

# Antecedents of Mobile Data Services Acceptance: Insights from the Young Singaporean Market

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## Abstract

This paper presents preliminary findings from work-in-progress that examines the attitudes of young Singaporeans toward mobile data services (MDS), focusing on the factors influencing their adoption of these emerging services. In-depth focus group interviews provided data for qualitative analysis. The analysis reveals that participants are generally receptive towards these technological services, based on their perceptions of the benefits of MDS and their expectation that MDS will deliver functional utility and satisfy hedonic influences. However, potential barriers to adoption include insecurity regarding MDS service providers, the reliability and security of MDS applications, their costs, loss of human touch, difficulty of use and a lack of social support. The authors conclude by discussing the contributions of their research to knowledge of technology acceptance and managerial practice.

## 1. Introduction

The surge in adoption of mobile digital devices worldwide [31] generates a keen interest by industry players to expand their profitability by offering mobile data services (MDS) to supplement voice telephony. To date, huge investments in Third Generation (3G) networks show disappointing results largely because network operators are unsure which 3G services consumers want and will pay for [12]. From the supply perspective, operators are reluctant to commit the fixed costs needed to develop new MDS unless they are certain that demand exists. From the demand perspective, wary Singapore consumers accept services such as text messaging and downloading ringtones and pictures, but do not actively seek new MDS [17].

Further, the demand for MDS is a moving target: each new MDS technology creates new possibilities to create consumer value, while consumer awareness of and preferences for MDS evolve. This dynamism in the MDS environment underscores a need of extending the scope of traditional adoption theories. From the practical

perspective, operators need to understand the drivers and inhibitors of MDS adoption.

This paper presents work-in-progress, focusing on our preliminary findings as we seek to understand the factors influencing adoption of mobile applications. The paper first reviews literature on adoption behavior, and discusses our methodology. Next, the paper reports the insights gained from in-depth focus group sessions conducted with young Singaporeans. The last section discusses the implications of these preliminary findings and presents recommendations for industry players.

## 2. Literature Review

Research on innovation diffusion and technology acceptance has examined various variables influencing the adoption of new innovations and technologies. These variables include activities of industry players, beliefs about using the new technology, perceived needs and past experience.

### 2.1 Activities of Industry Players

Gatignon and Robertson [14] posited that the actions of industry players, including their competitive activities, play a role in affecting the pattern of adoption and rate of diffusion. However, few studies have explained or empirically examined this role.

### 2.2 Beliefs about Using a New Technology

Based on the theory of reasoned action (TRA) [13], the technology acceptance model (TAM) [7] posits that two specific beliefs of using a new technology, namely, perceived ease of use and usefulness, affect people's acceptance of technology. Perceived ease of use is an indicator of the cognitive effort needed to learn and to utilize a technology whereas perceived usefulness is a measure of an individual's subjective assessment of the utility offered by a technology in a specific task-specific context [15]. The effect of these two variables on technology acceptance is supported by many empirical studies (e.g., [8] [24] [27]).

Most existing studies on technology acceptance focus their investigation on the functional utility of a new technology. Few studies have looked into people's evaluation of the costs and risks of using a new technology. The evaluation of costs and risks could be fairly complex as it may require an assessment of transaction costs, switching costs and opportunity costs. For example, in adopting a new computer software, a user generally must undertake a substantial change in the approach and the procedures involved in performing a task, which represents switching costs [11]. Further, the user must also consider the uncertainty concerning the performance of the new system functioning as advertised. In addition to attitude, subjective norms and perceived behavioral control were posited to influence intention to adopt the new behavior in the extended theory of planned behavior [1] [3] [27]. Researchers concur that beliefs about the normative expectations (normative beliefs) of other people and motivation to comply with these expectations influence a person's intention to adopt a technology.

### 2.3 Perceived Needs

The advantage that a new behavior creates basically reflects how well it helps satisfy certain innate needs of a user. Researchers studying uses and gratifications of technology postulate that adopters seek different gratifications in technology based upon their individual "needs" [9] [21] [22] [23] [26]. These needs may include social interactive, affective, cognitive, personal integrative and diversion needs [20].

