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Smart phone demand: An empirical study on the relationships between phone handset, Internet access and mobile services

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ABSTRACT

This study clearly identified the differences among different dimensions of users' demand for mobile/smart phone; i.e., the smart phone handset, subscription of mobile network and usage of mobile services such as voice calls and SMS or some value added services such as GPS via the mobile Internet, and then examined the relationship between these three demand dimensions, and the effect of users' demographic characteristics on the dimensions as well, by an empirical study in Taiwan. The results show that the usage of the mobile services are not significantly affected by how consumers choose smart phone handset, and how they subscribe to the mobile network. For the effect of users' demographic characteristics, gender's effect is observed, but is not as obvious as what have been pointed out in the literature. The most noticeable relationship is the effect of demographic variables on the attributes of mobile network. Specifically, users' gender, age, occupation and income are found to have significant effects on the contract with voice and 3G Internet, and the monthly 3G Internet fee.

1. Introduction

According to the online PC Magazine Encyclopedia (http://www.pcmag.com/encyclopedia/), a smart phone is defined as "a cellular telephone with built-in applications and Internet access. In addition to digital voice service, modern smart phones provide text messaging, e-mail, Web browsing, still and video cameras, MP3 player and video playback and calling." Among others, the Internet access is without doubt the most important feature for a mobile phone to be called a smart phone. Many of the built-in applications of a mobile phone; e.g., e-mail, Web browsing, rely on its Internet access via Wi-Fi or 3G network.

For a consumer to actually use a mobile or a smart phone, three elements are indispensable: (1) a mobile or smart phone handset, (2) a subscription to the 2G/3G network, and (3) mobile services such as voice calls, SMS (short message services) or some value added services such as GPS via the mobile Internet. This is to say that to enjoy the services provided by the use of a mobile/smart phone, a consumer has to pay for all these three kinds of product and/or services, even though what he/she really needs is actually the third one only; i.e., mobile services, in most cases.

In economics terms, the demand for a mobile/smart phone handset and subscription to the 2G/3G network, much like the travel demand (Mokhtariana and Salomon, 2001; Mokhtariana et al., 2001), is called the 'derived demand', derived from the direct demand for the mobile service, which yield direct satisfaction to the consumers. To examine consumers' demand for a mobile/smart phone, an overall perspective from the direct and indirect, which covers all these three different elements or dimensions, is needed. In the literature which tried to examine the demand for mobile/smart phone, however, none is found

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to have clearly identified these different demand dimensions and have given an overall view covering the above three. Most studies have been focused on examining a single dimension of mobile/smart demand, including topics in a wide range from micro to macro perspective, from IT to commerce, and from individual behavior to global market analysis. For example, some studies adopted macro perspective to examine the market of mobile/smart phone handsets and made international comparisons and some examine the penetration rate of 2G/3G subscription demand, mostly from a macro view also.

Among others, studies on the mobile services from a micro perspective maybe the most diversified. Take the m-commerce for example, in their review of 149 m-commerce articles, Ngai and Gunasekaran (2007) grouped the themes into five distinct categories: (1) m-commerce theory and research, (2) wireless network infrastructure, (3) mobile middleware, (4) wireless user infrastructure, and (5) m-commerce applications and cases. Category (2–4) is the research related to IT, while category (1) and (5) related to the behavioral or social science and most of them are related to commerce.

Recently, more and more studies examine the mobile/smart phone use behavior of individual consumers by aiming at their perception of mobile/smart phone attributes. For example, Leung and Wei (2000) found that affection/sociability, entertainment, instrumentality, psychological reassurance, fashion/status, mobility and immediate access are the major factors driving consumers to use mobile phones. On the other hand, Leung (2007) found that sociability, instrumentality, reassurance, entertainment, acquisition and time management are the critical factors. In addition, he also defined six categories of gratifications of the SMS use, namely, entertainment, affection, fashion, escape, convenient and low cost as well as coordination.

Although the literature on mobile/smart phone use is abundant, they do not seem to have given an overall view on consumers' demand covering the three aforementioned elements. The purpose of this study, therefore, is to examine the individual consumers' demand for smart phone in Taiwan from the three dimensions described above and examine the relationship between them. We hypothesize that there are dependent relationship between the direct demand; i.e., mobile services, and the derived demand; i.e., mobile/smart phone handset and subscription to the 2G/3G network. In addition, we also consider the effect of consumers' socio-demographic characteristics on these direct and derived demands in this study.

The remainder of the paper is organized as follows. In the next section, it discusses the three dimensions of smart phone demand by reviewing some relevant literature. It is followed by a section describing the research framework and the data collection on the smart phone demand in Taiwan for empirical analysis. In section four, it shows the data analysis results. Finally, it gives a summary and draws the conclusions in section five.

2. Dimensions of mobile/smart phone demand

2.1. Mobile/smart phone handset

Mobile phone handsets have a high turnover rate. Their potential life span is approximately ten years, but most users change their phones frequently, causing the usable life of these devices to decrease to 12–24 months (Paiano et al., 2013). The characteristic of the mobile/smart phone handset industry is multi-faceted; e.g., rapidly evolving nature with short product life-cycles (Tseng and Lo, 2011), the addition of new features to the mobile phones, and fierce competition among numerous companies in the industry (Haverila, 2011). According to Dedrick et al. (2011), though the carriers capture the greatest share of gross profits from each phone handset, followed closely by the handset makers, the latter actually are able to retain more of that profit than the carriers, and capture far greater value than any of their component suppliers. This in turn enables handset makers to upgrade their product in a quick way to attract consumers and possibly make the life span of mobile phone shorter.

Today a smart phone is a device served as a mobile computer. Even without connection to the network or the Internet, consumers can use a smart phone to engage in a variety of activities such as taking photos by built-in camera, scheduling by calendar, listening to music by mp3 player. Among others, camera seems to be the most noticeable and useful built-in attribute in daily life and has drawn some authors' attention for research. For example, Rouibah and Abbas (2010) applied a qualitative field study to build their research model and then a quantitative field study to examine the acceptance and usage of camera mobile phones, and Rouibah et al. (2011) investigated the factors affecting camera mobile phone adoption before consumers' e-shopping in the Arab world by using the second technology acceptance model (TAM2).

Apart from built-in camera, some other features have also been noted in the literature. In their empirical study on examining gender differences regarding the importance and costs of mobile devices' characteristics, for example, Economides and Grousopoulou (2009) found that students tend to consider the following features important: battery life, mp3 player, video camera, photo camera, storage memory, Bluetooth, design and elegance, clock, calendar, organizer and reminder, while most of the respondents in their study do not consider the following important: touch screen, voice commands, chat, teleconference, encryption and cryptography, common use of files, printing.

Mobile phone manufacturers like to add features to the phone because they can help enhance and differentiate their products from competitors with low marginal cost (Head and Ziolkowski, 2012). Consumers also seem to enjoy these new additional features at a low cost. However, as Head and Ziolkowski (2012) pointed out, greater product feature complexity would require greater consumer effort and that consumers naturally wish to minimize their decision efforts. Too many features may make a product overwhelming, thus lead to consumer dissatisfaction.

Işıklar and Büyüközkan (2007) proposed a multi-criteria decision making approach in assessing mobile phones as regards to the user's feature preferences order in Turkey. In their study, Işıklar and Büyüközkan gathered the criteria for selecting a