 2016), resulting in OTT free-riding. Yet, these explanations are questionable because telecommunications companies (“telcos”) play a very important role in these relations. In addition to their role of intermediary, telcos can partner with OTTs under the scheme called zero-rating. In this scheme, telcos are paid by OTTs to offer services to end-users without any charge for data traffic associated with the services. This kind of model leads to problem that telcos may block, throttle, and limit the speed for access to not-telcos-partnership OTT. It is considered an unfair situation for some OTT players, new innovators, and even users. Many countries thus have become more attentive to the net neutrality principle, and some finally have encouraged legal enforcement of this principle. However, the net neutrality principle is not yet implemented in Thailand, possibly due to the relatively low concern about concern in Thailand.

There are principally two kinds of business model for OTT services—one-sided and two-sided (Kraemer & Wohlfarth, 2015)—and they lead to different dimensions of relationship between OTT and telcos and also regulatory framework. Basically, every OTT player provides services by transmitting through the Internet, but the method that OTT players acquire the revenue determining the kind of business model. OTT players, which directly charge the end-users in the form of subscription fee, are categorized as one-sided business model. Netflix, Hulu, and Hooq are examples of this model. Instead of charging the users, the two-sided business model gains its revenue through advertising and in-app purchases and lets the users enjoy the services free of charge. OTT communications services mostly employ this business model, except some OTTs, such as Skype, offer additionally managed voice over IP (VoIP) services to customers by charging them. The two-sided business model is considered a successful one, as evidenced by the overwhelming revenue and subscribers, even though it requires a not-always-free Internet connection and a complex setup process.

In this paper, OTT communications services are the main focus; Dominant OTT Line, Facebook Messenger, WhatsApp, WeChat, and Skype are included. Because OTT communications services are clustered in the two-sided business model, it is assumed the end-users do not directly pay OTT players. The price for OTT itself thus is zero, so tariff type is alternately used. The detail will be explained later in the methodology section (Section 5).

3. Current situation in Thailand

3.1 Over-the-top services

An abundance of evidence reveals that OTT in Thailand is considerably successful both for media and communications. With respect to OTT communications, Thailand has been the second largest market of Line application, the most popular OTT communications in Thailand, with approximately 41 million users in 2018. It is considered a large number compared with the Thai population and unique mobile Internet subscribers, which are 69 and 45 million, respectively (Leesa-

guansuk, 2018). Moreover, Thailand, especially in Bangkok, holds a high-ranking position in the most active Facebook account. As a result, Facebook’s connected messaging application, named Facebook Messenger, is also favored with 26 million users in 2018. Users of WhatsApp, WeChat, and Skype are also numerous, but they are more niche compared with Line and Facebook Messenger. Nonetheless, OTT communications services are anticipated to grow further for many reasons, such as cheap mobile Internet subscription fees and the large number of smartphone usage in Thailand, which is over 70% of overall devices used in Thailand.

Concerning regulation, the National Broadcasting and Telecommunications Commission (NBTC), a telecom regulator, has attempted to establish the framework to obligate OTT services over the past few years. According to NBTC’s announcement in April 2019, the regulator imposes a surcharge plan for network bandwidth usage to “big OTT” as determined by data volume, such as YouTube, Netflix, Line, and Facebook streaming video through the Internet. The underlying motivation was those OTT exploiting the infrastructure in which the government invested, and the surcharge is expected to contribute to the International Internet Gateway (IIG). After overwhelming criticism concerning its impracticality, NBTC decided to backtrack on the plan (Tortermvasana, 2019). Thus, the regulatory framework for OTT in Thailand is still in a process of trial and error. The results of this research are expected to contribute to develop the plan further.

3.2 Traditional telecom services

On the other side of the telecommunications market, traditional telecommunications services[†], specifically mobile telephony, SMS, and MMS, are suffering from decline in usage and revenue. As shown in Figure 1, the total revenue of mobile network operators is increasing gradually, but the contribution to each kind of service has changed; revenue from non-voice, including OTT usage, is increasing instead of voice, which was once the main source of revenue for mobile network operators (MNOs).