### 2.4 Past Experiences

In deciding whether to use a new technology, an individual will compare the benefits, effort, costs and risks between adopting the new technology and continuing the use of an existing technology. Even when people are eager to change, there are forces that encourage the maintenance of existing behavior [30]. Although studies in this area have been modest in number, researchers report that past behavior has direct effects on intentions and/or behavior (e.g., [2] [29] [10]). For example, Venkatesh and Davis [29] found that direct experience with the software examined in their experiment affects technology acceptance, and explained this finding by saying that people essentially form self-efficacy beliefs from their own direct experience in a similar situation. Eastlick and Lotz [10] examined the influence of existing behaviors such as consumers' prior experience with computers, cable television and shopping from other non-store retailer categories on the adoption of interactive shopping. Their results showed that respondents with prior experience of similar innovative shopping activity (such as catalog shopping) were more likely to adopt interactive shopping.

In short, our literature review shows that the role of certain variables in the adoption decision process, such as the activity of industry players, perceived risks and past

experience have not been well investigated. Using MDS as an example, our research attempts to uncover various variables affecting technology adoption and the role that they play in the adoption process.

## 3. Methodology

The research presented in this paper represents the first stage of an ongoing project concerning MDS adoption in Singapore. Focus group interviews, which are beneficial for understanding attitudes and perceptions that are developed through interaction with other people [19], were used for generating insights in this stage. The interviews conducted help us specify the content area of MDS adoption and identify factors affecting the adoption.

The scope of this research is limited to three specific MDS: messaging (short text messaging or SMS and multimedia messaging or MMS), mobile gaming and non-voice mobile transactions. SMS refers to the delivery and receipt of messages that include only text over existing mobile networks, whereas MMS messages also incorporate images, sound or video. Mobile gaming refers to individual play of interactive games over mobile networks, or play of games that have been downloaded onto mobile devices. Non-voice mobile transactions refer to the non-vocal exchange of value between parties over existing mobile network based communication. These range from accessing information and downloading of free pictures and ringtones to payment for online goods and services, making donations, payment of bills, and purchases at the point of sale (such as retail stores, car parks, or cinemas).

The three specific services were selected because these types of applications are often the most profitable [4]; therefore, the work will be of interest to practitioners. Singaporeans are also more likely to be able to relate to these kinds of services because of the widespread adoption of SMS (80 percent), single-user gaming on mobile phones (12 percent) [17] and the Internet (nearly 60 percent in 2000) [18] as well as non-voice transactions (such as ATMs). Finally, some of these applications, especially mobile transactions and mobile gaming are recently launched. Thus, we may be able to gain insights into the reasons for variation in receptiveness towards MDS.

While small, the Singapore market is an interesting research site: at 78 percent, Singapore has one of the highest mobile phone penetrations in the world [5]. As the standard of living and economic condition in Singapore is generally good and the education standard is relatively high [18], subscribers have the digital literacy and disposable income needed to try out new services. Finally, a mix of cultures in Singapore provides a test-market for many innovations which diffuse to regional markets [28]. Thus, our findings will interest industry players.

### 3.1 Data Collection

The guidelines for the focus group discussions were derived from our literature review and research objectives. Participants were invited from several sources: convenience sampling of friends and acquaintances of the researcher, and invitations posted on online forums (such as Yahoo!) and in the public folder of a local university. The first session included tertiary students from local technical institutes, polytechnics and universities. The second session tapped young working adults in their twenties, who have been working for ten months to three years. Each session took approximately two hours, and began with general discussion of the participants' knowledge and sources of information about mobile technology and MDS. A deeper discussion ensued, focused on factors influencing adoption, past experience with mobile applications (if any), perceived barriers to the adoption and use of existing MDS, and their opinions about service providers. All sessions were videotaped for later analysis.

### 3.2 Data Analysis

Consistent with the “annotating-the-scripts approach” [16], we read the transcripts of the video-recorded sessions, and then re-watched the tapes, before interpreting the data. This enabled us to view each experience as a whole and to re-experience the group discussion, interpreting not only the transcript, but the body language and the tone of the discussion as well. We then analyzed our interpretations and highlighted the themes that emerged.

## 4. Findings

This section explores responses to uncover the motivations and barriers for the adoption of MDS. Our findings indicate that the tradeoff between perceived costs, risks and benefits, and subjective norms about the use of MDS influence the intention to adopt. Figure 1 portrays links among the main themes revealed during our research.

