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Service Quality and Perceived Value's Impact on Satisfaction, Intention and Usage of Short Message Service (SMS)

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Abstract. *SMS, being an almost instantaneous communication medium that connects people, is now a phenomenon that has grown and spread around the globe at an amazing speed. Given the current trend of SMS usage and its potential growth, this paper will provide an insight of the extent to which how service quality and the value perceived by the SMS users have an impact on their extent of the SMS usage in the post SMS adoption phase. Specifically, this article will examine how service quality of the service providers and perceived value affect customer satisfaction and how customer satisfaction will affect their behavioural intention to continue to use SMS which in turn affects the extent of SMS usage in the local context. Using partial-least-squares, an analysis was conducted based on the 150 surveys collected to test for the proposed relationships. The results showed that the tangibles, empathy and assurance dimensions of service quality are antecedents of customer satisfaction and a positive relationship exists between customer satisfaction and customers' behavioural intentions to continue to use SMS. Additionally, the positive relationship between customers' behavioural intentions to continue to use SMS and the extent of SMS usage is also significant. These results were similar to the results shown by Cronin and Taylor (1992) studies. The perceived value/customer satisfaction relationship investigated in this research was in line with Fornell et al.(1996) and Cronin et al.(2000) where perceived value was one of the determinants of customer satisfaction. Specially, the results revealed that perceived value, together with tangibles, empathy and assurance aspects of the service quality, played an important role in determining customer satisfaction for SMS. Implications of the above results for research and practice are discussed.*

Key Words. *telecommunications, SMS, service quality, satisfaction, intention, use*

1. Introduction

The future will present tremendous promise, opportunities and challenges for the fast-evolving telecommunication industry. The telecommunications industry in Singapore has undergone complete liberalisation in 1994. Since then, the industry has transformed from a supply-dominated to a demand-driven one. The industry had also experienced tremendous growth, with the number of mobile phone subscribers in Singapore increasing 63.7% from 1999 to 2000 (Statistics Singapore, 2001). In the light of the transformation of the telecommunications industry, theorists have proposed that mobile telephony should be viewed as a service rather than to focus on the actual products such as mobile phones (Andersson and Mölleryd, 1997). Due to intense competition and the seemingly homogenous mobile products offered by the mobile industry, service providers in Singapore (namely Singtel, Mobile One and Starhub) have begun to emphasise a customer-oriented attitude to establish competitive advantage.

With the increased number of mobile subscribers over the world, Short Message Service, or SMS in short, has also gained popularity. Available on GSM (Global System for Mobile communication) networks, it allows text messages to be sent or received via the network operator's message centre to a mobile phone, or from the Internet, using the "SMS gateway" websites (IDA, 2000). Most mobile phones have this digital cellular network feature that allows users to send short alphanumeric messages at a relatively reasonable price. As SMS operates on a 'store-and-forward' concept (even if the recipients' phone is switched off, they will still be able receive the message), it can be considered as an almost instantaneous communication medium as compared to the conventional email which operates on a 'store-and-retrieve' concept (sender must wait for the receiver to come on-line and access the network to retrieve the message) (Jones, 2001).

SMS has become an integral part of people's lives (Pastore, 2002), with significant implications for communication and information transmission. According to GSM Association, 15 billion SMS massages were sent over GSM wireless networks during December 2000 (Pastore, 2002). In Singapore alone, an average of 8.5 million text massages are sent out daily by the island's 3 million mobile subscribers (Tham, 2001). SMS also facilitates communication for the hearing impaired, where the potential for a niche market exists. Besides basic person-to-person messaging, service providers have begun to introduce value-added service applications such as advertising, stock alert and SMS information service.

Given the current exponential growth in SMS usage and its importance, it is worth finding out the extent to which service quality and the value perceived by the current SMS users would impact their SMS usage in the post adoption phase. Earlier research has reinforced the strategic benefits of superior quality in contributing significantly to market share and profits (Gale and Buzzell, 1989). Both quality service and customer satisfaction are key factors on the success measurement scale. Due to its role as a communication medium, service quality is crucial in ensuring that SMS are in fact sent and received by the parties involved. The industry has also recognised the importance of service quality and perceived value in SMS. Singtel, Mobile One and Starhub have set up a Short Messaging Service Industrial Working Group (SMSWG) aimed at identifying and addressing the SMS inter-operability issues in Singapore (IDA, 2001).

From a theoretical perspective, this research provides an understanding of how service quality and perceived value affect customer satisfaction. It also examines how customer satisfaction will affect behavioural intentions, which in turn affects the extent of SMS usage in the telecommunication industry. Therefore, the dependent variables are customer satisfaction, behavioural intentions and extent of usage. Behavioural intentions of SMS users can be broken down into the following elements: the use of more SMS in the future and recommending other people to use SMS. The extent of usage is viewed as the number of SMS sent monthly, the frequency of SMS sent and how SMS users would categorise his or her own usage. By analysing the relationship of service quality and perceived value with customer satisfaction, as well as the relationship between customer satisfaction and behavioural intentions, this research provides a better and more complete understanding of the process by which behavioural intentions are formed.

From a practical perspective, knowing and understanding the relationship of service quality and customer satisfaction provides telecommunication service providers with insights as to which aspects of the service quality current SMS users value the most. This may result in more effective and targeted deployment of resources, with increasing the volume of SMS usage as the ultimate objective. Furthermore, knowing the perceived value of using SMS by current users help service providers in developing future pricing policies upon introduction of innovative SMS application services.

This paper proceeds as follows. The theoretical background, research model and hypotheses development will be presented next. They would be followed by the research methodology. There would then be a discussion of the results, their implications, limitations of this study, and finally the conclusion of this research.

