Customer Satisfaction in the Metropolitan Ambulance Service

by

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Declaration

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Abstract

The field of customer satisfaction is complex and lacks clarity. Any technique that can bring order and predicability to the field is keenly sought. The partial least square methodology (PLSM) is a new means of modelling and predicting future outcomes.

This research uses the partial least square modelling methodology to investigate and model the satisfaction of users of the Metropolitan Ambulance Service, Melbourne (MAS). The theories of Customer Satisfaction were reviewed then a definition of the concept established. The current state of the MAS was briefly discussed and the PLSM methodology was defined. Data collected from the MAS customer population was analysed by the PLSM method and by traditional statistical methods for comparative purposes.

The results of the research demonstrated that the PLS methodology can be successfully applied to the field of satisfaction measurement of the ambulance service customer. Whilst uniquely modelling the determinants of customer satisfaction, it agreed with work by earlier researchers that particular aspects of staff behaviour were very important for high levels of customer satisfaction in the service industries.

The model predicted that changes in the satisfaction rating of the staff variable would have a significant effect on overall satisfaction and critical consequential outcomes such as reuse and re-subscription. It also predicted that the overall model of customer satisfaction of MAS users was insensitive to changes with image, cost or equipment.

An unexpected finding was that perceived medical ability was strongly linked to the paramedic's professional appearance.

Implications of the finding are that MAS should pay close attention in the design and maintenance of the paramedic uniform. The relationship between a paramedic's professional appearance and their medical ability as perceived by a patient should be emphasised during training and professional development days. The very high importance of staff issues such as competence, friendliness, calmness and trustworthiness in regard to customer satisfaction reaffirms MAS attention and awareness of the matter.

The research needs to been repeated within MAS to give a trend over time and a measure of the effectiveness of changes. To show that the methodology is widely applicable the research should be repeated using another ambulance service.

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1. Introduction

This thesis will test the appropriateness of a methodology to investigate and model the satisfaction of users of an ambulance service. Firstly, there will be a review of the theories of customer satisfaction then a definition of the concept will be established to be used in the thesis. The methodology to be applied will be defined. The organisation, which is the subject of this study, is the Metropolitan Ambulance Service, Melbourne (MAS). The current state of the MAS will be briefly discussed. Data collected from the MAS customer population will then be analysed by the selected method and by traditional statistical methods for comparative purposes.

In this chapter, the issues to be studied will be outlined to give a basis for the research and discussions in later chapters.

1.1 Aims

This thesis aims to:

- Identify the drivers of satisfaction with an ambulance service,
- Measure the relative satisfaction with and importance of those drivers,
- Determine whether the Subscribers and the Health Care Card Holders have differing satisfaction models and values,
- Determine which areas for improvement within MAS offer the greatest potential return on investment,
- Predict the effect changes on the service will have on the decision to reuse and resubscribe, and

- Benchmark the MAS's level of customer satisfaction against other organisations.

1.2 Satisfaction of ambulance service customers

There is a sizeable body of research on the medical aspects of pre-hospital care and on the area of customer satisfaction but few studies have been reported on customer satisfaction of users of an ambulance service. A review of the available literature found only one published study (Fultz, Coyle and Reynolds, 1998) examining satisfaction of customers of an ambulance service. Fultz, Coyle and Reynolds (1998) investigated the satisfaction of patients transported by an Air Ambulance Service. A further three unpublished studies, were uncovered including one which measured the customer satisfaction with the call taking process that initiates the MAS emergency response (Patterson, 1996; NWR–ASV, 1999; Dale, 2000). None of these studies, however, considered the service delivery *and* subscription aspects of an ambulance service.

The above studies did not model the satisfaction of ambulance users or attempt to make predictions regarding effects of changes.

It is proposed in this thesis that a suitable methodology for measuring the satisfaction of customers of an ambulance service would:

- Identify the drivers of satisfaction and rate them in terms of performance and importance,
- Determine which drivers have the potential to be efficiently improved with a resulting increase in satisfaction,

The methodology should also be able to establish if the various segments of the customer base have varied expectations of the ambulance service,

- Finally the methodology should be able to link the nebulous concept of satisfaction with tangible, measurable acts such as use, recommendation and repurchase,
- The ability to validly benchmark the results against other organisations would be an additional benefit.

1.2.1 Satisfying patients enhances service quality

Providing the service that the customer wants is the best course of action for organisations, according to the World Quality Movement (1997), the world peak quality body. MAS's Ambulance Paramedics receive three years medical training at university and in the field, before they are qualified. The elite mobile intensive care ambulance paramedics undergo a further twelve months training. Their medical care and skills levels are thought to be of world standard by MAS and the Victorian State Government. But as Fitch (1989, p. 9) states, "*Patients can receive excellent clinical care and at the same time be mistreated*". Paramedics should care for people, not just medical problems. If an Ambulance Service is committed to excellence then they would need to ask, "*what can we do for our patients above and beyond excellent medical treatment?*" The non-medical aspects of the interaction can be very important to a patient and their family. It can be argued that what really matters to the patient are the things that MAS should be doing. In this sense, a quality service as defined by the customer, is one that produces customer satisfaction.

Lately quality has been defined as customer satisfaction. Companies such as General Electric and Motorola have been moving away from the ISO 9000 series measures to one using customer satisfaction. The Australian Wider Quality Movement in their report, *Quality, Productivity and Competitiveness* (1997) stated, "*Quality is what the customer believes it is*". On 5th May 1997, the World Quality Movement defined customer satisfaction as quality (1997). Fornell (1995) has shown that customer satisfaction guided changes to an organisation have shown a competitive advantage demonstrated by increased market share and profit margin.

Internationally quality management schemes seem not to have brought the results first promised by their supporters. In a survey of more than 200 British firms, only 20% reported they had found any significant impact as a result of Total Quality Management, (TQM), (Ittner and Larcker, 1996). Of 500 US companies, almost two-thirds found no competitive gain in their quality programs (Ittner and Larcker, 1996). TQM had the effect of focusing employee's attention on internal processes rather than on external results (Harari, 1993), effort had been directed toward jumping through internal bureaucratic hoops and not necessarily adding value to the end user.

1.2.2 Benchmarking

An important part of many quality programs is benchmarking an organisation with other comparable businesses. MAS is seeking to benchmark its performance against eight other ambulance services throughout the world (Baragwanath, 1997a). Because of the differences such as area, population, skill levels, geography, climate and funding levels

between the services, meaningful comparisons may be hard to make for often quoted benchmarks, such as response times or successful resuscitation from cardiac arrest.

If there were a robust model of customer satisfaction, meaningful comparison could be made with other ambulance services that do not exactly match MAS in demographics.

Customer satisfaction can be used as an externally rated, inter-industry benchmark; it can also be used cross sectionally and over time (Fornell et al., 1996). A deficiency of satisfaction scores from other ambulance services would not inhibit a comparison being made. By using a customer satisfaction methodology, MAS could validly benchmark its self against other non-ambulance organisations that achieve high levels of satisfaction.

1.3 The MAS

The Ambulance Service Victoria - Metropolitan Region, trading, as Metropolitan Ambulance Service, Melbourne, is the subject of this study. MAS is the sole provider of professional pre-hospital emergency health care for the 3.4 million people living in Greater Melbourne and the surrounding area. The service is a state government backed enterprise and its role is enshrined in the *Ambulance Services Act, 1986*.

Some may argue that the role of an organisation such as MAS is to deliver paramedic services, not necessarily to make stakeholders happy. However, it is important that MAS is perceived to be effective and efficient by the stakeholders and customers. For

any organisation to survive, even a government-backed monopoly, it must satisfy its market. To achieve this goal the market must perceive that its needs have been met.

Few would argue that the quality of medical care provided by an ambulance service is not of paramount importance. The patients, the customers of that service, usually have little ability or experience to judge the quality of the paramedical medical service provided. MAS's data suggests that that the average person only uses the service between one and two times in their lifetime. The patients therefore tend to judge the quality of the service as a whole on other non-medical factors (Swan, 1989). Swan (1989) stated these included, the paramedics conducting themselves in a calm and reassuring manner, clean ambulances and how well the service performs compared with preconceptions formed from television and movies. He claimed that it is these judgments that influence how the customers perceive the organisation.

MAS has a number of stakeholders, including the state government, subscribers and public. The satisfaction or dissatisfaction of MAS customers can have direct and indirect effects. For example, a dissatisfied subscriber may chose to not resubscribe. Levels of satisfaction or dissatisfaction can also place pressure on the state government who have ultimate control over the MAS.

1.3.1 Paramedical service quality

MAS have in place a Total Quality Assurance Program (Csupor, 1997) consistent with ISO 9002. MAS's performance, measured by these criteria, is now tied to funding (Olszac, 1997). Previously all of MAS's non-emergency stretcher contractors had been

accredited to ISO 9002 (Olszac, 1997). MAS has now achieved certification under AS/NZS ISO 9001:2000 (MAS, 2001). As one of its quality activities under AS/NZS ISO 9001:2000, MAS is obliged to monitor information on the level of customer satisfaction and/or dissatisfaction.

In MAS's Quality Assurance Plan, Csupor (1997, p. 8) alludes to customer satisfaction by the statement "*It is the community, in the broader definition, who will determine whether they have received "Quality Service*". She argued that quality is usually perceived as having three interrelated domains: "*Service"*, "*Care"* and "*Organisational"*.

Csupor (1997, p. 7) stated that *Quality Service* is "*achieving community satisfaction by the service provided*". Unfortunately, how this is measured was not outlined. *Quality Care* is defined as providing care to acceptable and established standards. *Quality Organisation* is achieved by fostering a working culture of getting it right first time and a commitment to doing better by participation in a coordinated continuous clinical quality improvement process (Csupor, 1997).

Whilst adhering to ISO 9002 and AS/NZS ISO 9001:2000 may or may not improve medical care for the patients, it could be argued that it would not necessarily demonstrate an improvement in their satisfaction without an appropriate methodology.

1.3.2 Stake holders and public perception

Many groups, the government, subscribers, the media, patients, the public and staff, evaluate MAS's performance. The State Government of Victoria, through the Department of Human Services, provides the bulk of the funds to MAS. They appoint the Board Of Management and Chief Executive Officer. The MAS is directly accountable the Department of Human Services and is required to meet performance targets. The media provides information and helps form opinions for all the above groups. The members of the fourth estate wield considerable power over public opinion, particularly those members of the public whose only source of information of MAS is through the media. Patients are the most obvious of the groups served by MAS. In some ways, this group is easy to satisfy, if they receive an ambulance in time and are given the care they expect. The strong emotions however, generally involved in ambulance work, can colour the perception of the service provided. The patients and their relatives are usually in a highly emotional state and any deficiency in the care provided, real or perceived may result in a formal complaint to management, the media, or the government. This may in turn affect the perception of others. Improved customer satisfaction would impact in all of these areas and result in improved community perception of ambulance care (Daly, 1992).

There has been a move toward smaller government expenditure and greater public accountability by the bodies receiving the funding. The publishing of customer satisfaction measurement scores would assist in justifying the monies used by MAS.

1.3.3 Subscription scheme

MAS has a Subscription Scheme. This is analogous to insurance where for an annual fee the subscriber is entitled to free emergency ambulance treatment and transport. The MAS Chief Executive Officer stated in the 1996 annual report that the financial viability of MAS is linked to the well-being of its Subscription Scheme (Olszac, 1996). The scheme is a major source of income to MAS. Any profit the scheme makes helps to defray the loss incurred by MAS due to lack of full cost recovery from patient transport fees (Baragwanath, 1997a).

The revenue from subscribers for 1995/96 was almost $28 million representing 34.7% of its total revenue of $80.6 million (MAS, 1996). This result was profitable as the members only accounted for 14.8% of the patients transported. The profitability wasn't lost on health insurers such as Medibank Private who have provided competition to the subscription scheme. Over the period, 1994/5 to 1995/6, MAS subscriptions dropped from 530,385 to 512,028 (MAS, 1996). Almost certainly some of this was due to defection of members to the health insurers, although recession and negative publicity during this period may also have had an effect.

MAS needs to focus on keeping existing customers rather than just recruiting new ones. It costs five times more to acquire a new customer than to keep an existing one (Djupvik and Eilertsen, 1995). It makes sound commercial sense for MAS to keep subscribers satisfied. There is a close relationship between customer satisfaction and customer loyalty (Djupvik and Eilertsen 1995). Satisfied customers buy more, more often, and are more price tolerant (Marr and Crosby, 1993). A more satisfied customer base increases their likelihood of resubscribing and hence improves the long-term viability of the organisation (Brooks, 1995).

A dissatisfied customer may cost MAS more than just one subscription. Research on bank customers suggests that the average unhappy user will tell sixteen other people of his experience. By comparison, a happy bank customer will tell an average of eight of his delight (Goodman et al., 1995).

The average subscriber does not use the MAS in any given year, yet most continue to pay the annual fee. The reasons behind this need to be explored. The appropriate customer satisfaction methodology would enable predictions to be made where improvements in the quality would increase the satisfaction and hence the value of the MAS subscriber base.

New subscribers must be recruited even if the subscriber base were to be totally satisfied with MAS. For example, once a person is entitled to income support, the Federal government issues a Health Care Card, which among other things entitles the holder to free ambulance transport. Only the most supportive subscribers continue to be members in these circumstances. To grow the size of the subscriber base still more new members are needed. The decision to join the subscription scheme also needs to be understood by MAS. This would enable more focused and effective advertising.

1.3.4 Competition from other insurance schemes

During the 1996-97 financial year, 76,800 new members were recruited to the scheme while 49,500 members left. Some of the loss was due to former subscribers becoming eligible for free transport, but MAS estimated that around 30 per cent of members who failed to renew their subscription become members to cheaper insurance schemes. (Baragwanath, 1997a)

To compete with the other Schemes MAS has to either drop its prices, or increase the satisfaction of its subscribers and exploit their increased price tolerance.

The accurate measurement of customer satisfaction would enable MAS to better manage its subscription scheme by better understanding its customers and being able to predict their propensity to resubscribe.