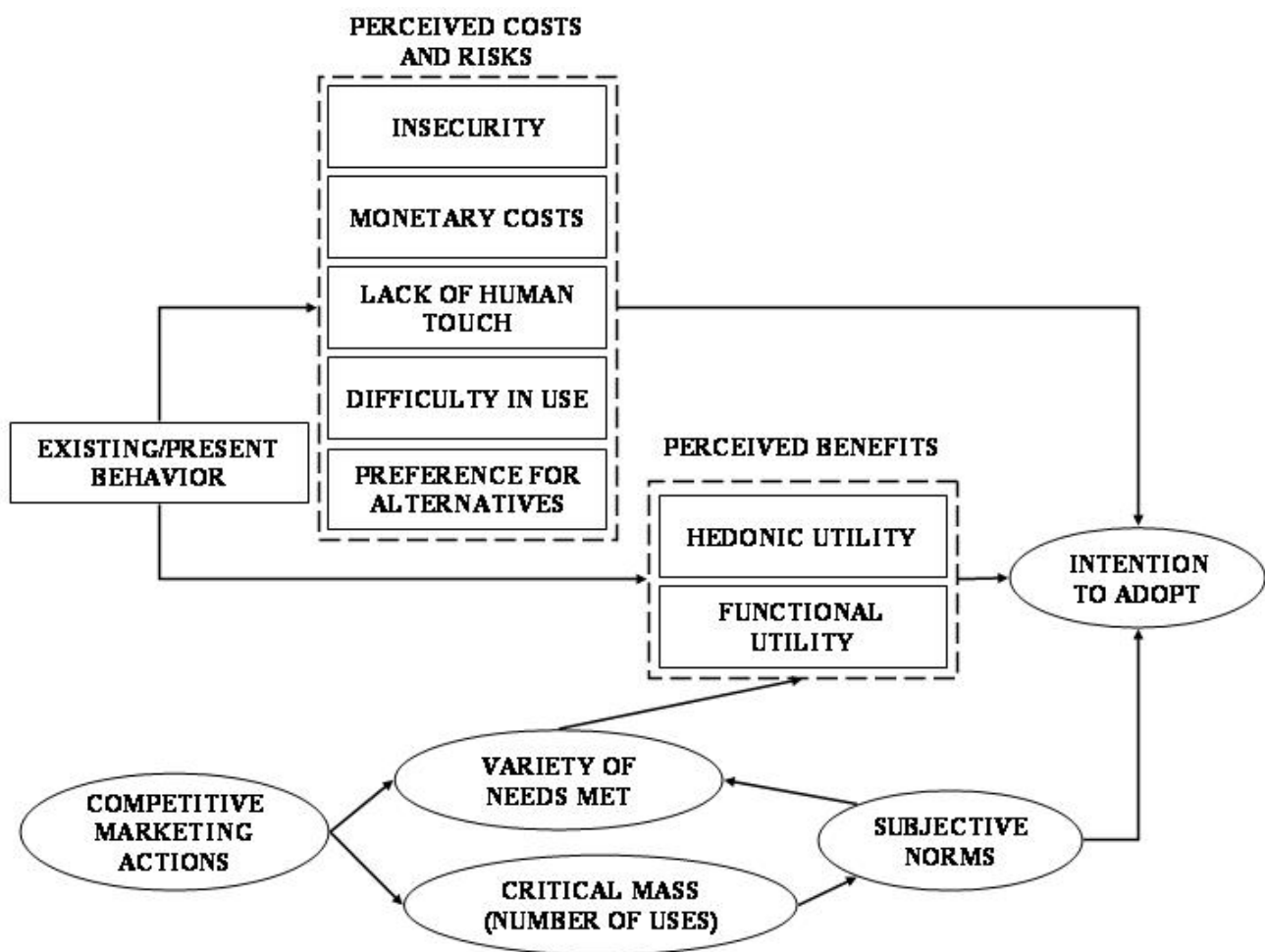


Figure 1 Main themes revealed in the focus group interviews

## 4.1 Drivers of MDS Adoption

Competitive marketing actions by industry players influence the pervasiveness of use of MDS within the society when they launch new services and improved affiliations. These actions help attract a critical mass of users, which then drives the formation of subjective norms. The norms in turn help generate the variety of needs met by using MDS, which subsequently influences consumers' perceptions of the benefits of using MDS, thereby affecting intention to adopt MDS.