2. Theoretical Background

2.1. Service quality and customer satisfaction

SERVQUAL provides theoretical grounding for the relationship between service quality and customer satisfaction. "Service quality has been described as a form of attitude, related but not equivalent to satisfaction, that results from the comparison of expectations with performance." (Bolton and Drew, 1991; Cronin Jr. and Taylor, 1992; Parasuraman, Zeithaml and Berry, 1988; Shepherd, 1999). Initially, 10 determinants of service quality were identified based on focus group interviews (Parasuraman, Zeithaml and Berry, 1985). Later these 10 determinants were reduced into five specific dimensions: tangibles, reliability, responsiveness, assurance and empathy (Parasuraman, Zeithaml and Berry, 1988) by performing factor analysis on the 22-item instrument developed from the focus group interviews. On the other hand, customer satisfaction is the consumer's fulfilment response. It is a judgement that a service feature, or service itself, provides a pleasurable level of consumption-related fulfilment (Zeithaml and Bitner, 2000).

Since its introduction in 1988, the dominant operationalisation of service quality has been the SERVQUAL model developed by Parasuraman Zeithaml and Berry (1988). The relationship of perceptions and expectations are investigated by

SERVQUAL, which originally consists of 2 sections: a 22-item section to measure customer service expectations of companies, within a specific sector and a corresponding 22-item section to measure customer's perceptions of a particular company in that sector (Parasuraman, Zeithaml and Berry 1988, 1991).

While customers' expectations are determined by the personal needs of the customer, the customer's past experience with the service providers, word-of-mouth communications and external communications (from the service provider and others) (Wisniewski and Donnelly, 1996), customer perceptions of service quality are determined by the actual service performed. Service quality is therefore represented as the difference between customer perceptions and expectations of service. In short, SERVQUAL is conceptualised as a "perceptions-minus-expectations" service quality measurement framework (Parasuraman, Zeithaml and Berry, 1991).

Within the SERVQUAL framework, there are 5 dimensions of service quality that make up the perception-minus-expectation gap. The conceptualisation of SERVQUAL model (Parasuraman, Zeithaml and Berry, 1988) was intended to be a generic measurement of service quality that could be applied across different industries. The five constructs are listed and defined in Table 1, as the first five definitions of the first column named "Name and definition of variables".

However, prior literatures have raised criticisms on the SERVQUAL model (Brown, Churchill Jr. and Peter, 1993; Buttle, 1996). Firstly, there was little evidence that customers assessed service quality in terms of the disconfirmation paradigm (i.e. the 'gap' between service expectations and actual service performance). Secondly, SERVQUAL had been inappropriately based on an expectations-disconfirmation model rather than an attitudinal model of service quality. Cronin Jr. and Taylor pointed out a "hesitance to call perceived service quality an attitude". Thirdly, SERVQUAL did not capture the dynamics of changing expectations .(Buttle, 1996). Performance-minus-expectations was thus regarded as "an inappropriate basis in the measurement of service quality" (Cronin Jr. and Taylor, 1994).

Teas (1993) further argued that because the service quality expectations concept might have discriminant validity shortcoming (i.e. expectations does not measure service quality as well as it is expected to), the perceptions-minus-expectations service quality measurement framework could be a misleading indicator of customer perceptions of service quality. Thus, he suggested that eliminating the expectations measure could improve the SERVQUAL model, relying solely on the perception component.

Hence, Cronin argues for the superiority of the performance-based-only (SERVPERF) measures of service quality as compared to the "perceptions-minus-expectations" measures (Cronin Jr. and Taylor, 1994). Despite the fact that SERVQUAL is the more commonly used framework since its introduction as it has been used longer, this paper uses the SERVPERF model. SERVPERF measures were based only on consumers' perceptions of the performance of a service provider, which explained more of the variation in service quality and it assessed service quality without relying on the disconfirmation paradigm.

2.2. Perceived value and customer satisfaction

There have been several literatures measuring the relationships between perceived value and customer satisfaction. Consumer's perception of value has been defined as: "(1) value is low price, (2) value is whatever I want in a product, (3) value is the quality I get for the price I pay, and (4) value is what I get for what I give" (Zeithaml, 1988). Zeithaml (1988) further captures the essence of the four expressions into a general definition: "perceived value is the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given". This paper would be adopting this definition as can be seen in table 1 column 1.

The ACSI (American Customer Satisfaction Index) model in Fornell et al.'s (1996) study demonstrated that "customer satisfaction is more quality-driven than value- or price-driven"; nevertheless, perceived value also affects customer satisfaction. Later, Cronin et al. (2000) reinforced this by showing that perceived value is a "significant predictor of satisfaction".

3. Research Model and Hypotheses Development

Stemming from the above discussions, our research model is shown in Fig. 1 below. Following this, we will provide an elaboration of our hypotheses as shown in the research model.

3.1. Hypotheses development

Hypothesis 1. Service quality is positively correlated to customer satisfaction

Table 1. *Survey questions*

Name and definition of variables	Original questions extracted	Modified questions	Source of original questions
Tangibles	'1. XYZ has up-to-date equipment.	1. The SMS service provider has up-to-date equipment and technology.	Cronin, J. Joseph and Taylor Steven A. (1992), " Measuring Service Quality: A Reexamination and Extension", Journal of Marketing Vol. 56 (Jul)
Appearance of physical facilities, equipment, personal and written materials	2. XYZ's physical facilities are visually appealing.	2. The SMS service provider's physical facilities should be visually appealing.	
	3. XYZ's employees are well dressed and appear neat.	3. The SMS service provider's employees are well dressed and appear neat.	
	4. The appearance of the physical facilities of XYZ is in keeping with the type of service provided.	4. The appearance of the physical facilities of the SMS service provider is in keeping with the type of service provided.	
Empathy Caring, individualized attention is given to customers	5. XYZ does not give you individual attention.	5. The SMS service provider does not give you individual attention.	Cronin, J. Joseph and Taylor Steven A. (1992), " Measuring Service Quality: A Reexamination and Extension", Journal of Marketing Vol. 56 (Jul)
	6. Employees of XYZ do not give you personal attention.	6. Employees of the SMS service provider do not give you personal attention.	
	7. Employees of XYZ do not know what your needs are.	7. Employees of the SMS service provider do not know what your needs are.	
	8. XYZ does not have your best interests at heart.	8. The SMS service provider does not have your best interests at heart.	
	9. XYZ does not have operating hours convenient for all their customers.	9. The SMS service provider does not have operating hours convenient for all their customers.	
Assurance Employees' knowledge and courtesy and their ability to inspire trust and confidence	10. You can trust the employees of XYZ.	10. You can trust the employees of the SMS service provider.	Cronin, J. Joseph and Taylor Steven A. (1992), " Measuring Service Quality: A Reexamination and Extension", Journal of Marketing Vol. 56 (Jul)
	11. You can feel safe in your transactions with XYZ's employees.	11. You can feel safe in your transactions with the SMS service provider's employees.	
	12. Employees of XYZ are polite.	12. Employees of the SMS service provider are polite.	
	13. Employees get adequate support from XYZ to do their job well.	13. Employees get adequate support from the SMS service provider to do their job well.	