1.3.5 Preparation for a deregulated emergency ambulance market place

Currently under the *Ambulance Services Act 1986*, MAS has a legislated monopoly on pre-hospital emergency assessment treatment and transport in the Greater Melbourne area. Since 1994, sub-contractors to the MAS have handled the bulk of non-emergency transport between hospitals.

This situation may change. The last conservative state government of Victoria had privatisation very much on its agenda. In the last few years, the electricity, gas and

water industries have been privatised. Even the Metropolitan Fire Brigade has been suggested as a potential candidate.

It is possible in the future that the emergency ambulance industry could be subject to privatisation. A high level of public satisfaction may enable MAS to avoid this outcome. This could be compared with the Victorian Public Transport Corporation where poor public perception made it easer for the then government, and more palatable to the public, to privatise.

If a government did privatise the MAS, and / or other companies competed in the pre-hospital emergency care market, the MAS would need to all the tools available to it to compete more effectively. One of most powerful tools is an accurate measurement of customer satisfaction.

MAS in a possible, future, deregulated market may be compared to Norwegian Telecom (NT). NT is a former monopoly being steadily opened up to an increasing number of competitors. This situation called for a market and customer-oriented organisation with a clear strategy not to lose too many customers. NT in the early 1990's had little experience with competition and its success depended on how fast the organisation became more market orientated (Djupvik and Eilertsen, 1995). NT used customer satisfaction research to meet the challenge of competition.

If the aims outlined in section 1.1 are to be achieved, a definition of the term and a suitable methodology of measuring customer satisfaction must be found. In the next

chapter the field of customer satisfaction will be discussed, defined, and the appropriate research methodology selected for this project.

2. Literature Review: Customer Satisfaction

The field of Customer Satisfaction is large and traverses many academic disciplines. In this chapter, a review of the published literature upon which this study rests will be presented. The search for a workable definition of customer satisfaction will be explored. The concepts regarding the theoretical nature of customer satisfaction will be investigated and some of the major techniques used to measure it will be discussed. Lastly, the literature concerning the driving factors for satisfaction regarding medical care and in particular, ambulance services will be considered.

2.1 Definition of Customer Satisfaction

An analysis of the literature concerned with customer satisfaction in 1992 revealed a large and ever growing body of research with some 15,000 trade and academic articles, which had been written on the topic over the previous two decades (Peterson and Wilson, 1992).

Despite the many studies on customer satisfaction, there appeared to be no overall agreement over important issues such as concepts, constructs, definitions, measurements, methodologies and various interrelationships (Yi, 1990; Brooks, 1995).

Currently the constructs of customer satisfaction are built upon concepts such as individual wants, needs and expectations. These concepts emerged from theories about consumer choice for goods and services, which are sought to meet needs and wants.

Issues such as prices, convenience, appeal and quality were seen as moderating the choices.

The concept of satisfaction itself needs to be defined. The Shorter Oxford English Dictionary (1944, p. 1792) defined *satisfaction* as '[1] being satisfied, [2] thing that satisfies desire or gratifies feeling'. It describes *satisfy* as ' [1] meeting wishes of content, [2] be accepted as adequate [3] to fulfil, [4] comply with, [5] come up to expectations.' *Customer* is defied as 'a person who buys a product or uses a service.' Hence using these definitions, *customer satisfaction* can be thought of as a user or purchaser having their needs and expectations fulfilled.

The concept of *customer satisfaction* has been defined in various ways. Zeithaml, Berry and Parasuraman (1993) suggested that customer satisfaction is a function of the customer's assessment of service quality, product quality and price. Oliva, Oliver and Bearden (1995) suggested that satisfaction is a function of product performance relative to consumer expectations. Bachelet (1995) considered satisfaction to be an emotional reaction by the consumer in response to an experience with a product or service. He believed that this definition included the last contact with a product or service, the satisfaction experience since the time of purchase as well as the general satisfaction experienced by regular users. Hill (1996) defined customer satisfaction as the customers' perceptions that a supplier has met or exceeded their expectations. Jones and Sasser (1995) defined customer satisfaction by identifying four factors they postulated affected it. The factors were: (1) essential elements of the product or service that customers expected all rivals to deliver, (2) basic support services such as customer assistance, (3) a recovery process to make up for bad experiences and

(4) "customisation" which were factors that met customers' personal preferences, values, or needs. Ostrom and Iacobucci (1995) examined a number of definitions from other researchers and distinguished between the concept of consumer value and customer satisfaction. They stated that customer satisfaction was best judged after purchase, was experiential and took into account the qualities and benefits as well as the costs and efforts associated with a purchase. Gerson (1996) suggested that a customer was satisfied whenever his or her needs, real or perceived were met or exceeded. He put it succinctly as "*Customer Satisfaction is simply whatever the customer says it is*"(p. 24).

A new paradigm of customer satisfaction has evolved from this multifarious body of knowledge. Johnson and Fornell, (1991) proposed an econometric model where satisfaction was viewed as "*a cumulative abstract construct that describes customers' total consumption experience with a product or service*"(p. 271). They stated this was *not* a transient perception of how happy a customer was with the product at any given point in time. It was the *overall* experience with the purchase and use of a product or service to that point in time. This concept is consistent with the economic notion where satisfaction embraces post-purchase consumption utility as well as expected utility (Meeks, 1984). Johnson and Fornell's (1991) view also conformed to the economic psychological theory where satisfaction was compared with the notion of subjective wellbeing (Wärneryd, 1988). The Johnson and Fornell (1991) model evolved into the American Customer Satisfaction Index (ACSI). The ACSI model rests on the relationships between the customers evaluated characteristics such as perceived quality, perceived value, price tolerance, willingness to repurchase and recommendation of the product or service to others (Fornell et al., 1996). Put simply by Fornell et al (1996, p.

10), "*Customer satisfaction is when your customers come back and your products don't*".

2.1.1 Importance of customer satisfaction

The significance of customer satisfaction to the business world is the concept that a satisfied customer will be a positive asset for the company through reuse of the service, repurchase of the product or positive word of mouth, which should lead to increased profit. The converse of this is that a dissatisfied customer will tell more people of their dissatisfaction, possibly complain to the company and if sufficiently disenfranchised, change to another company for their product or service, or totally withdraw from the market (Anderson and Sullivan, 1993; Fornell, Ittner and Larcker, 1995; Oliva, Oliver and Bearden, 1995).

2.1.2 Perception of customer satisfaction

Customer satisfaction studies tend follow two different models. These models have been dubbed the "customer concerns" and the "organisational concerns" approach. There are also an infinite number of shades of grey in-between the two extremes (Wittingslow and Markham, 1999).

The model of customer satisfaction chosen in a study reflects the culture of the organisation conducting the study. The type of model chosen has consequences for defining *customer satisfaction*. A company that is driven by the importance of what it believes it is doing and the importance of its market approach, tends to interpret

customer satisfaction as what the customer should want, against these organisational and marketing needs (Yi, 1990; Dutka, 1994). If however the organisation has a culture where the customer is seen as being an independent entity who has his/her own motives beliefs and needs, then customer satisfaction will be defined as being based upon customer thinking (Wittingslow and Markham, 1999).

Wittingslow and Markham, (1999) suggest that we perceive the world around us in an egocentric and selective way. Because we can't take in all the images, sensation and feelings that are experiencing continually, we select those that are the most important. A result of this filtering process is we can not evaluate, with any accuracy, a thing we have either consciously or unconsciously selected out. The sequela of this, for customer satisfaction research, is that asking questions on an issue that the respondent has selected out or not experienced produces problems for the data set produced. Either the respondent chooses an answer at random (inducing noise into the data set) (Andrews, 1984) or replies with a "Don't Know / Not applicable" (resulting in missing data). To minimise this problem, the respondent must be asked question that draw from their experience and are in language that they understand (Wittingslow and Markham, 1999).

In this study, customer satisfaction will be defined as "*those perceptions that act on the decision process to use, subscribe, reuse and resubscribe to the MAS*." The various schools of thought on customer satisfaction will now be examined.

2.2 The Nature of Customer Satisfaction

Before customer satisfaction can be measured, the nature of satisfaction itself must be determined. As Johnson, Anderson and Fornell, (1995) stated, "*The modelling of customer satisfaction depends critically on how satisfaction is conceptualised.*" This aspect however is controversial. Some of the disputed characteristics of customer satisfaction are, the nature of satisfaction, whether satisfaction is cumulative, or transaction specific, and the merits of measurement at the individual compared to the market level.

2.2.1 Social Sciences theories of the nature of satisfaction

There have been many approaches in defining the consumer satisfaction/ dissatisfaction construct and how the various customer factors such as cost or product performance impact on satisfaction.

1. **Equity Theory**. - According to equity theory, satisfaction occurs when a given party feels that the ratio of their outcomes of a process is in some way in balance with their inputs such as cost, time and effort (Brooks, 1995).

2. **Attribution Theory** - in this theory the outcome of a purchase is thought of in terms of success or failure. The cause of the satisfaction is either attributed to factors that are internal such as the buyers' perceived buying abilities or external such as difficulty of the buying task, other peoples efforts or luck (Brooks, 1995).

3. **Performance Theory** - customer satisfaction is directly related to the product or services' perceived performance characteristics (Brooks, 1995). Performance is defined as the customers' perceived level of product quality relative to the price they pay. That is satisfaction is equated with value, where value equals perceived quality divided by the price paid (Johnson, Anderson and Fornell, 1995).

4. **Expectancy Disconfirmation Theory** - Brooks (1995) stated that Expectancy Disconfirmation Theory, at the time of the publication of his research, was the most popular of all the social science theories. In this theory, customers form expectations of product performance characteristics prior to purchase. When the product is bought and used, the expectations are compared with actual performance using a better-than, worse-than heuristic. Positive disconfirmation results if the product is better than expected while worse than expected performance results in negative disconfirmation. Simple confirmation results when a product or service performs as expected. Satisfaction is expected to increase as positive disconfirmation increases (Liljander and Strandvik, 1995).

2.2.2 Statistical History of customer satisfaction

The first work in the area that would become mathematically based customer satisfaction was carried out in the 1920's by sociologists studying mass behaviour using primarily percentage analysis. By the 1940's, scaling and ratings were at the cutting edge of consumer science. The jump from correlation to equations was the major development in the 1950's. The first generation of multivariate analysis occurred in the

1960's. These methods however were limited in their ability to bring together theory and data. They also were restricted in processing behavioural data by their failure to incorporate auxiliary measurement theories, i.e. the theoretical assumptions made during measurement, that, if excluded from the empirical model, would bias estimates and confound results (Blalock 1982, Fornell, 1988).

The increasing availability of computer technology in the late 1960's and early 1970's enabled the widespread use of multivariate analysis in marketing (Sheth, 1971). The new methods of simultaneous analysis of multiple variables displaced the older techniques of univariate and bivariate analysis. The new processes included multiple regression, multiple discriminant analysis, factor analysis, principal components, multi-dimensional scaling and cluster analysis. The multivariate revolution of the early 1970's became established within academia by 1980 and became commonly used in commercial marketing research by 1982 (Bateson and Greyser, 1982).

Around 1982 a new multivariate technique appeared which was claimed brought together the areas of psychometrics, econometrics, quantitative sociology, statistics, biometrics, education, philosophy of science, numerical analysis and computer science (Fornell, 1988). This technique was dubbed the Swedish Satisfaction Barometer (Fornell, 1988). Claimed advantages of this methodology were that it corrected for measurement imprecision, isolated effects, modelled a system of relationships and provided a basis for cause-and-effects interpretation. By the 1990's the method had developed by researchers such as Fornell, Anderson, Johnson, Cha and Bryant at the National Center for Quality Research (NCQR) into the American Customer Satisfaction

Index (ACSI), an aggregate, prospective, predictive customer satisfaction measure. The ACSI will be discussed further in section 2.4.4 (p. 28).

2.3 Concepts of Satisfaction Performance

2.3.1 Gap theory

Parasuraman, Zeithaml and Berry (1988) suggested that expectations in the satisfaction literature have been used as predictions of service performance, while expectations in the service quality literature were viewed in terms of what the service provider should offer. Later Zeithaml, Berry and Parasuraman (1993) modified this distinction, introducing two different levels of expectations and proposing the existence of a zone of tolerance between these levels. They argued that satisfaction is the function of the difference or gap between predicted service and perceived service, while perceived service quality is the function of the comparison of adequate or desired service with perceived service performance.

2.3.2 Catastrophe theory / fuzzy logic

Most models of customer satisfaction assume a linear relationship between the effect of various causes such as expectancy disconfirmation on the consumer's reaction to a product or service. Oliva, Oliver and Bearden (1995) put forward the concept of involvement with a product or service. They suggested that at a low level of involvement the traditional linear assumptions hold true. However, at high levels of

involvement the relationship becomes "sticky". That is, the consumers do not shift preferences over a range of reported performance. Instead, the perceived performance level declined until it reaches a cusp where the consumer suddenly abandoned the product in favour of a competitor. Later when the perceived performance of a product improves, the consumer will not re-purchase until there is large advantage in doing so.

2.3.3 Transaction-specific satisfaction and cumulative satisfaction

Johnson, Anderson and Fornell (1995) suggested there were two concepts of customer satisfaction in the literature: transaction-specific satisfaction and cumulative satisfaction. Transaction specific customer satisfaction focuses on individual consumer responses to individual products and services while the cumulative one describes the total consumption experience of a customer with a product or service (Anderson and Fornell, 1993; Boulding et al., 1993).

Some disagreement exists in transaction-specific satisfaction. Parasuraman, Zeithaml and Berry (1988) suggested that perceived service quality was an antecedent to transaction-specific satisfaction while Bitner (1990) and Bolton and Drew (1991) believed that transaction-specific satisfaction is an antecedent to perceived service quality.

Johnson, Anderson and Fornell (1995) argued that while enterprises had a practical need to conduct transaction specific research on customer satisfaction, this action did not contribute to the generation of empirically generalised theories and models on satisfaction. They suggested that a market level or aggregate approach to customer

satisfaction was more likely to overcome problems in reconciling the variation of findings at the individual level.

