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# Factors Affecting 3G Adoption: An Empirical Study

Naresh Kumar Agarwal

*National University of Singapore, naresh@comp.nus.edu.sg*

Zhen Wang

*National University of Singapore, wangzhen@comp.nus.edu.sg*

Yunjie Xu

*National University of Singapore, xuyj@comp.nus.edu.sg*

Danny C.C Poo

*National University of Singapore, dpoo@comp.nus.edu.sg*

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## 19. Factors Affecting 3G Adoption: An Empirical Study

Naresh Kumar Agarwal  
School of Computing  
National University of Singapore  
naresh@comp.nus.edu.sg

Zhen Wang  
School of Computing  
National University of Singapore  
wangzhen@comp.nus.edu.sg

Yunjie Xu  
School of Computing  
National University of Singapore  
xuyj@comp.nus.edu.sg

Danny C.C. Poo  
School of Computing  
National University of Singapore  
dpoo@comp.nus.edu.sg

### Abstract

*3G opens up doors for high-speed transfer of both voice and data. However, the actual adoption rate of 3G has remained below expectations. Thus, it is important to understand the interplay of actors involved in the adoption process of this technology. Prior research suggests that external variables like convenience, self efficacy, service quality and variety of service, perceived value and price are significant factors in the adoption of a technology. In this study, we examine the impact of these factors on user adoption of 3G. The study found that 1) price, convenience and service quality are all significant predictors of perceived value 2) the relationship between variety of service and perceived value is mediated by convenience and 3) perceived value has a strong relationship with purchase intention. The study adds to the adoption literature and lends support to Zeithaml (1988)'s value dimensions. Consideration of the factors identified should lead to more successful adoption of 3G.*

**Keywords:** 3G Adoption, Convenience, Service quality/variety, Perceived value, Price

### Introduction

3G, the third-generation mobile telephone technology opens up doors for high-speed transfer of both voice and data. Improved capabilities of 3G networks and devices, combined with the availability of more compelling multimedia content, are likely to increase the attractiveness of 3G to potential customers. 3G provide a wide variety of audio, video and data services. All these services become more attractive when combined with high speed (Adler 2004; Lu *et al.* 2005). However, the actual usage of 3G has been far below the expectation of service providers in most countries (Forrester Research 2002; 3G UK 2004; Garfield 2004). It is thus imperative to understand the interplay of factors involved in the adoption of this technology.

Prior research suggests that external variables like convenience, self efficacy, quality of service, variety of service, perceived value and price are significant factors in the adoption of a technology (Auger and Gallagher 1997; Bradanch and Eccles 1989; Davis *et al.* 1989; Davis *et al.* 1992; Fishbein and Ajzen 1975; Venkatesh *et al.* 2003). In this study, we aim to examine the impact of these factors on user adoption of 3G. The purpose of this paper is to investigate “*What are the key variables that significantly affect 3G adoption success?*”

This paper is organized as follows. The next section provides the overall literature review of the concepts of the Technology Acceptance Model (TAM), some external variables (e.g., convenience, service quality, etc.), value and price. This is followed by the research model

and hypotheses. Next, methodology and findings are discussed. Finally, we conclude the paper with a discussion of theoretical and managerial implications, limitations and suggestions for future research.

### **Literature Review**

Most empirical studies have used adoption-oriented measures of innovation, where *adoption* is typically defined as the physical acquisition of an innovation (e.g. Fichman and Kemerer 1999) or as a commitment to use it. The widely-used Technology Acceptance Model (TAM) is derived from Theory of Reasoned Action (TRA), but is specific in explaining the computer usage behavior (Davis *et al.* 1989). TAM is specifically tailored for modeling user acceptance of information systems. It focuses on only attitude by ignoring subjective norms intentionally due to uncertain theoretical and psychometric status (Davis 1989; Davis *et al.*, 1989). This model incorporates two beliefs of the potential adopter, *perceived usefulness* and *perceived ease of use of technology* as the main determinants of the attitudes toward a new technology. These two beliefs create a favorable disposition or intention toward using the IT that consequently affects its self-reported use (Davis *et al.* 1989).