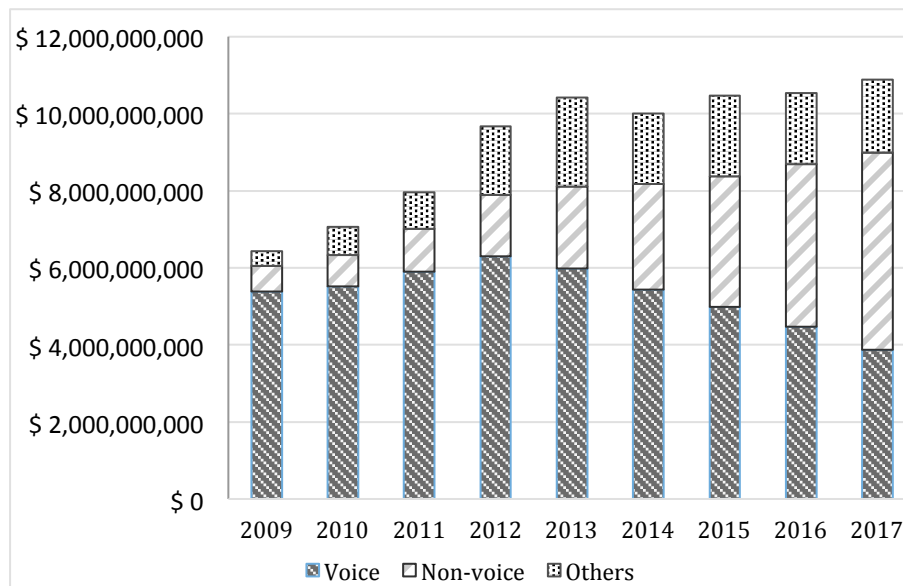


Fig. 1: Revenue of Mobile Network Operators in Thailand 2009–2017 (Source: GSMA, 2019, as of April 23, 2019)

Like the decreasing revenue of MNOs, the minutes of use per connection are heading in the same direction. According to the GSMA report in 2009, the minutes of use per connection averages 459 minutes and slightly increased to a peak of 498 minutes in 2010. Afterward, it continuously

[†] There are three dominant mobile network operators (MNO) in Thailand: Advanced Info Services (AIS), Truemove, and Dtac. These three MNOs hold about 97% of the market share. CAT and TOT, which are state-owned enterprises, own the remainder.

declined to 149 in 2018. Regardless of other factors, such as cost and higher competition, minutes of use assure the assumption that customers have changed their behavior in making a call. They might switch to other platforms, OTT communications in particular.

According to Figure 1, non-voice revenue is growing over time. Messaging revenue is included in this section, but it cannot be said the revenue is increasing. It is quite difficult to observe the messaging revenue in the case of Thailand because the data sets are typically incomplete. However, it is assumed that messaging is going downward as well as the global trend. Regarding available data, messaging revenue had been increasing and peaked in 2012–2013 or more than 20 million USD in a quarter for each mobile operator. Then, the revenue decreased to less than 10 million USD recently. Hence, it tends to constantly decrease because the users are not using messaging feature via mobile networks as before.

In terms of regulation for traditional telecom services, legal enforcement is implemented through several acts defining the regulation and responsible governmental organizations. Regarding Telecommunications Business Act B.E. 2544 (2001), the regulation mentioned general rules, such as licensing and interconnection, standard of quality, and right of licensees and users. It is normal that traditional telecom services are obligated in rules because they have been constructed and developed for such a long time. However, OTT's new kind of services should be included in rules or regulation, and how those rules and regulations should be remains the question, especially in the case of Thailand.

