CONSUMER MIGRATION ACROSS GENERATIONS OF TECHNOLOGY SERVICE PLATFORMS: A STUDY OF 3G INTRODUCTION IN HONG KONG

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Abstract

This paper examines consumer migration intention across generations of information and communication technology (ICT) service platforms. Our work complements macro-level research on the diffusion of multiple technology generations and thus has implications for ICT service innovations targeted at consumers. Integrating research from multiple disciplines, we proposed four categories of determinants of consumer platform-migration intention: general perceptions of ICT services, perceptions of advancements in a new generation of ICT services, external influences, and individual differences. The direct effects model was supported in a study of over 4,000 consumers in Hong Kong who could migrate to 3G, a new generation of mobile data service platform. A model with interaction terms distinguished three types of migration situations—namely transformative, leapfrogging, and incremental—based on the current technology generation being used by a consumer. Specifically, the new category of constructs introduced in this work, perceptions of the new generation of ICT services, were the strongest drivers of migration intention in incremental migration, whereas external influences and general perceptions of ICT services had stronger effects in transformative and leapfrogging situations.

Keywords: ICT services, platform migration, mobile data services, innovation diffusion

1. Introduction

The penetration of ICT services into the consumer market—e.g., wired Internet services and mobile data services (MDS1)—raises the need to understand consumers’ decision making about ICT service innovations. Information and communication technologies (ICTs) have revolutionized the way in which companies offer services, enabling the development of long-term customized relationships with individual consumers. Advances in computing have allowed firms to provide high quality, diversified, and personalized services more easily and affordably than ever before. This is most evident in the ICT service markets for consumers,2 where service providers keep innovating by frequently introducing new generations of technology platforms on which new services are offered to consumers. An example is the surge of the third generation (3G) of MDS. Consumers can not only enjoy superior services, such as video

1 We define mobile data services as an assortment of ICT services that can be accessed using a mobile device over a wide range of geographic area (Hong and Tam 2006).
2 In this paper we generally define ICT service as an ICT-enabled provider-client interaction that creates and captures value (IBM Research 2004). We focus on ICT services for consumers, that is, services with which consumers have direct interactions.
streaming and mobile business solutions, but also personalize their mobile devices by downloading ringtones and logos. Service innovations, enabled by the new generation of platforms, are expected to enhance both revenue and competitive advantages for ICT service providers (Dewan, Freimer, and Seidmann 1998). In keeping with these rapid innovations and explosion of the services space, there have been calls issued for research on ICT service innovations and management (Rai and Sambamurthy 2006).

Two unique characteristics of ICT services motivate this work. First, as discussed earlier, ICT service innovation is made possible by rapid technological evolution. The ICT industry keeps rolling out new generations of technologies at an accelerating pace (Westland 2002). For instance, in the mobile communication market, 2G has been rapidly replaced by new generations, such as 2.5G, 2.75G, and 3G, within just the past 10 years. Rapid evolution leads to the simultaneous diffusion of multiple generations. That is, at any point of time, multiple generations of service-enabling ICTs—e.g., mobile data services—co-exist and consumers are distributed along the diffusion curves of different generations (Figure 1). These generations compete with and, at the same time, complement each other to meet consumers’ needs (Danaher, Hardie, and Putsis 2001). Given that consumers are using different generations of ICT, they may exhibit different decision-making patterns when migrating to the newest generation. Thus, when introducing a new ICT generation, ICT service providers face the challenge of attracting consumers of different existing generations to the newest generation. This issue is of strategic importance because the introduction of a new generation of ICT usually implies a large investment, such as research and development (R&D), infrastructure deployment and license fees—e.g., the stakes of mobile operators on 3G licenses was an estimated USD 100 billion by 2002 (Kelly 2002).

Second, because of the unique cost structure of ICT—i.e., the relatively high development cost and the low production and distribution cost (Shapiro and Varian 1999)—the diversity of ICT services, especially information goods, has been ever increasing and greatly exceeds that in traditional industries (Bakos and Brynjolfsson 1999; Hitt and Chen 2005). Again, this expansion and diversity of service offerings is enabled by the rapid technology evolution. For example, as shown in Table 1, while 2G MDS only consists of short messaging services (SMS) and WAP Internet browsing, the diversity of 3G MDS
has increased significantly with mobile video streaming, video phone calls, location-based services (e.g., navigation guidance), and mobile business solutions (e.g., mobile banking). Thus, when a new ICT generation is introduced, ICT service providers face the challenge of marketing service innovation with greater variety (Rai and Sambamurthy 2006) and fostering success both for organizations and consumers (Rai, Lang, and Welker 2002).

Figure 1. Diffusion of Multiple Generations of ICT

Information systems (IS) research tends to treat technologies as singular and independent. However, most technologies are not independent of others as in the case of technology platforms and application services (Gawer and Cusumano 2002). For example, application software, such as Microsoft Office, PC games, and Internet Explorer, are services built upon the Wintel platform for PCs. Moreover, as discussed earlier, rapid technology evolution has shortened the time interval between the introduction of successive generations of ICT service platforms. Examples include the Wintel PC platform (OS: Windows 9x, Windows NT, Windows 2000, and Windows XP; CPU: 80486, Pentium, Pentium II) and the mobile computing platforms (e.g., first generation based on analog standards, second-generation based on GSM, and the third-generation based on WCDMA). The rapid evolution of ICT service platforms drive the survival and growth of business along the entire supply chain in the ICT industry, affecting a large number of stakeholders, such as service providers, content and application developers, infrastructure
and device manufacturers. When a new platform generation is introduced, its impact is felt throughout the business ecosystem and the speed and magnitude of its diffusion largely determine the survival and success of all the stakeholders, particularly those who create products and services for the new platform.

<table>
<thead>
<tr>
<th>Platform Generations</th>
<th>2G</th>
<th>2.5G</th>
<th>3G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology Standards</strong></td>
<td>GSM</td>
<td>GPRS</td>
<td>WCDMA</td>
</tr>
<tr>
<td>TDMA (IS-136)</td>
<td>CDMA-1 (IS95-A)</td>
<td>CDMA2000</td>
<td></td>
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<tr>
<td><strong>Technical Features</strong></td>
<td>Circuit switched data</td>
<td>Packet switched data</td>
<td>Packet switched data</td>
</tr>
<tr>
<td>~9.6 kbps (GSM)</td>
<td>53.6 kbps (GPRS)</td>
<td>2 Mbps – stationary</td>
<td></td>
</tr>
<tr>
<td>14.4 kbps (CDMA)</td>
<td>64 kbps (CDMA-1)</td>
<td>384 kbps – pedestrian</td>
<td></td>
</tr>
<tr>
<td><strong>Acceptable Applications</strong></td>
<td>Voice</td>
<td>Voice, SMS, &amp; WAP</td>
<td>Apps on 2.5G platform</td>
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<tr>
<td>SMS</td>
<td>MMS</td>
<td>Most broadband apps: e.g.,</td>
<td></td>
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<tr>
<td>Mobile Internet (WAP)</td>
<td>Basic Internet Apps *</td>
<td>video clips</td>
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<td></td>
<td>Java Apps</td>
<td>Video phone call</td>
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<td></td>
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<td>M-business, etc.</td>
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* Examples are mobile Internet browsing, e-mail, low quality video, document sharing, and audio.