### **External Variables**

According to the TAM model, external variables affect the adoption of a technology. Triandis (1979) termed such variables as facilitating conditions which include the extent and type of support provided to individuals that influence their adoption and use of the technology. Venkatesh *et al.* (2003) talked of facilitating conditions as ‘the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system’ (p. 453). Previous studies have proposed a number of external variables that have an effect on technology adoption (see Legris, Ingham and Collette (2003) for a review). After reviewing past studies on 3G adoption (Han 2002; Pedersen and Ling 2002; Pagani 2004; Phuangthong and Malisawan 2005), we have identified a group of external variables affecting 3G adoption. Based on their relevance to 3G technology, the following variables are selected – convenience, service quality, IT self efficacy and variety of service. Factors such as enjoyment were not included as ‘avoidance of unpleasantness’ can be considered part of convenience (Yale and Venkatesh 1986).

**Convenience.** 3G has brought workforce mobility to a higher level, enabling problem solving at anytime, anyplace. Ng-Kruelle *et al.* (2002, p.277) defined convenience as ‘how certain activities are made easier’. Convenience would include *mobility*, which refers to having access in real time to information and communications (Pagani 2004). While convenience may be a necessary factor in the adoption of 3G, it is not sufficient. Ng-Kruelle and her colleagues (2002) analyzed the price of convenience. In their discussion, privacy is the price of convenience which brings with it a loss of freedom. E.g. a 3G phone user may not be comfortable using the video phone feature, when he/she is not appropriately dressed.

Yale and Venkatesh (1986) classified convenience into six dimensions – time utilization, handiness, appropriateness, portability, accessibility and avoidance of unpleasantness. However, Gehrt and Yale (1993) have argued that these classes are not discrete. Building on past studies, Berry, Seiders and Grewal (2002) distinguished service convenience from product convenience and arrived at five types of service convenience – decision convenience, access convenience, transaction convenience, benefit convenience and post-benefit convenience. These types reflect stages of consumers’ activities related to buying or using a service. Consumers’ perceived time and effort costs related to each type of service

convenience affect the consumers' overall convenience evaluations. In our study, we are looking at 3G as service and technology as opposed to a pure product (3G phone model).

**Service Quality.** Service quality has been studied in various disciplines from Marketing, Economics and Consumer Research to Information Systems. Perceived service quality is defined as the customer's assessment of the overall excellence or superiority of the service (Zeithaml 1988). It is a consumer judgment and results from comparisons consumers make between their expectations and their perception of the actual service performance (Lewis 1989). Parasuraman *et al.* (1988) considered that a customer's assessment of overall service quality depends on the gap between expectations and perceptions of actual performance levels (Bolton and Drew 1991).

Since the 1980s, SERVQUAL (Parasuraman *et al.* 1988) has been widely used for consumer services evaluations. SERVQUAL, based on the disconfirmation paradigm, helps perform a gap analysis of an organization's service quality performance against customer service quality needs. However, subsequent literature has criticized the SERVQUAL model (e.g., Brown *et al.* 1993; Buttle 1996). The SERVPERF instrument is a performance-only-based measure of service quality as opposed to 'perceptions-minus-expectations' measure (Cronin Jr. and Taylor 1994). SERVPERF measures are based solely on consumers' perceptions of the performance of a service provider, which explain more of the variation in service quality and assesses service quality without relying on the disconfirmation paradigm used by SERVQUAL (Lai 2004). In the context of 3G, service quality includes reliability of network, availability and accessibility. A user might also consider the level of hardware and software functionalities, such as dimension of device, battery life, display, speed and functionalities provided (Pagani 2004).

