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The Internet of Things as an accelerator of advancement of broadband networks: A case of Thailand

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ABSTRACT

The advanced development of broadband access is an inevitable step toward supportive daily lives and sustainable economic growth. However, the decisive outcome of the development relies heavily on the demand side. Consumer choice among advanced Internet broadband technologies will determine the achievement of the development. This study aims to illustrate that consumer decisions on choices of advanced Internet access are influenced by the emergence of the Internet of Things (IoT) applications. A bivariate probit model is applied to examine the effects of IoT, consumer's individual characteristics, and their current use of networks on their decision pertaining to the choice of advanced Internet access. Using Thailand as a case study, the result indicates that the emergence of IoT applications accelerates the adoption of both advanced mobile broadband (5G) and advanced fixed broadband (FTTH). This finding may help policy makers to optimize the future direction of the Internet infrastructure development in Thailand, and also countries in a similar stage.

1. Introduction

Around the end of 2014, Thailand's government formally announced the Digital Economy policy, which aims at enhancing and supporting the Thai industry and society toward prosperity and well-being. Under Thailand's ICT2020 Policy Framework and Broadband Policy, ICT infrastructure development is the key to serve users' demand for future digital application (Inluksana, 2013). In addition, the government's Telecommunication Master Plan requires the development to match the ASEAN ICT Masterplan 2020, which aims at achieving an advanced digitally-enabled economy through the promotion and development of the Internet of Things (IoT) technologies (ASEAN, 2015). The country expects that the development will yield social stability, economic wealth, and achieve a leader status in ICT development in Southeast Asia (ASEAN, 2015; ITU, 2015a; MICT, 2016). According to the National Broadcasting and Telecommunications Commission (NBTC), the ICT development will be driven by IoT, which the Commission predicts the adoption rate by 2020 will grow 3–4 times comparing to 2016 (Malisuwan & Kaewphanuekrungsi, 2016).

The Internet of Things (IoT) combines a wide range of advanced technologies including cloud computing, future Internet, big data, robotics, and Semantic technologies. IoT will make identification and connection of everything, anytime, and anywhere possible through the Internet and create a high potential of marketing (Tan & Wang, 2010; Vermesan et al., 2013). In 2011, there were over 15 billion “things” connected by the Internet, and over 50 per cent of Internet connections were between “things”. By 2020, it is expected that over 30 billion “things” will be connected (Vermesan et al., 2013). Although some existing IoT applications consume low

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bandwidth, many others such as video surveillance and home streaming video require high-capacity broadband connection to transfer larger amounts of data (James, 2014). In addition, the simultaneous usage of numerous connected devices and the processing of big data generated by IoT will drive the necessity of high-capacity backbone connections along with high demands for more bandwidth (European Commission, 2015; ITU, 2015c; James, 2014; Vermesan et al., 2013).

IoT transition may affect the network market by increasing the bandwidth demand. The European Commission (2015) mentions that 5G technology will brings challenges to the world in the context of ubiquitous service. 5G technology will serve a wider range of connected devices and drive stronger competition in the communication industry. However, because of capacity limitations of mobile networks, the market will also demand for fiber deployment (ITU, 2015c; James, 2014; Vermesan et al., 2013). From a technology point of view, advanced mobile broadband such as 5G requires more optical fiber network backbone connections. That being said, this does not mean that people will need optical fiber as a means of Internet access. Finding from Srinuan and Bohlin (2013) indicates that the widespread of broadband availability does not automatically lead to the widespread of its adoption. Thus, the research focus in broadband adoption is shifting from the supply side to the demand side.

With this background in mind, this paper aims to explore the influence of the Internet of Things on consumer intention to adopt advanced broadband technology in Thailand. It hypothesizes that consumer-oriented IoT will raise consumer intention to adopt or migrate to advanced broadband, which includes 5G as the advanced mobile broadband and FTTH as the advanced fixed broadband connections.

