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Global Acceptance of Technology (GAT) and Demand for Mobile Data Services

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Abstract

Social transformations are envisioned to occur with the increased diffusion of mobile data services, once technology and business partnering issues are defined and executed. To better understand how this market may unfold, user behavior in markets outside the U.S. can offer clues to future growth. The varied rates of mobile service diffusion around the world suggest that there are several variables affecting demand for mobile data services.

The explanatory power of current theoretical models to explain the market for mobile data services has been tested as the industry seeks viable business models. Specifically, a need for models that provide understanding of technology adoption from the user's context as well as the technology side of the diffusion process are needed. Using a modified version of the Diffusion of Innovations framework, we examine the underlying behavioral, cultural, and economic factors affecting demand for mobile technology across several markets. We propose an initial framework to account for adoption levels of mobile data services between and within national markets. Our proposed model, the Global Adoption of Technology (GAT) seeks to incorporate the influence of culture to a greater degree than some commonly utilized models of technology diffusion.

In sum, we apply data collected from a multination-wide survey of mobile data consumers with an emphasis on users in the U.S. market. Comparing the preferences of users across markets suggests that a shared outlook exists regarding some of the key

attributes that mobile data service should possess. Survey data indicates that productivity and convenience are qualities that motivate users to adopt mobile data services, although certain segments particularly younger users do place value on fun and entertainment.

The need to consider context, demographics and other social factors has been accentuated by regional discrepancies in adoption of mobile data services. Overly optimistic forecasts for mobile data services in both consumer and enterprise markets in the United States in particular, have revealed a need for analytic frameworks to specifically aid in understanding mobile user's needs and preferences. Using primary data, we seek to explain some of the variance in mobile service adoption both within and between national markets, through applying the GAT framework.

Keywords: mobile data services; diffusion of innovation; user behavior; culture; cross-cultural; adoption; demographics; wireless technology;

1. Introduction

The adoption of mobile communications and data technologies may potentially offer fundamental life and work changes for business and personal users. Rapid mobile phone diffusion throughout the world underscores the benefits of anytime/anywhere communications. Whether mobile data communications will continue to deepen interactions between people, networks, companies, and organizations through always-on and easy to use devices is the question. Although the envisioned transformations have not yet taken place, many argue that it is still too early, and that when several conditions are finally met in the U.S. market, including, implementation of high speed mobile networks, targeted marketing, and attractive pricing, wide scale diffusion will finally occur.

The varied rates of mobile service uptake in consumer markets in Asia and Europe provide indications, but not clear trends that can be applied to the U.S. market. For example, the rapid popularity of short-messaging service (SMS) in many parts of the world has not been transferable to thus far in the U.S. The need to consider context, demographics and other social factors has been accentuated by these regional discrepancies in adoption. Overly optimistic forecasts for mobile data services in both consumer and enterprise markets in the United States in particular, highlights a need for analytic frameworks to understand the factors that influence the usage of mobile data services, the variable we are studying.

2. Literature Review

A multitude of frameworks exist to categorize technology diffusion, and some have even been adapted to explain mobile service uptake. For instance, Gilbert & Kendall (2003), have developed a research model for studying market segmentation of mobile data services that includes supply, demand and the contextual forces that shape these forces. Maitland (1998), suggests the need to incorporate cultural factors into diffusion models that for interactive networks. The Input-Process-Output model (IPO), focuses on consumer adoption and usage of mobile devices (Sarker & Wells, 2003). This

model includes user characteristics, features of mobile technologies, contexts for use, the process of trying out the technology, assessment of the experience, and the outcomes of usage. Nysveen & Pedersen (2004) introduces a model for mobile service adoption that has been tested with 232 respondents. Among the observations made, they find a significant relationship between external influences and perceived usefulness, and also that attitudes towards usage are influenced by social factors, including communications through the media and interpersonal communications. As Venkatesh et.al (2003) observe, “researchers are confronted with a choice among a multitude of models, and find that they must pick and choose constructs across the models, or choose a factored model and largely ignore the contributions from alternative models.” The growth of new models to analyze mobile technology adoption may reflect the level of uncertainty faced by industry decision-makers trying to develop investment strategies.

Our exploratory framework is inspired by Rogers’ framework and Venkatesh’s Unified Theory of Acceptance and Use of Technology (UTAUT), (2003), and is discussed with reference to survey data gathered in 4 markets: Korea, Hong Kong, Japan and the U.S. in 2003 and 2004 from the Worldwide Mobile Internet Study an international research consortium which carries out an annual survey of 1,000 mobile users in Asia, Europe and the U.S.

User perceptions of value, preferences and actual usage behavior are discussed within the framework of the GAT model. By examining mobile users across different national contexts, the differences and similarities in terms of current usage and future use intentions can be broadly described and compared.

Many models of technology diffusion focus on individual users without differentiating between age groups, professions, living conditions or other socio-cultural factors. Yet, emerging studies of mobile users examine the role of mobile services in different public and private social spaces, the work-leisure divide, use demographic studies and social theory, interview and social observation-based qualitative studies to determine a profile of the mobile user and their use patterns of mobile services (Venkatesh, Remesh, Massey, 2003). Demographic characteristics such as gender, education level, and income, have been studied in relation to different communications patterns. Anderson, et al., (1999), for instance finds that communications technology use is related to social characteristics such as class, income, and life prospects.

Culture is broadly defined in this study in terms of way of life, and specifically as the learned behaviors, values, and beliefs that a group, or nation share (Rosman & Rubel, 1995). Any group of people or society has a range of individual behaviors, but there are still features of personality that many people will share in addition to norms, language, and shared historical experience. National level cultural characteristics have been identified by many, including the oft-used five dimensions identified by Hofstede (1980), which include individualism vs. collectivism, femininity vs. masculinity, long term vs. short term orientation, power distance, and uncertainty avoidance. Previous studies have suggested difficulties in determining the implications of the first four of these dimensions on user adoption of interactive network services (Maitland, 1998). Only uncertainty avoidance seems applicable to study of the diffusion of mobile technologies. Uncertainty avoidance as a national trait refers to the degree to which a society is open to and accepting of innovations. Thus, in low uncertainty avoidance societies there will be low resistance to unknown ideas or technologies.

2.1 Review of Technology Diffusion Models

A comparison of commonly used models for mobile technology diffusion is provided in Fife & Pereira, (Pagani, 2005), Pederson (2004), and Venkatesh & Morris, et.al, (2003), and Gera & Chen (2003). Venkatesh, Morris, et.al.'s (2003) review the user acceptance literature and systematically compare eight well-known models and the various predictive factors that each specify. Their Unified Theory of Acceptance and Use of Technology (UTAUT) is a unified model that synthesizes and adds to previous models. Important among the determinants of user acceptance of technology are “performance expectancy” which is the degree to which a user believes that using a technology will provide gains in job performance.

Next, “effort expediency” is the degree of ease in using a system. “Social influence” is the degree to which individuals perceive that it is important that others believe that they should use a new system. Finally, “facilitating conditions” are the degree to which individuals believe that there is organizational and technical support for using the system. Additionally, it is argued that these direct determinants of user acceptance are moderated by gender, age, voluntariness and experience (Venkatesh, Morris, et. al., 2003).

The UTAUT model provides a useful starting point for analyzing technology adoption by individuals. Our data suggests however, that adoption patterns in different markets require a greater emphasis on social and cultural factors, including government and regulatory barriers all of which can pose significant obstacles to technology adoption.

The well known Diffusion of Innovation framework developed by Rogers (1995) also serves as a base for the GAT framework. This framework covers the major attributes of an innovation, such as its benefits, compatibility with existing ways of doing things, its ease of use, and the degree to which it is easy to experiment with the innovation. Although the social system as a factor is noted, it is not fully delineated to a degree that allows for cross-cultural comparisons.

Lastly, the Technology Acceptance Model, (TAM) is based upon intentions to use technology and defines two key constructs “perceived usefulness” and “perceived ease of use” (Davis, 1989). The former refers to the degree to which the individual believes that using the technology will enhance their job performance. TAM has been used to understand skill training (Venkatesh, 1999), consumer behavior in an online environment (Koufaris, 2002), and in telemedicine (Hu & Chau, 2001).

Among the gaps in the explanatory power of the models listed above include the following three situations:

- 1) Different adoption rates of innovations across national markets or within societies
- 2) Different adoption rates of innovations in the same ethnic groups across different national markets

3) Different adoption rates of innovations within the same age groups across different national markets

The proposed model, the Global Adoption of Technology (GAT) incorporates and weights cultural norms – social and organizational to a greater degree than the other models discussed here. The Diffusion of Innovation model is the most general and is often used because it is widely applicable and can explain many types of outcomes. The importance of culture for instance, is noted, but encompasses a wide range of factors that in the end dilutes explanatory power. On the other hand, the TAM model is the most parsimonious model listed below, but as a result is also limited in capturing the complexities of mobile technologies and services.