**Computer Self Efficacy.** Self Efficacy is people's perception of their ability to plan and take action to reach a particular goal. Computer self-efficacy (CSE) refers to individuals' judgment of their capabilities to use computers in diverse situations (Compeau and Higgins 1995b; Marakas *et al.* 1998) and has been studied in past literature (e.g. Compeau and Higgins 1995a; Agarwal and Karahanna 2000; Thatcher and Perrew 2002).

**Variety of Service.** The variety of services should include the availability of personalized information or functions, such as MS Office compatibility, download facilities, organizer functions, games, identification. The larger a range of services is, the more powerful the technology. As a consequence, greater variety of service can add more value to its consumers. 3G provides a wide variety of audio, video and data services. *Video* related services enable users to download, save and view video footage; see and hear other people using a 3G phone too. *Pictures*-related services allow users to take and send pictures to friends and colleagues much faster than GPRS. They can play faster and better *games* owing to high speed. With *Location Services*, users can find out where they are, how to go a cinema, etc. The other unique service provided by 3G is *Television*.

### ***Value***

In the marketing research literature, perceived value has been suggested as one of the most important measures contributing to consumer purchase intention (Woodruff 1997; Parasuraman and Grewal 2000). The role of consumer value has been widely recognized and empirically tested in marketing research area. Woodruff (1997) proposed consumer value to be regarded as a source of competitive advantages because it is a better way to increase profitability than quality and satisfaction management.

Value has been defined in several ways in the literature. Summarized by Zeithaml (1988), value has four meanings – 1) value is low price, 2) value is whatever one wants in a product, 3) value is the quality that the one receives for the price paid, and 4) value is what the consumer gets for what he gave. Taken these meaning together, value represents ‘consumer’s overall assessment of the utility of a product based on perceptions of what is received and what is given.’

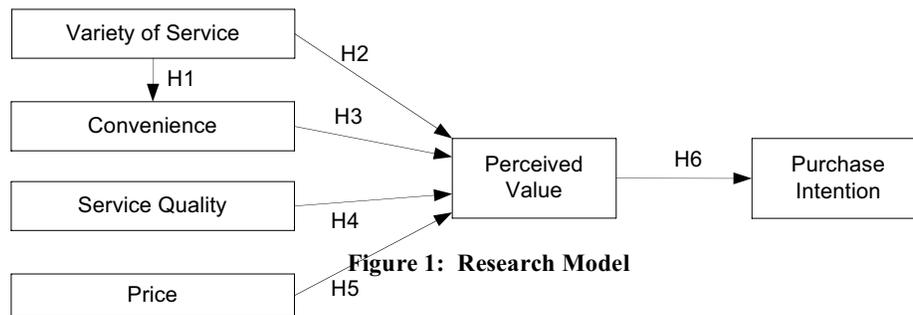
A number of studies adopted the conceptualization that value is a tradeoff between ‘benefit’ and ‘sacrifice’. The *benefit* component of value includes salient intrinsic attributes, extrinsic attributes, perceived quality, and other relevant high-level abstractions. The *sacrifice* component includes monetary prices and non-monetary prices. In this research, we will adopt the definition provided by Zeithaml (1988). Perceived benefit may take the form of product-related benefit (i.e. product quality) and/or transaction-related benefit (i.e. service quality, time/efforts savings). In the context of 3G, transaction processes are as important as product quality. Customer accumulates information about a specific telecom company through the transaction experiences with this company. From the value maximizing perspective (Kahneman and Tversky 1979; Thaler 1985; Zeithaml 1988), customers are likely to make transactions which maximize benefits and minimize sacrifices.

Perceived value has been suggested as a multi-dimensional construct. Kahneman and Tversky (1984) classified value as 2 distinct types: experience value and decision value. Sheth *et al.* (1991) proposed 5 value dimensions: functional, social, emotional, epistemic and conditional.