We seek to understand consumer migration intention across multiple generations of ICT service platforms. We focus on this issue because the success of the ICT service innovations ultimately depend on consumers’ embrace of new platform generations as they are at the end of the supply chain and the source of revenue (Gulati, Sawhney, and Paoni 2003). Much of the research on individual-level technology adoption has been conducted in workplace settings where employee decision-making criteria are grounded in the psychology of the worker (for a review, see Venkatesh et al. 2003). While there is an explosion of technologies for the mass market and some research on consumer adoption and use of technologies (e.g., Kraut et al. 1999; Venkatesh and Brown 2001; Brown and Venkatesh 2005), the overlapping of technology generations has not been largely overlooked and new technologies were treated as singular and independent without consideration to predecessors. Research on models of innovation diffusion has explicitly considered the case of overlapping generations. However, those models were built at the macro-level and are mainly descriptive about the interdependence among technology generations, i.e., the cannibalization effect of the new generation on the diffusion of the old ones and the enhancement effect of the previous generations on the diffusion of the latest (e.g., Danaher et al. 2001; Pae and
Lehmann 2003). Also, no distinction was made between a platform and the enabled services. Given the fundamental role of the ICT service platform and the concurrent presence of different generations, it is important to understand how individual consumers using many different existing generations of platforms make their migration decision. Given this backdrop, this paper has the following objectives:

1. Develop a baseline model of consumers’ intention to migrate to the newest generation of an ICT service platform;
2. Extend the baseline model by incorporating the moderating role of a consumer’s current generation to understand different migration situations—incremental, leapfrogging, and transformational; and
3. Empirically validate the proposed models in a naturally-occurring field setting concurrent with a nationwide introduction of a new ICT service platform.

2. Literature Review and Gaps in Research

In this section, we present an overview of the relevant literature, identify the specific gaps in prior research, and highlight three important ways in which our work extends current knowledge. First, we present the platform-application dichotomy. We then discuss successive technology generations targeted at the mass market. Finally, we explain how platform migration is different from technology adoption.

2.1. The Platform-Application Dichotomy and Platform Leadership

ICT artifacts build on a metaphor of a layered system in which technologies in the lower layer serve as the platform on which technologies in the upper layer (i.e., applications) function (Gawer and Cusumano 2002; McGrath 1995). A platform is a set of subsystems and interfaces that form a common structure from which derivative applications can be effectively developed and distributed (McGrath 1995). For example, many applications, such as word processing, financial management, and media packages, are built on the Wintel platform for PCs. In this paper, we use the term “ICT services” to refer to ICT applications with which consumers have direct interactions. For instance, in the context of 3G mobile communication, short messaging services (SMS), multimedia messaging services (MMS), and mobile business applications are the ICT services while the underlying platform consists of broadband networking, packet-switching data transfer, and device functionalities; and application development tools include technologies, such as J2ME and Micromedia mobile solutions (Tilson and Lyttinen 2005).
The platform strategy, i.e., the cost-effective development of multiple products on a common underlying technology platform, has been considered to be the fundamental strategy for ICT product development, which defines the cost structure, production capabilities, and differentiation of a high-tech firm (McGrath 1995). Platform leadership—being the first to introduce the latest generation of platform—has been studied at the firm level with an emphasis on the coordination of application development by third-party vendors (Gawer and Cusumano 2002). For example, Intel continually upgrades its platform formed by its CPU and motherboard technologies based on which a variety of “applications,” such as the video display card, sound card, Windows OS, and other application software are developed. Research on platform leadership has thus far focused on the firm-level analysis about how a platform leader coordinates application innovations and, therefore, ensures a continuing supply of externally developed complementary products for the platform. As noted earlier, an understanding of consumer decision making about the evolution of ICT service platform will complement prior work at the macro level.

The concept of the ICT service platform is important as it couples an underlying technology base to the enabled ICT services. As services in the upper layer function on the lower layer (platform), a fundamental change in the platform can result in a chain-reaction in the industry (Gulati, Sawhney, and Paoni 2003; Lyytinen and Rose 2003). Contrary to the adoption of a single ICT service, consumer migration to a new platform is a meta-decision as it creates opportunities to gain access to a range of services that could be uncertain or unknown at the time of the decision (Fichman 2004; Lyytinen and Rose 2003; Norton and Bass 1987; Sawhney 1998; see Table 1). Our review suggested little work on this meta-decision in the context of overlapping generations that permeates most ICT environments.

2.2. Successive ICT Generations

The notion of technology generations is ubiquitous, yet it has not been explicitly considered in prior adoption research. Instead, technology has typically been treated as a single “generation” and a standalone element (e.g., PC, WWW, Windows OS) and thus, modeled as a static and independent entity. While such a simplified view helps develop parsimonious models, it overlooks the evolutionary nature of technology. Many technologies evolve over time with new features and improved performance. These
changes can be characterized along a spectrum with one end signifying small, incremental changes and the other end representing discontinuous technological breakthroughs. For instance, while the 2.5G mobile data service platform is an incremental upgrade to 2G, 3G is a technological breakthrough characterized by architectural change in infrastructure and fundamental improvement in the service portfolio (Tilson and Lyttinen 2005; see Table 1). While prior work examined the interdependence among multiple technology generations at the macro level (e.g., Danaher et al. 2001; Norton and Bass 1987), we focus on consumer decision making regarding a single generation, i.e., the newest one, and theorize about the moderating role of the consumer’s current generations on key relationships.

2.3. Going beyond Technology Adoption Research

Prior adoption research has typically treated technology as a single entity with no differentiation among the layers of technologies. However, we contend that in deciding to migrate to a new generation, say from a 2G to a 3G platform, a consumer will give consideration both to the technology base and the services. Although not all users are knowledgeable about the underlying technology base, they will nonetheless form expectations about the services enabled by the new platform in the future. Expectations about both the platform and the services will nonetheless be important inputs to consumers’ decision-making process. For instance, both Fichman (2004) and Gawer and Cusumano (2002) showed that in addition to the applications enabled, the overall evaluation of the capability of an ICT platform was an important factor that influences the market share or adoption of the platform.

Most work on technology adoption has focused primarily on the workplace, and use of workplace systems is often organizationally mandated (e.g., Rai and Bajwa 1997). As ICT has become more and more ubiquitous and inexpensive, it has become available for consumer use outside the workplace. Our work focuses on ICT services that are acquired directly by consumers. The decision is at the individual level and voluntary. In understanding consumer technology adoption, consumers’ purchase considerations become important (see Venkatesh and Brown 2001). For example, previous technology adoption models ignore monetary cost and media influence as these constructs were not likely to be relevant to employees.
(Venkatesh et al. 2003). But such factors cannot be overlooked in consumer studies. Consumer migration decisions will be driven by different factors compared to those theorized in prior adoption research.