### 4.1.1 Competitive Marketing Actions

Our findings show that participants rely on the mass media for information. They trust, to some extent, the information provided by the mass media and are attracted to new behaviors because of the media. This is evident from repeated comments by participants about the usefulness of MMS for real estate agents (which was portrayed in advertisements advocating the use of MMS by Nokia and the service providers in Singapore.)

*Student E: ... "I find it very useful, let's say if the other party has the phone, then you can message him, the client, no need to go down and see, can get some kind of rough idea, ... You like, you can go down and see..."*

### 4.1.2 Critical Mass

The use of the mobile device in our daily lives, coupled with messaging capabilities and installed games, captivates us and replaces the existing behavior of reading and sleeping while we wait or travel. In fact, this is also one reason for the massive success of SMS, which all our participants confess to be reliant upon.

*Participant A<sup>1</sup>: ... "there is a very strong expectation when you send a SMS is that you have to reply, everywhere. ...Even if that certain remark doesn't require a reply, you would still expect some kind of response."*

*Student C: "Even when I'm asleep I'll keep my phone on. ... If I come to a state when I forget to bring my phone, I'll feel lacking, handicapped."*

The excitement of competing with other people in playing games also helped in creating a critical mass who engaged in the "Snake" game (that is pre-installed in all Nokia handsets) craze at one time. As explained,

*Participant F: ... "everybody were playing, then they'll go like ... I got 900 something points, then you'll no shio<sup>2</sup>, so must go play as well."*

This is also similar to the phenomenon of network gaming and multi-player gaming via the Internet. Therefore, it is likely that the downloading of games and the capability to play interactive games with other mobile device owners will be a hit if there is a critical mass involved.

### 4.1.3 Subjective Norms

Subjective norms are significant for three reasons. Firstly, they influence consumer adoption because most people have a need to belong, or conform to predominant behavior, which is usually brought about by the critical mass. For example, one of the reasons for the widespread adoption of Nokia handsets initially was the massive exchange of "picture" messages (using alphabets and symbols, users construct images that will only show up properly as pictures on Nokia handsets). As explained by a participant who related a similar scenario with MMS:

*Student B: ... "if a lot of people are already using MMS and you still don't? ...they keep sending you MMS, and you keep cannot receive it. It's very irritating; gradually you would want to see what they actually send to me."*

Secondly, as clarified by our student participants, subjective norms also provide a cue for the usefulness of the application. Conformist behavior could be due not only to the need to imitate and "belong", but also normative beliefs that "what others need should be what I need as well".

*Student B: ... "if a lot of people have a need, you would also have a need."*

Thirdly, subjective norms play an important communication role, as consumers seem to rely on it as a trustworthy source of information and feedback:

*Student B: "Sometimes, it depends on what applications, you see. ... for mobile applications, I may wait for people to use it first..."*

*Interviewer: "Which one will you be more influenced by? Like the media, friends, family, or do you read up about it?"*

*Participant G: "Friends and media. I wouldn't go read up about such things. Can't be bothered."*

*Participant A: "Depends on the service."*

### 4.1.4 Variety of Needs Met

The variety of needs the service can meet is a factor affecting attitude toward adoption. An anecdote raised by a participant led to the following discussion about this point:

*Participant B: ... "No point they provide a service like pay car park, full stop... but others, like bills, fines, as well, more extensive, every other thing in your life. There's a higher chance that you try something, and feel maybe it's not bad, then you'll try another, and another, then slowly pick up..."*

This comment reminds us of the diffusion of stored-value cards in Singapore. The adoption of these cards only took off after the mandatory use in cars for the electronic road-pricing scheme (an automated toll-paying system for entering the business district) in Singapore. Subsequently, the use of these cards became more popular as it was later applied to many car parks, and even the grocer's and vending machines.

The availability of more variation in the use of MDS affects people's perceptions of its usefulness and benefits. MDS is not currently useful enough with its limited range of applications, most of which is also unknown to the ordinary mobile phone user.

#### 4.1.5 Perceived Benefits

Two major benefits of MDS identified were functional utility and hedonic utility. Usefulness is the most easily identifiable factor influencing the adoption according to all the responses. The functional value of MDS points to two aspects: convenience and immediacy. These sentiments are shared by both focus groups.