### **Price**

According to Lichtenstein *et al.* (1993), *price* represents the amount of economic outlay that a person has to give up in exchange for a good or service. *Objective price* and *perceived price* are the two types of price most commonly used in the literature (Zeithaml 1988; Jacoby and Olson 1977). Perceived price is the comparison between objective price and reference price. It is the customer’s perceptual representation or subjective perception of the objective price of the product or service (Jacoby and Olson 1977). Studies suggest that use of perceived price is more suitable in marketing research than objective price (Dickson and Sawyer 1990). Customers do not always know or remember the actual prices of products, thereby they have to interpret price in a way meaningful to them. Alternatively, Dodds *et al.* (1991) suggested that perception of price is formed based on objective external stimulus and internal representations. The external stimulus and internal representations corresponds to external and internal reference price respectively (Biswas and Blair 1991). The external reference price is derived from the observation of the vendor’s promotional or advertised price. The internal reference price resides within the customer’s memory and exists as points or a range of values that may serve to evaluate external reference prices or savings claim (Monroe 1984). Vendors can manipulate customer’s perceived price by providing reference price, such as the price from the other vendor, etc.

## Research Model and Hypotheses



While IS researchers have made significant efforts in building theories to examine and predict the determinants of IT acceptance, the perspective on services and service-enabling technologies is considerably less pronounced (Pagani 2004). Here, we propose a model to study the adoption of 3G.

Convenience consists of six dimensions – time utilization, handiness, appropriateness, portability, accessibility and avoidance of unpleasantness (Yale and Venkatesh 1986). A great variety of services would empower the users to perform more tasks. It would be even better to do these tasks with just one integrated device, as it reduces the time and effort to carry and change devices. Thus, the larger variety of services provided by a technology, the more convenient it is. Ng-Kruelle *et al.* (2002) also showed that the higher level of workforce mobility enabled problem-solving with 3G, increasing convenience. Therefore, we hypothesize that,

*H1: The variety of services provided by 3G positively affects the convenience in using 3G.*

Functional value is the perceived utility acquired by an alternative as the result of its ability to perform its functional purposes (Sheth *et al.* 1991). Integrated with more services in a single device, users gain more benefits in using this technology. Thus, a larger variety of service would also increase the functional value.

*H2: The variety of services provided by 3G positively affects the perceived value of 3G.*

Ng-Kruelle *et al.* (2002, p.277) defined convenience as ‘how certain activities are made easier’. When a user perceives 3G as providing convenience by reducing time and effort, it would impact the user perception of the benefits provided by 3G, thus raising its perceived value.

*H3: Perceived convenience positively affects the perceived value of 3G.*

Experience value refers to the degree of pleasure or pain, satisfaction or anguish in the actual experience of an outcome (Kahneman and Tversky 1984). The convenience of 3G would increase the user satisfaction, thereby positively affecting the experience value. Similarly, service quality can raise experience value as well. Therefore, we hypothesize that,

*H4: Service Quality positively affects the perceived value of 3G.*

Perceived price is derived from the comparison between objective price and reference price (Thaler 1985). Because of this negative impact of perceived price, which serves as a 'sacrifice' component, we posit negative relationship between perceived price and perceived value, using the transaction utility perspective. This negative relationship has been supported by many studies (e.g. Dodds *et al.* 1991; Teas and Agarwal 2000; Chen and Dubinsky 2003). Thus, high price would lead to a greater 'sacrifice' component of 3G, reducing its value in the eyes of the consumer. Hence, we hypothesize that,

*H5: Price negatively affects the perceived value of 3G.*

Perceived value has been proposed as an intervening construct between price and non-price information with intention (Zeithaml 1988; Dodds and Monroe 1985). A high perceived value implies a perception of high benefits and low sacrifices/costs. From the value maximizing perspective (Kahneman and Tversky 1979; Thaler 1985; Zeithaml 1988) customers are likely to make transactions, which maximize benefits and minimize sacrifices. Many research studies suggest that perceived value is a significant predictor for adoption behavior (Bolton and Drew 1991; Cronin *et al.* 2000). Hence, we hypothesize:

*H6: Perceived value positively affects the user's behavioral intention to adopt 3G.*

### **Research Methodology**

Surveys are appropriate for research questions about self-reported beliefs or behaviors (Neuman 2003). The target population of this study is working people (since 3G is an expensive alternative to standard mobile services, working people are best suited to be able to afford 3G services, as compared to say students). The study population is the group of young, working Singapore professionals between the ages of 20 to 40. As it is impractical to obtain a sampling frame of this magnitude, we used a sample consisting largely of professionals working in the Central Business District of Singapore. Data was collected in person. The collected data was statistically analyzed following the psychometric procedure to determine support for the hypotheses arrived at.