(*Continued on next page.*)

Table 1. *(Continued).*

Name and definition of variables	Original questions extracted	Modified questions	Source of original questions
Responsiveness Willing to help customers and provide prompt service	14. XYZ does not tell customers when services will be performed.	14. The SMS service provider will tell customers when services will be performed.	Cronin, J. Joseph and Taylor Steven A. (1992), " Measuring Service Quality: A Reexamination and Extension", Journal of Marketing Vol. 56 (Jul)
	15. You do not receive prompt service from XYZ's employees.	15. The SMS service provider will give prompt service to customers.	
	16. Employees of XYZ are not always willing to help customers.	16. The SMS service provider will be willing to provide solutions to customer problems.	
	17. Employees of XYZ are too busy to respond to customer requests promptly.	17. The SMS service provider will be available to respond to customers' requests promptly.	
Reliability Ability to perform the promised service dependably and accurately	18. When XYZ promises to do something by a certain time, it does so.	18. When the SMS service provider promises to send a SMS within a certain time, it will do so.	Cronin, J. Joseph and Taylor Steven A. (1992), " Measuring Service Quality: A Reexamination and Extension", Journal of Marketing Vol. 56 (Jul)
	19. When you have problems, XYZ is sympathetic and reassuring.	19. When you have problems, the SMS service provider is sympathetic and reassuring.	
	20. XYZ is dependable.	20. The SMS service provider is dependable.	
	21. XYZ provides its services at the time it promises to do so.	21. The SMS service provider will provide its services at the time it promises to do so.	
	22. XYZ keeps its records accurately.	22. The SMS service provider keeps its records accurately.	
Perceived value Consumers' overall assessment of the utility of the product based on perceptions of what is received and what is given	23. If I bought this bicycle at (selling price), I feel I would be getting my money's worth.	23. If I use SMS (for example, \$0.05 for general SMS usage or \$0.20 for value-added services like stock alert etc.), I feel I would be getting my money's worth.	Grewal, Dhruv; Monroe Kent B and Krishnan R., (1998), "The Effects of Price-Comparison Advertising on Buyers' Perceptions of Acquisition Value, Transaction Value and Behavioural Intentions", Journal of Marketing Vol 62 (April)
	24. I feel I am getting a good quality bicycle for a reasonable price.	24. I feel I am getting good SMS service for a reasonable price.	
	25. I feel that acquiring this bicycle meets both my high quality and low price requirements.	25. I feel that subscribing to SMS meets both my high quality and low price requirements.	
	26. I would value this bicycle as it would meet my needs for a reasonable price.	26. I would value SMS as it would meet my needs for a reasonable price.	

(*Continued on next page*.)

Table 1. *(Continued).*

Name and definition of variables	Original questions extracted	Modified questions	Source of original questions
Customer satisfaction Consumers' fulfillment response. It is a judgement that a service feature, or service itself, provides a pleasurable level of consumption-related fulfillment.	27. My choice to purchase this service is a wise one.	27. My choice to subscribe to this SMS service is a wise one.	Cronin, J Joseph; Brady K. Michael Hult, G. Thomas (2000), "Assessing the Effects of Quality, Value and Customer Behavioural Intentions in Service Environments", Journal of Retailing Vol 76(2)
	28. I think I did the right thing when I purchased this service.	28. I think I did the right thing when I subscribed to this SMS service.	
	29. My feelings towards XYZ __'s service can best be described as ___.	29. My overall feelings towards SMS service provided can be described as ___.	
Behavioural intent The use of more SMS in the future and recommending other people to use SMS.		30. Do you intend to use more SMS in the future?	Sirohi et al. (1998), Brady et al. (2002) and other studies
		31. Do you intend to recommend the service to your friends?	
Extent of usage The number of SMS sent monthly, the frequency of SMS sent, customers' self-categorisation of his or her own usage of SMS		32. How many SMS do you send a month?	Self-developed
		33. How often do you use SMS?	
		34. How would you categorise your own usage of SMS?	

Questions in italics are items that were dropped after the pre-test.
'Question 1 was dropped later after assessing the measurement model from PLS.

Cronin and Taylor (1992) showed that service quality was an antecedent of consumer satisfaction. In our context, the 5 dimensions measured were interpreted as (1) the tangibles aspects of the service provider, (2) the empathy shown to consumers, (3) the assurance provided by the service staff, (4) the responsiveness of the service provider, and (5) the reliability of the service provider. The hypothesis had been developed as follows:

H1a: Tangibles is positively correlated to customer satisfaction
H1b: Empathy is positively correlated to customer satisfaction
H1c: Assurance is positively correlated to customer satisfaction
H1d: Responsiveness is positively correlated to customer satisfaction
H1e: Reliability is positively correlated to customer satisfaction

Hypothesis 2. Perceived value is positively correlated to customer satisfaction.