The dependent variable of interest is migration intention—switching to the newest generation of an ICT service platform. In some studies of adoption, the decision of interest was whether to go from no technology to a new technology (e.g., Szajna 1996; Venkatesh 1999; Venkatesh and Brown 2001), while other research has examined contexts where users go from an existing technology to a new technology (e.g., Chau and Hui 1998; Rai and Patnayakuni 1996). Yet, no consideration was given in prior research to the existing technology or the extent of change between the old and new technologies. In studies examining use as the dependent variable, the technology was already in place for some time and the dependent variable was typically some combination of extent, intensity, and frequency of use (e.g., Straub, Limayem, and Karahanna 1995). In sum, a focus on consumer migration intention has the potential to substantially advance knowledge in the broad domain of technology adoption.

3. Theoretical Framework and Research Model

We propose a model that integrates work on ICT services (e.g., Bakos and Brynjolfsson 1999), ICT platform strategy (e.g., Gawer and Cusumano 2002), technology adoption (Venkatesh et. al. 2003), technology success (e.g., DeLone and McLean 1992, 2003; Rai, Lang, and Welker 2002), and consumer behavior (e.g., Dodds et al. 1991). Specifically, our baseline model comprises four categories of factors that predict consumer platform migration intention: (1) perceptions of ICT service innovation; (2) general perceptions of ICT services; (3) external influences; and (4) individual differences as control variables. We then extend the baseline model to include technology generation as a moderator to study the relative importance of the first three categories across different three different migration situations. The proposed model is shown in Figure 2.
3.1. Perceptions of ICT Service Innovation

In this category, we have two constructs that capture the two unique characteristics of ICT services: one construct focuses on the new generation of the service platform and the second construct focuses on the associated new portfolio of services. To capture the rapid technology advancement in the service platform, we propose the construct of *perceived radicalness of the new platform*. To represent the ever increasing diversity and improving performance of ICT services, we propose the construct of *perceived superiority of the new generation of services*. As migrating to a new platform is a meta-decision involving the acquisition of a new platform on which a new family of services will be available to consumers, their beliefs about both the underlying platform and the associated services play an important role in determining their migration intention. As multiple generations co-exist at any point in time, consumers will make comparisons between the new generation and the existing ones. Thus, our two constructs account for consumers’ mental comparisons.
We define *perceived superiority of the new generation of services* as a consumer’s overall perceived benefits derived from using ICT services on the new platform generation when compared to what is gained from an existing generation or generations. This construct represents expectations about new services that are not available in the existing platforms and improved performance of existing services. Particularly, the increasing diversity of services that satisfy a variety of consumer needs is captured in this construct (Bakos and Brynjolfsson 1999; Hitt and Chen 2005). Such superiority has the potential to be perceived as contributing positively to various outcomes at the individual level (e.g., Delone and McLean 1992, 2003; Rai et al. 2002). For example, when comparing 3G mobile services with 2.5G services, consumers will expect to have both new services, such as video phone call and movie clips, that satisfy their different needs and improved performance of existing services, such as the transfer speed and quality of MMS. Either will contribute to the consumers’ overall belief about the superiority of the new family of ICT services. Therefore, we hypothesize:

*H1a: Perceived superiority of the new generation of services will positively influence a consumer’s migration intention.*

Following the work of Dewar and Dutton (1986), we define *perceived radicalness of the new platform* as the degree to which a consumer believes novel technological content is embodied in the new generation when compared to existing generations. In the case of the 3G platform, for example, novel components in the ICT base involve broadband data capabilities, packet-switching data transfer, and improvements in device functionalities, such as processors, displays, and storage; and in the system development set, innovations include development tools for advanced data applications, such as J2ME and Micromedia mobile solutions (Tilson and Lytyinen 2005). Previous work on technology management distinguishes two types of innovation, namely incremental innovations and radical innovations (e.g., Dewar and Dutton 1986; Moreau, Lehmann, and Markman 2001). Other researchers have proposed a spectrum of change with one end signifying small, incremental changes and the other end representing discontinuous technological breakthroughs (e.g., Gatignon, Tushman, Smith, and Anderson 2002).
Although ICT service platforms are usually transparent to consumers, they may have a significant impact on consumers’ migration intention for two reasons. First, when a new generation is introduced, application vendors tend to upgrade their products or even introduce innovations for the new platform. For instance, when 2.5G mobile network and multimedia features for mobile devices were introduced, SMS based on text was upgraded to its multimedia version, i.e., MMS and new services, such as ringtone downloads, were offered. This leads consumers to recognize the relationship between a superior platform and improved functionality of ICT services (Sears and Jacko 2003). Second, consumers can gain information and knowledge about platform innovation easily because ICT platform vendors tend to incorporate the technology component in their marketing and differentiation strategies—e.g., Intel always requires computer manufactures to put the “Intel Inside” label on PCs to have consumers associate the brand with the quality of the platform. In the mobile sector, mobile operators always try to establish a link between the platform innovation and superior services. For instance, NTT DoCoMo advocated its third-generation platform (WCDMA) when promoting its 3G services—i.e., FOMA—and Hutchison’s 3G services are branded as “3” worldwide. Therefore, we hypothesize:

\[ H1b: \text{Perceived radicalness of the new platform will positively influence a consumer’s migration intention.} \]

3.2. General Perceptions of ICT Services

When a new platform generation is introduced, consumers not only estimate overall gains from migration, but also update their beliefs about different aspects of ICT services on the new platform, e.g., the usefulness and ease of use of mobile data services based on the 3G platform. While migration and adoption are not equivalent, they are similar in that both involve evaluation of a technology. Therefore, adoption research can be leveraged to identify relevant perceptions about ICT services. Here, we draw from the unified theory of acceptance and use of technology (UTAUT) as it presented key technology perceptions synthesized from over 30 constructs from eight different models (Venkatesh et al. 2003).

Of the four predictors of behavioral intention and use in UTAUT, two are included as general perceptions of ICT services: performance expectancy and effort expectancy. Performance expectancy is
defined as the degree to which an individual believes that using the technology will help him or her to attain gains in personal productivity. Effort expectancy is defined as the degree of ease associated with the use of the technology. These two factors have been consistently shown to have an effect on intention to use a system (see Venkatesh et al. 2003). In the context of migration, new services and improved performance enabled by the new platform will contribute favorably to consumers’ work/life efficiency, e.g., m-business solutions enabled by 3G can greatly improve personal productivity of knowledge workers and a timely MMS greeting card can enhance social relationships. The greater the expected gain, the greater the intent to migrate to the new platform. In contrast, the novel technological contents embodied in the new platform may unleash new functionality and interfaces to access the ICT services that may make consumers’ past knowledge about the technology obsolete and demand a substantial amount of effort to learn the new platform in order to be able to migrate. The lower the expected level of effort, the stronger the migration intention. Therefore, we hypothesize,

\[ H2a: \text{Performance expectancy will positively influence a consumer’s migration intention.} \]

\[ H2b: \text{Effort expectancy will positively influence a consumer’s migration intention.} \]