Our initial framework seeks to account for circumstances of technology adoption or non-adoption that are not easily handled by other current models. Below in Table 1, the most common frameworks and the modified framework proposed here are compared in terms of their explanatory power.

Table 1 – Comparison of Various Models of Innovation Diffusion

	Diffusion of Innovation	UTAUT	GAT	TAM
Different adoption rates across national markets	not specifically but can be assumed under <i>type of innovation decision</i>	not specifically, but can be assumed under <i>facilitating conditions</i>	yes	no
Different adoption rates of innovations in the same ethnic groups across national markets	not specifically but can be assumed under <i>comm. channels</i> or <i>type of innovation</i> or <i>social system</i>	no	yes	no
Different adoption rates within the same age groups across different national markets	not specifically but can be assumed under <i>social system</i> or <i>comm. channels</i>	not specifically, but can be assumed under <i>social influence</i>	yes	no

NEW APPROACH

VERY GENERAL

VERY SPECIFIC

1) Different adoption rates of innovations across national markets

The Diffusion of Innovation framework classifies users and their interactions with new products (Rogers, 1995). This model encompasses a broad range of factors, and does not weight any particular factor as more salient than another. Social factors are acknowledged, but are not delineated. Initially, Rogers felt that a general framework should suffice to explain diffusion and that other factors like culture, profession and other social influences were important as diffusion would be the same in different contexts (McGrath & Zell, 2001). However, further research suggests that social and environmental factors may indeed have great significance. Consumer behavior studies have found for example, that when countries converge in respect to national income, cultural variables help to explain differences in country-level consumer behavior (de Mooij & Hofstede, 2002).

Other studies attribute varying adoption rates of mobile services to differences in economic performance. For example, the most comprehensive study of the diffusion for mobile services has been carried out by Gruber and Verboven (2001) who employ a model based upon data for 140 countries. Two variables are used, including a measure of how technologically “advanced” a country is measured by its adoption rates together with the growth rate of diffusion. These variables are modeled as functions of country-specific factors, including per capita GDP, per capita fixed main lines, the level of competition, standards, etc.

Their study of the diffusion of mobile communications in the European Union finds that technological developments, namely the transition from analogue to digital technology in the early 1990s along with the increase in spectrum capacity has had a dramatic impact on mobile telecommunications diffusion (Gruber & Verboven, 2001). Overall, technology and regulatory factors are considered the significant force driving the diffusion of mobile services in the consumer market.

In addition to the factors that are prominent in most theoretical analyses, such as the overall GDP of a country, network size, and the market structure of the telecom industry, other factors such as the level of privatization, regulatory schemes, and pricing arrangements have also been examined (Banerjee and Ros, 2002). These analyses focus primarily on consumer mobile telephony markets, and highlight the critical factors for mobile technology growth. They find that a technological base must provide performance, ubiquity and reasonable pricing. Mobile technologies have an “epidemic” or “viral” quality as adoption by many, fuels further adoption. The importance of technological readiness is clear, and network capacity and the availability of spectrum are general prerequisites for the adoption of mobile services.

It has been often noted that specific characteristics of national markets are important in determining mobile subscription rates, (Ahn and Lee, 1999), but these have been generally defined in terms of regulatory policies, technological innovation, and competition. Although these factors have been recognized as catalysts accelerating the adoption of new technologies, they nonetheless provide a less than complete explanation for the rapid growth of mobile services in certain select markets throughout the world, such as Finland, South Korea and Japan. To explain mobile service adoption in these markets, social factors and the perception of the relative value seem to provide a more complete explanation. Cultural factors also help explain the lower than expected uptake for broadband services in Singapore, where despite strong government backing, the perceived value of online services and applications has remained low.

Models that specifically examine adoption rates of mobile telephony, frequently cite the main drivers of growth as national income, competition, and the ubiquity and quality of the fixed network. Economic drivers including income, price and network externalities have also been investigated in terms of building critical mass for mobile telephony markets (Madden, Coble-Neal and Dalzell, 2002).

From a consumer behavior perspective, Levitt (1983) contends that new technology and the media homogenize consumer's wants and needs, and suggests that consumers will show a preference for standardized products. However, this argument is challenged by many who find that differences in preferences are affected by of cultural context. Consumers sometimes do not make adoption choices based upon maximizing utility, but often for emotional reasons and through the veil of cultural context. For instance, exploratory research into the preferences of mobile consumers indicates that status and appreciation for brand names are motivate mobile consumers in the Korean market, while U.S. consumers are driven by the perception of utility and convenience and not the desire to support their social status. (Kim, et. al, 2004)

Although it is suggested that culture is important as a factor for technology adoption, there are few empirical studies to substantiate this idea. Hall (1987) describes different cultural orientations as "high context" such as Japan and Korea, and others like the United States as "low context." Additionally, consumer behavior and cultural factors are identified by Hofstede (1993) as significant elements that determine the adoption of innovations. These theories have not been systematically tested in the realm of mobile data applications, however where it appears that cultural context as well as government policy and regulation may play strong roles in the diffusion process.

2) Different adoption rates of innovations by the same ethnic groups in different national markets

Cultural and societal influences are increasingly recognized as important variables for understanding technology adoption. Research is still in the exploratory stages; studies have looked at a small number of individual users across several cultures to provide comparative analysis. For example, focus groups, in depth observational studies, diaries, and surveys have been conducted in Finland, Hong Kong, Japan, and the U.S. to look at motivations and perceived benefits of using mobile devices and services. However, we have not found studies that examine the behavior of mobile users from a specific culture such as Korea, when they are re-located to a different market, such as the United States. Investigating the behavior of transplanted technology users would shed light on the importance of contextual factors through examining the extent to which attitudes and use of mobile devices has been altered.

3) Different adoption rates of innovations within the same age groups across different national markets

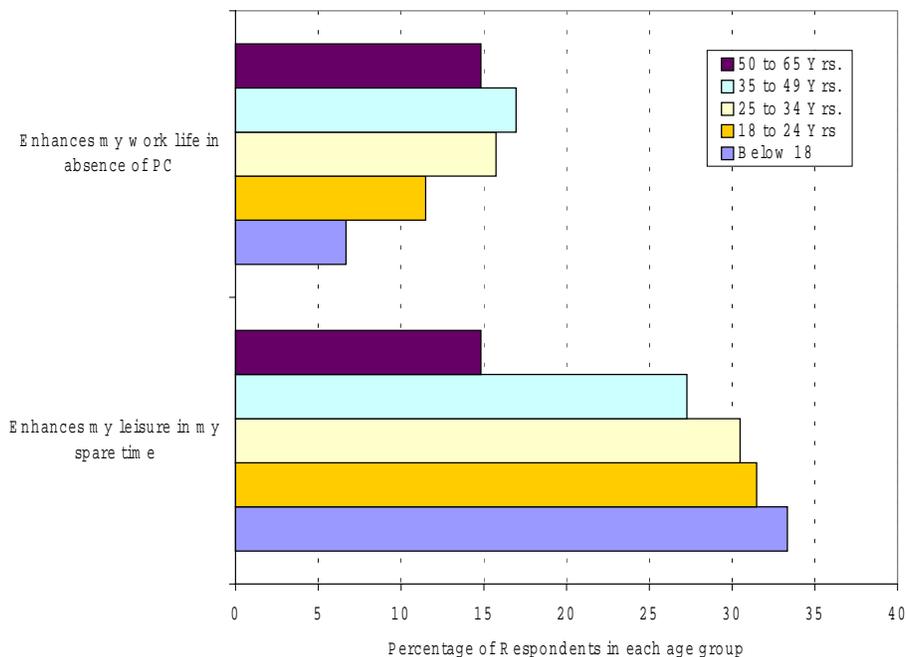
A few studies have noted that a user's age has an influence on technology adoption (Morris and Venkatesh, 2000), but such studies have typically been confined to small groups, and to users in the workplace. This study finds differences in technology

adoption between older workers and younger workers, suggesting that this is a key moderating influence.

Small scale empirical studies have examined mobile users specifically to help understand the influence of age. Despite numerous studies of the mobile youth culture, there is still relatively little research that examines uptake among similar age groups across cultures, or that compares the behavior of users of different generations. For instance, a comparative study of professionals between the ages of 25-65 across societies and disciplines has not been carried out.