2.3.4 Individual (disaggregate) satisfaction

A large amount of customer satisfaction literature is based on the model of disaggregate (individual level) satisfaction with services or goods (Yi 1991). These disaggregate studies show the scope of human behaviour. However, Yi (1991) and Anderson and Sullivan (1993) have reported problems with the empirical "generalizability" of these studies. Johnson, Anderson and Fornell (1995) argued that the attitudes and behaviour of individuals might be so unique that reliable generalisations cannot be determined from individual level studies. As a solution to this problem, they suggested the aggregation of individuals to produce a market level satisfaction.

2.3.5 Market level (aggregate) satisfaction

Little work has been done on aggregate or market level customer satisfaction. Market level satisfaction is the aggregate satisfaction of all those who purchase and consume a particular product. Johnson, Anderson and Fornell (1995) reported that the aggregation of individual responses served to improve the power of the measurement by reducing the error in measurement of satisfaction variables and increasing the verification of coherent relationships with other variables. They suggested that the aggregation might also increase the sensitivity to relationships between consumer attitudes and subsequent purchase behaviour.

Market level satisfaction has been found to be reasonably stable over time (Johnson, Anderson and Fornell 1995). Market performance expectations have a large rational component yet remain adaptive to changing market conditions.

Johnson, Anderson and Fornell (1995) identified three antecedents of their market model: performance (perceived product quality relative to price), expectation (attitudes or beliefs about the degree of performance) and disconfirmation (the degree to which perceived performance confirms performance expectations). They suggested that disconfirmation has an important role in developing transactional models of satisfaction although it is a problematic concept.

2.4 Measuring Customer Satisfaction

Various methods have been used to measure customer satisfaction. Many customer satisfaction measures however are created without consideration of to their final use. In particular, they are not designed for easy interpretation by managers looking to best implement change in their organisation (Fornell, Ittner and Larcker, 1995). Those that have been used include:

2.4.1 The Top box method

The very common "Top-box" surveys where the respondent ticks one of a small number of boxes suffer from a number of limitations. The small number of scale points results in a significant measurement error in the indices. This makes small changes in customer satisfaction difficult to track (Fornell, Ittner and Larcker, 1995). When filling

out a survey form, respondents will rarely use extremes. So if boxes numbered 1 to 5 are presented to an individual, the responses 1 and 5 are rarely used. This effectively reduces the scale to one of three points with the mean average normally in the range 3 to 4. There is a tendency for researchers, when analysing data from Top-box surveys, to add together the top two boxes, generally an "excellent" and "good" rating and then to use the resulting percentage value as the number that are satisfied (Patterson, 1996; Quint and Fergusson, 1997). As well as oversimplifying the concept of customer satisfaction, this reduces the sensitivity of the measure to changes such as customers going from a good to an excellent rating.

2.4.2 The SERVQUAL method

SERVQUAL was developed by Parasuraman, Zeithaml and Berry (1988) and is based on the service quality "gap model". The gap model defines service as a function of the gap between customers' expectations of a service and their perceptions of the actual service delivery by an organisation. Although widely used (Hemmansi, Strong and Taylor, 1994), SERVQUAL has had a number of criticisms including multicollinearity (Chen, Gupta and Rom, 1994) and psychometric problems (Brown, Churchill and Peter, 1993). Smith (1995) considered it of questionable value for either practitioners or academics.

The above two techniques are the main systems utilised by researchers. However, they are affected by several problems. The most important of these is that they fail to provide insight into the determinants of customer satisfaction that have the greatest influence on purchase, repurchase and price tolerance that lead to the highest economic returns for the supplier.

2.4.3 National Centre For Quality Research (NCQR) method

The basic model for estimating the NCQR consists of a system of equations describing relations among six constructs, perceived quality, customer expectations, perceived value, customer satisfaction, customer retention and customer complaints. Each construct is measured using multiple questionnaire items to increase the precision of measurement. Each of the questions is measured on a ten-point scale to enhance reliability and reduce error in the indices. This also increases the ability to track small changes that may be lost using a more coarse scale.

The data is analysed using a proprietary version of partial least squares modelling (PLSM) to produce a customer satisfaction index (Fornell, Ittner and Larcker, 1995). It is claimed that the index has a high correlation with customer repurchase intention and price tolerance and hence economic performance because of the weighting of individual items such as overall satisfaction, confirmation to expectation and comparison to ideal (Fornell, Ittner and Larcker, 1995). The index was developed to overcome shortcomings in ability to directly link quality improvements with changes in financial performance.

The NCQR methodology can be used at both the macro and micro level. Examples of the macro level applications are the Swedish Customer Satisfaction Barometer and the American Customer Satisfaction Index. Used this way it is a national measure of how well companies and industries satisfy their customers (Fornell, 1992). It measures economic performance in regard to *quality* from a customer perspective. This may be

compared with a productivity index, which also measures economic performance but refers to *quantity*.

The micro level application of the NCQR methodology focuses on a single business. It assists in the managing of the overall business strategy by concentrating on the retention of customers rather than the more common emphasis on recruiting new clientele. The methodology considers the customer base to be an asset. It aims to measure what variables affect customer satisfaction and retention and it is claimed that the methodology can predict what will be the impact of changes to the variables upon reuse, recommendation, repurchase and price tolerance (Fornell et al., 1996).

2.4.4 Macro applications of the NCQR method

The National Centre for Quality Research methodology was used first by the Swedish Customer Satisfaction Barometer (SCSB) in 1989 (Fornell, 1992). Although many individual companies and some industries had measured customer satisfaction, this was the first time a nation had done so (Fornell, 1992).

A further evolution of the cumulative and aggregate market approach is the American Customer Satisfaction Index (ACSI) that was first developed in 1982, tested, further modified and implemented by Fornell, Johnson, Anderson, Cha and Everitt-Bryant in 1995 (Fornell et al., 1996). The ACSI is the macro face of the NCQR methodology; instead of dealing with an individual company, it is a national economic indicator of customer evaluations of the quality of goods and services of the major corporations in the particular economy. The development of the ASCI model is based on aggregated market relationships between underlying customer characteristics such as perceived

quality, perceived value, customization, reliability, customer expectations and price tolerance (Fornell et al., 1996).

The World Quality Council (WQC), the international peak quality body, has been deliberating on methods by which quality could be measured across, dissimilar products, services and nations. In 1997, the Secretary General of the WQC recommended that the member countries develop their own Customer Satisfaction measures based on the NCQR from the Business School of the University of Michigan (WQC, 1997).

2.4.5 Micro applications of the NCQR method

The NCQR methodology that is used for the SCSB and the ACSI can be customised for application at the micro or individual company level. This is done by conducting initial qualitative research by non directive interviews with customers and staff to determine the drivers of customer satisfaction and the economic consequences of the satisfaction that are unique to that company. From this a preliminary model of the customer satisfaction, customer generated drivers of satisfaction are constructed and grouped into latent variables. These latent variables impact to various degrees onto the overall satisfaction. Changes in the overall satisfaction affect the economic consequences or outcomes of price tolerance and loyalty in terms of re-purchase and recommendation to others.

From the survey results, it is possible to estimate the financial consequences of changes in the satisfaction drivers through factors such as quality initiatives. See section 3.3.4.2 (p. 56) for a detailed discussion on the methodology.

2.5 Medical Care Satisfaction Literature

2.5.1 The importance of satisfied patients

The generalised ramifications of satisfaction that apply to other customers were also found in medical patients. Patients that were satisfied were more likely to return to a particular doctor or hospital, less likely to leave private health insurance, and less likely to sue of negligence (Ware and Hays, 1988; Stelber and Krowinski, 1990; Weiss and Senf, 1990; Aharony and Strasser, 1993; Levinson et al., 1997). Satisfied patients were also more compliant with their medical therapy and as a result had better clinical outcomes (Greenfield, 1985; Rubin, 1989; Kaplan, Greenfield and Ware, 1989; Hauck, 1990; DiMatteo et al., 1993).

Welch et al. (1999) argued that patient perception of health care quality reflected underlying satisfaction with care. They suggested that patient satisfaction was as important as any other outcome of medical care, particularly in the elderly population.

Thomas (1998) asserted that patient satisfaction was a critical variable in any calculation of quality or value of medical services. He observed that the *science* of

medicine was the technical side while the *art* of medicine was the patient satisfaction side.

2.5.2 Determinants of patient satisfaction

Many factors have been reported as influencing patient satisfaction with medical care. They include:

Age - Older patients tended to be more satisfied with their medical care (DiMatteo and Hays, 1980). The researchers suggested that this may have been due to the patients' longer than average relationship time with their care providers.

Gender - Lieberman (1989) found that women had higher satisfaction levels than men. This contrasted with the earlier work of Gray (1980) and Greenley and Schoenherr (1981) that found no gender bias in satisfaction.

Income - Many studies found that wealthy patients are more satisfied than poor patients (Chaska, 1980; Patrick, Scrivens and Charlton, 1983; Calnan, 1988). They suggested reasons such as poorer patients received less continuity of doctors, less salubrious hospitals and paid a proportionately more for medical prescriptions.

Cost - Sing (1990) found using factor analysis that satisfaction with a medical insurance provider tended to be very independent dimension from satisfaction with medical care providers. That is, the patients could rate the medical care highly while having low satisfaction with their medical insurance providers and vice versa.

Race – Murray-Garcia et al. (2000) found significant differences in the level of satisfaction different racial and ethnic groups reported with medical care providers. They found that Blacks reported the highest satisfaction, followed by Whites while Asians tend to report lower levels. However, the group was unsure if this reflected higher expectations or differences in quality of care.

Staff - Many studies on medical services reported factors relating to staff as having the most impact both on overall satisfaction and on tendency to recommend the service to others (Quint and Fergusson, 1997; Garney, 1998; Press and Garney, 1998; Weinsing et al.; 1998, Brown et al., 1999). The exact description of what aspects of the interpersonal interface were the most important varied greatly depending on the study.

Quint and Fergusson (1997) in their study of patients of Victorian public hospitals found that the key drivers of very high patient satisfaction were communication aspects, compassion, reassuring attitude, courtesy and availability of staff. Press and Garney (1998) reported that staff sensitivity to the problems of the patient was the most important influence in recommendation of that hospital to others. The lesser important interpersonal factors found were, staff concern about patient privacy, nurse's attitude toward being summoned and friendliness of nurses. Weinsing et al. (1998) found that "informativeness" and "humaneness" were among the factors most often cited as important to patients. Garney (1999) found that the issues most influencing the likelihood of a patient recommending a hospital were, staff sensitivity to the inconvenience that health problems can cause, staff concern for patient privacy, amount of attention paid to patients special needs, degree to which nurses took patients health problem seriously, nurses attitude towards being called and the friendliness of the

nurses. Dale and Howanitz (1996) found meeting an outstanding employee was correlated with higher satisfaction rates.

Some authors believed that the patient's evaluation of the communication skills of their treating clinician was a critical determinant of patient satisfaction (Rowland-Morin and Carroll, 1990; Hall et al., 1994; Frederickson, 1995; Roter et al., 1997). Brown et al. (1999) found that patient satisfaction did not increase after a short training session on communication skills for general practitioners. They suggested that such skills training programs might need to be longer and teach a broader range of skills to have an effect on patient satisfaction.

Response - Promptness of response to call button was found by Press and Garney (1998) to be of importance to hospital patients. Garney (1999) found this also influenced the likelihood of a patient recommending a hospital. Time waiting for admission was found to be a factor by Quint and Fergusson (1997)**.** Dale and Howanitz (1996) also found that shorter waiting times were correlated with higher satisfaction rates in patients.

Clinical Skill - Patients find it difficult to evaluate the clinical skill of medical providers (Berry, 1995). Quint and Fergusson (1997) stated that the technical skills of medical staff are assumed to be high and it was the "personality" aspects of a hospital, which appeared to play a greater roll in patient satisfaction. Other studies found clinical skill to be important. Baker (1991) established that quality of medical care was one determinate of patient satisfaction with their general practitioner. Dale and Howanitz (1996) found that professional treatment and discomfort less than expected, correlated

with higher satisfaction rates. Weinsing et al. (1998) reported that patients often cited competence and accuracy as important in their satisfaction with a general practitioner. Garney (1999) found that the technical skill of nurses influenced the likelihood of a patient recommending a hospital.

Other Determinates – Other factors that patients found influenced their satisfaction with their general practitioner were accessibility, continuity, availability, premises where patients were involved in decisions, time for care, accessibility and availability (Baker, 1991; Baker and Streatfield, 1995; Weinsing et al., 1998).

In regard to hospitals involvement of the patient in decisions, adequate information about treatment, less injections, quality of meals, overall cheerfulness of the Hospital were found to influence satisfaction and the likelihood of a patient recommending a hospital (Dale and Howanitz, 1996; Quint and Fergusson, 1997; Garney, 1999).

Overall Satisfaction

The patient's overall satisfaction with care is influenced by their medical outcome (O'Connor et al., 1999). As discussed above interpersonal factors play a important role. Lumley, Brown and Small (1993) suggested that there was a tendency for patients to be uncritical of health care workers, particularly immediately after the event. This perhaps would lead to high satisfaction scores if customers were surveyed immediately after their experience.

The high satisfaction usually found when measuring patient's evaluation of medical care caused problems in interpreting surveys (Stelber, 1988). As an example, Quint and

Fergusson's (1997) survey of Victorian Hospital recorded high levels of satisfaction. Quint and Fergusson found that in regard to overall satisfaction, 76% of patients were "very satisfied" and 20% "fairly satisfied". A high 96% of patients said they would recommend the hospital to friends and family. In terms of perception of the quality of care, 55% rated it as excellent, 32% as very good and 10% as good.

2.6 Ambulance Customer Satisfaction Literature

2.6.1 Australian ambulance satisfaction studies

The literature shows high satisfaction with Australian ambulance services. However, none of the publicly reported Australia ambulance satisfaction surveys are directly comparable to the proposed ACSI methods.