3.3. External Influences

Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the target system (Venkatesh et al. 2003). In technology adoption studies,
social influence in the form of peer and superior influences has been known to influence adoption decisions (e.g., Karahanna et al. 1999; Venkatesh and Davis 2000). The impact of social influence on human behavior is widely noted in social network research, especially studies on the informal social networks in non-work settings (e.g., Reingen and Kernan 1986) and is thus pertinent to the consumer migration context. Reingen and Kernan (1986) suggested consumers may base their decisions on the opinions of peers and senior members in their social group even in voluntary settings (Brown and Venkatesh 2005). When facing a new platform with novel but complex features and a greater variety of services, consumers can be expected to defer to others’ opinions. Therefore, we hypothesize,

\[ H3a: \text{Social influence will positively influence a consumer’s migration intention.} \]

Media influence is defined as the degree to which a consumer perceives that the mass media, such as TV and newspapers, advocate that he or she should use the technology (Venkatesh and Brown 2001). Media influence is a key factor affecting purchase intent and decisions (e.g., Campbell and Keller 2003; Moschis and Moore 1982). Recent work on household PC adoption decisions found information from secondary sources, such as TV and radio, to be a significant determinant (Venkatesh and Brown 2001). To promote a new platform and the associated services, firms launch marketing campaigns through the mass media. In addition to advertisements, media outlets provide reviews by analysts and experts on new technologies that typically tend to create hype around the new technology. Therefore, we hypothesize:

\[ H3b: \text{Media influence will positively influence a consumer’s migration intention.} \]

3.4. The Moderating Effects of Technology Generation

In this section, we theorize that the importance of each factor will be moderated by the current technology generation that a consumer is using. We draw from Rogers’ (1995) work on innovation diffusion and Moore’s (1999) work on the cracks and the chasm in the adoption bell curve. While both works focused on explaining adoption in single innovations, they provide a frame of reference to study user behavior across different generations of an ICT service platform. Both Rogers (1995) and Moore (1999) argued that the adoption decision is not only influenced by innovation attributes but also by adopter categories. Five categories of adopters were defined based on the timing of adoption: innovators
are venturesome and adopt innovations at the earliest stage; early adopters are opinion leaders while early majority and late majority are people who need to deliberate and are even skeptical about innovations; and, finally, laggards are the most conservative people who rely almost solely on the past and are very resistant to change (see Moore 1999; Rogers 1995).

Rogers (1995) pointed out distinctions between two more general categories—earlier adopters (innovators and early adopters) and later adopters (early majority, late majority, and laggards) in terms of socioeconomic status, personality, and communication behavior. Particularly, earlier adopters, relative to later adopters, are wealthier, have a more favorable attitude toward change, are more innovative, more risk-taking, and have greater ability to deal with abstractions and uncertainty. Innovators and early adopters serve as opinion leaders, seek novelty, and possess a lot of computer experience (Chau and Hui 1998). In contrast, later adopters need extensive press endorsement (Moore 1999), suggesting that consumers who are using earlier generations of an ICT platform are subject to greater media influence.

Moore (1999) suggested that there are three cracks and a chasm in the adoption bell curve. The cracks are between the innovators and early adopters, early majority and late majority, and late majority and laggards respectively. The chasm exists between the early adopters and early majority. Each crack indicates the potential for some differences between the categories in decision-making criteria regarding innovations. The chasm indicates a major gap in the thought process across the categories—early adopters vs. early majority—that in turn typically creates a major obstacle in the marketing of high technology products. We draw on this basic idea and develop our hypotheses related to migration based on a consumer’s current generation. Moore (1999) applied the framework of innovation diffusion to marketing in high technology markets. Generally, innovators are technology enthusiasts who appreciate a technology for its own sake regardless of its specific functionalities. Early adopters are visionaries who are less interested in the value from the technology itself, rather they are interested in the benefits of it to match a strategic opportunity or goal. Early majority are pragmatists who prefer to make incremental, measurable, and predictable progress. Late majority are conservatives who are against discontinuous innovations and believe far more in very gradual progress and look for extensive endorsement from
various sources, including actual market success. Finally, laggards are skeptics who do not participate in the high technology marketplace (Moore 1999). In general, as the adopter continuum moves from innovators to laggards, users are less likely to adopt “technology for the sake of technology” and become increasingly practical, conservative, and resistant to change.

While the categories of adopters provides us grounding in the rich literature on adoption and diffusion, in order to conceptualize categories of potential migrators, we must also consider work on cross-generation effects at the macro-level. The macro-level literature has suggested that there are two types of migration—leapfrogging and incremental (e.g., Danaher et al. 2001). We extend this to suggest that there is a third category—namely, transformative. Our definition of the incremental migration situation is consistent with the macro diffusion literature. Consumers facing such a situation are those using the latest generation—i.e., the generation of the technology that is closest to the new generation. However, users of older generations could be using one of many previous generations. These users will experience a major paradigm shift as well as a steep learning curve should they decide to migrate to the new generation. We refer to such a migration situation as transformative. In contrast, users of relatively newer generations do not have to go through a paradigm shift and/or deal with dramatically new types of services when they migrate. We use the term leapfrogging to refer to such a migration situation. We expect that the factors identified in the baseline model will exert different effects on migration intention depending on the migration situation outlined above.

3.4.1. Moderating Effects on Perceptions of ICT Service Innovation

Consumers of later generations typically have a positive attitude toward change and greater knowledge about new technologies—here, the new ICT service platform. Therefore, we expect that the generation will moderate the impact of perceived superiority of services and perceived platform radicalness on migration intention. Innovators and early adopters of a new platform are usually technology savvy and many are inspired to use the new services (Rogers 1995). This group of consumers not only welcomes change, but they seek out change and contribute to the momentum of creating successive platform generations. As long as they perceive radical improvement in both technology
platform and services supported/offered, these consumers will be motivated to migrate to a new platform
generation. In contrast, consumers of earlier generations are often content with the technology and
services provided. Better technology and the expectations of new services do not serve as motivators that
would lead them to migrate to the new generation as they prefer stable, established services and prefer to
avoid change. They tend to accept mature technologies and services with incremental improvement
(Moore 1999). Consumers of earlier generations demand a very convincing answer for the “so what?”
question, while those who have the current generation appreciate the technology for its own sake because
of its promise and potential and, because of their own latent innovativeness. Radicalness appeals to
consumers who are obsessed with new technologies and those who have a strong desire for uniqueness
and trend-setting (Lynn and Harris 1997; Tepper 1997). They would be consumers of the most current
generation who will, therefore, pursue the newest generation early in its life cycle to be different and

The moderation of the effects of service superiority and platform radicalness on migration
intention by generation can also be argued from a consumer knowledge perspective. Alba and Hutchison
(1987) proposed two major components of consumer knowledge—familiarity and expertise. Familiarity is
defined as a consumer’s product-related experiences, such as advertising exposure, information search,
purchase and use. Expertise is defined as the ability to perform product-related tasks successfully that
requires product-related cognitive structures and processes. In general, increased product experiences
(and thus, familiarity) lead to greater consumer expertise. When a new product is introduced, consumers
with greater expertise based on more product experience tend to have a better understanding of the
product and evaluate it more accurately (Alba and Hutchison 1987). The moderating role of consumer
expertise in innovation evaluation and adoption has been supported in a number of marketing studies (e.g.,
Cowley and Mitchell 2003; Moreau et al. 2001). Therefore, we hypothesize:

**H4a:** Generation will moderate the effect of perceived superiority of services on a consumer’s platform
migration intention such that the later the generation, the stronger the effect.