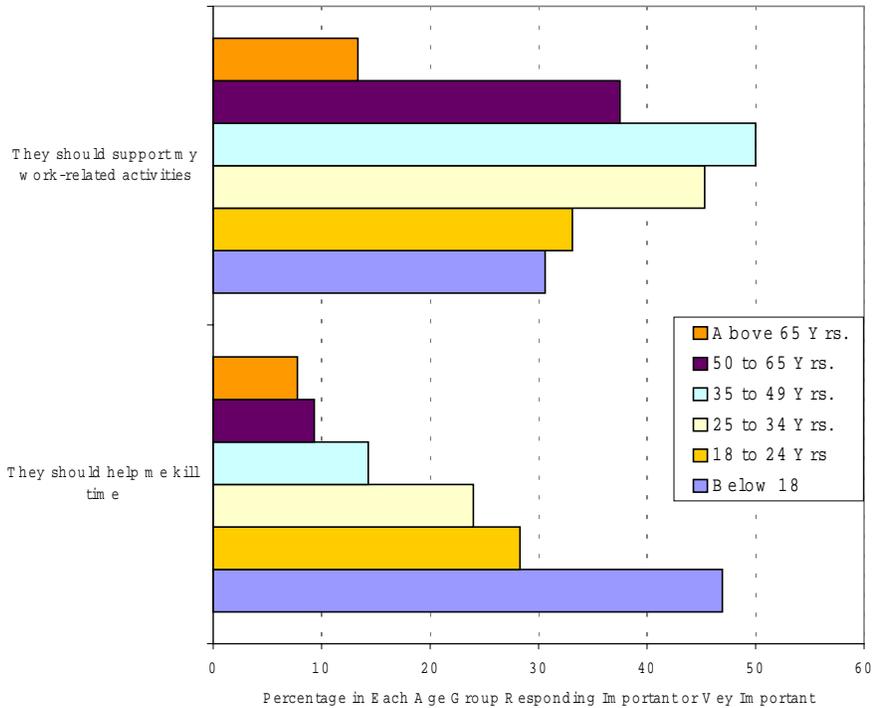
As prominent and enthusiastic mobile users, teens and younger children have been the subject of many such observational and interview based studies in countries with fast-growing usage such as Norway, Sweden, Finland, Japan, and England. Most such studies examine social context to explain the popularity of text-messaging and other communication services with young people. Ito & Okabe, (2005) posit that mobile technologies provide a means for young people to build relationships among one another outside the structure imposed on them by the adult world. Selian, (2004) surveying 189 young people in Boston, Massachusetts finds that young people use their phones enthusiastically for communications with friends and family and entertaining purposes like playing games, and sending pictures, although a main benefit cited is the fact that mobile phones make life easier. Data from the WMIS survey, 2003 shows a correlation between age and type of content, with users over 21 years old more interested in news-related content than under 21 year olds. This finding was true for the U.S. market as well as the Japanese market.

Our survey data below suggests that young people across different cultural contexts: Hong Kong and the U.S. both value mobile phones as something that can enhance leisure activity to a much greater degree than older users. In both cultures, the older the user is, the less inclined they are to use the mobile phone for fun.



Source: WMIS data, 2004

Figure 1. Hong Kong Quality of Life - 2004

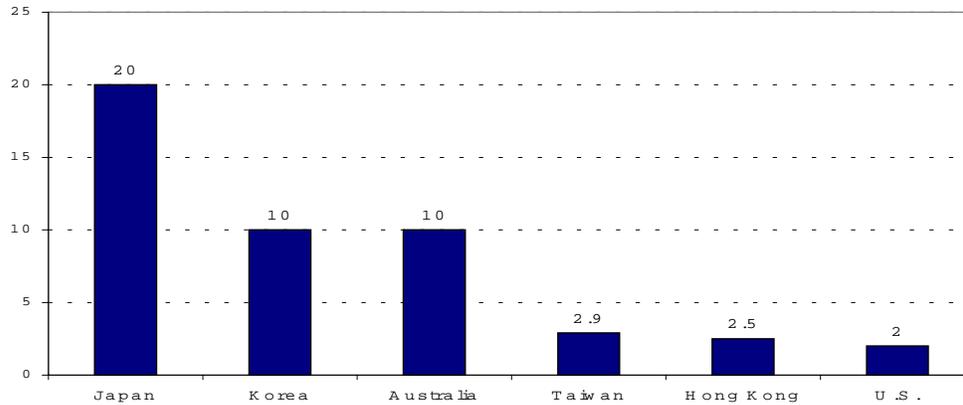


Source: WMIS data, 2004

Figure 2. U.S. Quality of Life - 2004

2.1 Application of User Adoption Models to Mobile Data Services

The diffusion of mobile services and applications seems to be influenced by numerous factors, including culture, economics, geography, organizational structures, government policies and regulation. In addition, the timing of a technologies' introduction is yet another variable (Rogers, 1995). The rate of technology diffusion between different countries is thought to be affected by time, as changes in design, pricing, and communication systems seem to influence adoption rates in countries where a service was introduced later (Eliashberg & Helsen, 1996). The chart below illustrates the differences in uptake of mobile data services in several economies, often explained as a reflection of several factors, including network implementation, interoperability, Internet penetration, government influence, competition, pricing, as well as cultural factors. It is important to note that the kinds of services that comprise this revenue, are principally, SMS and downloads (ringtones, wallpaper, and graphics).



Source: ITU, 2003, 3rd Qtr.

Figure 3 - Mobile Data Service Revenues as a % of Total Revenues, 2003, 3rd Qtr.

2.2 Framework for Analysis: Global Adoption of Technology Model (GAT)

The model used here, the Global Adoption of Technology Model, or GAT builds on the Diffusion of Innovation model, but assigns greater weight to cultural socialization including organizational and social norms as factors driving technology adoption in different sectors. Differences between individual's preferences and choices and technology adoption on a sector level are also considered. For example, while it is generally accepted that increased productivity and profitability are the primary drivers motivating firms and industry to adopt technologies, individuals may adopt a technology for a different, albeit wide variety of needs and desires, ranging from curiosity, social and emotional needs, or utilitarian values like increased convenience.

Individual users have demonstrated that it is possible to create a user base if an innovation is perceived as having high value, is compatible with existing practices, is user-friendly and is consistent with social and cultural norms of the group. Although individual efforts can be sustained by early adopters, mass take-up requires visibility and communication between organizations. This is classified as "observability" in Roger's model.

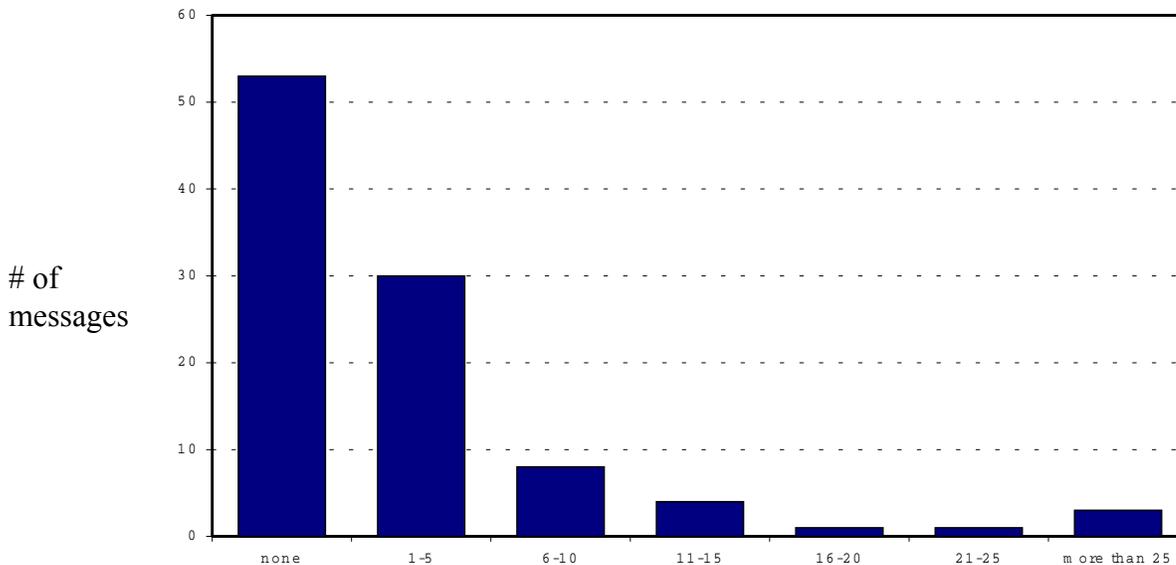
The importance of social networks in supporting and shaping the diffusion process of mobile technologies and applications is demonstrated in the U.S. survey data. Word of mouth and interactions via the Internet have demonstrated feasibility, and have had a significant effect in educating potential users and providing motivation to investigate and try out mobile services as shown above in Figure 1-2.