Patterson's (1996) survey of the patients transported by the Queensland Ambulance Service (QAS) used the top-box method. She reported that of the 903 responses, 80% rated QAS as excellent and 17% as good.

North West Region – Ambulance Service Victoria's (NWR–ASV) (1998) survey reported a 99% affirmative response to the yes / no question "*was the patient satisfied with the overall service provided?*" The author then felt the need to point out that the single "*no"* vote was received from a patient being transferred between psychiatric institutions. Both surveys reported good response to questionaries via mail, Patterson (1996), reported a 45.2% return rate among a cohort of transported patients that included 95% subscribers. NWR–ASV (1998) had a 37% return rate after sampling every tenth case it responded to in October 1998. This high response rate is echoed in the USA where Fultz, Coyle and Reynolds (1998) reported a 61% response rate to a mail survey of 400 medical patients transported by air ambulance.

The NWR–ASV (1998) survey questionnaire was generated from unspecified research on patient surveys that other ambulance services had used along with input from the ambulance service's management team. Patterson (1996) did not state how the questions for her survey were chosen. Table 1 (below) displays a comparison of the issues measured by the two surveys. It can be seen that the two surveys examined similar issues apart from Patterson's focus on complaint handling. The survey instrument used in this thesis can be found in Appendix I.

Table 1 Comparison of issues measured by Australian ambulance satisfaction studies

North Western Region – Ambulance Service Victoria (1999)	**Queensland Ambulance Service, Patterson (1996)**
Demeanour of the call takers.	Initial telephone call.
Quality of advice provided by call takers.	
Response time.	Response time.
Quality of ambulance medical care.	Emergency treatment and care provided by Ambulance Paramedics.
Relief of pain by ambulance paramedics.	Effort of the Ambulance Paramedic to understand your problem and needs
Ambulance vehicle comfort, temperature and cleanliness.	Ambulance vehicle comfort.
Ambulance staff performance.	Courtesy and consideration of the Ambulance Paramedics.
Standard of driving.	
	Response to complaint (if any) regarding patient care.
	Response to complaint (if any) regarding administration or billing.
	Response to contact after the event for reason other than complaint
Overall satisfaction.	Overall satisfaction

2.6.2 Australian ambulance emergency call takers

Dale (2000) studied the level of satisfaction of 423 telephone callers requesting emergency ambulances from Intergraph Public Safety™ (IPS). Whilst IPS takes the initial calls for service and dispatches the Metropolitan Ambulance Service crews, it is a separate organisation. Dale's (2000) study used non-directive telephone interviewing to develop a customer-based questionnaire; then used simple descriptive statistics to analyse the resulting data. The mail questionnaire achieved a 53% response rate. He found that the main drivers of satisfaction with the call taking process were: attentiveness, efficiency, professionalism, ability and perceived level of training of the call takers. Dale (2000) reported a mean satisfaction with the call taking process of 8.62 on a scale of 1 to 10. Health professionals were less satisfied with the call taking process with an average overall satisfaction on 7.9 on the same scale. Dale (2000) did not explore the reasons for the differences or determine whether they were statistically significant.

2.6.3 USA studies of ambulance services

Fultz, Coyle and Reynolds (1998) studied air ambulance patients in the USA, using a 4-point Likert scale; the respondents discussed similar issues to the Australian studies. They found that the issues, which were important to the patients and needed improvements, were rapport with the crew, communications and operations.

2.6.4 Customer perceptions and expectations of MAS

Baragwanath (1997a) in his Auditor General's report into the MAS stated "*The public's expectation of its ambulance service is that it will respond quickly to emergency calls and provide quality clinical care to patients*"(p.5). No one would argue that the quality of medical care provided by an organisation, such as MAS is, not paramount in importance, but the general public has little medical knowledge from which to judge their pre-hospital care. Because of their technical nature, or other reasons, it is not always possible for customers to know if a service was performed properly. Services that are difficult for customers to judge even after they have been performed are known as "black box services" (Berry, 1995). In effect, the service remains hidden or semi-hidden as if in a black box. This is true of the MAS service, as the customer/patient has little idea of the correct medical procedure. As a result, they are likely to form their opinion of the service from other factors (Swan, 1989). Bachelet (1995) found that a product's perceived performance will tend to reflect its image when the customer is unable to compare the service provided with other products. Swan (1989) suggested that personal grooming, neat uniform, clean, well maintained vehicles, safe driving and calm professional conduct of the ambulance officers were important factors for the public in judging the performance of an ambulance service. He also suggested that community first aid and CPR programs help positively affected the public's perception of an ambulance service. Ryan (1994) stated that customers, who are patients, needed a high level of reliability for the provision of equal access to definitive care. Yet, it seems that the staff interpersonal issues, not medical technical quality, were the main causes of satisfaction and complaint (Lescun, 2000). In the wider literature, a study of customer satisfaction with hospitals by Gilbert, Lumpkin and Dant (1992) found that, staff

friendliness, was the most important followed by staff competence and cost. MAS's data on complaints (Lescun, 2000) demonstrated the importance of good interpersonal skill and attitude for staff.

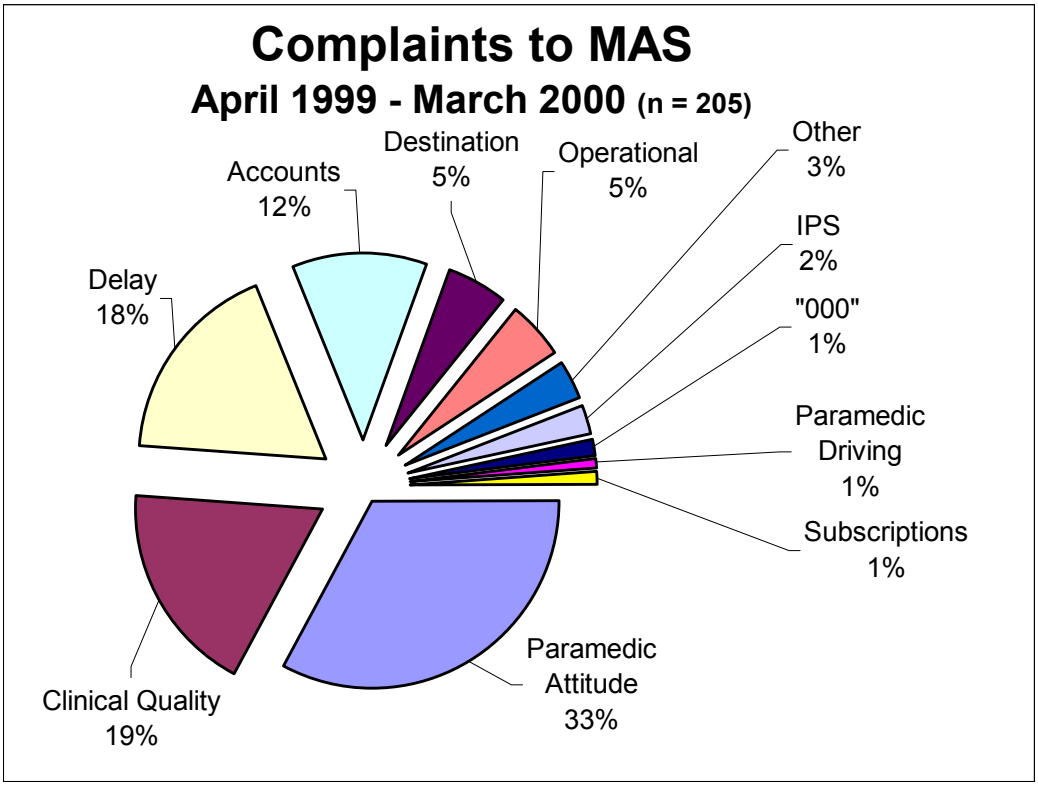


Figure 1 Complaints to MAS for the 12-month period April 1999- March 2000 (Lescun, 2000).

Figure 1 (above) shows total complaints received by MAS for the period 1st April 1999 – 31st March 2000 inclusive. Commendations for the same period numbered 389 but were not broken into categories (Lescun, 2000). The commendations were approximately double in number compared to complaints and this was seen as suggestive, by senior management, of high customer satisfaction. That *Paramedic Attitude* is the largest category concurs with the black box concept of clients forming an opinion of the service on factors other than medical quality, as suggested by Swan

(1989). Some 19% of the complaints were categorised as relating to *Clinical Quality*, so medical quality was perceived to be a factor by customers. *Delay* related to time until the ambulance arrived. *Accounts* related to the billing of customers that were not otherwise coved by subscription or a Health Care Card; *Destination* related to the choice of Hospital by the ambulance crew. *Operational* was concerned with system problems. *IPS* was Intergraph Public Safety™, the private company that dispatched the Ambulances (as was discussed section 2.6.2, page 38). *000* is the Australia wide emergency phone number, comparable to "911" in the USA or "999" in the UK. This service was staffed by Telstra™ employees, not MAS. *Paramedic Driving* and *Subscriptions* are self-evident.

2.6.5 MAS and quality

In 1997, all MAS's non-emergency stretcher contractors were accredited to ISO 9002 (MAS, 1997). MAS as a whole achieved ISO 9001-2000 in 2001 (MAS, 2001). MAS have not published a document that deals directly with customer satisfaction. It does however have a *Total Quality Assurance Program* with a stated goal of continuing improvement in the quality of care delivered by the MAS. It acknowledges that the MAS's core business is that of patient care (Csupor, 1997)

MAS currently measures the quality of its service by clinical indicators. Csupor (1997) stated that the crew members first complete an informal clinical audit at the time of service delivery, in the form of self or peer appraisal. A more formal clinical In-field audit is performed by a Clinical Support Officer (CSO). The CSO observes the individual ambulance paramedic's clinical performance, patient care at the scene and later at the hospital handover. This enables the CSO to make measurements and

judgments about the quality of that performance against the existing clinical standards. Data recorded is passed to the clinical department for further analysis.

Polsky and Johnson (1994), reviewing continuous quality improvement in ambulance services in the USA, found some processes were statistically in good control and met the ISO 9002 definition of quality, but did not adequately meet customer needs or expectations. They felt these processes needed to be examined, to identify opportunities, to improve all future results.

Ryan (1994), however, stated that quality assurance in health care has been ineffective in enabling good care. He found that quality assurance merely functioned to retrospectively police the quality of care by identifying offenders who failed to adhere to normative values. Ryan (1994) also stated that ambulance service managers must seek out and incorporate the customers' perspective's as to their varying needs. Mattera (1995) suggested that customer satisfaction was one of the dimensions that needed to be measured on the change from quality assurance to continuous quality improvement in prehospital care.

While the current MAS process for measuring quality maybe suitable for the ISO 9002 process, Csupor (1997) stated that the community would determine whether they received quality service. She defined *Quality Service* as achieving community satisfaction by the service provided. Currently MAS have no way of measuring community satisfaction apart from indirectly in a qualitative manner via the print and electronic media. The NCQR methodology would be suitable to meet the terms of the MAS obligation, under ISO 9001:2000, of ensuring customer needs and expectations

are determined and fulfilled (MAS, 2001). The NCQR methodology measures satisfaction at the market level rather than the individual (Johnson, Anderson and Fornell, 1995). For the MAS, its potential market and the community are arguably the same population.

MAS are seeking to benchmark its performance against other ambulance services throughout the world (Baragwanath, 1997a). Response times are one of these benchmarks and are closely monitored by the MAS. Different emergency organisations have various definitions of response time but it is generally regarded as referring to the time from a person requesting an ambulance at the dispatch centre until the ambulance arrives at the given address. The variation in definitions and differences in geography and populations make this a difficult benchmark to apply fairly. Patients tended to overestimate the response times, but under estimate the on-scene and transport times. Harvey et al. (1999) suggested that actual response times often met patients' stated expectations; although the patients may not perceive that they have been met.

Another popular performance benchmark used amongst ambulance services is that of successful resuscitation from cardiac arrest. This is a tantalising measure of quality of medical service, from a product performance view. The resuscitation benchmark, however, is confounded by different definitions of a successful resuscitation, what constitutes a cardiac arrest, different response times and exclusion criterion.

Naumann and Giel (1995) suggested benchmarking using customer satisfaction. Fornell et al. (1996) stated that the NCQR methodology for measuring customer satisfaction could be used to benchmark across different industries. If the MAS could

utilise the NCQR methodology it would not be restricted to comparing itself only with other ambulance services and it could apply a more rigorous means of evaluation.

2.7 Conclusion

In summary, the definition of customer satisfaction that will be used in this research is "*those customer/patient perceptions that act on the decision process to reuse and resubscribe to the MAS.*" The rest of the thesis will apply the NCQR methodology as described above in section 2.4.5 (p 29).

The next chapter will discuss how various methods of collecting customer satisfaction data and an appropriate modelling tool examined and selected so the above definition can be applied in a field study.

3. Measuring Customer Satisfaction

3.1 Introduction

Having decided in chapter 2, on a working definition of customer satisfaction as "*those perceptions that act on the decision process to reuse and resubscribe to the MAS*" the next step is to measure the concept. Early methods of measuring customer satisfaction such as percentage analysis, scaling, ratings and "the top box" method are still used in the corporate world. Nevertheless, more advanced multivariate methods have been developed. Analysis of variance is an example of the first developments of improving analysis of data, while still a useful tool, it like other first generation multivariate methods has problems bringing theory and data together. Second generational multivariate methods such as Structural Equation Modelling (SEM) and Partial Least Squares Modelling (PLSM) are able to combine theoretical and empirical knowledge. SEM and PLSM are finding favour in a variety of applications but of interest here is that of modelling customer satisfaction. In this chapter, it will be argued that PLSM in particular is suited to measuring satisfaction because of its tolerance to the type of the data generated by a customer survey.