4. Literature review

Studies examining the replacement of telecommunications services by OTT communications services are rather limited. Among the few, Arnold, Schneider, and Hildebrandt (2016) failed to provide sufficient evidence that OTT communications services are replacing electronic communications services (ECS), as they consider that OTT is like-for-like substitute, and users just change their communications behavior. The study interestingly revealed significant factors associated with the usage of OTT through its mixed methodology: age, household income, smartphone, Apple usage, and recently purchased high-speed volume Internet. Arnold, Schneider, and Hildebrandt (2016) asserted reasons for OTT adoption based on semi-structured interviews, such as novel functionalities, level of immediacy, and intimacy.

There is a significant amount of literature, however, analyzing telecommunications services that are part of or resemble OTT services, such as VoIP, nonvoice communications, and mobile Internet. The related findings have been mixed. Some of these studies found that VoIP or mobile Internet can substitute mobile voice calling (Cecere & Corrocher, 2012) and fixed-line telephony (Lange & Saric, 2016). Other studies determined that mobile Internet complements mobile voice calling (Gerpott, Thomas, & Weichert, 2014). Another study found that the traffic substitution of mobile and VoIP is insignificant (Kwak & Lee, 2011) In addition, these literatures also examined various factors associated with the usage of new communications services: usage of other voice and non-voice communications services, device, available technologies (e.g., cable, 3G, high-speed Internet), service price, and socio-demographic characteristics.

With respect to messaging function, some studies found that the intense use of SMS sometimes complements and substitutes mobile Internet (Gerpott, 2015). This finding is consistent with other studies that posited the relationship between SMS and messaging application and mobile Internet are substitutable and complementary in certain situations (Karikoski & Luukkainen, 2011)

Because the main objective of this research is to investigate the substitution effect between new and old communications services in Thailand, the results are diverse. The first research question (RQ) is:

RQ1: What is the relationship between OTT services and traditional telecommunications services, including mobile telephony and messaging?

To further understand this phenomenon, factors collected from previous studies are included and examined as the second research question:

RQ2: What are the factors affecting the adoption of OTT services?

In addition to the literature of substitution between OTT communications and traditional services, the regulations of OTT are also the main topic in a myriad of studies. The European Union (EU) regulations of OTT communications were assessed, and the author found that only regulatory framework based on privacy and data retention are appropriate and feasible, more than interconnection, numbering, and emergency calling (Brown, 2014). In the meantime, Kraemer and Wohlfarth (2016) defined the OTT business model as a two-sided market in which the regulation should follow the

degree of competition OTT may face, and *ex ante* or access regulation is appropriate. At the time, some traditional telecoms and analysts demand a level playing field. The other side has argued that OTT should not be regulated by reason of substitution because OTT differs from traditional telecom services in terms of business model, technology utilization, and barrier to entry. Moreover, the Internet is not considered scarce but rather abundant (Chima & Pallero, 2017). It instead should be regulated by reason of human rights or security. Nonetheless, OTT regulation in each country may differ based on domestic conditions and market.

5. Methodology

5.1 Survey and data collection

This paper relies on the cross-sectional data collected through face-to-face surveys conducted in April and May 2019 in Thailand. The dataset contains 1,052 observations from respondents in five regions: northern, northeastern, central, Bangkok metropolitan, and southern. The participants had to own a smartphone to affirm their ability to access all of the choices.

The questionnaire was designed and mainly adapted from a previous survey conducted by the NBTC in 2014. It comprised three essential sections: (a) socio-demographic characteristics, (b) information related to the usage of traditional telecommunications services, including their current package/promotion subscription, and (c) information related to the usage of OTT services. For the question asking about package/promotion, the respondents were required to dial *165*1# on their own mobile phone, and then information about package/promotion, including main and on top, would show on the device's screen. This process was applied against the incorrect recall of respondents, which may have led to a deviance outcome.