*Interviewer: "Would you be interested in shopping with your mobile phone?"*

*Participant B: "Yes. Why not? Sometimes, if I'm so busy at work, I don't even have time to go and shop, so it's very convenient..."*

*Participant E: "Sometimes when you are just on the streets, and you see something, and you want to check out something, you can check it out immediately... Or if you are out with your friends, and you have to decide where to go for dinner, so you can check it out immediately on the Internet to see what is good. And it's very fast."*

*Student C: ... "for certain kinds of information, you want it at that particular time, you need it ... it's emergency that kind of thing...I need the information, there right now... even if later I have the information, it'll be a lost cause."*

Functional utility is not the only advantage that consumers seek; hedonic "usefulness" is also important as consumers buy and consume certain products to make themselves feel good. The participants reveal keen affinity for camera-enabled phones, MMS and the

downloading of ringtones and pictures for reasons such as affection for the application and as a means of self-expression.

*Student B: ... "I like the idea you can take a picture anytime you want..."*

*Participant E: "...when suddenly everyone can afford a mobile phone. Then like got the same phone, so must make mine different, so download ring tones, and what have you."*

#### 4.1.6 Existing/Present Behavior

Existing behavior serves as a basis to which the perceived benefits and risks of the new behavior is measured upon. Existing behavior can serve as a double-edged sword as it could encourage maintenance of existing behavior, or help reduce the learning curve and thereby encourage new behaviors. The participants relate this with regards to MMS:

*Student C: "All I need is the basic functions. Like make and receive calls, and send and receive SMS... The optional functions are more on a case-to-case basis. Some may find that photo taking to be very useful, if they need it... But some don't need it at all..."*

Current use of SMS does not lead to a better opinion of MMS because participants do not view them in the same way. Of the fourteen participants, only about 30% had an MMS-enabled phone, and none used this capability regularly.

However, they also saw the other side of the influence of present behavior. Some are already avid players of pre-installed games on their mobile devices although these are single player games that are played only against the computer program installed in the mobile phone and are relatively simple. There are some who are also network and Internet multi-player gaming enthusiasts. Therefore, participants see these gaming behaviors similar and think that current practices will evolve to the new behavior because people are interested and the learning curve is reduced.

*Student B: "People now already play games over their mobile phones. ... Especially when they are traveling, in the buses..."*

*Student C: "It's an alternative source of entertainment... like last time I'll read books, but now got my mobile phone to play with... most of those who are interested in LAN gaming... will play also, 'cos it's part of their hobby."*

## 4.2. Barriers to Adoption and Use

There are many reasons for the decision not to adopt MDS, including insecurity, monetary costs, lack of human touch, a preference for alternatives and reliability.

### 4.2.1 Insecurity

In general, participants were insecure in three aspects: including a lack of confidence in their service providers, doubts about the reliability of the application as well as concerns about the security of mobile technology. Also, perhaps owing to the repercussions from the Internet security hazards, the security of the transaction is still a major deterrence despite people's interest in mobile transaction. These factors may pose major drawbacks especially with regard to mobile transactions.

Participants reveal a lack of trust and a generally poor impression of their service providers. This is a concern, especially with mobile transactions, because consumers may not adopt a service because of predicted difficulty in the usage as well as the lack of support in aid.

*Participant E: "It's lousy... You don't hear from them, unless they (service provider) want to tell you that they have some new service, then they'll SMS you, or the next thing will be your next bill. Then you don't hear from them"...*

*Participant B: "...there's no way other than have complete trust in them that, that's the actual amount that you really used... I feel that there's a lack of consumer protection, they can bill anything they want..."*

*Interviewer: "...do you think the service providers are giving you enough help or information about MDS, or rather non-voice communications..."*

*Participant B: "If you are an existing subscriber, press 1. Then after 10, 15 minutes later, maybe you get some voice..."*

Both groups of participants are also skeptical about the performance of mobile service applications as there is still little known about them. This is especially a concern when conducting mobile transactions because people will have to face the issue of accountability if the transaction goes awry. This is especially so with the student participants, who prefer cheaper and "just as convenient" alternatives:

*Student A: "... I would rather call someone to talk to the person and make a reservation. ... Maybe I'm not good in that, that's why I don't use it."*

*Student E: "Maybe cock-up or something.... Then don't know who to blame."*

The interest in mobile transaction is more prominent among young working adults who are possibly more time-poor. However, their attitudes toward adoption are also less positive, reflecting skepticism about MDS performance and the security of the channel.