**Instrument.** The items developed for the constructs variety of service, convenience, price, service quality, value and behavioral intention are listed in the Appendix. IT Self-Efficacy was used a control variable (along with demographics such as age, gender, nationality, etc.), which is not of theoretical interest but could potentially affect the dependent variable. Computer self-efficacy (CSE) refers to individuals' judgment of their capabilities to use computers in diverse situations (Compeau and Higgins 1995b; Marakas *et al.* 1998). In this study, we changed the construct from computer self efficacy to IT self efficacy to make it more suitable to the 3G domain. The questionnaire used the 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). The face validity of the items was ascertained through group discussion and through consultation with experienced researchers in the field.

**Data Collection.** A pilot test was conducted on 30 randomly selected University students (26 valid responses) to fine-tune the questionnaire. The main data was collected in person over a period of 2 weeks from the target sample of working professionals. 110 responses (101 valid, invalid responses were incomplete) were collected.

**Table 1: Subjects' Demographics of Main Survey**

Nationality					Gender		Mean Age	Years of using hand phone	Monthly Spending on phone (S\$)	Education		
SG	PRC	Indian	Malaysian	Others	F	M				Bachelor	Master PhD.	Others
59	21	10	6	5	47	54	30.44	7.7	70.40	25	23	53
58.42%	20.79%	9.9%	5.94%	4.95%	46.53%	53.47%				24.75%	22.77%	52.48%

From Table 1, we can see that our study population was a heterogeneous group of working people in Singapore. Since the subjects were self-selected to participate in the survey, and since data collection lasted 2 weeks, response bias was checked before data analysis. No bias was found.

**Data Analysis.** We then carried out data analysis using SPSS and LISREL. For pilot test (N=26), we conducted Exploratory Factor Analysis (EFA). While for main survey (N=101), we conducted the Confirmatory Factor Analysis (CFA) and hypothesis testing.

*Pilot Test.* Psychometric analysis was performed as per the procedure recommended by Anderson and Gerbing (1988). EFA with principal component analysis (Hair *et al.* 1995) was used to extract the factors, followed by Varimax rotation. The major latent factors extracted together explained 83.11% of the variance. 3 problematic items were examined statistically and theoretically and removed. The communalities examined indicated that all items had a high portion of variance (in the ranges of 0.7, 0.8 and 0.9) explained by all the factors except for CONV1 (0.632) and SQ2 (0.673). The main study with our target population was conducted after the questionnaire was finalized.

*Main Study.* We used LISREL8.54 to conduct a unidimensionality testing with the main survey data (N=101). Three items violating unidimensionality were dropped for both theoretical and statistical reasons. As shown in Table 2, the Cronbach's  $\alpha$  of each latent variable is greater than 0.8, which indicates that the measurement items are reliable (Nunnally and Bernstein 1994).

**Table 2: Descriptive Statistics and Cronbach's Alpha**

Constructs	No. of Items	Mean (1-7 scale)	Standard Deviation	Reliability (Cronbach's $\alpha$ )
Variety of Service	2	5.307	1.142	0.836
Convenience	3	5.010	1.139	0.828
Service Quality	3	4.211	0.883	0.803
Price	3	5.498	1.204	0.860
Perceived Value	5	4.119	1.089	0.923
Purchase Intention	4	3.837	1.403	0.868

EFA was performed using LISREL to test the convergent (factor loading > .5) and discriminant validity (correlation between item and unintended construct < 0.4) of the instrument (Hair *et al.* 1995). Convergent validity was established using criteria suggested by Anderson and Gerbing (1988) showed that all the standardized factor loadings are statistically

significant; the composite factor reliabilities and Cronbach’s  $\alpha$ s are  $> 0.8$ ; average variance extracted (AVE) values are all  $> 0.6$  (only AVE for service quality was 0.593).