2.2.1. Perceived Relative Value

Acknowledging that a user's perceptions of an innovation rather than the actual qualities of the technology are equally important to an adoption decision, perceived relative value is defined as the social and/or economic advantage that a user thinks they can derive from adopting a new technology. For example, when asked about reasons to

use mobile data services, users in the U.S. market say that benefits are defined as greater utility, convenience (anytime/anywhere) and the ability to control conditions of everyday life more effectively. These reasons provide a rationale for users to adopt mobile data services, if services providing these benefits are available, and if these services are accurately understood by the user.

Voice calling remains the principal activity of mobile users in the U.S. environment although handsets are now equipped with multimedia messaging features, cameras, and online gaming features. Forty-four percent of the U.S. survey respondents have the ability to send video and pictures from their mobile phones and 80% stated that their phones were enabled for text-messaging. When asked however, how many text messages they sent per day, the majority of respondents, shown below in Figure 4, 53% said that they sent none. Thirty percent send between 1 and 5 text messages per day.



Source: WMIS survey data 2004, U.S.

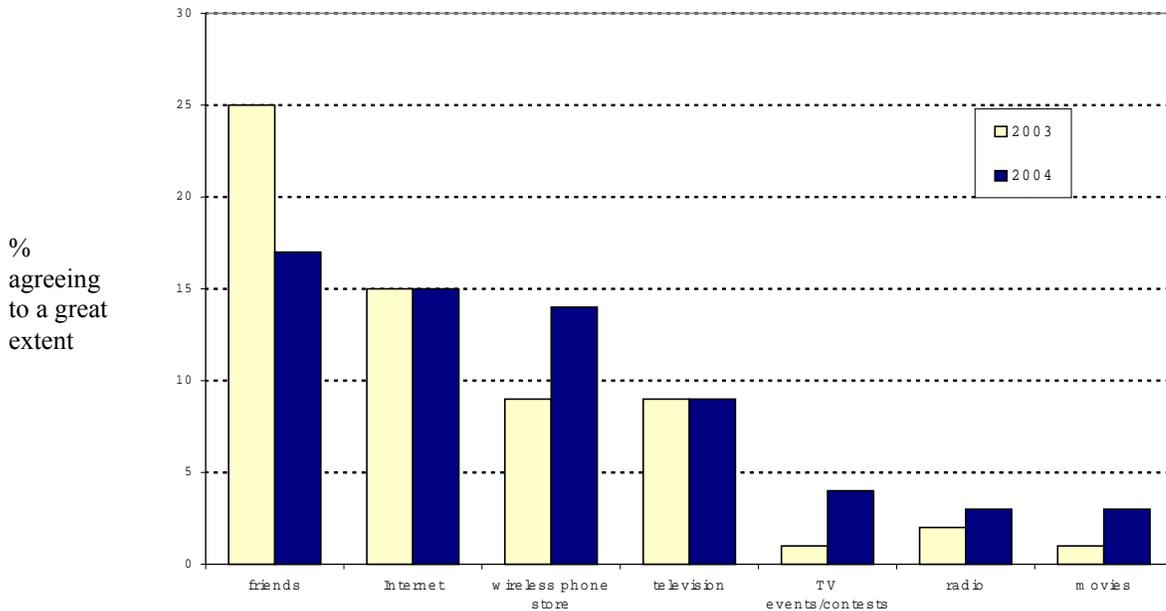
Figure 4. Number of Text Messages Sent in Total Per day on Wireless Phone, U.S.,

2.2.2 Usability – Compatibility Drivers

It is easier for an innovation to be incorporated by an individual if it is consistent with the existing and past experiences and mind-set of the adopter(s). A user's perspective on the usability of an innovation is shaped by several factors including age, level of education, technological readiness which is supported by the existing network infrastructure in the user's environment, and finally, the exposure to the technology that the user is confronted with, including advertising, word of mouth, and communications through the media.

It is thought that communication of ideas takes place more frequently between people who are alike, "homophilous," than in situations where individuals have differing beliefs, cultural and socioeconomic situations, "heterophilous," groups (Takada & Jain,

1991). Adoption rates for products may be higher when there is more communication among similar people, and the word-of-mouth effect can be supported. The importance of “word of mouth” as a means of diffusion is noted by several researchers as significant (Bass, 1969; Moore, 1995). This factor seems highly relevant to mobile service adoption, which builds on critical mass to increase value.



Source: WMIS data, US Survey, 2003, 2004

Figure 5. U.S. Users: Extent to which they rely on the Following Sources to Learn About Wireless Data Services

2.2.3. Cultural Socialization Drivers: social and organizational norms

Social norms are generally defined as the tacit or explicit social rules that govern interaction between individuals in a society. Also, they define an individual’s behavior as a member of a social group or as a citizen. The formal and informal education system of a society transmits and reinforces these norms. Social interaction between individuals within different parts of the social structure of an industry or discipline vary greatly. Commonly agreed on social norms in the U.S. individual rights, might include wariness of government, valuation of “privacy” over “general good, appreciation of confidentiality for information,

Organizational norms are the tacit or explicit rules that define an individual’s behavior within a group, family, school, company or other organization. Organizational norms govern the individual’s behavior when they are in the group. For example, in education, student-professor interactions have specific rules and structures.

However, organizational culture and values, like the acceptance of risk and uncertainty will influence decisions to try out and utilize new technologies, and will influence the provision of training and the collection of skills within a discipline or industry. Although it is difficult to generalize about either organizational or social norms, the social context will shape “technology-willingness.”

2.2.4 Technology Adoption Catalyst

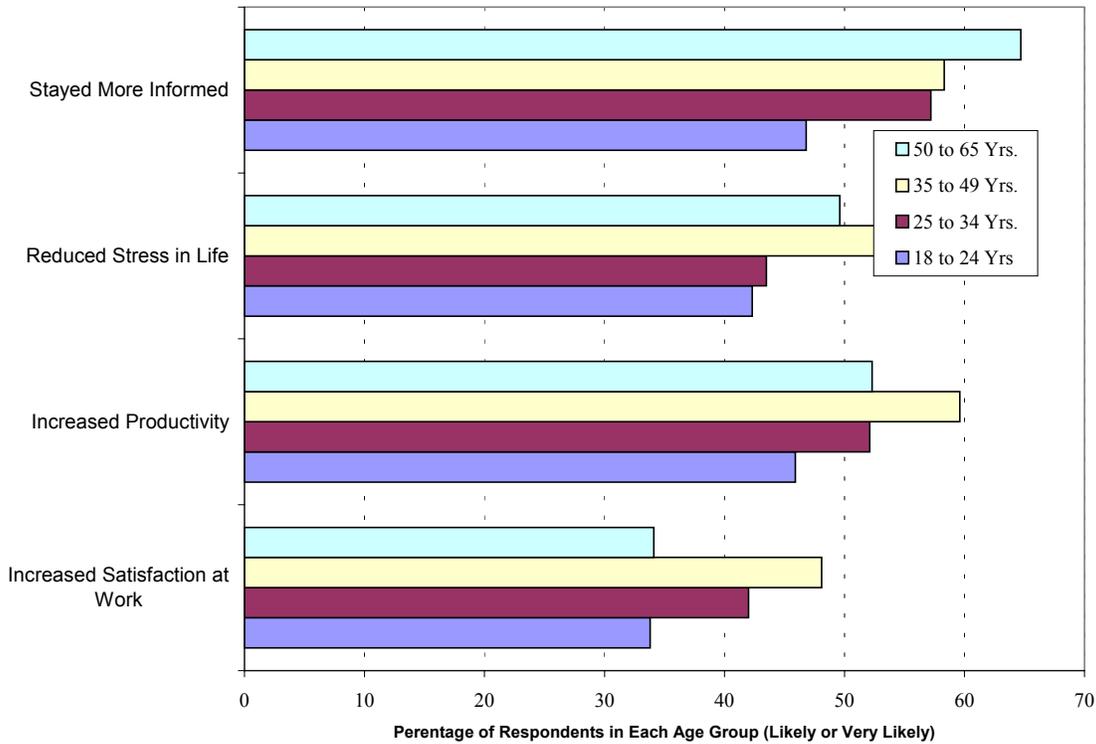
Progress in adopting a technology can occur through individual members of a social system (industry or discipline), or by the entire social system. When an individual firm or person adopts an innovation, this is a voluntary process. When an entire social system adopts an innovation however, this can happen by consensus or as it often happens through the guidance of a central authority, such as government. In many cases, authority-based decisions have tended to promote faster adoption.