5.2 Variable specification and analysis

Prior to describing the variables included, it is necessary to explain that the observations for mobile voice calling were divided based on tariff type, since the real price of OTT services cannot be captured. In general, tariff types are flat rate and use-dependent plans, and they are considered a crucial factor affecting the use of particular services. To distinctly see the usage behavior of individuals under different usage plans, the data were separated into two schemes by tariff type extracted from the package data. Due to the taximeter effect, users are more pleased with a flat rate plan because it is not associated with additional costs (Nassar & Mitomo, 2011). Consequently, under the use-based scheme, the substitution relationship is anticipated to be higher than another plan.

In Thailand, flat rate pricing is also called bundling price, and it permits relatively hundreds of free minutes of calls and a sufficient volume of data. Three dominant mobile operators provide the services under similar conditions: if the user's call exceeds the limit, he/she will be charged at 1.50 THB or approximately 0.05 USD per minute. For excess Internet usage, the speed will be slowed down to around 128 kbps or 256 kbps, which is considered insufficient to make a good quality call. After separating the data into two groups, the flat rate plan contained 838 observations, and the use-based plan contained 211 observations. Three respondents were excluded due to incomplete data. A total of 1,049 observations were used in the analysis.

Because SMS and MMS are not included in the bundling price, users are charged usually 3 THB or 0.095 USD per message for SMS, and 4–5 THB or 0.13–0.16 USD per MMS message, which cannot be separated based on tariff type. Thus, for the messaging function, the mobile broadband variable is included as *mobile_bb*, which took the value 1 if the respondent subscribed to mobile broadband and 0 if otherwise. After removing missing data and failed variables from 1,040 observations, a total of 1,031 observations were estimated in this full model.

This study aimed to investigate the relationship of OTTs and traditional telecommunications services, so the main variables were OTT and mobile telephony usage. OTT usage was defined as a dependent dummy variable. As shown in Table 1, variable *OTT_call* took value 1 if the respondent literally used the OTT in voice calling and 0 if otherwise. The next communications services comparable to OTTs was mobile usage intensity. According to the literature, variables regarding traditional telecommunications services usage were diversely defined. Cecere and Corrocher (2012) employed survey data that explicitly asked respondents to identify whether they are always, sometimes, or never mobile voice calling users. This method was relatively weak because individuals rate themselves differently and subjectively. Gerpott and Meinert (2016) improved on the previous study by

using data from the billing system, which reflected the actual usage of each individual. This was very solid but not feasible in the instant study.

With effort to extract the actual usage by individuals, the usage of mobile voice calling in this study was defined as the mobile usage intensity or *mob_intensity* in Table 1. This variable was generated from two components: average number and length of call. Categorical multiple choices were presented to help respondents recall the numbers. There were three variables regarding intensity of usage. The variable *mob_intensity1* meant very rare use to never, *mob_intensity2* was moderate use, and *mob_intensity3* was relatively heavy users. These variables are dummy variables, which took the value 1 if individual fell within the criteria and 0 if otherwise.

In the section of messaging feature, similar to mobile intensity, there were three variables representing mobile SMS and MMS in different levels of use: *mob_sms3*, *mob_sms2*, and *mob_sms1*. The dependent variable was defined as *OTT_msg* and took value 1 if individual use messaging feature in OTT and 0 if otherwise.

Table 1: Descriptive data I

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>Flat rate scheme</i>					
OTT_call	838	.556	.497	0	1
mob_intensity3	838	.078	.268	0	1
mob_intensity2	838	.618	.486	0	1
mob_intensity1	838	.303	.460	0	1
male	838	.507	.500	0	1
age	838	35.498	10.044	18	67
married	838	.669	.472	0	1
north	838	.169	.375	0	1
northeast	838	.329	.470	0	1
central	838	.169	.375	0	1
bangkok	838	1.501	.360	0	1
ed_prime	838	.008	.091	0	1
ed_secondary	838	.018	.133	0	1
ed_high	838	.279	.449	0	1
ed_college	838	.695	.461	0	1
<i>Use-dependent scheme</i>					
OTT_call	211	.687	.465	0	1
mob_intensity3	211	.275	.448	0	1
mob_intensity2	211	.607	.490	0	1
mob_intensity1	211	.118	.324	0	1
male	211	.507	.501	0	1
age	211	33.725	12.155	18	74
married	211	.488	.501	0	1
north	211	.365	.483	0	1
northeast	211	.166	.373	0	1
central	211	.190	.393	0	1
bangkok	211	.161	.369	0	1
ed_prime	211	.038	.191	0	1
ed_second	211	.109	.313	0	1
ed_high	211	.564	.497	0	1
ed_college	211	.289	.454	0	1