A discriminant validity test performed using the chi-square differences between the constrained and original models showed that all the chi-square differences are strongly statistically significant. Discriminant validity was also established using the square root of AVE method. As shown in Table 3, for every construct, the square root of AVE (diagonal line) is greater than its correlation with other constructs. Thus, the discriminant validity of this study is fully satisfied.

**Table 3: Comparison of Correlation and Square Root of AVE (in diagonal)**

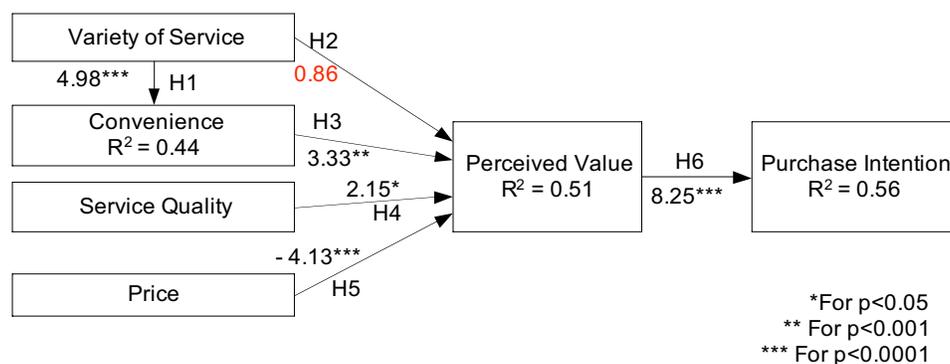
	Variety of Service	Convenience	Service Quality	Price	Perceived Value	Purchase Intention
Variety of Service	<b>0.845</b>					
Convenience	0.549	<b>0.794</b>				
Service Quality	0.426	0.410	<b>0.770</b>			
Price	0.381	0.196*	0.026 <sup>+</sup>	<b>0.826</b>		
Perceived Value	0.331	0.487	0.471	- 0.179*	<b>0.843</b>	
Purchase Intention	0.211*	0.432	0.322**	- 0.243**	0.682	<b>0.800</b>

\*\*Correlation is significant at the 0.01 level (1-tailed)

\*Correlation is significant at the 0.05 level (1-tailed) + Not significant at 0.05 level

The overall fit indices of the revised models were examined (DoF=155;  $\chi^2 = 181.92$ ,  $p=0.069$ ;  $\chi^2 / \text{DoF} = 1.174$ ; RMSEA=0.042; NFI = 0.86; NNFI = 0.96; PNFI = 0.7; CFI = 0.97; IFI = 0.97; RFI = 0.83; RMR = 0.12; standardized RMR = 0.07; GFI = 0.85; AGFI = 0.79; PGFI = 0.62). All of the indices are above the suggested level, except for NFI (cut-off 0.9), RMR (cut-off 0.05) and GFI (cut-off 0.9). GFI and NFI are sensitive to sample size, but the sample size in this study  $N=101$  should be satisfactory. While a GFI index of 0.90 is preferred, many studies have cited an index of 0.80 and above as acceptable. The model fit has room for further improvement by dropping more items.

*Hypotheses Test.* Given acceptable convergent and discriminant validities, the test of the structural model was performed to test Nomological validity (Campbell 1960; Cronbach and Meehl 1955). Figure 2 summarizes the LISREL hypotheses testing results.