Perceived Value is defined as "Consumers' overall assessment of the utility of a product based on perceptions of what is received and what is given." (Zeithaml, 1988). In this research, the "product" is referred to as SMS. The result that was shown in Cronin et al.'s (2000) journal was that perceived value was a "significant predictor of satisfaction".

However, there was relatively little research so far to identify the relationship between perceived value and customer satisfaction. Therefore, it is worth finding out whether perceived value is positively correlated to customer satisfaction, other than the five dimensions of the SERVPERF model.

Hypothesis 3. Customer satisfaction is positively correlated to behavioural intention.

Customer satisfaction is viewed as a fulfilment response, a judgement that "a service feature, or service itself, provides a pleasurable level of consumption-related fulfilment" (Zeithaml and Bitner, 2000). Cronin and Taylor (1992) suggested that customer satisfaction had a significant effect on purchase intention. It was observed to be a "richer" construct than service

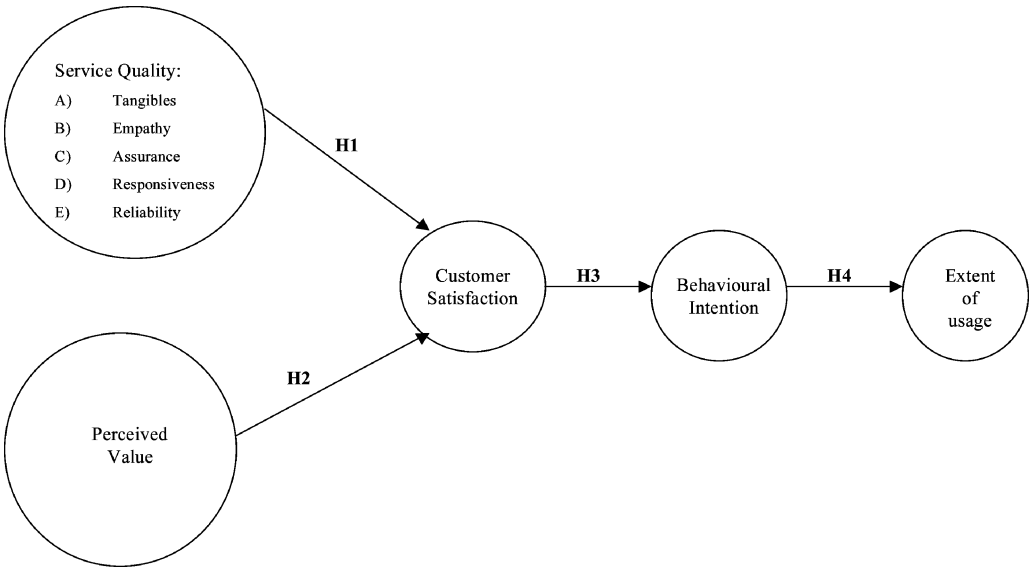

Fig. 1. *Research model.*

quality in predicting purchase intentions (Cronin Jr. and Taylor, 1994). Numerous studies have looked at behavioral intention to continue use. In Sirohi et al.'s (1998) study, "store loyalty intentions" are measured by "intent to continue to shopping, intent to increase purchases and intent to recommend the store." This paper regards these as "behavioural intentions", and had adapted them to the context of this study (see definition in Table 1 column 1):

1. The use of more short message services (SMS) in the future
2. Recommending other people to use SMS

Hypothesis 4. Behavioural Intention is positively correlated to Extent of Usage.

Parasuraman, Zeithaml and Berry (1988) suggested that favourable behavioural intentions are associated with the service provider's ability to get its customers to remain loyal to them and to recommend the service to other customers. Retention of existing of customers and potential acquisition of new customers helps to increase usage of the service. Later, Brady et al. (2002) suggested that the customer satisfaction/ purchase intention relationship could have an impact on potential purchase behaviour. These 2 studies point towards the positive influence of behavioural intentions on extent of usage. In this study, the Extent of Usage is defined in Table 1 column 1 as follows:

1. The number of SMS sent monthly
2. The frequency of SMS sent
3. Customers' self-categorisation of his or her own usage of SMS

4. Research Method

This study uses field surveys as the primary form of data collection. The study's operationalisation of the research variables, context and sample and statistical approach are examined below.

4.1. Operationalisation of research variables

Table 1, column 2 list the original questions used in SERVPERF and column 3 lists the modification of these questions into the survey questions used for this study. A 7-point Likert scale was used for all questions except for those measuring extent of usage, where predetermined options were given.

We conducted a pre-test using face-to-face interview on a representative set of 30 respondents selected from our target population based on the questions in column 3 of 1. Feedback was obtained as to question ambiguity and content validity of the questions used in this study. Respondents were not cued as to what dimension the questions are capturing so as to minimise response bias. We made changes to the questions based on feedback from the pre-test and final questions are listed

Table 2. *Final questions for further analysis*

Research variables	Final questions
Tangibles	2. The SMS service provider's physical facilities should be visually appealing.
	3. The SMS service provider's employees are well dressed and appear neat.
Empathy	5. Employees of the SMS service provider do not give customers individual attention.
	7. Employees of the SMS service provider do not know what your needs are.
Assurance	8. The SMS service provider will have the customer's best interests at heart.
	10. Customers can trust in their respective SMS service providers.
	11. Customers will feel safe in their transactions with their respective SMS service providers.
Responsiveness	12. Employees of the SMS provider are polite.
	15. The SMS service provider will give prompt service to customers.
	16. The SMS service provider will be willing to provide solutions to customer problems.
	17. The SMS service provider will be available to respond to customers' requests promptly.
	18. When the SMS service provider promises to send a SMS within a certain time, it will do so.
	21. The SMS service provider will provide its service at the time they promise to do so.
Reliability	19. When you have problems, the SMS service provider is sympathetic and reassuring.
	20. The SMS service provider is dependable.
	22. The SMS service provider keeps its records accurately.
Perceived value	24. I feel I am getting good SMS service for a reasonable price.
	25. I feel that subscribing to SMS meets both my high quality and low price requirements.
	26. I would value SMS as it would meet my needs for a reasonable price.
Customer satisfaction	27. My choice to subscribe to this SMS service is a wise one.
	28. I think I did the right thing when I subscribed to this SMS service.
	#29. My overall feelings towards SMS service provided can be described as ___.
Behavioural intent	^30. Do you intend to use more SMS in the future?
	^31. Do you intend to recommend the service to your friends?
Extent of usage	*32. How many SMS do you send a month?
	§33. How often do you use SMS?
	[a]34. How would you categorise your own usage of SMS?