**H4b:** Generation will moderate the effect of perceived radicalness on a consumer’s platform migration
intention such that the later the generation, the stronger the effect.
3.4.2. Moderating Effects on General Perceptions of ICT Services

It is likely that consumers of earlier generations of platforms are content with their current services and thus, are less motivated to migrate to the new platform unless they are convinced that improvement in terms of performance and effort expectancies can be achieved. These consumers tend to be more conservative and even suspicious about new technologies (Moore 1999; Rogers 1995). Therefore, this group of consumers will place more weight on performance and effort expectancies related to the new technology platform. In contrast, these expectancies will be less important to users of the newer generations. As noted earlier, consumers of the most current generation available at any given time will often be willing to migrate to the latest generation just for the sake of using it regardless of expected benefits. Such users will also be willing to expend any necessary effort. Therefore, we hypothesize:

\[ H4c: \text{Generation will moderate the effect of performance expectancy on a consumer’s platform migration intention such that the earlier the user’s current generation, the stronger the effect.} \]

\[ H4d: \text{Generation will moderate the effect of effort expectancy on a consumer’s platform migration intention such that the earlier the user’s current generation, the stronger the effect.} \]

According to Rogers (1995), early adopters, because they are typically more affluent, tend be less constrained by economic resources. Thus, the more affluent the user, the more willing he or she will pay for innovations and will be less sensitive to the monetary value associated with the migration decision. In contrast, consumers of earlier generations typically take a wait-and-see attitude and are more price sensitive. Further, when new services are introduced, they tend to have a price premium that the less affluent cannot afford and/or do not find too costly in a cost-benefit assessment. Price elasticity of consumers increases as we move beyond innovators and early adopters. To help consumers cross the chasm (Moore 1999), only over time do service providers tend to cut prices. Therefore, we hypothesize:

\[ H4e: \text{Generation will moderate the effect of monetary value on a consumer’s platform migration intention such that the earlier the user’s current generation, the stronger the effect.} \]

3.4.3. Moderating Effects on External Influences

Consumers of later generations are more innovative and are expected to seek new technology for the sake of the technology with an emphasis on being at the cutting edge and the status gains that come
with such a lead-user position (e.g., Venkatesh and Brown 2001). They are less susceptible to social influence. In contrast, as noted earlier, consumers of earlier generations are conservative and employ a “wait-and-see” attitude. They will rely on friends and family to validate new technologies and guide them in the decision-making process. They are also less innovative and more risk averse, thus seeking external validation and advice. Similarly, mass media serve as the secondary source of opinions and suggestions (Brown and Venkatesh 2005). Therefore, we hypothesize:

\[ H4f: \text{Generation will moderate the effect of social influence on a consumer’s platform migration intention such that the earlier the user’s current generation, the stronger the effect.} \]

\[ H4g: \text{Generation will moderate the effect of media influence on a consumer’s platform migration intention such that the earlier the generation, the stronger the effect.} \]

3.5. Individual Characteristics: Control Variables

A wide variety of individual characteristics have been shown to influence consumer decision-making (e.g., Donthu and Gilliland 1996). We control for a few key individual characteristics. We do not develop specific hypotheses for these variables as these have been established in the extant literature, but rather include them as control variables. They are: demographics (age, gender, and income) and personal dispositions (risk aversion and personal innovativeness with IT). Particularly, personal innovativeness with IT (PIIT) is as “the willingness of an individual to try out any new information technology” (Agarwal and Prasad 1998, p. 206) and risk aversion is defined as an individual’s propensity and tolerance for risk (Bauer 1960; Munichor, Erev, and Lotem 2006), both likely to influence migration to innovations with an unknown and uncertain future.

4. Method and Results

4.1. Research Setting: 3G

We investigate consumer migration to a new ICT service platform with 3G as the focal new platform. The 3G platform is a technological shift as it can bring about radical and pervasive innovations in the mobile communications industry (Tilson and Lyytinen 2005). The 3G broadband data capabilities, improvements in device functionalities, and new development tools can enable the creation of a variety of new services not available on 2G and 2.5G platforms (shown earlier in Table 1). The 3G platform also
offers a setting to study consumers’ migration to a new platform generation when multiple old generations are present, i.e., 2G and 2.5G platforms. We studied consumer perceptions and migration intention in conjunction with the introduction of 3G in Hong Kong. We map the three types of platform migration situations in the case of 3G introduction to the three conceptual categories of migration types:

1) 2G (Voice)—Voice communication was the sole application for this group of users. Despite the proliferation of data services, such as SMS, multimedia messaging service (MMS), and application downloads, these services are not used by this group of users. In terms of platform migration, 3G is not their only choice. The other alternatives are 2G (data) and 2.5G. This is clearly a very conservative group. To migrate to 3G directly represents a **transformative** decision to them.

2) 2G (Data)—This group of users use both voice communications and SMS—a simple text-messaging data service. They can choose either 2.5G or 3G. They have prior experience with data services in the form of SMS. Unlike the previous group, the 3G platform is not transformative because of their prior experience with a data service (i.e., SMS). To users in this group, the decision is whether to **leapfrog** 2.5G and adopt 3G directly.

3) 2.5G (Data)—Users in this group are familiar with novel mobile data services, such as MMS, ringtone and game downloads, and mobile Internet. Migrating to 3G will offer this group services with better quality and higher bandwidth (e.g., from 64 kbps to a maximum of 2Mbps) and accessibility to new applications. Their decision to adopt 3G represents an **incremental** migration decision to them.

**4.2. Instrument Development and Refinement**

Most scales were adapted from previous research and modified to fit the current research context. The scales were carefully examined to ensure content validity and adapted to the context of mobile data services (see Appendix). The scales for *performance expectancy*, *effort expectancy*, and *social influence* were adapted from Venkatesh et al. (2003). We extended the two-item scale for *media influence* from Pedersen and Nysveen (2003) by adding one more item to improve both content validity and reliability.

The scale for *perceived monetary value* was adapted from Dodds et al. (1991). The scale for *perceived radicalness of the new platform* was drawn from Gatignon, Tushman, Smith, and Anderson’s (2002) five-
item scale. As there was no existing scale to measure perceived superiority of the new generation of services, we developed new items based on the definition of the construct and through interactions with industry experts for the ideas about the superiority of services on the new ICT platform. Superior services include greater variety and better performance in a cost-effective way (McGrath 1995; Norton and Bass 1987; Sawhney 1998) and our three-item scale captured these aspects. Demographics were measured using single-item scales. Gender was measured by a dichotomous variable with the value “1” for men and “0” for women. Age was calculated in years based on the date of birth reported by respondents. We asked respondents to indicate their income by choosing a particular range of income. The scales for the two personal disposition constructs—risk aversion and personal innovativeness with IT—were adapted from Donthu and Gilliland (1996) and Agarwal and Prasad (1998) respectively. Finally, three items were used to measure consumer migration intention.