3.2 Background of Measuring Customer Satisfaction

The first work in the area that would become mathematically based customer satisfaction was done in the 1920's by sociologists studying mass behaviour using primarily percentage analysis. By the 1940's, scaling and ratings were at the cutting

edge of consumer science. The jump from correlation to equations was the major development in the 1950's. The first generation of multivariate analysis occurred in the 1960's. First generation multivariate methods, like multiple regression, factor analysis, analysis of variance and others have become extremely useful tools for researchers. First generation methods help evaluate constructs and relationships between constructs. However, such an evaluation has to be performed in subsequent steps. These methods all are limited in their ability to bring together theory and data. They are also all restricted in processing behavioural data by their failure to incorporate auxiliary measurement theories, i.e. the theoretical assumptions made during measurement, that, if excluded from the empirical model, would bias estimates and confound results (Blalock 1982; Fornell, 1988).

3.3 Second Generation Modelling

The increasing availability of computer technology in the late 1960's and early 1970's enabled the widespread use of multivariate analysis in marketing (Sheth, 1971). The newer methods of simultaneous analysis of multiple variables displaced the older techniques of univariate and bivariate analysis. The new processes included multiple regression, multiple discriminant analysis, factor analysis, principal components, multi-dimensional scaling and cluster analysis. The multivariate revolution of the early 1970's became established within academia by 1980 and became commonly used in commercial marketing research by 1982 (Bateson and Greyser, 1982). Claus Fornell (1984) labelled these multivariate techniques, *second generation*.

Around 1982 a novel multivariate technique appeared that brought together the areas of psychometrics, econometrics, quantitative sociology, statistics, biometrics, education,

philosophy of science, numerical analysis and computer science (Fornell, 1988). Instead of simply aggregating measurement error in a residual error term, this methods simultaneously evaluate both the measurement model and the theoretical model. It adjusts the relationships among the variables accordingly (Aubert, Rivard and Patry, 1995). Advantages of these methods are that they correct for measurement imprecision, isolate effects, model a system of relationships and provide a basis for cause-and-effects interpretation (Fornell, 1988).

3.3.1 Impetus to model customer satisfaction behaviour

Through the use of a coherent psychological model of customer behaviour, there is a higher likelihood of being able to make sense of the empirical data collected. The raw data from a customer satisfaction study can be dealt with in many ways. At the basic level, it can be looked at in terms of cross tabulation and analysis of variance. Alternatively, customer satisfaction data can be seen as a prime target for using modelling methods because, the nature of customer satisfaction is that there are contributory variables to satisfaction and also satisfaction leads to customer outcome behaviour such as reuse and recommendation. Modelling provides the researcher with the ability to explore possible causal connections between the various levels of variables. If accurately modelled, it can also provide statistical information, which can be a guide to predicting likely future behaviours of the customer population.

At a more general level, any approach to customer satisfaction, which uses the customer's behaviour as its starting point also uses some underlying theory of human behaviour. In this study, the underlying theory is the expectancy-value approach that

has had extensive use in organisational behaviour (Gordon, 1996). This position states that behaviour is determined by the interaction between the expectations the individual has of an outcome and the valuation he/she places on that outcome. Applying this to customer behaviour it can be seen that the customer has expectations of product/service and places valuations (financial and affective) on that product/service. His/her satisfaction will be strongly determined by the extent to which the performance of the product/service is congruent with the prior expectancy/value system (Gordon, 1996).

Customer satisfaction researchers have used various second generation analytical methods such as SEM, Factor Analysis, and Multidimensional Scaling. These techniques are broadly concerned with defining the structural relationships between variables. Loehlin (1992) suggested that SEM is the most flexible of these. The statistical package LISREL® that is used in many areas of social and econometric research is based on SEM (Long 1983). SEM is also used in market research (Maclean and Grey, 1998).

3.3.2 Partial least squares modelling (PLSM)

Partial Least Squares Modelling (PLSM) is related to SEM. PLSM is similar to regression, but simultaneously models the structural paths (i.e., theoretical relationships among latent variables) and measurement paths (i.e. relationships between a latent variable and its indicators). PLSM has evolved from a class of least-squares models of correlation matrices introduced in the 1920's by the biometrician, Sewall Wright. Wright used the technique to link path analysis with factor analysis. The technique was rediscovered in the 1960s and 70s and given its current name by Herman Wold, a Swedish econometrician (Wold, 1980). PLSM originally went under the name Non-linear Iterative Partial Least Squares (NIPALS), dating back to Wold's (1981) "fix-point" algorithms of the 1960's. Wold's work evolved over three decades and many articles. The focus of Wold's (1980) work was the process of producing models that been developed from a set of empirical assumptions about behaviour as opposed to generating theories about behaviour and then testing them with a modelling procedure.

SEM by comparison centres on testing theory while PLSM is about modelling empirical systems. PLSM has been described as being close to the data while SEM is close to the theory (Aubert, Rivard and Patry, 1995).

Wold dubbed PLSM, *soft modelling*. The PLSM approach, applied in this study, defines the key elements of the model from the qualitative data collected. The research begins with an empirical model and the field data collection is based upon it. PLSM does not look for models within a data set, which has been collected with some general latent variables in mind. The important difference between PLSM and SEM is that

SEM emphases exploring various possible models which could explain the data structures (Joreskog and Wold, 1982).

Wold (1982) stated that some aspects of his soft modelling technique was not fully developed within theoretical statistics and admitted that approach was outside conventional population-based statistical analyses. This has not stopped PLSM being refined and used for a variety of applications over the years. The basic algorithms were fine-tuned by Young (1994). Herman Wold's son Sven (Wold and Sjostrom, 1977; Wold, 1978) created specialised algorithms for PLSM in the field of Chemometrics which deals with the evaluation of chemical and pharmaceutical problems. PLSM was applied to a range of problems in psychology (Bookstein, 1991). In the field of econometrics, the American Customer Satisfaction Index (Fornell et al., 1996) is based on PLSM applied to Customer Satisfaction. Other Customer Satisfaction indices across Europe and Asia also use PLSM (CFI, 2000; EOQ, 2000, Fornell, 2000).

3.3.3 Choosing an appropriate modelling tool

The choice of method of statistical analysis and modelling depends on many variables. In situations where preceding theory is strong and additional evaluation and development is the aim, covariance based full-information estimation methods, (i.e. Maximum Likelihood or Generalized Least Squares) are used. Some widely known software such as AMOS and LISREL® use a covariance fitting approach. However, there exists a loss of predictive accuracy with these methods due to the indeterminacy of factor score estimations. The component-based PLSM avoids two serious problems: inadmissible solutions and factor indeterminacy (Fornell and Bookstein, 1982). The potential loss of accuracy is tolerated when measuring customer satisfaction as the

prime concern is testing the structural relationships (i.e. parameter estimation) among concepts (Chin, Salisbury and Gopal, 1996).

PLSM is primarily intended for causal-predictive analysis in situations of high complexity but low theoretical information. When comparing PLSM with SEM, one major difference is the way in which models are estimated. PLSM uses Least Squares estimation while SEM tends to use a Maximum Likelihood estimation procedure (Hahn, Johnson and Herrmann, 2000). The Maximum Likelihood procedure depends on having data that fulfils parametric criteria. PLSM, using Least Squares, has a much lower requirement for parameterisation than SEM. Therefore PLSM can deal with data that violates the parametric requirements of SEM. As a result of the lesser parameterisation requirements, PLSM can handle smaller samples than other methods to generate stable models (Wittingslow and Markham, 1999). For example, PLSM can generate significant results with a sample size of 200 for complex models than involves 10 exogenous latent variables and 3 endogenous latent variables. By comparison, covariance approaches would require samples of 500 to obtain stable results (Hahn, Johnson and Herrmann, 2000). PLSM's ability to model latent constructs under conditions of non-normality and small to medium sample sizes has made it popular use among researchers (Aubert, Rivard and Patry 1994; Compeau and Higgins 1995; Chin and Gopal 1995). PLSM also has a cumulative effect – with subsequent research on the same population, using the same model, even smaller samples than the initial can produce significant results (Fornell et al., 1996).

The PLSM algorithm adjusts weighting for each indicator in calculating the score of the latent variable rather than assuming equal weights. This results in lower weightings for

the indicators with weaker relationships to related indicators. This attribute makes PLSM preferable to techniques such as regression, which assume error free measurement when using data sets that contain noise (Wold, 1982, 1985 & 1989; Lohmöller, 1984). As the reliability of the data declines, regression produces biased and inconsistent coefficient estimates, along with a loss of statistical power (Busemeyer and Jones 1983; Aiken and West 1991). When using regression, with perfect data, a small effect ($f = 0.02$) would be detected at a power of 0.80 in a sample of $n = 400$, this sample would need to increase in size to $n = 1056$ if the data was only 80% reliable (Aiken and West, 1991).

Andrews (1984) showed that even scrupulously performed surveys had 20-30% "noise" (and therefore produced data of 80-70% reliability). The noise is erroneous data due to human variance. As a result when dealing statistically with a data set from a questionnaire one must apply a methodology that can handle the inherent erroneous data. While regression type methods can handle imperfect data sets, PLSM is must be used if very large sample sizes are to be avoided.

Consequently the PLSM method is often more suitable for application and prediction. PLSM assumes that all the measured variance is useful variance to be explained. Latent variables are estimates as exact linear combinations of the observed measures, so avoiding the indeterminacy problem and providing an exact definition of component scores. The PLSM method uses an iterative estimation technique that provides a general model, which encompasses, among other techniques, canonical correlation, redundancy analysis, multiple regression, multivariate analysis of variance, and principle components (Wold, 1982).

A weakness of PLSM is that being a limited information method the bias and consistency of parameter estimates are less than optimal. The estimates will be asymptotically correct under the joint conditions of large sample size and large number of indicators per latent variable. Otherwise, construct to loadings tends to be overestimated and structural paths among constructs underestimated (Fornell and Bookstein, 1982).

PLSM is considered capable of explaining complex relationships (Fornell and Bookstein 1982; Fornell, Lorange and Roos, 1990). Wold (1985) suggested that PLS was virtually without competition when analysing large, complex models with latent variables. By the 1990's, the method had developed by researchers such as Fornell, Anderson, Johnson, Cha and Bryant at the National Center for Quality Research (NCQR) into the American Customer Satisfaction Index (ACSI).

3.3.4 National centre for quality research method using PLSM

The NCQR research techniques are based on PLSM and it is this, which makes it arguably the leading customer satisfaction method. The NCQR method's predictive power comes from the use of an econometric model which ties customers perceptions of quality and value to satisfaction, and then explains the effects of that satisfaction on consumer behaviour such as complaints, price tolerance and repurchase intentions. While many other opinion surveys measure the same features they have so far failed to match the reported accuracy of the NCQR in predicting customer behaviour in response

to changes in the product or service experience and then to economic returns (Anderson and Mittal, 2000).

The basic model for estimating the NCQR consists of a system of equations describing relations among six constructs, perceived quality and value, and customer expectations, satisfaction, retention and complaints. Each construct is measured using multiple questionnaire items to increase the precision of measurement. The response to each of the questions is given on a ten-point scale to enhance reliability and reduce error in the indices.

The data is analysed using a patented version of the partial least squares (PLS) mathematical technique to produce a customer satisfaction index. The index has a high correlation with customer repurchase intention and price tolerance and hence economic performance because of the weighting of individual items such as overall satisfaction, confirmation to expectation and comparison to ideal (Fornell, Ittner and Larcker, 1995). It was developed to overcome shortcomings in ability to directly link quality improvements with changes in financial performance (Fornell, Ittner and Larcker, 1995).

The NCQR methodology can be used at both the macro and micro level. Examples of the macro level applications are the Swedish Customer Satisfaction Barometer and the American Customer Satisfaction Index. Used this way it is a national measure of companies and industries as a whole satisfy their customers (Fornell, 1992). It measures economic performance in regard to *quality* from a customer perspective. This

may be compared with a productivity index, which also measures economic performance but refers to *quantity*.

The micro level application of the NCQR methodology focuses on a single business. It assists in the managing of the overall business strategy by concentrating on the retention of customers rather than the more common emphasis on recruiting new clientele. The NCQR methodology considers the customer base as an asset and measures what factors affect satisfaction and retention. It can predict what result changes to the factors would make in reuse, recommendation, repurchase and price tolerance.

3.3.4.1 Swedish customer satisfaction barometer (SCSB)

The National Centre for Quality Research methodology was used first by the Swedish Customer Satisfaction Barometer (SCSB) in 1989 (Fornell, 1992). Although many individual companies and some industries had measured customer satisfaction, this was the first time a nation has done so. It was found that high scores were in industries where customers tasted varied and the products were also heterogeneous. The automobile industry is an example of this. There were also high scores when the product was undifferentiated and the customers' taste was also homogeneous: consumers of milk or sugar for example. Low scores were the result when varied consumer taste was not fulfilled with sufficient choice. Government monopolies such as police and telecommunications were the best examples of this (Fornell, 1992).

3.3.4.2 American customer satisfaction index (ACSI)

An evolution of the cumulative and aggregate market approach is the American Customer Satisfaction Index (ACSI) that was first developed in 1982, tested, further

modified and implemented by Fornell and his colleagues in 1995 (Fornell et al., 1996). The ACSI is the macro face of the NCQR methodology in that instead of dealing with just with an individual company, it is a national economic indicator of customer evaluations of the quality of goods of the major corporations in the particular economy. The development of the ASCI model is based on aggregated market relationships between underlying customer characteristics such as perceived quality, perceived value, customization, reliability, customer expectations and price tolerance.

There is evidence in the literature for the accuracy of the NCQR methodology used in the ACSI. A positive and significant relationship between customer satisfaction results using the NCQR methodology and the performance of the companies using it was found by Fornell and Bryant (1997). These include a significant and positive relationship between the ACSI result and market-to-book values and price/earnings ratios. There is also a negative relationship between ACSI and risk measures implying that firms with high loyalty and customer satisfaction have stronger financial positions and less variability (Fornell and Bryant, 1997).

Since the ACSI has been released, high rating ACSI and SCSB firms have out-performed the stock market average. Further economic validity of the ACSI is shown by the statistically significant stock market following public releases of ACSI results in the USA. Since its release in 1994 the ACSI has predicted the stock market with precision (Fornell, Ittner and Larcker, 1995).