Legend: Except for Questions 29 to 35, all questions use the following 7-point Likert scale: Strongly Disagree; Disagree; Slightly Disagree; Neutral; Slightly Agree; Agree; Strongly Agree.
Likert scale used: Strongly Unsatisfied; Unsatisfied; Slightly Unsatisfied; Neutral; Slightly Satisfied; Satisfied; Strongly Satisfied.
^Likert scale used: Very Unlikely; Neutral; Very Likely.
*This is a multiple-choice question. The options are:
0–50 51–100 101–150
151–200 201–250 251-300
301–350 351–400 more than 400
§This is a multiple-choice question. The options are:
Everyday Once a week
4–6 times a week Once a month
2–3 times a week
[a]Likert scale used: Extremely Light User; Average User; Extremely Heavy User.

in Table 2. Changes to these questions are described below.

4.2. Operationalisation of service quality

Service quality is operationalised using the SERVPERF model due to the superiority of performance-based measures (Brady, Cronin and Brand, 2002; Brown, Churchill and Peter, 1993; Carman, 1990; Cronin Jr. and Taylor, 1992; Teas, 1993). Minor alterations were made to this generic measurement of service quality to fit the specific application situation of the research (Parasuraman, Zeithaml and Berry, 1991; Shepherd, 1999). Therefore, 'XYZ' in the original questions will be substituted by 'SMS service providers'.

The pre-test showed that questions 4, 6, 9 and 13 under "Modified Questions" column in Table 1 should be dropped. Feedback from the pre-test showed that most respondents were not concerned about the appearance of the physical facilities of the telecommunication service providers when they use SMS (Question 4). Respondents also could not differentiate between

providing personal attention (Question 6) from that of providing individual attention (Question 5). Question 9 was redundant because 24-hour help-lines from service providers already ensure "round-the-clock" service, so operating hours was not important in deciding service quality. Respondents did not know enough to answer Question 13. This question was also dropped since it fails to capture adequately the assurance dimension within SERVPERF. Feedback also showed that Question 14 was irrelevant. Since SMS is almost an instantaneous communication medium, users find it a nuisance if service providers were to inform them each time the SMS was sent successfully.

Further re-classification and re-phrasing were made. Question 8 under the "Modified Questions" column in Table 1 was used to measure the Assurance dimension rather than Empathy within SERVPERF. Having the consumers' best interests through employees' courteous acts and competence would instil trust and confidence, as according to the definition of the Assurance dimension. Question 12 was reclassified under the Responsiveness dimension rather than Assurance because we are of the view that politeness indicates willingness to help customers, more so than in instilling trust and confidence. Similarly, Questions 18 and 21 are re-classified under the Responsiveness dimension. Both relate to the delivery of SMS within a specified time period and could be inferred as providing prompt service as according to the meaning of Responsiveness. Original measures under the Responsiveness dimension from Cronin and Taylor (1992) were phrased negatively; for this study, these measures were re-phrased positively to facilitate understanding. Question 10 was re-phrased as "SMS service provider" rather than "employees" because during the pre-test, respondents indicated that they rarely come into contact with the service provider's individual employees, and so were unable to express an opinion. On the other hand, they could assess their level of trust in the SMS provider.

4.3. Operationalisation of perceived value

Perceived value has been measured using two dimensions, perceived transaction value and perceived acquisition value (Grewal, Monroe and Krishnan, 1998). Perceived transaction value refers to perceived psychological satisfaction due to pleasure in taking advantage of the financial terms of the price deal (Grewal, Monroe and Krishnan, 1998). Perceived acquisition value refers to the perceived net gains associated with the products or services acquired (Grewal, Monroe and Krishnan, 1998). This latter definition from Grewal, Monroe and Krishnan (1998) is similar to Zeithmal (1988) general definition of perceived value, "Consumers' overall assessment of the utility of a product based on perceptions of what is received and what is given". As there is no specific instrument from Zeithmal (1988), measures for this construct were adopted from Grewal, Monroe and Krishnan (1998) studies. Relevant questions were extracted and modified. Question 23 was dropped after the pre-test because respondents were confused and feedback revealed duplication between Questions 23 and 24.

4.4. Operationalisation of customer satisfaction

This paper uses the "evaluative" set of measurements of customer satisfaction from Cronin et al. (2000). Question 29 from Table 1 was adopted from Cronin and Taylor (1992).

4.5. Operationalisation of behavioural intentions

This variable is measured using 2 items (Questions 30 to 31). They are adapted from measures used for capturing purchase intentions in other studies (Brady, Cronin and Brand, 2002; Sirohi, McLaughlin and Wittink, 1998), where purchase intention is characterised as intent to buy more in future and to recommend to others.

4.6. Operationalisation of extent of usage

This variable is measured using 3 self-developed items (Questions 32 to 34) in Table 1. Extent of usage is measured as level of usage, frequency of usage and self-categorisation of one's usage of SMS.

4.7. Study context and sample population

To ensure a high response rate, surveys were distributed during peak hours at shopping malls with high pedestrian traffic (e.g. Woodlands, Jurong, Orchard, Tampines and Tiong Bahru). The data collection period spanned 2 weeks. Our survey population consists of SMS users. A screening question "Have you used SMS before?" was asked before the self-administered surveys were given out.