(Source: Authors' calculation)

Socio-demographic characteristics were important components in the analysis; besides being control variables, socio-demographic-related variables might reflect the usage pattern. Gender was the first variable in this group. It was expected that males were more positively associated with new communications services use (Gerpott & Meinert, 2012; Srinuan et al., 2012). Thus, *male* was included

in the model, and it took the value 1 if the individual was male and 0 if otherwise. The next variable was *age*. Age was one of the frequently used factors to explain customer behavior. It was expected to be negatively correlated to the usage of OTT because young people are perceived as more active in new technology. Marital status was the next variable. Married status was more positively correlated to new services in the literature. Consequently, marital status was defined as the *married* variable, and it took the value 1 if the respondent was married and 0 if otherwise.

Education also could be an indicator of potential in new services adoption. In this factor, positive relations were expected because OTT usage requires basic IT skills to set up and use. Moreover, higher education implied a higher career position, which generally requires IT skills. Education was divided into four variables; *ed_prime* took value 1 if the individual received a primary school diploma as the highest level of education obtained and 0 if otherwise; *ed_second* took value 1 if the individual obtained a secondary school diploma and 0 if otherwise; *ed_high* took the value 1 if the individual obtained a high school diploma; *ed_college* took value 1 if the individual obtained a college certificate or higher. The last factor was the region in which the respondent resided. Because people living in the Bangkok metropolitan were more likely to enjoy a better quality of facilities, including Internet connection, it was expected that Bangkok metropolitan living respondents were higher positively correlated to OTT usage than other regions.

Table 2: Descriptive data II

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>Messaging</i>					
OTT_msg	1,040	.883	.322	0	1
mob_sms3	1,040	.855	.352	0	1
mob_sms2	1,040	.137	.344	0	1
mob_sms1	1,040	.009	.093	0	1
male	1,040	.505	.500	0	1
age	1,040	35.309	10.787	18	74
married	1,040	.634	.481	0	1
north	1,040	.216	.412	0	1
northeast	1,040	.315	.465	0	1
bangkok	1,040	.152	.359	0	1
<i>ed_prime</i>	1,040	.007	.082	0	1
<i>ed_secondary</i>	1,040	.027	.162	0	1
<i>ed_high</i>	1,040	.338	.473	0	1
<i>ed_college</i>	1,040	.628	.484	0	1
mobile_bb	1,040	.895	.306	0	1

(Source: Authors' calculation)

The methodology in this paper is mainly adopted from the study of Cecere and Corrocher (2012). Because the outcome is dichotomous, a Probit analysis was performed. To check the heteroskedasticity, the models without control variables are demonstrated. In case of messaging, the variables named south and central regions were removed as they caused Simpson's paradox in the model.

6. Results

6.1 Mobile telephony

6.1.1 Flat rate scheme

Within the scheme of flat rate usage, mobile voice calling usage was positively correlated to OTTs as expected, with $p < 0.01$. In other words, the relationship between OTTs and mobile telephony is complementary when users subscribe to the flat rate plan. Moreover, the users tend to use more OTT services if they are heavy users of mobile voice calling.