The World Quality Council, the peak quality body, after deliberating on methods by which quality could be measured across, dissimilar products, services and even nations,

in 1997, recommended that the member countries develop their own Customer Satisfaction measures based on the NCQR at the Business School of the University of Michigan. The NCQR methodology has been adopted by the USA, Sweden, Israel, Taiwan, South Korea and the European Union as the technique they have use to measure Customer Satisfaction (CFI, 2000; EOQ, 2000; Fornell, 2000).

3.3.4.3 The NCRQ methodology at the micro level

As mentioned in 2.4.5 the NCQR methodology can be customised for application at the micro or individual company level. This is done by conducting initial qualitative research by non directive interviews with customers and staff to determine the drivers of customer satisfaction and the economic consequences of that satisfaction that are unique to that company. From this a preliminary model of the customer satisfaction is constructed with the customer-generated drivers of satisfaction being grouped in to latent variables. These impact to various degrees onto the overall satisfaction. From the overall satisfaction are the economic consequences or outcomes of price tolerance and loyalty in terms of re-purchase and recommendation to others.

A survey produced from the model presents a statement generated from the customer interview and then asks for a response on a one to ten scale with a "don't know" option. In a similar way the respondent is questioned on their overall satisfaction with the product, how it compares with an ideal and how it has met their expectations. The respondents are then asked about their willingness to repurchase the product, recommend it to other and their price tolerance.

The data from the survey is analysed with a proprietary technique based on partial least squares (PLS). The resulting data gives estimates on a scale from 0 to 100 on the relationship between changes in driver scores and customer satisfaction and the relationship between changes in customer satisfaction and customer loyalty. The data also produces a performance rating for each of the drivers and their impact on customer satisfaction.

From the above information, it is possible to estimate the financial consequences of changes in the satisfaction drivers through factors such as quality initiatives. The drivers of satisfaction that have a low satisfaction rating and a high impact are those that have the greatest effect on customer satisfaction and hence repurchase, recommendation and price tolerance. The methodology then allows for the calculation of the effect a quality initiative would have on the value of the customer asset.

3.4 Conceptual Framework - Defining a Model's Components

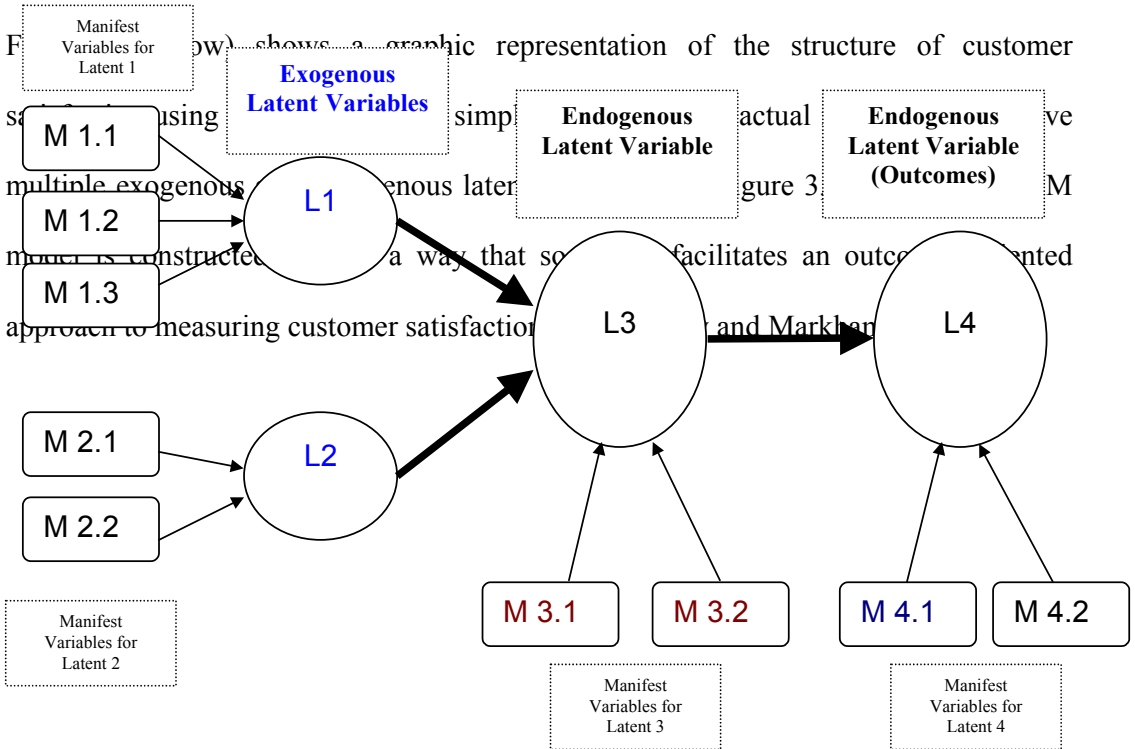
PLSM modelling, (refer to Fig. 2, p. 62) uses manifest and latent variables. A manifest variable is one that can be measured directly. A latent variable is inferred from a set of

manifest variables and can not be measured directly (Wittingslow and Markham, 1999). In a questionnaire each item measures a manifest variable. When processing the data these are grouped into latent variables. Customer satisfaction is an example of a latent variable that has to be measured by inference from a number of manifest variables (Wittingslow and Markham, 1999).

The concept of endogenous and exogenous variables is also utilised by PLSM modelling (Wittingslow and Markham, 1999). Exogenous variables are independent; they are not affected by changes in other latent variables. By comparison, endogenous variables are affected by changes in other latent variables. The definition of endogenous and exogenous can change depending on the perspective from which they are examined. In the two stage process of PLSM producing a customer satisfaction model, the latent variable for satisfaction is at first an endogenous variable, later when calculating outcomes, it is an exogenous variable (Wittingslow and Markham, 1999).

Figure 2 General structure of PLSM model (after Wittingslow and Markham, 1999)

3.4.1 The extension of PLSM into customer satisfaction research



The model displayed in figure 2 (p. 60) has three separate components:

1. ***L1* and *L2*** are the latent exogenous variables that influence overall satisfaction These each have satisfaction measures are generated from the PLSM calculations processing the associated manifest variables. For example, *M1.1*, *M1.2* and *M1.3* are the manifest variables that are used by the PLSM to produce the satisfaction value for *L1*. This calculated value is based upon the weighted average of manifest variables but are not a straightforward sum of the manifest scores. Each manifest variable represents the mean value for the customer response to a particular question

2. ***L3*** is the latent endogenous variable for overall satisfaction. It is this satisfaction score that can be used as an overall measure to benchmark with other organisations.

3. ***L4*** The latent endogenous variable(s) (only one shown for clarity) that measure(s) the outcomes from satisfaction. These outcomes are typically factors such as repurchase, reuse and recommendation.

Apart from producing a satisfaction score for each of the latent variables, a second value is estimated that describes the impact of the exogenous latent variables on the endogenous latent variables. For example this enables predictions to be made in regard to changes in overall satisfaction and hence outcomes with known changes to satisfaction with a given exogenous latent variable.

This study will test to see if the NCQR methodology for measuring customer satisfaction at the micro (or corporation) level is applicable to a section of the customers

of the MAS. The methodology used will be in line with that of the NCQR. It will measure the customer's level of customer satisfaction using the customer's model of customer satisfaction.

3.4.2 Conclusion

In summary, the definition of customer satisfaction that will be used in this research is as those perceptions that act on the decision process to reuse and resubscribe to the MAS. In the rest of the thesis, the NCQR methodology as described above in the last Section 3.3.4.3 (p. 58) will be applied. The following chapter will attempt to model satisfaction and successfully apply it to the MAS customer population.

4. Methods

4.1 Introduction

In the previous chapters, the definition of Customer Satisfaction has been discussed and a working definition suggested. The mathematical method for analysing the data has also been discussed. In this chapter the necessary methodology will be developed.

In this study, the National Centre for Quality Research (NCQR) methodology employing PLSM will be used. As discussed in chapter 3, the NCQR methodology utilising PLSM is arguably the leading method for measuring customer satisfaction and linking it to repurchase and reuse.

As mentioned in chapter 3, many methods have been used to measure customer satisfaction. Many customer satisfaction measures however are created without consideration of to their final use. In particular, they are not designed so that higher satisfaction levels produce higher scores and in turn higher scores predict greater financial performance (Fornell, Ittner and Larcker, 1995).

The two most popular methods are, Top Box and SERVQUAL. As discussed in chapter 2, they are affected by a number of major problems. The most important one of these for organisations is that they fail to provide insight into the determinants of customer

satisfaction which have the greatest influence on repurchase and price tolerance that lead to the highest economic returns.

The remainder of this chapter will discuss the design of the instrument in the thesis project and how it attempts to overcome the problems of the two most frequently utilised methodologies.

4.2 Parameters used in the study

4.2.1 Sample frame

The MAS management interviews were in December 1997 and January 1998. The data collection from the public was in October 1998. The geographic area of the study was that of Greater Melbourne and districts. This mirrors the coverage area for the MAS. The sample frame was those individuals who reside in the coverage area for the MAS.

4.2.2 Study groupings

Firstly, some terms must be defined.

Subscribers - Individuals who are covered by the subscription scheme. The subscription scheme is akin to insurance.

Health Care Card Holders (HCCH) - Individuals who hold a federal government issued Health Care Card and therefore are eligible for free ambulance transport. There are many specific groups entitled to free transport, unemployed and old age pensioners for example, but no attempt was made to study division within this particular grouping.

These two groupings were chosen to assess the difference in customer satisfaction between people who are paying an annual fee for a service and those who are not (neither group pays for each individual service.) Some old age pensioners also have a subscription to the MAS. The pensioners are aware that they get the service for free without subscribing, but tend to view it as a donation.

Both Subscribers and HCCH's receive the same service. Usually the MAS employee providing the service does not know if the customer is a subscriber or not until transport is initiated and the subscriber card or HCC is requested. All groups were drawn from the same geographic areas. All groups were sampled in the same time frame. Subscribers have to pay an annual fee to MAS (analogous to an insurance fee) for service unlike the HCCH customers. This requires the subscribers have to have an annual interaction with MAS subscription department, by telephone or mail, unlike the HCCH. This fact may increase the subscriber's involvement (Oliva, Oliver and Bearden, 1995) with the process. This is likely to increase importance the customer puts on the service. The involvement is likely to be high in any case, when calling for an ambulance, given the importance of the service provided to the customer. Possibly the subscribers have a greater expectation of the service. If as is claimed, the service is the same, they should therefore report a lower level of satisfaction (Bryant and Cha, 1996). The comparison for this may be confounded by the different socio-economic

values of the two groups as the HCCH respondents are by having the card, signify that they are, on average, from the lower socio-economic groups. This may effect their perception and hence satisfaction levels of the Service.

User - This category consists of individuals who have been attended to by MAS between one and six months ago. The one-month restriction was to ensure that the majority of customers would have recovered from the event that caused them to use MAS's services. The six-month time limit was to ensure the issues surrounding the service by MAS are still clear in their mind.

Non User - Individuals how have never called for, treated or transported by an ambulance.

The two definitions of *User* and *Non user* were chosen to make any effects on the satisfaction of customers after interaction with MAS clear.

The NCQR methodology demands a minimum of 200 individuals that share the same model of customer satisfaction to achieve acceptable confidence levels. Subgroups with a population as small as 50 can be analysed with validity (Fornell et al., 1996).

The above categories combine to form the following research study groupings. See Table 2 (p. 67).

Table 2 Research study groupings

	User	Non User
Subscribers	**Subscriber User** Subscribers that have used MAS in the last six months	**Subscriber Non User** Subscribers that have not used the MAS
Health Care Card Holders	**Health Care Card Holder User** Health Care Card Holders that have used MAS in the last six months	**Health Care Card Holder Non User** Health Care Card Holders that have not used the MAS

4.3 Data Collection Methods

Unstructured non-directive interviews were carried out on a number of MAS managers and on a small number of randomly selected individuals from each of the above study groups. The interview was recorded and notes were taken at the time to assist in exploring each issue. As soon as practicable after the conclusion of the interview the tape was replayed and with the assistance of the notes taken at the time, the items that were elicited from the issues they raised relevant to satisfaction recorded on to a computer file.

4.3.1 MAS management interviews

The senior manager assisting the research sent memos to all other senior managers in MAS explaining the research project and asking for their assistance in providing time for an interview. All that responded were interviewed.

The management personnel who volunteered were interviewed to understand the current issues, as viewed by relevant management personnel, and develop a knowledge of the environment in which MAS operates.

From the interviews a theoretical management model of customer satisfaction in the MAS was developed. See Figure 3 (p 69).