*Participant F: ... "I think it's more feasible to carry around the notebook and the phone separately... You'll always fall back on something that you are comfortable with, like the PowerPoint in my laptop. And to use the phone with the PowerPoint presentation inside, I think I would still be a little afraid whether something will go wrong..."*

*Interviewer: "But if you are already so twenty-four by seven<sup>3</sup> on your phone, you don't have to bring your money out, don't have to bring your cards out. Everywhere you go, just carry your handphone. Is the idea not appealing?"*

*Participant F: "There should at least be some kind of security code or password that you have to key in, so that at least it wouldn't be a problem if you get robbed"...*

*Interviewer: "Would you be interested in shopping with your mobile phone?"*

*Participant A: "Depends on the security."*

### 4.2.2 Money Issues

A common characteristic of both groups is their unwillingness to pay for these services. The students were particularly concerned about cost possibly because of their limited income. Participants also distinguished between the cost of getting the device and the cost of maintaining the use of the service as separate issues. Seemingly, participants are willing to spend the extra money to be able to use the application, but this does not mean that they will actually capitalize on it.

*Participant E: ... "for example, my phone has GPRS, but I actually don't use it... But if I'm buying a new phone at the shop and the phone with GPRS just costs \$30 more, I will still buy the phone because it's like oh, it's additional benefit although I'm not going to use it..."*

### 4.2.3 Lack of Human Touch

Both groups expressed concern about the lack of human touch. Human touch seemed to be more important for the time-poor young adults, who were less

capable than students of finding time to interact socially.

*Participant A: ... "we could be meeting our friends through your phones."*

*Participant C: "That's so sad..."*

*Participant A: ... "when the technology is so advanced, and the cost is so cheap, people rather stay at home and have conversations... that's a concern, socially."*

*Student D: ... "with SMS, you cannot sense the tone of the person; ...it's not professional to use SMS to communicate 'cos there's no human touch to it. So actually calling the person would be more appropriate than SMS."*

#### 4.2.4 Difficulty in Use

Another factor hindering the adoption of some services is the ease of use of the application. As explained by a participant:

*Participant F: ... "I wanted to use GPRS. I was trying to get it. So I went to the web site and all but two times I keep getting "cannot open file". It's just not easy when it comes to GPRS and that sort of thing."*

This is also a major hindrance with mobile gaming because consumers are accustomed to game controls on keyboards and game devices, and not comfortable with the small size of the mobile devices, their low graphic quality and short battery life.

*Participant E: "Quite hard, this one is like so small, there's no room for two thumbs to be moving around"*

*Participant B: "Controls small."*

*Participant G: "Also because my battery always run out, so I have to charge it, and it might be inconvenient to charge it where I am at that time."*

#### 4.2.5 Preference for Alternatives

Participants expressed the view that Singapore is too small a country to require MDS because of the existence of alternatives "which are all faster and cheaper". This point is reiterated several times in both sessions. Also, the use of MDS is just "yet another means of doing it", and so it is not critical that consumers adopt it.

*Participant F: ... "Frankly I think it's much cheaper to stay at home and use the Internet. You're out, you use the mobile phone just to call people or send SMS..."*

*Using the Internet at home, calling the ticket hotline or going down to the cinema, I think that's faster."*

*Student C: "Actually, looking in the context of Singapore, Singapore is very small...from my place to any cinema is very nearby, so using such technology is not very feasible. There's other ways of doing it."*

## 5. Discussion

Despite the practitioners' excitement in bringing MDS to the market, consumer acceptance is still uncertain. Our research shows that consumers are generally receptive but express several major reservations, mainly insecurity, money issues, and the lack of social motivation.

Although our small sample and qualitative approach make it risky to generalize our focus group findings, future research involving both qualitative and quantitative methodology could illuminate these issues more thoroughly. Recently, we conducted a survey on six hundred undergraduates in Singapore and the preliminary results of the survey corroborate some of the focus group findings. For example, about three out of four respondents (74.9 percent) express distrust in the reliability of the service providers in the billing and 81.9 percent of respondents find the idea of using MMS favorable. Present behavior of using the existing technologies (SMS, pre-installed games and Internet multi-player gaming) also shows significant and positive correlations with intention to use MMS (.217,  $p < 0.01$ ) and mobile gaming (preinstalled games: .401,  $p < 0.01$ ; multi-player gaming: .167,  $p < 0.01$ ). Nearly half of the respondents (46.6 percent) expressed concern over the loss of human touch due to MMS while the majority of them (81.3 percent) regarded the use of MMS expensive.