With respect to the factors affecting the usage of OTT and the results, age, marital status, and some regions were significantly correlated to OTT voice calling. Education in this scheme was not consistent within the group; higher education was positively associated with OTT voice calling compared with primary school attended respondents, but college level of education was presented conversely. However, education was not statistically significant at any level. Age in this scheme was positively correlated to the OTT call. This is an unexpected result because younger people are supposed to be involved in new services compared with older respondents. The next variable was also unexpected: the result of the married variable was negatively correlated to OTT call, meaning single respondents are more likely to adopt OTT than married respondents. Concerning regions, the northeast and southern regions were negatively correlated to OTT use compared with the Bangkok metropolitan region, a base variable. As the literature suggested, this implies a digital divide between urban and rural areas in Thailand.

Table 3: Results of OTT call and mobile telephony – flat rate scheme

OTT_call	Model 1		Model 2	
	Coefficient	Marginal effects	Coefficient	Marginal effects
mob_intensity2	1.338*** (.106)	.493 (.033)	1.258*** (.143)	.406 (.043)
mob_intensity3	1.392*** (.188)	.511 (.061)	.692*** (.229)	.221 (.076)
male			-.093 (.101)	-.027 (.029)
age			.032*** (.006)	.009 (.002)
married			-.887*** (.144)	-.251 (.037)
north			.296 (.198)	.087 (.058)
northeast			-.286* (.160)	-.090 (.049)
central			.03 (.175)	-.009 (.054)
south			-.782*** (.198)	-.248 (.064)
ed_secondary			1.233 (.864)	.264 (.19)
ed_highschool			.067 (.609)	.018 (.169)
ed_college			-.254 (.603)	-.073 (.168)
_cons	-.800*** (.088)		-.874 (.646)	
<i>N</i>	838		838	
LR chi2	182.40		307.36	
Pseudo R2	0.1585		0.2670	

*** p < 0.01, **p < 0.05, *p < 0.1

(Source: Authors' calculation)

6.1.2 Use-based scheme

As shown in Table 4, opposite to the results of the flat rate plan, the correlation of OTT call and mobile telephony was negative in mobile voice heavy users in use-based schemes, with $p < 0.01$.

In other words, the relationship between OTT call and mobile voice calling in use-based scheme is substitutability. In the group of moderate use of mobile voice calling, there also was a negative relation, but it was not statistically significant.

For the other variables, the factors associated with OTT voice calling are northern region and education. The northern region was positively related to OTT voice calling compared with the Bangkok metropolitan. Education was positively correlated with OTTs. As expected, a higher education encouraged the use of OTT. To sum up, respondents who are residing in northern region and higher educated tend to adopt OTT voice calling in the use-based scheme.

Table 4: Results of OTT call and mobile telephony – use-dependent scheme

OTT_call	Model 1		Model 2	
	Coefficient	Marginal effects	Coefficient	Marginal effects
mob_intensity2	-.525 (.346)	-.154 (.087)	-.185 (.431)	-.047 (.105)
mob_intensity3	-1.2188*** (.364)	-.434 (.110)	-1.156 *** (.446)	-.325 (.120)
male			-.022 (.213)	-.007 (.055)
age			-.001 (.010)	-.0002 (.003)
married			.412 (.269)	.105 (.067)
north			1.096 *** (.319)	.266 (.082)
northeast			-.506 (.342)	-.168 (.110)
central			.344 (.348)	.103 (.104)
south			.179 (.396)	.055 (.122)
ed_secondary			2.794 *** (.771)	.701 (.107)
ed_highschool			2.782 *** (.720)	.698 (.084)
ed_college			2.096 *** (.717)	.507 (.094)
_cons	1.175*** (.325)		-1.974 *** (.866)	
N	211		211	
LR chi2	17.40		70.99	
Pseudo R2	0.0664		0.2707	

*** p < 0.01, **p < 0.05, *p < 0.1

(Source: Authors' calculation)

6.2 Messaging

Messaging was the most used feature in OTT users, so it is highly expected to substitute traditional SMS and MMS. Although the results presented in Table 4 are negative, which is supposed to go to substitutability, those two services are independent regarding to statistical signification in full model. Additionally, *mob_sms3* was removed by the program as value was too small. For the other

factors associated with the usage of messaging in OTTs, marital status were negatively correlated to the usage of messaging on OTT. It means single individuals are likely to adopt OTT messaging. At the time, mobile broadband subscription was positively correlated to OTT because it is a highly encouraging factor in using OTT. In addition, education is also positive correlated, so higher educated respondents are more likely to use OTT messaging. Similarly, north and northeastern region-residing respondents were positive in OTT messaging usage.