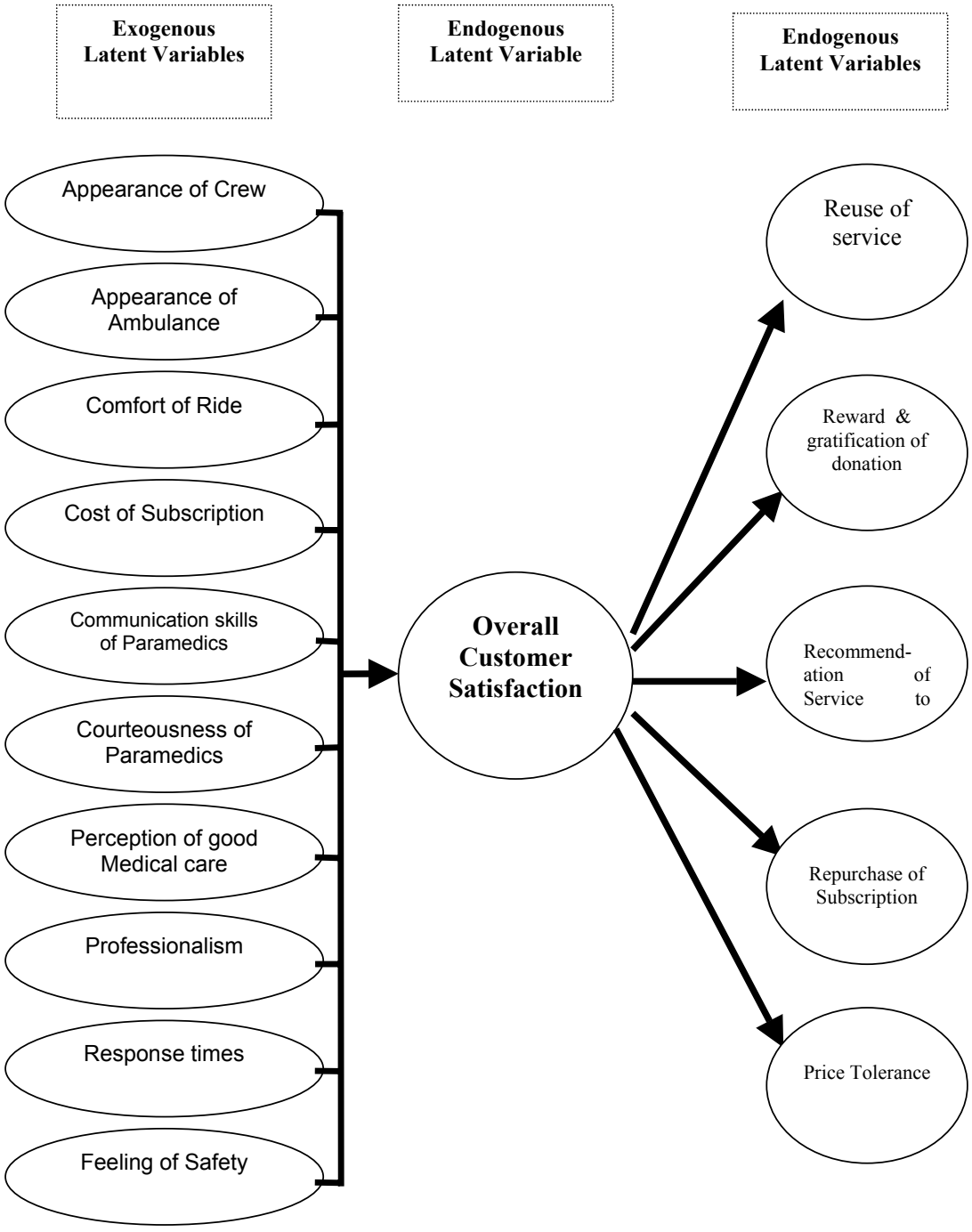


Figure 3 Management's theoretical model of customer satisfaction in the MAS

4.3.2 Customer interviews

For each of the four study groups, individuals were selected at random and interviewed using the non-directive interviewing method as described above, with the initial question being:

"*How do you see the MAS?*"

New subjects from each group are interviewed until no new factors influencing customer satisfaction are found for three subjects in a row. The total number of customer interviews was 19. Individual interviews have been used instead of focus groups. Focus groups tend to be dominated by one or two vocal individuals and hence produce skewed and biased results. Satisfaction and purchase decision are individual responses not the result of a group (Fornell, Ittner and Larcker, 1995).

4.3.3 Model building

The preliminary customer satisfaction model Figure 4 (p. 72), was built from the responses from the one on one qualitative non-directive interview. Each unique point that was raised by a customer was included in the model that was based on the generic model of customer satisfaction, as shown in Fig 2. (p. 62). These points were considered customer-generated drivers of satisfaction and are grouped on the basis of similarity into latent variables that impact to various degrees onto the overall satisfaction. Leading from the overall satisfaction is the economic consequences or outcomes of price tolerance and loyalty in terms of re-purchase and recommendation to

others. The manifest variables are in the boxes on the left while the rest of the diagram is in the same style as figure 3, The Managerial model (p.69).

The model prepared from the management interview (Figure 3) while similar, differs from that developed from the customers (Figure 4) in a number of areas. The model that was prepared from the customer interviews was the one used in the research.

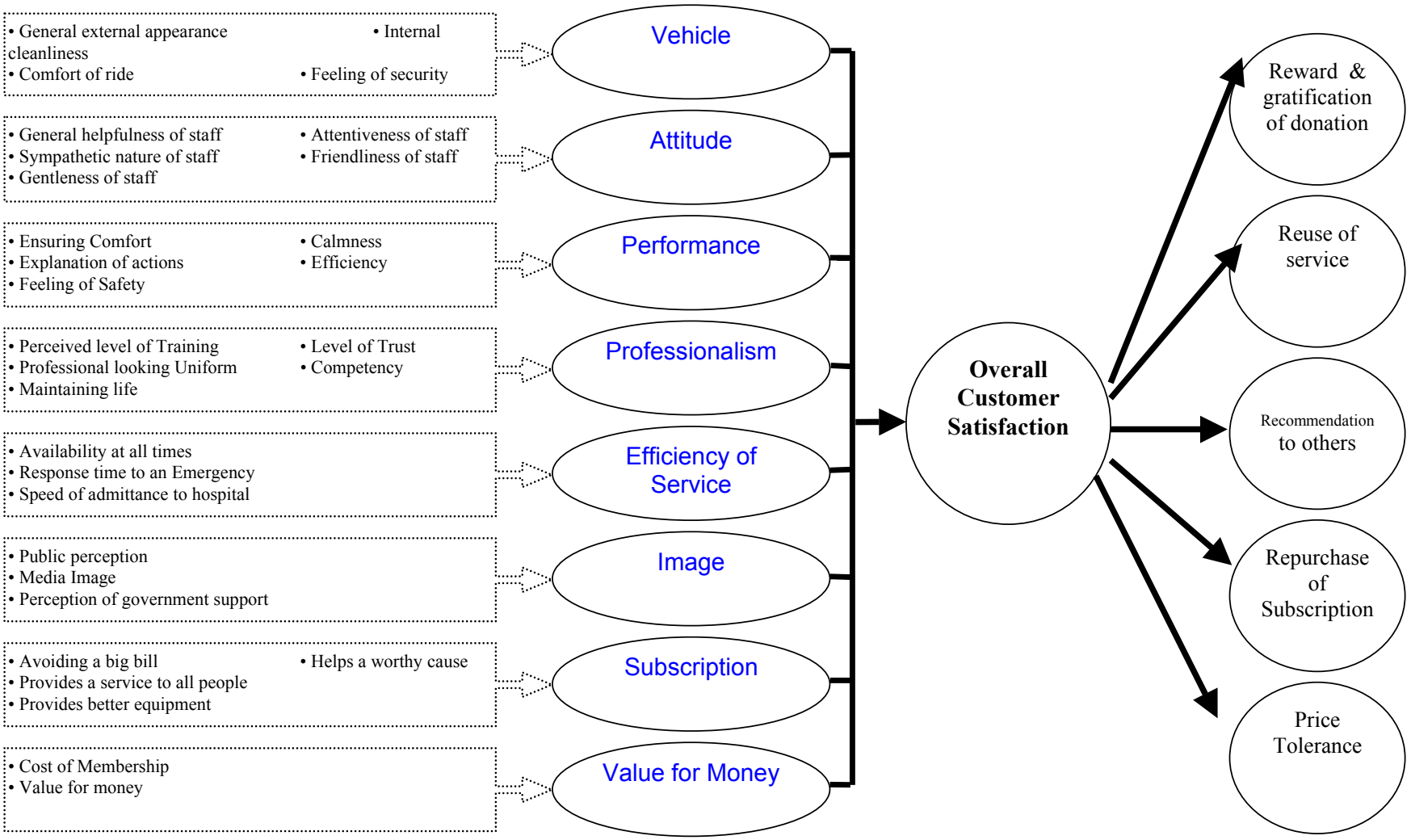


Figure 3 Preliminary model of customer satisfaction as seen by the customers of the MAS

4.3.4 Instrument design

The survey instrument was constructed from the content of the interviews with the MAS customers. Where possible the actual statements used by the customers were incorporated into the questions. The endogenous latent variables of *Overall Satisfaction*, *Reuse of service*, *Re-subscription*, *Recommendation of the service to others* and *Recommendation of subscription to others* were measured with extra questions.

The actual question was given as a statement, generated from the customer interview. The respondent was asked for a reply on a one to ten scale with an explicit "Don't Know" option. Demographic data about age, gender, home postcode and whether the respondent was a subscriber or held a health care card was then requested.

4.3.5 Field Survey

Recipients of Survey - MAS reports a return rate of approximately 50% to previous surveys (Roy, 1997). On that basis if was decided that the actual number of survey mailed out would need to be double the respondents needed.

One hundred individuals that fitted the criteria of each study groups, subscriber-user, subscriber-non-user and HCCH-user were randomly selected from the MAS database. The group that are Health Care Card holders and had not used the MAS did not appear on the MAS database. They were sampled by contacting the Victorian Aged Group and sampling via their database to get the required numbers of respondents. As this group

had no connection to MAS, a lower response rate was expected so one hundred and fifty surveys were mailed to this classification.

Those selected were sent by mail the same package consisting of, the questionnaire, two cover letters and a pre addressed mail back envelope. The first letter was from VUT explaining the survey and stressing the importance, independence and confidentiality of the research. A second letter was from MAS stating its support and interest in providing a better service to the public.

The next chapter will report on the findings and results of the methodology applied to the data collected from the questionaries.

5. Results

5.1 Response Rates

Response rates varied with the different groupings, subscribers were more likely to respond than Health Care Card Holders (HCCH). Individuals that had used MAS were more likely to reply than those that had not. See Table 3 (below).

Table 3 Response rates in the various groupings

Grouping	Questionaries sent out	Valid Responses	% Return
Subscriber that have used	100	80	80%
Subscriber that have not used	100	66	66%
All Subscribers	**200**	**146**	**73%**
HCCH that have used	100	59	59%
HCCH that have not used	150	50	30%
All HCCH	**250**	**109**	**44%**
ALL	**450**	**255**	**57%**

5.2 Final Model with Values

The final model is presented in Figure 5 (p. 76). It is similar in structure to the preliminary model of customer satisfaction generated from the interviews of customers shown in Fig 3 (p.72). This supported the decision to use the customer generated model. The differences between the preliminary and final model are discussed later in this section. The R^2 for Satisfaction is 0.66 indicating that the model fits the data well (Martensen et al., 1999).

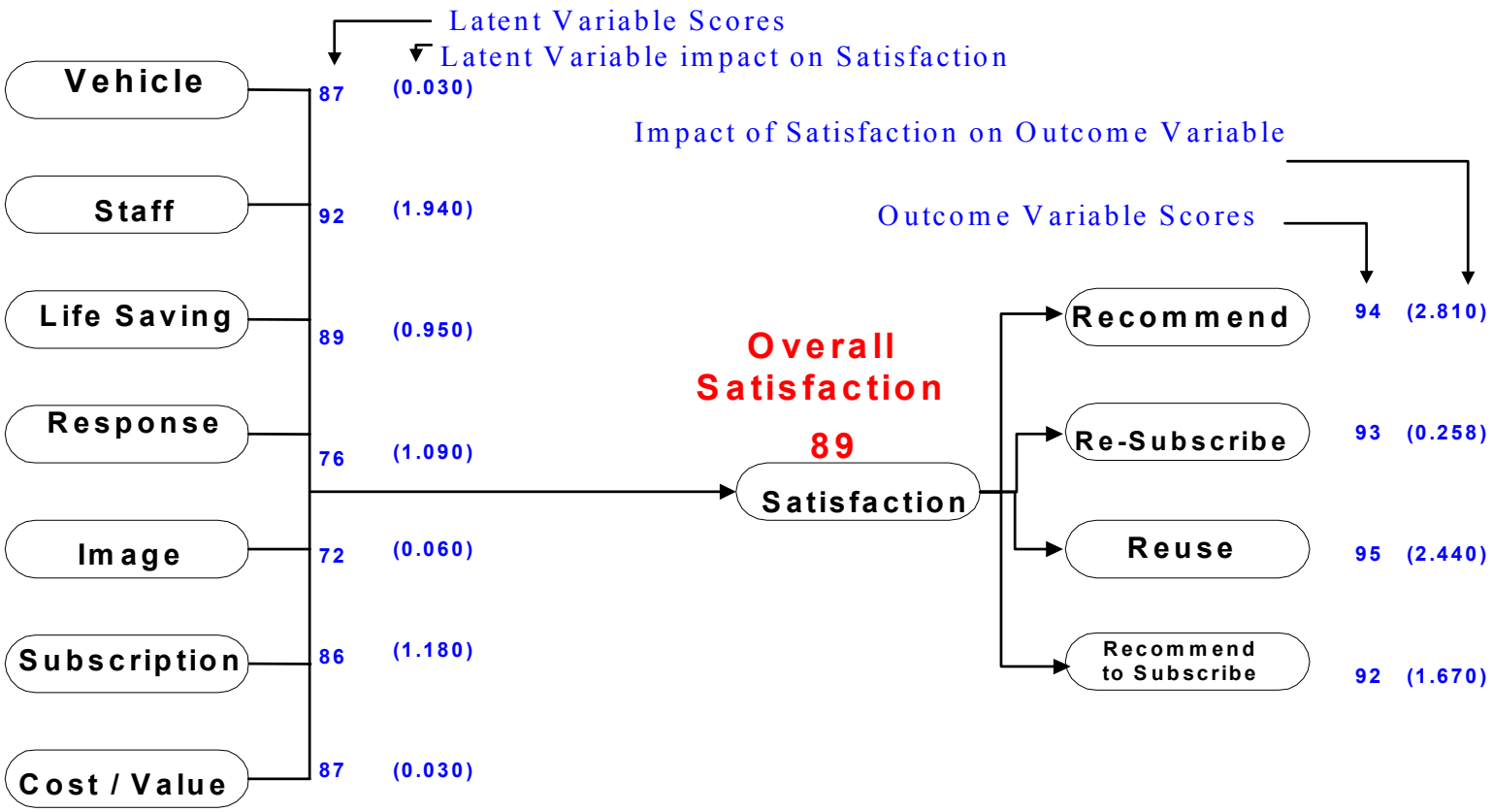


Figure 5 Final satisfaction model

There are three parts to the final satisfaction model (Figure 5, p. 76). Although they are interlinked, each part is measured separately in the questionnaire and statistically analysed independently.