3. Applying the GAT Framework

Applying the GAT framework, the factors influencing mobile data service diffusion across markets will be evaluated by viewing multinational survey results from the WMIS 2004/2005 data. By examining how factors including perceived relative value, usability-compatibility drivers, cultural socialization drivers, and technology adoption catalysts affect user’s perceptions and behavior across a few key markets with differing levels of mobile service adoption, we will shed light on the relative importance of these factors.

3.1. Perceived Relative Value

For U.S. mobile users, the benefits of mobile data services are the “anytime” and “anywhere” attributes. (2003 WMIS survey data). When asked about the benefits of mobile data services in their worklife, U.S. users tended to believe that mobile services have increased their productivity and have helped them to stay informed. Negative factors such as increasing daily workload are noted, but are less prominent than perceived or realized benefits. For simplicity, negative factors that were tested are not included in Figure 6. Overall, younger users tend to have a greater sense of perceived value, and are less concerned with negative outcomes, whereas older users have a greater sensitivity for negative factors, such as increased stress and intrusions of personal life into daily work life as a result of mobile services.



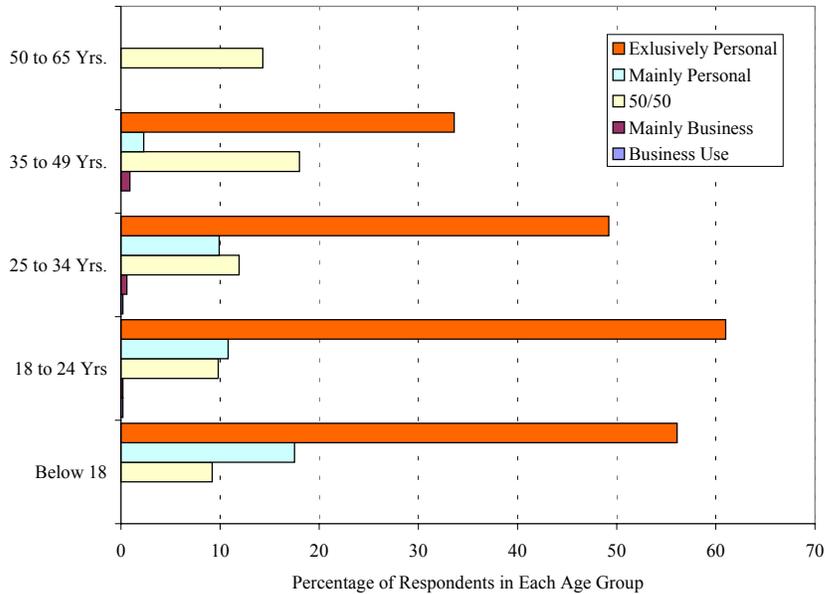
Source: WMIS survey data 2004, U.S.

Figure 6. U.S. Mobile Service Users and Quality of Work-Life

When comparing the type of use that occurs across different national markets, the WMIS survey data indicates that younger users use mobile data services exclusively for personal or social purposes, while as the age of users increases, the balance of work vs. personal usage changes. As shown below, in Figure 7, broken down by educational level, younger users in both Korea and the U.S. use the mobile Internet for personal purposes, while older users have a greater use for work-related services.

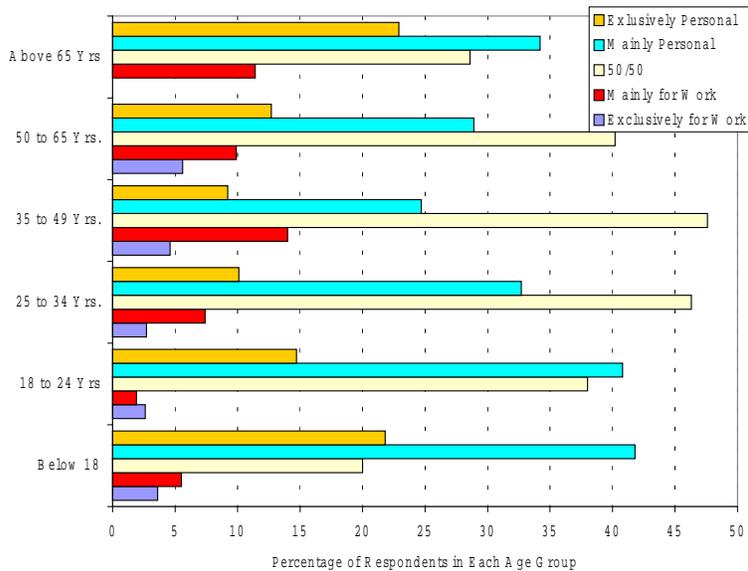
3) Different adoption rates of innovations within the same age groups across different national markets

The data below indicates that both Korean and U.S. mobile data users access services primarily for personal use rather than for business. Korean users do show a greater tendency to perceive mobile services as useful for personal rather than business purposes. Nonetheless, these different markets seem to both follow broadly similar conventions of mobile behavior. Thus, despite cultural differences, an overall similarity in how mobile services are utilized is evident.



Source: WMIS survey data 2004, Korea

Figure 7. Korean Mobile Data Users: Age and Kind of Usage, 2004

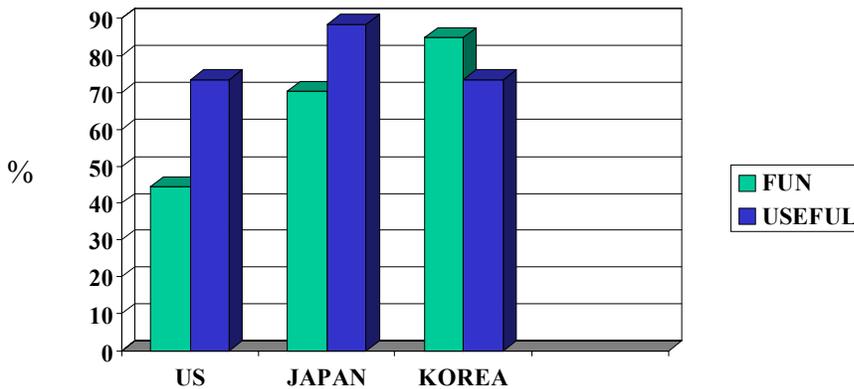


Source: WMIS survey data 2004, Hong Kong

Figure 8. U.S. Mobile Data Users: Age and Type of Usage, 2004

Survey data from 2003 suggests a dichotomy between mobile users' preferences for fun or entertaining services and useful services, as shown below in Figure 9. Although usefulness is valued as an attribute over enjoyment to a greatest degree by U.S. users compared to the other two national markets, in Japan utility is also valued higher

than entertainment, and in Korea, although fun is ranked higher than utility, usefulness is still ranked high as a benefit of mobile data services. Thus, in a broad sense, the perceived value of mobile data services across national cultures appears quite similar, despite differences in social and organizational norms and varying degrees of mobile service readiness.



Source: WMIS survey data, U.S., Japan, Korea, 2003.

Figure 9. Reasons for Using Mobile Data Services - 2003

3.2 Usability- Compatibility Drivers

In the U.S. market, similar to other markets, mobile voice is compatible with current infrastructure and other technologies. As a result there are substitutes for mobile Internet services available through PC-based Internet. In Japan, the mobile Internet has grown more rapidly than the PC Internet which grew at a significantly lower rate. Additionally, the mobile Internet in Japan did not grow out of the PC, but instead emerged from small device use like pagers and mobile phones. Thus, the mobile phone is not a PC substitute in Japan. (Ishii,2004), and serves a social purpose. It is used among friends and family, while email through a PC occurs with work-related individuals.

3.3 Cultural Socialization Drivers – social and organizational norms

In contrast to the Korean market where use of the mobile Internet seems to occur most frequently at home, in transit or at the office, in the U.S. context, use appears more dispersed across different spaces. Home-use by under 18 year olds in the U.S. compared to under 18 year olds in Korea shows distinct differences. Korean under 18’s access the mobile Internet to a much higher degree at home than U.S. teens. In the case of the Japanese, which like Korea has one of the higher rates of mobile Internet use in the world, usage has been attributed to long commuting times with the mobile Internet serving as a time-enhancing activity. However, Ishii (2004), contends that the high rate of diffusion of the mobile Internet in Japan cannot be explained by commuting time as survey data indicates that over half of usage occurs from home. Furthermore, this study of the

Japanese market suggests that the mobile phone is considered a vehicle for accessing life style information, while the PC is preferred for business-related information.

Comparing across markets, we see some general similarities, as all users state that in transit is a place where they access mobile data services. Also, in general, users under the age of 18, profess to use mobile services in public. Not shown in the figures, under 18's across markets also access the mobile Internet in school. Use in public places, in transit, the workplace and school, underscore the fact that mobile data services are sought during periods of activity, in different contexts and by a variety of demographic groupings.