Table 5: Results of OTT messaging and SMS/MMS

OTT_msg	Model 1		Model 2	
	Coefficient	Marginal effects	Coefficient	Marginal effects
mob_sms2	-0.466*** (.131)	-.109 (.036)	-.155 (.152)	-.029 (.028)
mob_sms3	(removed)			
male			-.110 (.112)	-.018 (.019)
age			.001 (.006)	.0001 (.001)
married			-.328** (.151)	-.054 (.023)
north			.603*** (.175)	.086 (.021)
northeast			1.176*** (.192)	.147 (.018)
bangkok			-.175 (.151)	-.031 (.028)
ed_secondary			1.014* (.588)	.269 (.175)
ed_highschool			1.091** (.518)	.283 (.168)
ed_college			1.130** (.519)	.291 (.168)
mobile_bb			.557*** (.169)	.114 (.041)
_cons	1.268 (.057)		-.430 (.590)	
N	1040		1031	
LR chi2	12.08		116.23	
Pseudo R2	0.0161		0.1550	

*** p < 0.01, **p < 0.05, *p < 0.1

(Source: Authors' calculation)

Regarding the results of the two schemes, the answer to the RQs are as follows:

RQ1: What is the relationship of OTT and traditional telecommunications services?

RQ1.1: OTT voice calling and mobile telephony

The relationship between those two services depends on the tariff type to which the respondents are subscribing. Under the flat rate plan, the relationship between those two services is complementary. In contrast, the relationship between them is substitutability in the use-dependent plan.

RQ1.2: OTT messaging and SMS/MMS

In the case of messaging, the results reveal that OTT messaging and SMS/MMS are not related.

RQ2 : What are the factors affecting the adoption of OTT services?

Tariff type is a very crucial factor associated with the usage of OTTs and mobile telephony. With respect to other factors, they are quite different under the distinguished scheme. Under the flat rate scheme, age, marital status, and northeastern and southern regions are associated with OTT services. Education and northern region are factors in the use-dependent scheme. Concerning messaging, individuals who tend to adopt OTTs are higher educated and live outside of the Bangkok metropolitan area, especially north and northeastern areas.

7. Discussion

Because there are claims that OTT services are replacing traditional telecommunications services, this research was conducted to empirically examine the relationship between these two communications services. The results here empirically capture this effect because it differs according to the usage plan adopted by the consumers. Although the flat rate plan offered by mobile operators is not totally unlimited, the allowed minutes and data are sufficient to make a call and surf the Internet without restriction. A fixed price is combined for the two services, so the users do not carefully count the minutes or bytes compared with the use-based scheme. Moreover, without concern about cost, users freely select a particular services in each situation and purpose. The results of the flat rate plan are positive, meaning the relationship of the two kinds of services are complementary. Conversely, under the use-based scheme, OTTs substitute mobile telephony. Not surprisingly, mobile operators charge users for each minutes of use, so users would switch to OTT to reduce the cost because Internet usage is flat rate. Users do not risk additional cost, so they end up using OTTs instead of traditional mobile voice calling.

For messaging, OTTs and SMS and MMS are independent. There are two possibilities regarding this issue. First, from the user aspect, these two services are not comparable, and users eventually use them differently. Second, the number of SMS and MMS users is very small and not properly distributed, so the actual effect of substitution cannot be captured.