When 3G was introduced in Hong Kong, both the 2G and 2.5G platforms also co-existed. Also, among 2G users, some were using only voice services without any data applications. To distinguish 2G voice users, 2G data users, and 2.5G users, a representative portfolio of mobile data services currently available in Hong Kong were selected (see Appendix). Those who never used any data services were classified as 2G voice users, those who had only used SMS were classified as 2G data users, and those who also used other data services such as MMS were classified as 2.5G users. Further, we reconciled the services with the phone model that the consumer was using to ensure accurate categorization of consumers. Finally, we also used a question on the survey to cross-check and ensure correct classification. This approach poses little risk of erroneous classification (e.g., Lee, Lee, and Schumann 2002). After categorization, we had 336 2G voice users, 820 2G data users, and 3,256 2.5G users.

We conducted a pre-test among approximately 100 consumers who had varying levels of experience with mobile services. One item of the radicalness scale was dropped due to its unclear meaning and problematic psychometric properties in the pre-test. Apart from that, only minor wording changes were made. A pilot study was conducted with a similar sample and the reliability and validity were supported.
4.3. Participants and Data Collection Procedure

We conducted an online survey. Online surveys have pros and cons (Ilieva, Baron, and Healey 2002). Two advantages are that a web-based survey can reach a wide audience with a better presentation of the questionnaire and an e-mail survey provides control over participant selection. In the current research, we follow a mixed approach with both a web-based questionnaire and an e-mail solicitation, thus gaining the advantages of both approaches (see Ilieva et al. 2002). One key limitation of an online survey is that the sample may not be representative of the population due to poor access to the Internet and low computer literacy of respondents. Hong Kong has ranked among the top five countries in ICT development based on Internet and mobile penetration and other key scores, such as PC and broadband penetration (ITU 2002). In 2005, the Internet penetration rate in Hong Kong was around 70%, and among those aged 10 and above, about 57% used Internet services (OFTA 2006). In 2006, household broadband penetration rate reached just over 66% (OFTA 2006). Therefore, administering an online survey in Hong Kong was an effective way of reaching a vast majority of the population.

Data were collected in one month before the 3G introduction in Hong Kong. The questionnaire was administered via a non-profit Hong Kong e-government portal, with free membership to any permanent resident of Hong Kong. An email with a link to the questionnaire was sent to members of the portal to solicit participation. To encourage participation, incentives, e.g., free mobile phones and mobile services packages, were offered. In order to help respondents understand the new platform (i.e., 3G) and its implications, flash demonstrations of 3G mobile services, such as videophone service, video clip downloads and MMS were presented to respondents prior to filling out the questionnaire. The online survey was conducted starting one month before the launch of 3G in Hong Kong and administered for one month. We received a total of 5,074 responses, serving as evidence that an online survey is quite effective in Hong Kong. Data were first cleaned by removing incomplete responses and “suspicious” responses (e.g., extremely fast completion time as logged by the server, responses to all questions were 7s). Next, invalid observations were deleted when there were contradictory answers to the reverse-coded item for perceived radicalness. Thus, the quality of the data was significantly improved (see Ilieva et al. 2002).
After these steps, we had 4,412 usable responses. We randomly subdivided this sample into two subsamples—one for an initial model test and another for cross-validation. In the overall sample, there were 2350 women (43%). The age range was 18 to 65, with a mean of 27.35 and a standard deviation of 7.77.

4.4. Instrument Validation

We conducted a principal components analysis with varimax rotation to examine reliability and validity. All factor loadings were above 0.70, indicating good reliability, and the cross loadings with very few exceptions were below 0.35, suggesting discriminant validity (Fornell and Bookstein 1982). The loadings and cross-loadings are shown in Table 2. Cronbach’s alpha was computed for each scale to assess the reliability. All scales were reliable as the Cronbach alpha scores were greater than 0.80. The descriptive statistics, Cronbach alphas, and correlations are shown in Table 3.
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Table 3. Reliability, Descriptive Statistics, and Correlations

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<td>Inc</td>
<td>See note 5</td>
<td>.20</td>
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Notes:
1. MIGIN T=Migration Intention; PE=Performance Expectancy; EE=Effort expectancy; SI=Social Influence; MI=Media influence; Rad= Perceived Radicalness of the New Platform; Sup=Perceived Superiority of the New Generation of Services; MV=Perceived Monetary Value; RA=Risk aversion; PIIT=Personal innovativeness with IT; Gdr: Gender; Inc: Income.
2. Diagonal elements are Cronbach’s Alphas for the two subsamples.
3. Off-diagonal elements are correlations. Below diagonal elements are correlations in the initial model test sample and above diagonal elements are correlations in the cross-validation sample.
4. Only correlations < .10 were non-significant; others were significant at least at p < .05.
5. Gender, age, and income in subsamples have similar profiles as the overall sample.
4.5. Hypothesis Testing

Each of the models was tested using multiple regression analysis. The results for the baseline model are shown in Table 4. The variance explained in migration intention was about 50%. Both perceived radicalness of the new platform and perceived superiority of the new generation of services were significant, supporting H1a and H1b. Performance expectancy and effort expectancy were significant predictors of migration intention, supporting H2a and H2b. However, perceived monetary value was not significant, thus not supporting H2c. Of the two external influences, only the effect of social influence was significant, thus supporting H3a but not H3b.

<p>| Table 4. Empirical Test of the Baseline Model: Initial Test and Cross Validation |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|</p>
<table>
<thead>
<tr>
<th></th>
<th>Initial Test</th>
<th>Cross Validation</th>
<th>Hypotheses Testing</th>
</tr>
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<tbody>
<tr>
<td>N</td>
<td>2206</td>
<td>2206</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>.49</td>
<td>.47</td>
<td></td>
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<tr>
<td>Perceptions of ICT Service</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Innovation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percd. radicalness of the new</td>
<td>.15***</td>
<td>.20***</td>
<td>H1a: √</td>
</tr>
<tr>
<td>platform</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percd. superiority of the new</td>
<td>.21***</td>
<td>.20***</td>
<td>H1b: √</td>
</tr>
<tr>
<td>generation of services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Perceptions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Of ICT Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance expectancy</td>
<td>.16***</td>
<td>.16***</td>
<td>H2a: √</td>
</tr>
<tr>
<td>Effort expectancy</td>
<td>.14***</td>
<td>.14***</td>
<td>H2b: √</td>
</tr>
<tr>
<td>Percd. monetary value</td>
<td>.02</td>
<td>.02</td>
<td>H2c: X</td>
</tr>
<tr>
<td>Social influence</td>
<td>.16***</td>
<td>.15***</td>
<td>H3a: √</td>
</tr>
<tr>
<td>Media influence</td>
<td>.00</td>
<td>.02</td>
<td>H3b: X</td>
</tr>
<tr>
<td>External Influences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal innovativeness with IT</td>
<td>.15***</td>
<td>.12***</td>
<td></td>
</tr>
<tr>
<td>Risk aversion</td>
<td>-.10*</td>
<td>-.10*</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.02</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.02</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>.03</td>
<td>.03</td>
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</tr>
</tbody>
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Note: *p<0.05; **p<0.01; ***p<0.001; ns Non-significant.