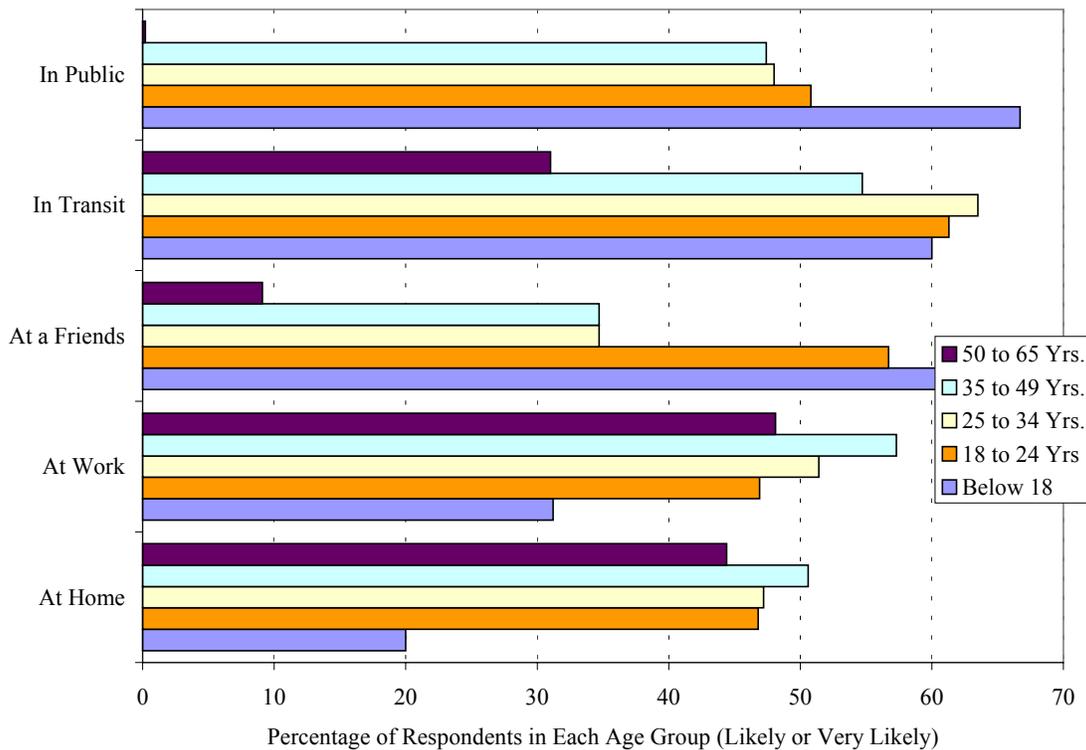


Figure 10. U.S. – Where Mobile Users Most Frequently Access Mobile Data Services by Age of User

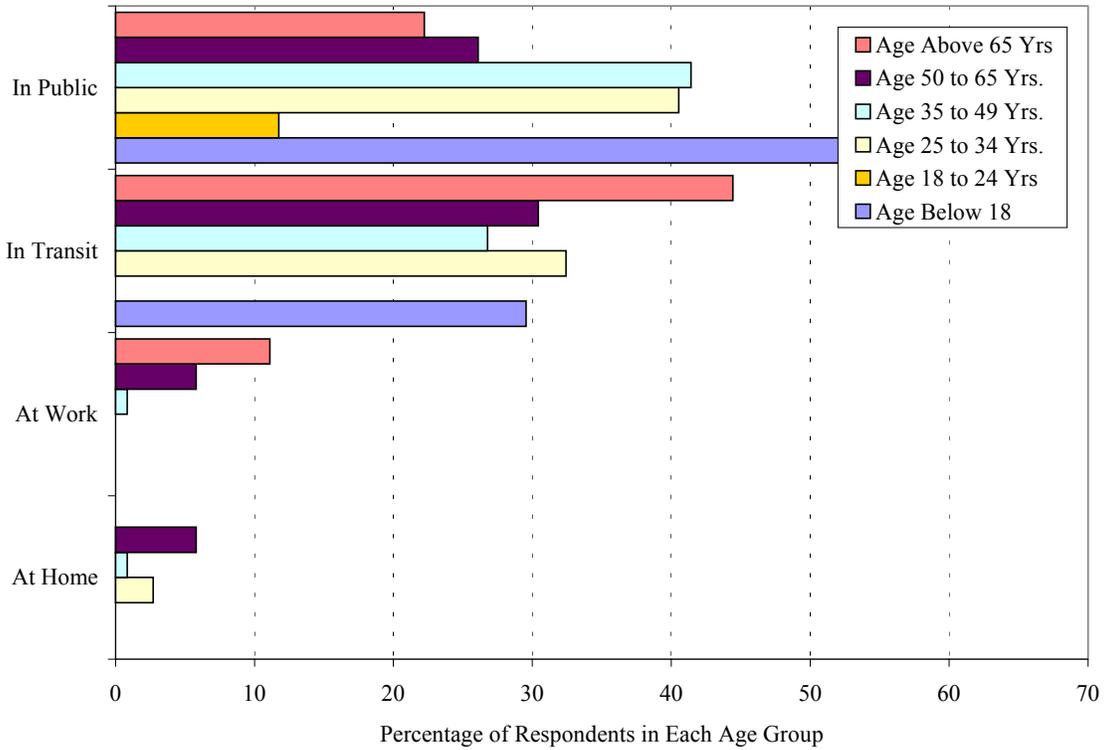


Figure 11. Hong Kong – Where Mobile Users Most Frequently Access Mobile Data Services by Age of User

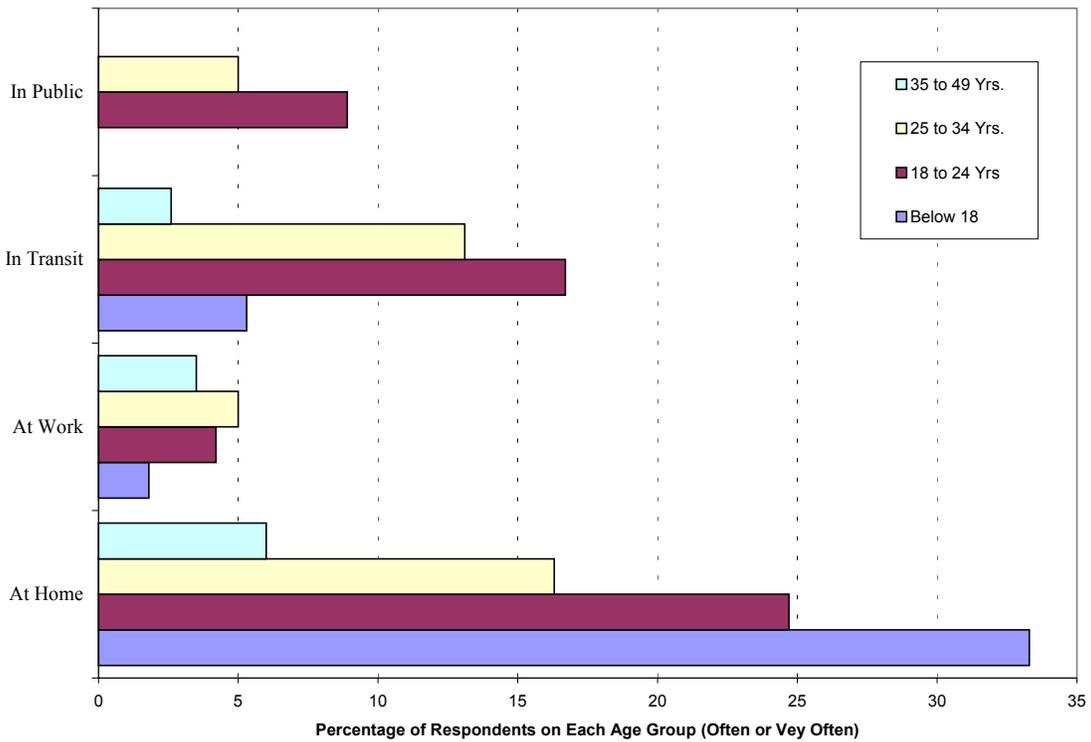


Figure 12. Korea – Where Mobile Users Most Frequently Access Mobile Data Services According to Age of User

Next, we look at the degree to which the mobile Internet is perceived as supporting social relationships which includes family and friends. As shown below in Figure 13, comparing U.S. mobile users to Hong Kong mobile users, the social value appears to be stronger for U.S. users who to a greater extent strongly agree that mobile data services support contact with friends and family.