Regions are also interesting factors affecting users' adoption of OTT services. Compared with the Bangkok metropolitan region, the capital city area of Thailand, other regions seem more negatively correlated to OTT usage except messaging. This shows a digital divide among regions in Thailand. Rural areas in Thailand still exist, and approximately 50% of the population live in rural areas. Bangkok is considered the most outstanding developed city in Thailand. Consequently, the results reveal that other regions are rather negative, as the users in Bangkok enjoy a higher quality of Internet access compared with other regions. Furthermore, it may be related to other factors, such as income, as the Bangkok metropolitan region has a higher income due to a relatively higher cost of living. With a higher income, better quality mobile packages and devices are more affordable. Last, it may relate to the lifestyle in urban areas. People who live in urban areas are demanded to possess sophisticated devices and new technology due to social values. In other words, social factor is probably also important and deserves further investigation to understand the phenomenon.

This study contributes policy implications. In Thailand, there are attempts to handle or regulate OTTs using various methods. However, regulation, which is similar to traditional telecommunications, is not needed in this study for two reasons: economic reason and practical implementation. Instead of regulating OTTs and traditional telecommunications services, the regulator should consider the OTTs as demand driving for Internet. An appropriate strategy was introduced by Stork et al. (2017); the regulator should support mobile operators in launching a flat rate plan to customers. Although the reason of regulation in economics is not suggested, it does not mean the regulation in other contexts is not necessary at all. Concerning customer rights, privacy protection, and cooperate income tax, the regulation issue is worth considering.

With respect to the mobile operators side, it seems that mobile operators and OTT players are not serious competitors. Although the services itself are functionally comparable, it does not mean they are substitutable in every situation. Furthermore, mobile operators are adjusting themselves to survive in the market by allying with OTT players. The evidence is the various packages offered to customers

in the form of fixed prices without charge for data traffic on OTT communications and occasionally media such as YouTube. This scheme is known as zero-rating. It not only attracts users who are active on OTTs but also can embrace traditional telecommunications services, such as mobile telephony, because it usually includes usage allowance for mobile telephony in the package. This plan eventually benefits the mobile operators and OTT players, unless net neutrality is implemented in Thailand.

Nonetheless, OTT services really rely on Internet connection, which is unstable in some areas, and is not fully developed, especially in Thailand. Users also experience some struggles using OTTs sometimes, which impede them from switching to OTTs. Once Internet connection in Thailand is more developed in terms of stability and coverage, OTTs may increase in influence to customers' communications services usage.

However, as the revealed preference research, it cannot capture the effects of some factors, such as change in price and social factors. Future research examining these issues might enhance knowledge in telecommunications regarding free services in Thailand.

8. Conclusion

OTT services are increasing in terms of revenue and subscribers nowadays. Conversely, traditional telecommunications services are moving in the opposite direction. For this reason, many analysts predict that OTTs will replace traditional telecommunications services soon. Empirical studies of this issue are scarce. This study therefore aimed to empirically investigate the relationship between OTTs and traditional telecommunications services in Thailand. Furthermore, the factors affecting adoption of OTTs were examined. The research relied on the data collected in 2019 in Thailand, and a total of 1,049 observations were analyzed for voice calling function and 1,036 respondents for messaging feature. After the Probit analysis, the results reveal that the relationship between those two services differs based on tariff types and flat rate plan and use-dependent scheme. With the flat rate plan, OTTs and mobile telephony are complementary. Older, single respondents are more likely to adopt OTTs, while respondents who reside in the northeastern and southern regions are less likely to adopt OTTs. For the use-dependent scheme, the relationship between the two services is substitutability. Higher education and northern region-residing users tends to switch to OTTs. For messaging function, there is no relation between OTT messaging and SMS and MMS. However, the individual who is more likely to adopt OTTs is higher educated, subscribes to mobile broadband, and lives outside of the Bangkok metropolitan region, except for the southern region.

According to the results, regulation similar to traditional telecommunications services is not preferable. The flat rate plan is an appropriate plan for embracing OTTs and traditional telecommunications, so regulators and mobile operators should support this scheme. However, this paper has limitations that need to be improved in further study in examining undetectable factors, such as price changes, stated preferences, and social factors.

9. Reference

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