Chi-square = 189.35, df=161, P-value = 0.06271, RMSEA = 0.042

**Figure 2: Lisrel Hypotheses Testing Results**

As shown in Figure 2, H1 (44% of variance explained), H5 and H6 (56% variance in purchase intention explained) are strongly supported. H3 and H4 are also supported. Convenience, service quality and price together explain a large (51%) variance in perceived value. However, H2 is not supported.

In the *post-hoc analysis*, demographic variables gender, age, nationality, monthly amount spent on handphone bill, years using handphone and current 3G subscriber were included in the model, but their effect on purchase intention was insignificant. The effect of IT Self Efficacy on both Purchase Intention and Value was found to be insignificant. The effects of demographics and IT self-efficacy may have been randomized, leading to insignificant effects.

### **Discussion and Implications**

The focus of this research study was to identify the key variables that significantly affect 3G adoption success. We expected variety of service, convenience and service quality to contribute to the *benefit* components of perceived value and price to contribute to the *cost* component of perceived value. We also expected variety of service to positively affect convenience. Finally, we expected perceived value to positively affect purchase intention. Our empirical study shows that the overall model fit was satisfactory, as the model chi-square (189.35) was not substantially larger than the degree of freedom 161. The chi-square value is not significant (P-value > 0.05). Thus, a good fit is implied.

The results showed that price was the most significant antecedent of perceived value, followed by convenience and service quality. *Price* was found to have a significant negative effect on perceived value. The high average score (5.498 out of 7) indicates that most viewers perceived 3G services to be expensive. Price can be inferred to be one of the most significant factors in the way of the widespread adoption of 3G. The saving in time and effort (*convenience*) provided by 3G was also found to have a significant effect on value. The effect of *service quality* was lesser because many respondents may not have identified with the service provider aspects without being actual subscribers of 3G. One important finding was that the effect of *variety of services* on perceived value was insignificant. This implies that merely providing a large many services does not appeal to many users. In fact, many users might get overwhelmed by the number of services provided, especially when they have no real use for them.

*Mediating role of Convenience.* However, the variety of services has a strong effect on convenience, which in turn has a positive effect on value. This implies that while variety of services may not directly lead to perceived value, convenience in the form of savings in time and effort provided by different services leads to increase in perceived value. As we did not hypothesize the mediating role of convenience, we performed a post-hoc analysis using the 4-step (with 3 equations) regression procedure (see Frazier, Tix and Barron 2004) and found that the mediation effect of Convenience from Variety of Service to Perceived Value is significant.

*Effect of Perceived Value on Purchase Intention.* The results show the perceived value has a very strong effect on purchase intention (t-value 8.25,  $p < 0.0001$ ). This implies that if a potential customer sees value in 3G (i.e. the benefits provided by 3G outweigh the costs), he may want to adopt 3G as well.

### ***Implications***

There are a number of theoretical implications of this study. First, the study adds to the empirical studies on Technology Adoption and provides credence to Zeithaml's (1988) value model. Factors such as convenience and service quality add to the benefit aspect of perceived value, where as price adds to the cost aspect. Second, perceived value was found to be a significant predictor of purchase intention. This implies that a consumer who sees strong value in a product/service is likely to buy/adopt it as well. Finally, it was found that while variety of service may not directly affect perceived value, the effect is mediated by convenience.

For practitioners and stakeholders of 3G deployment in a particular country, this study suggests that price and convenience are the two most important factors to keep in mind when offering 3G services. While this may be intuitive, the study provides a theoretical and empirical basis for the deduction in the context of 3G adoption in Singapore. Also, rather than simply providing a large variety of services, it is important to link those services to convenience leading to savings in time and effort. Finally, price has to be brought down to make 3G services sufficiently attractive for wide-scale adoption.

However, limitations of the study must also be noted. First, the sample size of the pilot data was rather small (26 valid responses out of 30 collected) and was taken from a student sample (while our target population was working professionals). Second, our study is limited to working professionals in the Central Business District of Singapore. To be fully able to generalize the study to working people, more studies of working people in different parts of Singapore need to be conducted. The study could also be extended in other countries where 3G services are being introduced. Third, care should be taken before generalizing the results because of the self-selection of candidates in the Central Business District of Singapore.