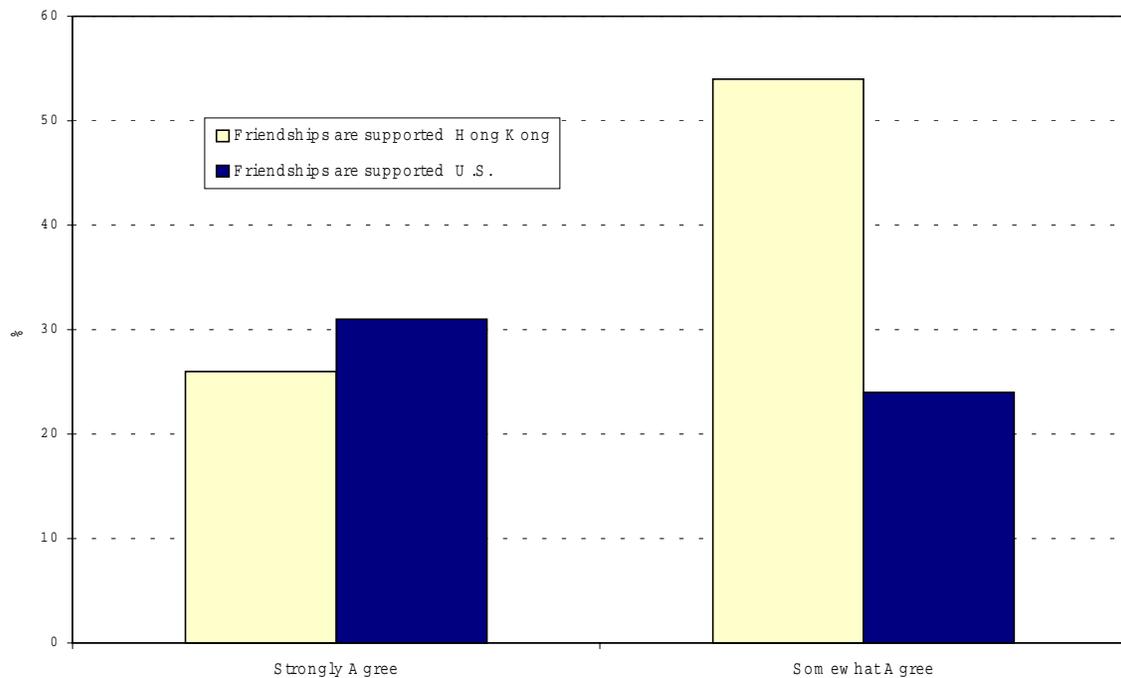


Figure 13. Hong Kong and U.S. Users – Extent of Agreement that Mobile Services Support Relationships with Friends

As seen below in Figure 14, U.S. users are more positive that mobile services support their family relationships than are Hong Kong users. This finding may suggest that some of the standard interpretations of cultural differences are not applicable in the case of mobile services, e.g. that overall the U.S. is characterized by individualism, while a group-orientation and tight family structures which characterize many Asian cultures should be reflected in patterns of mobile service usage.

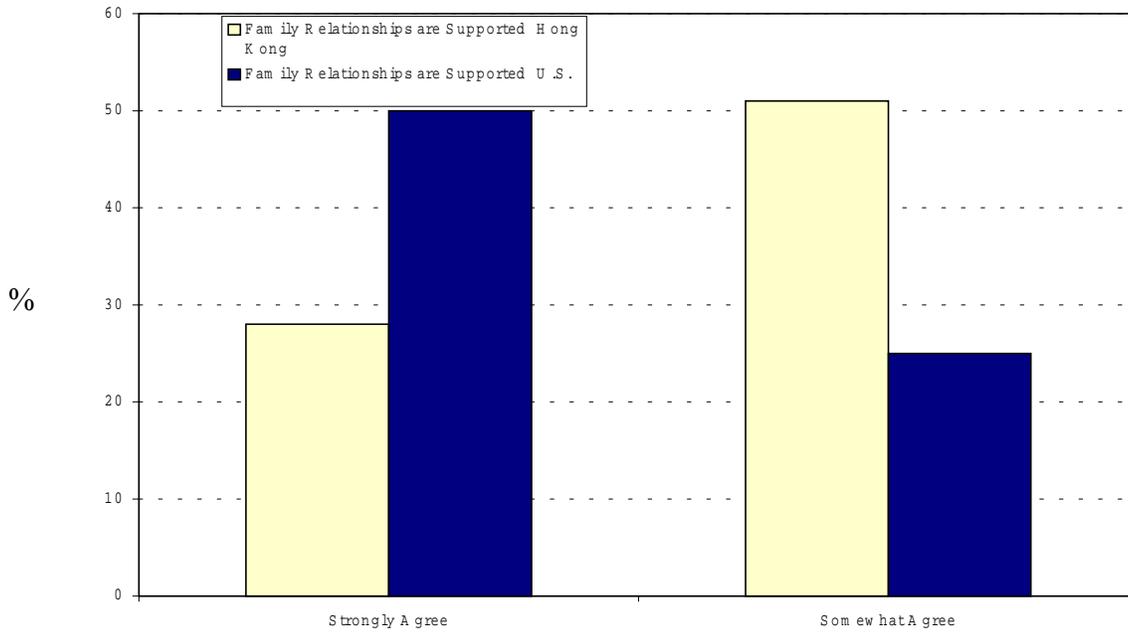


Figure 14. Hong Kong and U.S. Users – Extent of Agreement that Mobile Services Support Relationships with their Family

In the following, Figure 15, the breakdown by age of U.S. users who see benefits in using mobile services to support communications among family members is shown. Increased convenience and greater communication are seen as the principal benefits, while a much smaller group finds that mobile services actually increase stress or bring family issues into the workplace.

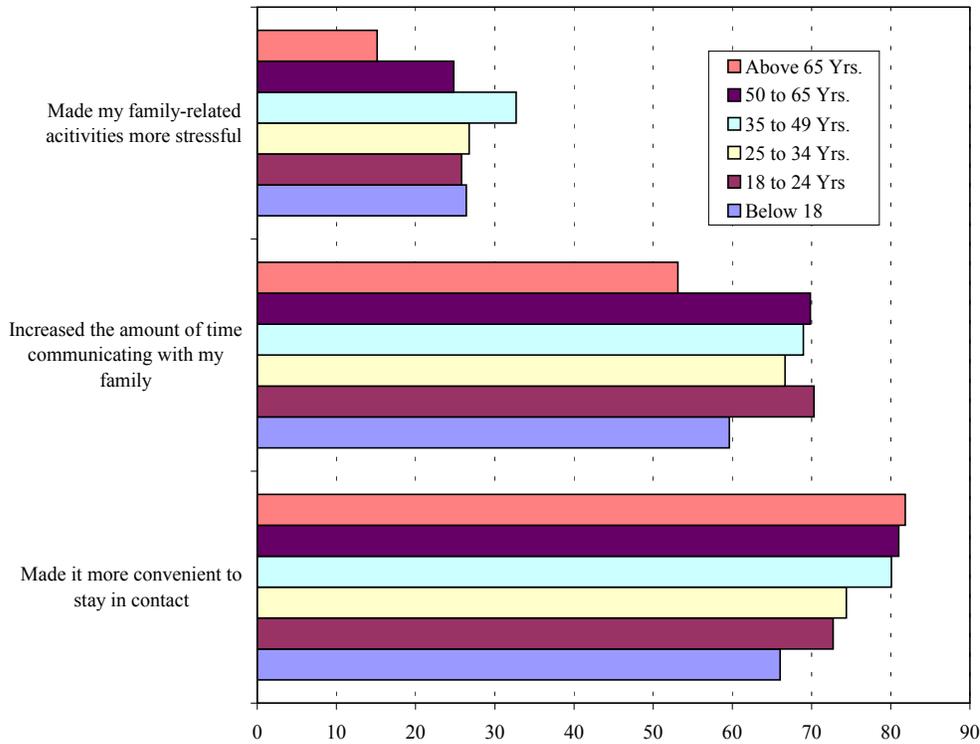


Figure 15. Percentage of U.S. Users who Strongly Agree or Agree that Mobile Data Services Support Family Relationships

3.4 Technology Adoption Catalyst

The lower degree of mobile Internet usage in the U.S. relative to other markets in Asia and Europe has been explained by several underlying or external factors. The fact that text messaging for instance remains less popular in the U.S. has been explained as a result of standardized, interconnected networks in many countries, in addition to demand factors in the U.S., particularly widespread PC penetration and an inexpensive and reliable landline infrastructure (Gera and Chen, 2003). Even if the groundwork has been laid for technology adoption, it is not necessarily the case that users will be eager purchase and use a service. Creating demand for the service may be part of the equation.