Out of the 200 responses obtained, 50 were incomplete or contained unreliable answers. 150 responses were deemed usable.

4.8. Statistical approach

This paper uses a component-based structural equation modelling technique, the partial-least-squares (PLS) method. It is a combination of principal components analysis, path analysis and regression. It examines the relationships among the 5 constructs within our research model in a single operation.

PLS offers many advantages. PLS is especially suitable for exploratory studies and model testing (Chin, 1998b; Gefen, Straub and Boudreau, 2000). This paper is among the first to apply SERVPERF to the telecommunication industry, and to empirically test the relationship between perceived value and customer satisfaction. With minimal requirements on sample size and residual distributions (Chin, 1998a, 1998b; Gefen, Straub and Boudreau, 2000), PLS is also an apt analysis procedure for this study that uses 150 responses. Other techniques such as LISRAEL require a sample size of 200 and above. In addition, it is an efficient and yet in-depth analysis method by assessing the measurement and structural models together. Hence it is suitable for complex models (Gefen, Straub and Boudreau, 2000). For these reasons, PLS is adopted here.

PLS entails a two-stage approach. The measurement model assesses the psychometric properties of scale through item loadings, internal consistency and discriminant validity. Item loadings are regarded as principal components factor loadings. Item loadings and internal consistencies of 0.7 and above are accepted (Fornell and Larcker, 1981). In social-behavioural science, 0.70 is a commonly used threshold when assessing internal consistency of scales used for psychological constructs. Discriminant validity exists when the average variance shared between the construct and its indicators is larger than the variance shared between the construct and other constructs. An indication of discriminant validity is when the square root of the average variance extracted (AVE) is larger than the inter-construct correlations. AVE shows the ratio of the sum of the variance captured by the construct and measurement variance; it measures the percent of variance captured by a construct (Chin, 1998a).

In the structural model, a path represents each hypothesis. Path coefficients are akin to the standardized beta weights in regression analysis. The corresponding t-values are calculated using the jack-knifing technique. Good structural model fit exists when there is reasonably high explanatory power (measured by R^2) and statistically significant t-values.

5. Data Analysis and Results

5.1. General profile and summary statistics

According to the population profile of those who send SMS in Singapore, an age gradient exists, with messaging behaviour dropping with age. The most prominent users are between 18–45, with messaging behaviour decreasing after the age of 50. (Nokia Networks & Customer Market Research, 2001). The respondents of this research, which consisted of mainly teenagers and young adults (aged 13 to 35), was around 81.34% of the sample size with almost equal distribution of males and females. This sample profile is comparable to the population profile of the SMS users in Singapore. Most of the respondents' monthly income was below $2500 because most respondents were students and production operators. Most of the respondents subscribed to Singtel and Mobile One because they are more established compared to Starhub. See Table 3 for the demographic profile.

5.2. Results

All variables were measured successfully. Table 4 illustrates the descriptives of the variables. From the means obtained, Assurance was the most important SMS service quality dimension. The next highest mean values were Tangibles and Perceived Value and Responsiveness. Empathy scored the lowest because the respondents generally understood that it was very difficult for service provider's employees to cater to the individual needs of each customer.

Most measures loaded well (see Table 5). Question 1 did not load onto the Tangibles variable and was thus dropped from further analysis. The loading for Question 5 (see Table 5) was low as well; however, it retained for further analysis. This is because while Question 7 captured the "caring" aspect of the meaning of empathy; Question 5 measured the degree of individualised attention given. Together, they would measure the variable more fully than if only Question 7 were used. In addition, Question 5 was also used by Cronin and Taylor (1992) and respondents encountered no problems with this item during the pre-test.

There were also satisfactory discriminant validity and internal consistencies. In table 4, the square root of AVE for each variable is higher than the corresponding correlations among constructs. Most variables had acceptable PLS internal consistencies except for the variable "customer satisfaction" (see Table 6). However,

Table 3. *Sample profile—Demographics*

		Frequency	Percent
Age group	Under 20	43	28.67
	20-35	79	52.67
	36-50	27	18
	51-65	1	0.67
	Total	150	100
Monthly income			
	Below $1000	62	41.33
	$1000–$2500	44	29.33
	$2501–$3500	29	19.34
	$3501–$5000	12	8
	Above $5000	3	2
	Total	150	100
Gender			
	Male	76	50.67
	Female	74	49.33
	Total	150	100
Occupation			
	Professionals/Managerial	35	23.33
	Educator/Academic	8	5.33
	Production operator	33	22
	Sales/services	3	2
	Student	57	38
	Home-maker	1	0.67
	Retired	0	0
	Others	13	8.67
	Total	150	100
Education			
	PSLE or lower	3	2
	'O' or 'N' Levels	44	29.33
	'A' Levels	24	16
	Diploma/degree	79	52.67
	Others	0	0
	Total	150	100
Service provider			
	Singtel	52	34.66
	M1	73	48.67
	Starhub	25	16.67
	Others	0	0
	Total	150	100

since the figure of 0.69 is very close to 0.7, the variable is still retained for further analysis. Cronbach's α for most variables were above 0.6 except those for Tangibles and Empathy. The PLS internal consistency for these two variables are higher than 0.7, and as such, the 2 variables were retained for further analysis. As mentioned before, the final set of measures used for further analysis are summarised in Table 2.

Results of the analyses of the PLS structural model, as presented in Fig. 2, showed H1a, H1b, H1c, H2, H3 and H4 to be significant. With a coefficient of 0.577, Perceived Value emerged as the most important factor affecting customer satisfaction. The adjusted R^2 for customer satisfaction was very high at 68.8%. Adjusted R^2 value for behavioural intent was still reasonably high at 22.1%, although the adjusted R^2 for the extent of usage was low, standing at only 14.5%.