### **Conclusions and Future Work**

This study has investigated 3G adoption. Specifically, we were interested in identifying the key variables that significantly affect 3G adoption success. The study concluded that price, convenience and service quality are all essential to perceived value. The relationship between variety of service and perceived value is mediated by convenience. The study also concluded that perceived value has a strong relationship with purchase intention.

Future research can extend the study to different samples in other working districts of Singapore, as well as other countries where 3G is being introduced. The model could be extended to include other factors such as need, availability, enjoyment, etc. which could affect purchase intention, apart from value. The model could also be used to study the adoption of other technologies apart from 3G.

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## Appendix - Items for constructs in the Research Model

Construct	Items	Item wording	References
Variety of service (2-item after EFA)	VOS1	3G provides a wide variety of services	Kim, Lee, Han & Lee (2002)
	VOS2	Compared to non-3G phones, the variety of services offered by 3G is significantly larger	Self-developed
	VOS3*	Number of services provided by 3G is more than what I expected	
Convenience (3-item after EFA)	CONV1*	It will save me the effort of meeting when I can see my friends on the 3G phone.	Zhang & Prybutok (2005)
	CONV2	Location-based services (e.g. showing you where you are or how to find a cinema) provided by 3G will save me effort	
	CONV3	High-speed data transfer provided by 3G will save me time	
	CONV4*	3G service will minimize hassle in my day-to-day life	
	CONV5	Overall, using 3G will add to my convenience	
Price (3-item)	PRICE1	Using 3G is expensive.	Self-developed
	PRICE2	I will probably save more money in hand phone bill with a non-3G service.	Gefen & Devine (2001)
	PRICE3	It is cheap to use 3G (reverse).	
Service Quality (3-item after CFA)	SQ1**	3G service provider provides services as promised	Kettinger & Lee (1994)
	SQ2	3G service provider is dependable in handling customers' problems	
	SQ3	3G service provider provides prompt service to users	
	SQ4**	3G service provider makes users feel safe in transactions	
	SQ5**	Employees of 3G service provider have the knowledge to answer user questions	
	SQ6	I believe 3G service provider offers excellent service	
Value (5-items)	VALUE1	Considering the price I would pay and the services I would get, using 3G technology is a good deal.	Sirdeshmukh <i>et al.</i> (2002)
	VALUE2	Considering the price I would pay and the high-speed transfer I would get, using 3G technology is a good deal.	
	VALUE3	Considering the effort I would make for enabling 3G service and the services I would get, using 3G technology is worthwhile.	
	VALUE4	Considering the risk involved in 3G technology and the services I would get, using 3G technology is of value.	Self-developed
	VALUE5	Overall, using 3G technology would deliver me good value.	Sirdeshmukh <i>et al.</i> (2002)
Behavioral Intention (4-item)	BI1	It is likely that I would purchase a 3G mobile phone	Jarvenpaa <i>et al.</i> (1999)
	BI2	It is likely that I would consider using 3G services in the short term	
	BI3	It is likely that I would consider using 3G services in the longer term	
	BI4	If I need to purchase a new mobile phone, 3G mobile phone is my first choice	Dodds <i>et al.</i> (1991)
IT Self-Efficacy (6-item)	SE1	I could learn how to use a high-tech product if there was no one around to tell me what to do as I go.	Compeau & Higgins (1995b)
	SE2	I could learn how to use a high-tech product if I had never used a product like that before.	
	SE3	I could learn how to use a high-tech product if someone showed me how to use it first.	
	SE4	I could learn how to use a high-tech product if I had seen someone else using it before trying it myself.	
	SE5	I could learn how to use a high-tech product if I could call someone for help if I get stuck.	
	SE6	I could learn how to use a high-tech product if someone else had helped me get started.	

\* Dropped after EFA on Pilot Data; \*\* Dropped after CFA