4. Conclusions

Our recent consumer survey data suggest that users view the benefits of the mobile Internet similarly to a great extent despite cultural context, the availability of alternative means of communications, and the overall state of the mobile services market. Looking specifically at the U.S. market, we see that adoption rates for mobile data services are slower than in markets like Korea, Japan, and Hong Kong. Demographic factors and cultural context do seem to underlie enthusiasm for some services, such as ringtones, greetings, and messaging which have been driven by the youth market.

Greater depth of understanding may be provided by looking at these markets systematically with our modified framework.

Overall, in the U.S. market, our survey data shows that the perceived relative value for mobile services to a great extent has not been demonstrated. The perceived relative value across cultures is revealed by the survey data to be usability and functionality, while entertainment-value is perceived in some environments like Korea to be of greater benefit than others like the U.S.

Cost and price issues as well as network performance and reliability are concerns that have not yet been adequately addressed in the U.S. market. The technology adoption catalyst is stronger in other markets such as Japan, Korea, and Hong Kong than in the U.S. Improving the perceptions of relative value in the U.S. market should be a primary focus of service providers to increase user awareness and openness to moving beyond mobile voice.

A significant determinant of mobile technology adoption is social interaction; word of mouth is the principal way that users learn about services. In the U.S. market, the mobile phone stores attract customers who want to learn more about their phones and want to solve problems related to billing, device complexity, and service plans. Customer service over the phone and on the Internet are not viewed positively by customers as sites of information and problem solving. For this reason, average customers rely on sales representatives in stores maintained by the primary U.S. service providers. Face-to-face communication appears to be a favored means to learn about current and prospective services for most demographic groups. Younger people are influenced by peers to a greater extent than users over 35 years old, who rely more on stores for education about services and pricing plans. This suggests an opportunity for service providers in the U.S. to transform stores into places where perceptions of mobile data services can be informed. To effectively increase demand for mobile data services, service providers need to make a compelling case to users. Greater knowledge of the user is the first step in facilitating the evolution from mobile voice to integrated services.

Our data indicates that there must be acute awareness of social norms in the marketing and education of consumers. If a technology or service is somewhat ill-defined in nature in terms of costs and benefits, the perceived value may not favor adoption.

REFERENCES

- Ahn, H & Lee, M. (1999). An Econometric Analysis of the Demand for Access to Mobile Telephone Networks. *Information Economics and Policy*, 11, 297-305.
- Banerjee, A. & Ros, Agustin. (2002, Aug.18-21). Drivers of Demand Grown for Mobile Telecommunications Services: Evidence from International Panel Data. *ITS 14th Biennial Conference*, Seoul, Korea.
- Bass, F. (1969, Jan.). A New Product Growth Model for Consumer Durables, *Management Science*, 15, 215-227.
- Davis, F.D. (1989, Sept.). Perceived Usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- de Mooij, M. & Hofstede, G. (2002, Spring). Convergence and divergence in Consumer Behavior; Implications for International Retailing, *Journal of Retailing*, 78(1), 61-69.
- Eliashberg, J. & Helsen, K. (1996). Modeling lead/lag phenomena in global marketing: The case of VCRs. Working paper, The Wharton School, University of Pennsylvania, Philadelphia, PA.
- Gera, K. & Chen, L. (2003). Wireless Technology Diffusion. *Ninth Americas Conference on Information Systems*, 1961-1974.
- Gilbert, L. A. & Kendall, J. (2003). A Marketing Model for Mobile Data Services. *Proceedings of HIICS-36*, Honolulu, USA, 89-98.
- Gruber, H. & Verboven, F. (2001). The Diffusion of Mobile Telecommunications Services in the European Union. *European Economic Review*, 45, 577-588.
- Hall, E. (1987). *Hidden Differences*. New York: Doubleday.
- Hofstede, G. (1993). Cultural Constraints in Management Theories. *Academy of Management Review*, 7(1), 81-94.
- Hu, P., Chau, P., et.al (1999, Fall). Examining the Technology Acceptance Model Using Physician Acceptance of Telemedicine Technology. *Journal of Management Information Systems*, 16(2), 91-112.

- Ito, M. & Okabe, D. (2005). Intimate Connections: contextualizing Japanese youth and mobile messaging. Forthcoming in R. Harper, L. Palen & A. Taylor, *Inside the Text: Social Perspectives on SMS in the Mobile Age*.
- Kim, J., Hong, S. et.al. (2003). Exploring E-Business Implications of the Mobile Internet: A Cross National Survey in Hong Kong, Japan and Korea. Unpublished manuscript – in press, *International Journal of Mobile Communications*.
- Koufaris, M. (2002, June). Applying the Technology Acceptance Model and Flow Theory to Online Consumer Behavior. *Information Systems Research*, 13(2), 205-223.
- Kumar, V. & Krishnan T. (2002, Summer). Multinational diffusion models: an alternative framework. *Marketing Science*, 21(3), 318-332.
- Lee, Y. & Kim, J. (2004). What is the Mobile Internet for? A Cross-National Study on the Value Structure of the Mobile Internet. (unpublished – in review, *Communications of the ACM*)
- Levitt, T. (1983). The globalization of markets. *Harvard Business Review*, 61. 2-11.
- Luna, D. & Gupta, S. (2001). An integrative framework for cross-cultural consumer behavior. *International Marketing Review*, 18(1), 45-69.
- Lundblad, Jennifer, F. (2003, Winter). A Review and Critique of Rogers' Diffusion of Innovation Theory as it Applies to Organizations. *Organization Development Journal*, 21(4), 50-64.
- Madden, G., Coble-Neal, G., & Dalzell, B. (2002, Aug.18021). Economic Determinants of Global Mobile Telephony Growth, *14th Biennial Conference of the International Telecommunications Society*, Conference paper, Seoul, Korea.
- McGrath, C. & Zell, D. (2001, Dec.). The Future of Innovation Diffusion Research and Its Implications for Management. *Journal of Management Inquiry*, 10(4), 386-391.
- Moore, G. (1995). *Crossing the Chasm*. New York: Harper Collins.
- Morris, M.G., and Venkatesh, V. (2000). Age Differences in Technology Adoption Decisions: Implications for a Changing Workforce, *Personnel Psychology* 53(2), 375-403.
- Nysveen, H., Pedersen, P.E., Thorbjørnsen, H. (2005). Intentions to Use Mobile Services: Antecedents and Cross-Service Comparisons. To appear in the *Journal of the Academy of Marketing Science*, 33(3), 1-17.

- Pagani, M. Ed. (2005). *Mobile and Wireless Systems Beyond 3G: Managing New Business Opportunities*. Adoption of Mobile Data Services: Towards a Framework for Sector Analysis, Fife, E. & Pereira, F., Pennsylvania: IRM Press. 51-80.
- Rogers, E. M. (1995). *Diffusion of Innovations*. New York: The Free Press.
- Rosman, A. & Rubel, P.G. (1995), *The Tapestry of Culture: an introduction to cultural anthropology*, (5th Ed.), New York: McGraw-Hill Inc.
- Saaksjarvi, M. (2003). Consumer Adoption of Technological Innovations, *European Journal of Innovation Management*, 6 (2), 90-100.
- Sarker, S. & Wells, J., (2003, Dec.). Understanding Mobile Wireless Device Use and Adoption, *Communications of the ACM*, 46 (12).
- Selian, A. (2004, Feb.). Mobile Phones and Youth: A Look at the U.S. Student Market, ITU/MIC Workshop on Shaping the Future Mobile Information Society, Switzerland: International Telecommunications Union.
- Takada, H. & Jain, D. (1991, April). Cross-National Analysis of Diffusion of Consumer Durable Goods in Pacific Rim Countries. *Journal of Marketing*, 55, 48-54.
- Venkatesh, V., Morris, M., et.al. (2003, Sept.). "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, 27(3), 425-478.
- Venkatesh, V., Ramesh, et.al. (2003). "Understanding Usability in Mobile Commerce," *Communications of the ACM*, 46, (12), 53-56.
- Venkatesh, V. & Speier, C. (1999, July). Computer Technology Training in the Workplace: a longitudinal investigation of the effect of mood. *Organizational Behavior and Human Decision Processes*, 79(1), 1-28.
- Vinson, D. & Scott, J. et al. (1977, Apr.). The Role of Personal Values in Marketing and Consumer Behavior, *Journal of Marketing*, 41(2), 44-50.
- Worldwide Mobile Internet Survey, (2004, Mar.18) Survey findings presented at conference, Yonsei University. Survey data presented from 2003 and 2004 survey, Korea, Hong Kong, Japan, and U.S. Researchers include: Jinwoo Kim, (Korea) Kazuaki Naruse, Rieko Tsuchiya, (Japan), Yar Yan Tam, (Hong Kong), Elizabeth Fife, Francis Pereira (U.S.)