This study takes Thailand as a case study because her growth and ambition of Internet network development are currently driven by many national policy frameworks. This study applies a quantitative approach using a bivariate probit model to examine the effect of the presence of IoT on consumer intention to choose between advanced mobile broadband connection (5G) and advanced fixed broadband connection (FTTH).

1.1. Background

The National Broadcasting and Telecommunication Commission NBTC (2013) reports that the consumer data usage grew exponentially in 2013 due to the diffusion of smartphones. On the one hand, because of the evolution of wireless broadband technology and the coming of 3G, the Thai mobile telecommunication market was growing rapidly. Consumers' enthusiasm, mobile network operators' promotions of data service, and price reductions boosted the number of mobile connections. On the other hand, fixed broadband service was driven by consumers' needs in residences especially as an offloading option for mobile Internet connections for smartphones and tablets. In responding to the rapid growth, NBTC held a spectrum auction for the 900 and 1800 MHz bands at the end of 2014. Since then, the increasing popularity of 3G and 4G services further drove the demand for mobile data usage (NBTC, 2014). Subsequently, the market for narrowband Internet service faded away and reduced to only 0.05 per cent of the whole Internet connection in the country. By the third quarter of 2015, mobile broadband penetration per rate reached 87 per cent, and the penetration of fixed broadband approached 9.26 per cent. The majority of fixed broadband Internet access, around 67 per cent of the connection was using Digital Subscriber Line (DSL). Optical fiber connection was ranked second at 23 per cent, which was mainly used by users in the central business districts. Coaxial cable connection shared approximately 7 per cent while other technologies shared around 3 per cent of the entire services. Overall, broadband diffusion in Thailand was mainly concentrated in urban areas and most people relied on mobile rather than fixed access (NBTC, 2015).

From 2001 to 2010, Thailand's ICT policies had intensively promoted the development and application of ICT to enhance her digital economy and citizen's quality of life. For instance, the ICT2020 Policy Framework and the "Smart Thailand 2020" initiatives initiated by the Ministry of Information and Communication Technology (MICT) emphasized ICT as the key instrument for the sustainable development on equality through the delivery of equal opportunities for people to access digital content (MICT, 2011). In 2014, the government decided to make ICT a basic commodity for the entire country through improvements in infrastructures and increases in mobile broadband penetration (ITU, 2015a). Around the end of 2014, the Thai Government announced her ambition to become a digital economy. This included the establishment of a national broadband committee who set specific targets to connect businesses and households to the Internet by connecting every village and house over to the broadband network in the next three years. The highlight of this initiative was the aim to expand the country's telecommunications infrastructure network by rolling out both mobile and fixed broadband via public-private partnerships and to improve Internet connection (BOI., 2016; ITU, 2015c; MICT, 2016). In addition, a low-cost Internet access had also been set as a goal to eliminate the digital divide and promote the utilization of advanced Internet facilities. Beyond that, in 2016, the country revised her policy to achieve "Thailand 4.0" through the use of the Internet of Things, big data, and other emerging advanced technologies to bring economic wealth to her people.

IoT is serving various dimensions of people's lives nowadays. In 2015, the applications of IoT in Thailand were mainly focusing on business sectors especially in the insurance industry such as automobile and health insurances. At the same time, for individual users, smart gadgets and wearable devices with sensors were also gaining momentum. One of the main concerns of the diffusion of IoT was security risks in the cloud services - an essential part of IoT, in order to address that, the Thai government and service providers had enhanced the level of security to build up trust among Thai users. As a consequence, more businesses and individuals had subscribed to the private cloud services, hybrid cloud service, and cloud orchestration (NBTC, 2015).

1.2. Internet of Things (IoT)

IoT connects technologies, such as sensor networks, RFID, mobile Internet, and embedded objects, and makes communications of all things that are surrounding people's daily lives possible (Agrawal & Das, 2011; Atzori, Iera, & Morabito, 2011; Borgia, 2014; Davies,

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