6. Discussion

This study is among the first to use SERVPERF within the telecommunication industry. Support for H1a, H1b and H1c lent further empirical evidence on the importance of the Tangibles, Empathy and Assurance dimensions.

Lack of support for H1d and H1e could be because consumers in Singapore already regarded a high level of reliability and responsiveness to be common to all SMS service providers. The high mean values for these 2 variables (see Table 5) indicate these high expectations. Despite lack of government regulation, stiff competition in the telecommunication industry ensures that SMS service remains highly reliable and responsive. Developing other aspects of service quality would help companies in attaining a competitive edge and achieving customer satisfaction; however, it would be beneficial to maintain the current level of reliability and retain existing customers.

Support for H2 validates our hypotheses that perceived value is also correlated with customer satisfaction. This study has empirically proven the relationship between these two constructs despite the dearth of research in establishing this relationship. The explanatory power for customer satisfaction was very high when both service quality and perceived value were assessed together, holding important practical implications for service providers.

Support for the customer satisfaction/behavioural intent and behavioural intent/extent of usage relationships reinforce earlier studies (Brady, Cronin and Brand, 2002; Cronin Jr. and Taylor, 1992; Parasuraman, Zeithaml and Berry, 1988; Sirohi, McLaughlin and Wittink, 1998; Zeithaml and Bitner, 2000). Even though the strength of these relationships were relatively weaker as compared to service quality and perceived value/customer satisfaction relationship, they are still positive and significant.

Table 4. *Descriptive Statistics and Inter-Variable correlations*

Research variables	Mean	SD	1	2	3	4	5	6	7	8	9
Tangibles (1)	4.73	0.87	0.83								
Empathy (2)	4.07	0.97	0.093	0.80							
Assurance (3)	4.81	0.91	0.312	0.175	0.83						
Responsiveness (4)	4.72	0.91	0.370	0.159	0.670	0.82					
Reliability (5)	4.54	0.95	0.383	0.219	0.424	0.620	0.81				
Perceived value (6)	4.73	1.06	0.324	0.208	0.614	0.625	0.523	0.91			
Customer satisfaction (7)	5.11	1.02	0.424	0.318	0.593	0.549	0.483	0.789	0.91		
Behavioural intent (8)	4.71	1.25	0.327	0.216	0.429	0.371	0.267	0.477	0.470	0.91	
Extent of usage (9)	4.33	1.61	0.002	0.124	0.059	0.055	0.024	0.195	0.353	0.380	0.88

Internal consistency is calculated using these formulae: $\rho c = (\Sigma\lambda_i)^2 / [(\Sigma\lambda_i)^2 + \Sigma_i \mathrm{var}(\varepsilon_i)]$, where λ_i is the component loading to an indicator and $\mathrm{var}(\varepsilon_i) = 1 - \lambda^2$.
The diagonal elements in bold are the square root of the variance (AVE) shared between the variables and the measures.
$\mathrm{AVE} = (\Sigma\lambda_i^2)/[(\Sigma\lambda_i^2) + (1 - \Sigma\lambda_i^2)]$. Off diagonal elements are correlations among the variables.

7. *Implications of Findings*

The results have implications for theory. This study had empirically demonstrated a positive relationship between perceived value and customer satisfaction. This may suggest that enhancing service quality is not the only means of achieving customer satisfaction in the service industry, as Brady, Cronin and Brand (2002) stated. Further research in investigating this relationship would enhance our existing state of knowledge.

However, the relatively lower explanatory power of customer satisfaction on behavioural intent and behavioural intent on extent of usage warrant further investigation. A user's decision-making process is a complex procedure that may be affected by his or her irrational behaviour and mood. Mood states are present in virtually every shopping encounter, and could have a significant effect on shopping behaviour (Swinyard, 1993). Future studies that incorporate relationships between mood states and behaviour intent and extent of usage would be beneficial.

From the research perspective, more studies can also be done to give further evidence of the validity of the SERVPERF model within the telecommunication industry. Despite empirical support for the Service Quality/Customer Satisfaction and Customer Satisfaction/Behavioural Intention relationships and the high explanatory power of service quality (as measured using SERVPERF) on customer satisfaction, such replication efforts of the SERVPERF model ensure that the conclusions drawn are accurate (Brady et al., 2002) in view of the limitations stated below.

The findings also hold many practical implications. Results had given empirical support for strategic efforts that enhance service quality and perceived value of using SMS in order to achieve customer satisfaction and influence behavioural intent. This would help these managers in the telecommunication industry achieve a competitive advantage.

Knowing and understanding which aspects of the service quality the current SMS users value the most gives valuable input to effective resource allocation decisions. Since current SMS users place both tangibles and assurance dimensions as important criteria in their assessment of the service quality, customers' confidence in SMS service providers would increase if they consistently improve and update their equipment and technology to meet their sophisticated needs. It may be helpful to channel precious resources into developing better services and network coverage to increase customer satisfaction and ultimately increase volume of SMS usage. Importance of the empathy dimension implies a strong need to develop competent, caring service staff and a keen knowledge of customers' needs and wants. Despite the lack of empirical support for the importance of responsiveness and reliability of SMS service to customer satisfaction, it would be advisable not to neglect these 2 aspects. Continued performance along these 2 dimensions may help to maintain the existing level of customer satisfaction.