### 5.1 Contribution to Knowledge

Consistent with existing literature, our findings suggest that consumers consider a myriad of factors, such as usefulness, normative beliefs and subjective norms before making a technology adoption decision. Most of previous studies, however, have focused on the adoption of technology in organizational contexts and also only concentrated on functional utility. In contrast, our findings corroborate the view that hedonic benefits affect consumers' adoption of technology [6], and highlight the importance of the role that industry players can perform in influencing adoption.

Interestingly, information and communication technology (ICT) which is originally intended for bringing people together could also separate people apart, as indicated by some of our participants' concern about the loss of human touch. This is consistent with

the paradox of assimilation and isolation of technological products that Mick and Fournier [25] proposed, whereby technology cannot only facilitate human togetherness but also lead to human separation. In addition, social influences affect not only normative beliefs about how our significant referents want us to behave, but also perceived beliefs and pervasiveness of use.

Our focus group findings also highlight the influence of present behavior (alternatives of satisfying particular needs) on the consideration of new behaviors, consistent with the studies by Venkatesh and Davis [29] and Eastlick and Lotz [10]. For example, consumers may consider going to the cinema directly or going online instead of booking the tickets over a mobile device.

## 5.2 Managerial Implications

Our focus group findings suggest that participants have a negative impression of the service providers, viewing them as profit-seeking companies rather than aids to their lifestyle. Thus, service providers could attempt to improve their images by taking an active role in meeting subscriber needs. Improving the image of the service providers will also demand establishing trust among the consumers. This will further help the adoption of MDS, especially with regards to mobile transactions.

Service providers might encourage MDS adoption by first absorbing costs for early adopters and then providing sufficient assistance to the next wave of users, thus ensuring that the perceived benefits of using an application will outweigh the costs of using it. The addition of applications via co-operation with content providers would also persuade trial of MDS. It would be advantageous to persuade consumers that MDS is an extension of alternatives such as self-service transaction machines (e.g. ATM) and cashless modes of transactions (e.g. stored value cards) rather than a new technology so as to reduce consumer perceived costs, risks and learning curve. Benefits such as “anytime, anywhere” as well as security and reliability issues should also be emphasized.

In order to reap the potential profits that MDS offers, a critical mass must be achieved. Our findings indicate that there are two major communication channels that consumers use – the mass media and word-of-mouth. As shown by the participants’ recollection of and interest in advertisements illustrating the usefulness and ease of use of MMS, industry players can consider making more use of the media in demonstrating new uses and MDS applications. The other main source of information for consumers is from word-of-mouth feedback. Thus service providers can also utilize this avenue for promotion of new services as well as encouraging adoption. For example, service providers can, based on their databases, find out users who are using or prone to using new applications. By communicating to these users or providing “exclusive

personalized promotions”, service providers can encourage them to recommend such services to their friends. For example, service providers can promote the formation of mobile communities for playing interactive gaming by offering discounts on each individual’s subscription.

## 5.3 Future Research

Consistent with traditional scale development methods, we used the findings from the focus group to refine a questionnaire that we recently employed in a survey. We conducted this survey for testing some of the relationships portrayed in Figure 1, and are currently analyzing the survey data. Future research examining the role of industry players on consumer adoption patterns is particularly valuable as little research has been done on the role. Future research examining how consumers cope with their present concerns with regards to an existing technology will also be useful in predicting and overcoming concerns about a new technology.

To conclude, we believe that in this dynamically changing environment, it is necessary to obtain a more thorough understanding of the adoption behavior of the consumers. This will aid the design and the marketing of the applications, thereby avoiding the lame adoption of some MDS applications, such as WAP.

## 6. Notes

<sup>1</sup> Student participants are labeled as “Student”. Young working adults are labeled as “Participant”.

<sup>2</sup> Shiok: lingo used in Singapore, synonymous with kick, high or feeling of excitement and happiness.

<sup>3</sup> Twenty by seven means twenty-four hours by seven days a week.

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