We further tested the moderating effects of technology generation based.³ Table 5 presents the results for different user segments defined by technology generation. Chow’s test was employed to test for possible differences in regression coefficients across the three sub samples (Chow 1960). As the generation moved from the oldest (2G voice) to the latest (2.5G), the relative importance of general

³ The moderation effects of age and gender in UTAUT were tested with no significant interactions found.
technology perceptions and external influences decreased while the weight of two perceptions of ICT service innovation increased. The effects of both general technology perceptions and external influences were statistically stronger for consumers using the earliest generation—2G voice users—when compared to those using the latest generation—2.5G users, with 2G data users in between. In contrast, the effects of perceived radicalness of the new platform and perceived superiority of the new generation of services were just the opposite—stronger for 2.5G users than for 2G voice users. The variance explained in the three group model tests—2G voice, 2G data, and 2.5G—were 60%, 59%, and 59% respectively. We also tested the moderation by generation in a single regression model with interaction terms (Aiken and West 1991). Two categorical dummy variables were created for the three levels of generation, i.e., 2G voice, 2G data, and 2.5G. The interaction terms were largely as predicted in H4, thus further supporting the moderating role of technology generation in consumers’ migration decisions. To further establish empirical support, we also used a single ordinal dummy variable and examined the interaction effects. These results also confirmed our predictions.

### Table 5. Analysis of Generation Effects

<table>
<thead>
<tr>
<th></th>
<th>2G Voice</th>
<th>2G Data</th>
<th>2.5G</th>
</tr>
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<tbody>
<tr>
<td>N</td>
<td>336</td>
<td>820</td>
<td>3256</td>
</tr>
<tr>
<td>R²</td>
<td>.60</td>
<td>.59</td>
<td>.59</td>
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<tr>
<td><strong>Perceptions of ICT Service Innovation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived. superiority of new generation of services</td>
<td>.04</td>
<td>.19***</td>
<td>.25***</td>
</tr>
<tr>
<td>Perceived. radicalness of new platform</td>
<td>.04</td>
<td>.19***</td>
<td>.25***</td>
</tr>
<tr>
<td><strong>General Perceptions of ICT Services</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance expectancy (PE)</td>
<td>.25***</td>
<td>.20***</td>
<td>.10*</td>
</tr>
<tr>
<td>Effort expectancy (EE)</td>
<td>.27***</td>
<td>.20***</td>
<td>.10*</td>
</tr>
<tr>
<td>Perceived. monetary value (PV)</td>
<td>.14**</td>
<td>.10**</td>
<td>.02</td>
</tr>
<tr>
<td><strong>External Influences</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Social influence (SI)</td>
<td>.30**</td>
<td>.25***</td>
<td>.14***</td>
</tr>
<tr>
<td>Media influence (MI)</td>
<td>-.20***</td>
<td>-.12**</td>
<td>.02</td>
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<tr>
<td><strong>Individual Differences</strong></td>
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<td></td>
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<td>Personal innovativeness with IT</td>
<td>.04</td>
<td>.11**</td>
<td>.15***</td>
</tr>
<tr>
<td>Risk aversion</td>
<td>-.12**</td>
<td>-.10**</td>
<td>-.14**</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>.01</td>
<td>.02</td>
<td>.03</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>.04</td>
<td>.01</td>
<td>.00</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td>.01</td>
<td>.04</td>
<td>.02</td>
</tr>
</tbody>
</table>

Note: *p<0.05; **p<0.01; ***p<0.001; ns Non-significant.

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4 We conducted test of the moderation effects proposed in the original UTAUT model and no significant effects were found.
5. Discussion

We proposed and tested a theoretical model of consumer migration across generations of ICT service platforms. The baseline model received strong support, with an explained variance just under 50%. The extended model, with moderation by technology generation, was supported and provided a rich explanation of the underlying phenomenon, with the variance explained being as much as 60%. Among the three types of migration situations, i.e., incremental, leapfrogging, and transformative, general technology perceptions—performance expectancy, effort expectancy, and perceived monetary value—were stronger in the transformative and leapfrogging situations. The same pattern was found for external influences. Perceptions of ICT service innovation—perceived superiority of the new generation of services and perceived radicalness of the new platform—were most important in the incremental group. These results support our proposed model and the critical role of perceptions of ICT service innovation in consumer migration intention, thus confirming that technology-related factors indeed play a central role in IS phenomena (see Benbasat and Zmud 2003).

5.1. Theoretical Contributions and Implications

Our work presents a study of a new type of ICT-related behavior—consumer platform migration—that corresponds to the ubiquitous phenomenon of co-diffusion of generations of ICT service platforms in the mass market. Our model of consumer migration is integrative and new in that it employs established constructs from prior work in a variety of fields—ICT strategy, IS success, technology adoption, and marketing—and also, introduced new constructs that are tailored to the context of platform migration. Moreover, we identified three conceptual categories associated with platform migration—transformative, leapfrogging, and incremental based on technology generation being used. Migration decisions are not made in the vacuum and are often not from no-technology to a technology solution but rather from one version or one generation to another. This suggests that where consumers are located on the technology evolution trajectory will be the key factor in the decision. Thus, our work goes beyond traditional technology adoption research and gives the ICT artifact a more central role in the model, which provides richness and depth that is unique to IS research (see Benbasat and Zmud 2003).
As pointed out by Orlikowski and Iacono (2001, p. 131), one of the five premises for theorizing about ICT artifacts is that “… artifacts undergo various transitions over time … while coexisting and coevolving with multiple generations of the same or new technologies at various points in time.”

Technology generation has been studied in innovation diffusion research at the macro-level, i.e., market or product level (e.g., Danaher et al. 2001; Norton and Bass 1987). There, the emphasis has been on the interactions among generations, such as the cannibalization effect of the new generation on the old and the enhancing effect of the old on the new (e.g., Norton and Bass 1987). However, we found little or no work on consumers’ migration decisions across generations. Moreover, the degree of change in each new generation over the old, i.e., radicalness and superiority, has not been modeled (e.g., Danaher et al. 2001). This is important because different generations involve varying degrees of innovation over existing ones, especially as perceived by the consumers. For instance, in the case of mobile data services, while 2.5G is an incremental upgrade from 2G data, 3G is a radical innovation capable of creating disruptive changes (Tilson and Lyytinen 2005). Our model thus complements macro-level work on innovation diffusion.