Findings from this study lent empirical support to the assertion that enhancing service quality is clearly not the only means of increasing consumer's satisfaction with a service provider (Brady, Cronin and Brand, 2002); perceived value is essential. This can be an important consideration when developing pricing policies for more innovative and value-added SMS

Table 5. *PLS Outer Model Loadings*

Research variables	Item loadings
Tangibles	
Question 2	0.91
Question 3	0.74
Empathy	
Question 5	0.53
Question 7	0.99
Assurance	
Question 8	0.75
Question 10	0.89
Question 11	0.83
Responsiveness	
Question 12	0.75
Question 15	0.83
Question 16	0.83
Question 17	0.82
Question 18	0.82
Question 21	0.84
Reliability	
Question 19	0.72
Question 20	0.89
Question 22	0.79
Perceived value	
Question 24	0.91
Question 25	0.91
Question 26	0.91
Customer satisfaction	
Question 27	0.95
Question 28	0.94
Question 29	0.83
Behavioural intent	
Question 30	0.92
Question 31	0.90
Extent of usage	
Question 32	0.83
Question 33	0.89
Question 34	0.93

Table 6. *Internal consistencies of research variables*

Research variables	No of measures	Cronbach's Alpha	PLS internal consistency
Tangibles	2	0.56	0.81
Empathy	2	0.60	0.76
Assurance	3	0.77	0.87
Responsiveness	6	0.90	0.92
Reliability	3	0.74	0.85
Perceived value	3	0.86	0.93
Customer satisfaction	3	0.89	0.69
Behavioural intent	2	0.66	0.91
Extent of usage	3	0.77	0.86

applications. Additionally, promotion efforts to portray stylishness and functionality may enhance the image associated with using SMS from a particular service provider.

Lastly, while multi-media mobile messaging services are emerging, understanding the current SMS users' behaviour in terms of attitudes towards the current SMS service provided and the value perceived in using the SMS is important to the telecommunication service providers. Given the similarity between new mobile messaging services and current short messaging service, customers would most probably use the service quality of SMS to judge and form expectation of the kind of quality the new mobile messaging service should provide. As such, telecommunication service providers may have to ensure that the services they provide for new mobile messaging services be comparable to that of SMS to meet the customers' expectations.

8. Limitations

Findings of this study should be interpreted in the light of the limitations of this research. First, the use of current SMS usage may not be a good indicator for predicting the extent of SMS usage in the future. Current SMS usage may be determined by factors other than the service quality of the service providers, such as the "lock-in" created by subscribing to service plans. For example, a plan with a higher locked-in "free" number of SMS will encourage its subscribers to send more SMS as compared to another plan with fewer or no "free" SMS. Thus, SMS usage plans offered by different service providers need to be considered to get a fairer assessment on the extent of SMS usage in the future.

Second, concerns exist due to the mall interview approach used for data collection. Non-sampling error may be present due to the use of this approach. As surveys are distributed outside shopping malls, some researchers have argued that the representativeness of the sample and data quality due to environment interference may introduce errors. In response, this study constructed its research instrument carefully by adapting from earlier, validated studies and conducting a pretest. Respondents were selected at random from representative locations. As a result, the sample profile was comparable to the population profile in Singapore. Due to limitation of resources, this has been a cost-effective

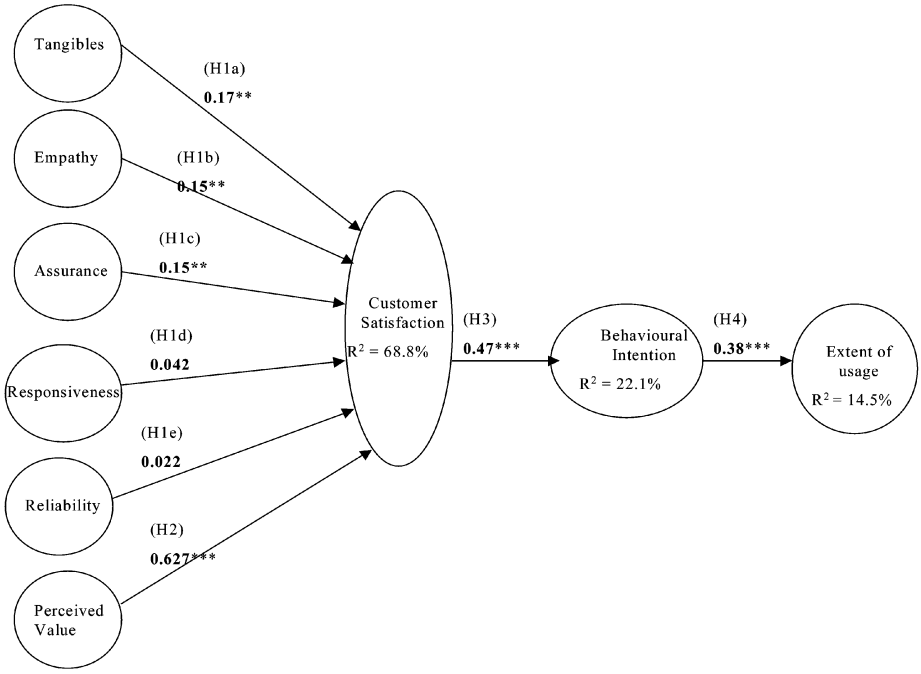

Fig. 2. *Structural model.*

mode of data collection that helps to attain high response rates. Future studies, however, should look into the use of stratified samples using phone interviews or mail surveys as ways to overcome this limitation.

9. Conclusion

The attempt to measure Customer Satisfaction, Behavioural Intentions of SMS and Extent of SMS Usage in the telecommunication industry using the SERVPERF model as well as Perceived Value have provided insightful results. Findings revealed that three dimensions (Tangibles, Empathy and Assurance) in SERVPERF did affect the level of customer satisfaction even though some of the relationships were weak. This research had also proven that Customer Satisfaction did have a positive relationship with customers' Behavioural Intentions to continue using SMS. The results of the Service Quality/Customer Satisfaction and Customer Satisfaction/Behavioural Intentions relationships tested were similar to the result shown by Cronin and Taylor (1992). The relationship between Perceived Value and Customer Satisfaction was also consistent with suggestions from other research Fornell et al. (1996) and Cronin, Brady and Hult (2000).

Last but not least, this paper had shown that Perceived Value, together with tangible, empathy and assurance aspects of the service quality, played an important role in determining customer satisfaction in the telecommunication industry.

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