The negative effect of media influence in transformative and leapfrogging migrations is both surprising and interesting. We speculate that this is because of 2G users’ defensive processing of external information about 3G such as news reports and advertisements, which is likely induced by the failure of 2G WAP in living up to projections. Marketing research suggests that when product performance fails to meet advertisers’ claims, consumers’ distrust of the advertiser will be evoked and may even generalize to other media, authority, and future attempts of persuasion (Pollay 1986). This type of distrust could create a negative bias in consumers’ judgment such that consumers will overgeneralize their distrust to situations where it is not warranted. Even superior products and those introduced by a different organization are vulnerable to this “defensive bias” (Chaiken, Giner-Sorolla, and Chen 1996; Darke and Ritchie in press). It is quite possible that this defensive information processing played a role in the case of 3G migration. MDS, based on 2G WAP, had been widely advocated by the media as a comparable mobile version of the wired Internet. However, what consumers got from 2G WAP was an experience that was termed “Wait-And-Pay.” These problems perhaps evoked consumers’ skepticism about 3G. This bias may be
particularly stronger for voice and SMS users because, unlike 2.5G users, 2G users still stayed on the 2G platform and the failure of WAP could have more easily triggered defensive information processing. In contrast, 2.5G users may already have had experiences with the performance and functionality improvement of the much-improved platform, thus having little or no defensive bias. This negative effect of media influence further supports the importance of technology generation as a moderator and highlights the necessity of studying interactions among generations of ICT at the individual level.

Platform strategy is the foundation for ICT product development (McGrath 1995). While there are a number of studies of ICT platforms (e.g., Gawer and Cusumano 2002; Sawhney 1998), much of that work has focused on issues related to the supply side, e.g., strategic management of ICT platform innovations within a firm or among firms. How individual users, such as mass consumers, react to platform innovations has been less studied. Our work studies the impacts from the demand side on the success of platform leadership strategy—i.e., what determines consumers’ migration to a new generation of platform—because the realization of the strategic value of ICT platform leadership, such as seizing market share from competitors, depends in the first place on end users’ embracing the new generation. Thus, our work complements and sheds new light on studies of platform leadership strategy in particular, and strategic management of ICT service innovations in general.

5.2. Practical Implications

While Rogers (1995) and Moore (1999) provided an *ex post* description of adopter categories, we believe technology generation offers an *ex ante* identification of consumer segments with strategic implications for ICT service innovations. We found evidence of differences in drivers of migration intention across these three consumer segments (transformative, leapfrogging, and incremental). ICT firms should design strategies tied to the factors that are most important to each category. For example, in the case of 3G migration, mobile service packages with advanced technology can be targeted at 2.5G users with a premium price, while ease of use and practical values of 3G should be emphasized when communicating with 2G data users.
The negative effect of media influence suggests that ICT firms should seek to actively manage the potential negative impact of old technology generation on the new one. When promoting a new generation of a platform, ICT service organizations need to take into account the negative biases created by the inferiority or even failure of previous generations. This is particularly important when there is a co-existence of multiple old generations. Users of older generations are more likely to distrust information about the superiority of the new platform due to their experiences with the inferior functionality of the older generations, and media campaigns may produce a negative effect on consumers’ views of the new platform, especially when they feel that there is no significant improvement in the new generation. Thus, caution is needed for decisions about marketing practices, especially advertising and other media forms.

Platform leadership has been studied from a perspective of strategic management of industrial innovations (e.g., Gawer and Cusumano 2002). A particular focus was how companies like Intel, Microsoft, Cisco, and NTT DoCoMo sustain their long-term competitive advantage through the successful introduction of platform innovations—e.g., CPU, Windows OS, Internet/Intranet technologies, and c-HTML plus specialized mobile devices. However, research and practice has largely neglected the distinction between incremental and radical platform innovations. Our paper shows that the majority of consumers do care about the radicalness of technological change and the superiority of the new family of ICT services, and the associated cost of behavioral change as captured by effort expectancy. Thus, we suggest the importance of the strategic management of consumers’ behavioral change triggered by service innovations. Particularly, communication or design strategies, such as education using analogy or metaphors, could facilitate consumers’ learning about the advantages offered by the new platform and lessen their burden of trial and error when using the new ICT services.

6. Conclusions

In this paper we examined consumers’ migration decision when a new generation of ICT platform is introduced. Integrating research on platform strategy, technology adoption, and consumer behavior, we proposed four categories of factors that influence end users’ platform migration intention: perceptions of ICT service innovation, general perceptions of ICT services, external influences, and individual
differences. Further, the co-existence of multiple technology generations is explicitly modeled by distinguishing three types of migration situations—transformative, leapfrogging, and incremental—based on the current technology generation being used by a consumer. We found that the superiority of a new generation of ICT services and the radicalness of the new platform are the two key influential factors that attract end users to the newest generation of the ICT service platform. Moreover, under different migration situations, consumers exhibited different decision-making patterns in terms of the relative weight they assigned to different factors. Generally, from transformative to incremental migration, consumers attach more importance to the radicalness and superiority of the service innovation, while placing less weight on performance gains, costs, and external influences. Thus, this paper complements existing macro-level research by examining consumer decision making about the migration to a new generation of ICT service platform.

7. References


8. Appendix: Key Survey Items

Scales (7-point Likert scale; 1: strongly disagree to 7: strongly agree, unless noted)

Migration Intention
1. I intend to use 3G MDS in the future
2. Will you use 3G MDS after the introduction in Hong Kong?
   A semantic differential scale from “Definitely not”, “Definitely will”
3. When do you expect to begin using 3G MDS after the introduction?
   A scale from “Within 1 month” to “Wait and see”

Perceived Radicalness of New Platform
1. 3G is a minor improvement over current mobile technologies (reverse-coded)
2. 3G is based on revolutionary change in mobile technologies
3. 3G is a breakthrough innovation compared with current mobile technologies
4. 3G leads to applications that are difficult to be substituted with current mobile technologies (removed)

Perceived Superiority of New Generation of Services
1. Compared with current mobile services, 3G MDS will bring more diversified services
2. Compared with current mobile services, 3G MDS will be of higher quality
3. Compared with current mobile services, MDS based on 3G will be of higher value

Performance Expectancy
1. Using 3G MDS increases my chances of achieving things that are important to me
2. Using 3G MDS helps me accomplish things more quickly
3. Using 3G MDS increases my productivity

Effort Expectancy
1. Learning how to use 3G MDS will be easy for me
2. My interaction with 3G MDS will be clear and understandable
3. It is easy for me to become skillful at using 3G MDS

Perceived Monetary Value
1. MDS are reasonably priced
2. MDS offer a good value for the money
3. At the current price, 3G MDS provide a good value

Social Influence
1. People who are important to me think that I should use 3G MDS
2. People who influence my behavior think that I should use 3G MDS
3. People whose opinions that I value prefer that I use 3G MDS

Media Influence
1. Media and advertising consistently recommend using 3G MDS
2. News articles, reviews, promotion and advertising suggest using 3G MDS to be a good idea
3. Media is full of reports, articles and advertisements suggesting 3G MDS would be worth using

Risk Aversion
1. I would rather be safe than sorry
2. I want to be sure before I purchase anything
3. I avoid risky things

Personal Innovativeness with IT
1. If I heard about a new IT, I would look for ways to experiment with it
2. Among my peers, I am usually the first to try out new information technologies
3. I like to experiment with new information technologies

Questions for Categorization of Current Technology Generation
Please choose your usage frequency for each of the following mobile data services (frequency from never to many times a day): a) SMS; b) MMS; c) Ringtone and Logo Download; d) Java Games; e) GPRS Mobile Internet; f) Mobile E-mail

* Other questions asked about the model of the phone and the generation of mobile services being used.