On the left of the model are the latent variables, these are variables that cannot be measured directly and are inferred from variables that can be measured, the manifest variables. The labels for the latent variables (eg *Staff*) are arbitrary but are chosen to reflect the nature of the questions that make up the variable.

In the middle is the overall satisfaction latent variable. *Satisfaction* is an endogenous variable in that it is dependent on exogenous variables such as *Staff* and *Life Saving*. The satisfaction variable is the one used to compare various organisation and industry categories in the American Customer Satisfaction Index (ACSI). Current results of the ACSI for government bodies, with which this can be directly compared to, can be found at http://www.bus.umich.edu/research/nqrc/acsi.html. By comparison, Hospitals in the USA, as an industry sector rated 70 for the first quarter 1999. The lowest score was the Internal Revenue, which rated 51, and the highest was the US Mint, which rated 86 among coin collectors.

On the right hand side of the model are the outcomes, these are also known as endogenous variables. In this model, they relate to the likely hood of the customer to, *Recommend* the MAS to others, *Re-subscribe* to the MAS, *Reuse* the MAS, and *Recommend to Subscribe* to others.

The values to the immediate right of the outcomes are first the outcome variable scores and then the impact of satisfaction on outcome variables. The outcome variable scores are the probability of a customer performing a given act. Hence, *Recommend* (the MAS to others) scored 94. This means that the model predicts that there is a 94% chance that the customer will recommend MAS to others. *Re-subscribe* scored 93, *Reuse* rated 95 and *Recommend to Subscribe*, earned 92.

Next to the latent variables on the left side of the model are the latent variable satisfaction scores. These can be thought of as how the customer rated a particular variable. It can be seen that *Vehicle* rated 87 while *Staff* high scored with 92. *Life Saving* received 89, *Response* 76 while *Image* was rated lower with a score of 72. *Subscription* netted 86 and *Cost/Value* scored 87.

The latent variables also have impact scores associated with them; these are the figures in brackets. The "Impact on the Satisfaction" scores provide a prediction of the movement by five points in the score of the latent variable will have on overall satisfaction. For example, *Staff* has an impact rating of 1.940. Were *Staff* to change its satisfaction rating by 5 points and go from 92 to 97, the overall satisfaction would increase by 1.940 and hence go from 89 to 90.940 (which would be rounded to 91).

Other variables that had high impacts were *Subscription* with 1.180, *Response* with 1.090 and *Life Saving* with 0.960. Variables that had small impacts were *Image* with 0.060, *Vehicle* with 0.030 and *Cost/Value* with 0.030. Hence, a change in the *Staff* variable is predicted to have a significant effect on overall satisfaction while the same order of change to the *Image* variable is expected to have inconsequential effects.

The result of a change in the overall satisfaction value can be predicted by the Impact of Satisfaction on the Outcome variables. These scores are to the far right of the model and work in a similar way as the impacts on the latent variables. With these, it is a change of 5 points in the *Overall Customer Satisfaction* variable, the model predicts that the outcome variables will change by the impact value. So, if *Overall Customer Satisfaction* changed from 89 to 94, the *Recommend* variable will increase from 94 to 96.810. In practice, this would be then rounded to 97.

There are two main changes compared to the preliminary model presented in Chapter 4. Firstly, the variables now have values. This is as a result of the PLS modelling. Secondly, there are changes in the latent variables. The variables of *Attitude*, *Performance* and *Professionalism* suggested in the preliminary model have, in the final model, been replaced by the latent variables *Staff* and *Life Saving*. This is due to questions 6 - 16 and 18 -19 being closely related in the correlation matrix and grouped together under the latent variable of *Staff*. Question 17 and 20 were correlated and impacted on the latent variable of *Life Saving*. *Response* was produced from questions 21, 22, 23 and 26. *Image* was the product of question 24 and 25. Questions 30 to 32 impacted on *Subscription*. *Cost / Value* was the result of questions 27 and 28.

5.3 Descriptive Statistics on Total Sample

Table 4 Descriptive statistics on total sample

Q#	Customer Generated Statement	Min	Max	Mean	S.D	Median	N
1	General external appearance of ambulance	2	10	8.63	1.21	9	259
2	Internal cleanliness of ambulance	1	10	8.89	1.34	9	185
3	Comfort of ride in the ambulance	1	10	8.03	1.79	8	174
4	Feeling of security in ambulance	1	10	8.84	1.53	9	179
5	Adequacy of MAS equipment	3	10	8.91	1.28	9	157
6	General helpfulness of MAS staff	6	10	9.35	0.89	10	215
7	Attentiveness of MAS staff	3	10	9.20	1.07	10	213
8	Sympathetic nature of MAS staff	5	10	9.17	1.05	10	212
9	Friendliness of MAS staff	6	10	9.21	0.98	10	220
10	Gentleness of MAS staff	1	10	9.12	1.23	10	210
11	Ensuring patient comfort	6	10	9.15	1.06	10	209
12	Calmness of MAS staff	4	10	9.25	1.06	10	213
13	Level of explanation of ambulance officer's actions	4	10	8.69	1.30	9	187
14	Efficiency of MAS staff	5	10	9.08	1.02	9	206
15	Feeling of safety when the ambulance officers arrived	5	10	9.29	1.01	10	204
16	Perceived level of training of MAS staff	2	10	8.95	1.16	9	217
17	Professional look of the MAS uniform	2	10	8.77	1.30	9	253
18	Level of trust in the MAS officers	6	10	9.27	0.93	10	243
19	Level of competency of ambulance officers	3	10	9.15	1.00	9	222

20	Probability of MAS officers keeping me alive until I reached a hospital	4	10	9.07	1.13	9	202
21	Availability of an ambulance at all times	1	10	7.87	1.92	8	224
22	Response time of ambulance to an emergency	1	10	8.10	1.87	8	221
23	Speed of admittance to hospital	1	10	8.14	1.85	8	197
24	Public perception of MAS	1	10	7.74	1.55	8	229
25	Media image of MAS	1	10	6.72	2.01	7	231
26	Perception of Government support to MAS	1	10	5.57	2.35	5	225
27	Cost of membership to MAS subscription scheme	2	10	8.51	1.57	9	220
28	Value for money of MAS subscription scheme	4	10	8.86	1.38	9	208
29	Subscription is a way of avoiding a large bill	1	10	9.29	1.38	10	234
30	Subscription provides better equipment	1	10	8.36	2.03	9	202
31	Subscription provides a service to all people	1	10	8.45	2.13	9	211
32	Subscription helps a worthy cause	1	10	8.87	1.80	10	224
33	The MAS meets my idea of an ideal ambulance service	1	10	8.63	1.53	9	235
34	The MAS has met my expectations	5	10	9.06	1.19	9	215
35	My overall satisfaction with the MAS	4	10	8.94	1.14	9	241
36	My willingness to re-use the MAS	5	10	9.47	0.89	10	226
37	My willingness to recommend others use the MAS	6	10	9.39	0.90	10	244
38	My willingness to re-subscribe to the MAS	1	10	9.25	1.57	10	216
39	My willingness to recommend others subscribe to the MAS	1	10	9.25	1.29	10	232
40	My willingness to re-subscribe to the Metropolitan Ambulance Service if the price increased $5 to $40 for singles and $10 to $80 for families	1	10	7.82	2.61	9	214

Above is Table 5 showing descriptive statistics on questionnaire responses for the total sample. The *Q#* denotes the question number in the survey. *Customer Generated Statements* are as they appear on the questionnaire. The *Min* and *Max* are the lowest and highest scores recorded for a given statement by all respondents. *Mean* is the adjusted geometric average of all responses for that statement. *S.D.* is the Standard Deviation of all responses for that statement. *N* is the number of valid responses to the statement.

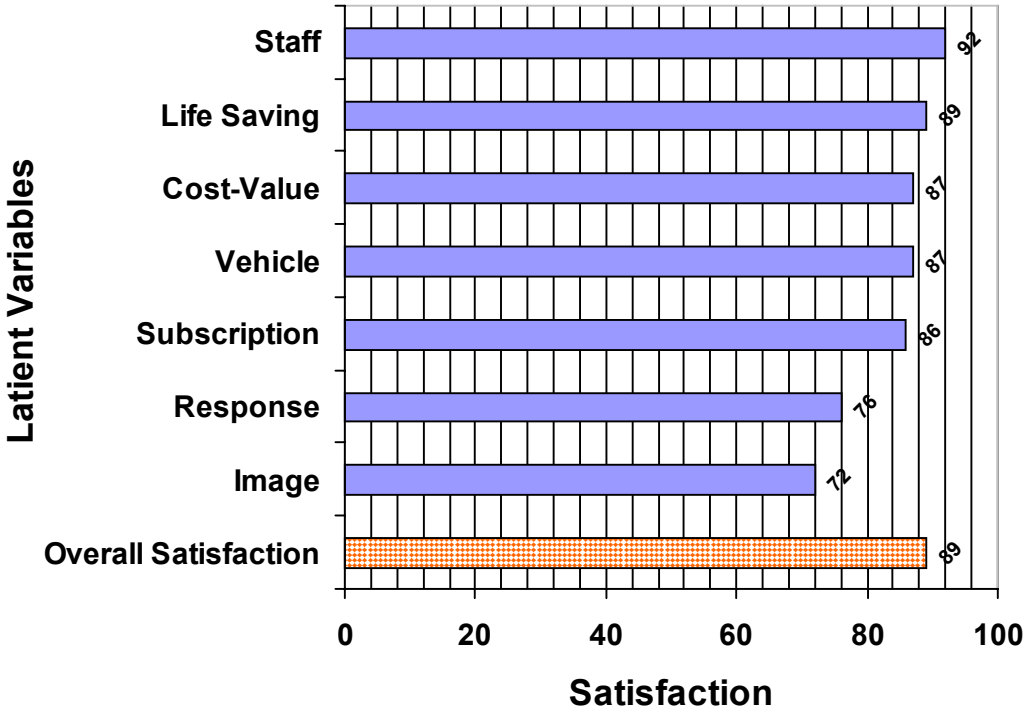


Figure 6 Customer satifaction with latent variables and overall satisfaction

5.4 Quality Component Scores -Satisfaction and Impact

The above Figure 6 shows the Satisfaction scores for the latent variables and overall satisfaction for the total sample. The latent variable of *Staff* had the highest score of 92. This was followed by *Life saving* on 89. The latent variable of *Cost-Value* and *Vehicle* both scored 87, followed by *Subscription* on 86. *Response* rated 76 while *Image* was the lowest with 71. *Overall satisfaction* scored 89.

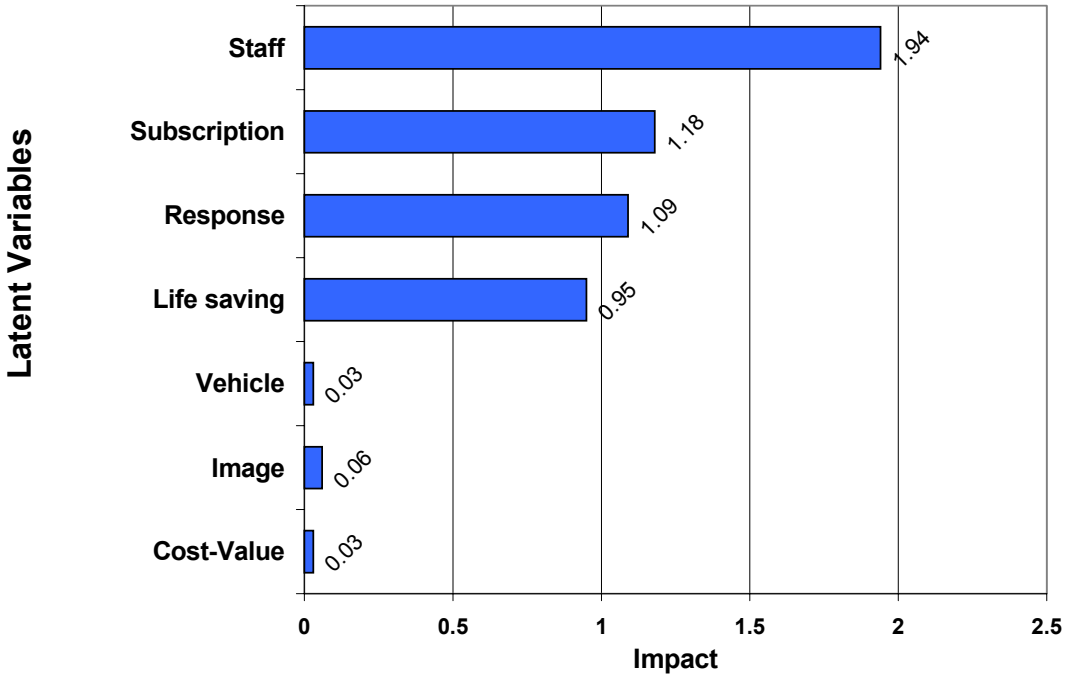


Figure 7 Latent variable impact scores

The above figure 7, shows the impact scores of the latent variables. As discussed in 5.1, (p. 75) these scores give a prediction of the effect the movement by five points in the score of the latent variable will have on overall satisfaction. Latent variables that have an impact score around 0.7 or greater are regarded as significant.

The impacts in this study appear to be distributed into three groups:

- **Very low impact**. The latent variables of *Vehicle*, *Image* and *Cost-Value* were found to have very low impact with scores in the 0.03 - 0.06 range. Even large changes in the satisfaction rating of these variable would have little effect on the predicted overall satisfaction rating.

- **Significant impact**. *Subscription*, *Response* and *Life saving*, scored in the 0.95 to 1.18 range thus a change in one of these would mean a important change in the predicted overall satisfaction rating.

- **Very Significant impact**. The highest impact score by far was *Staff,* with 1.94, almost double that of the next largest. The predicted overall satisfaction rating would be most sensitive to a change in the satisfaction rating of *Staff*.

The impact and satisfaction score for each of the latent variables may be combined together to form a satisfaction / impact matrix as in Figure 8 below.

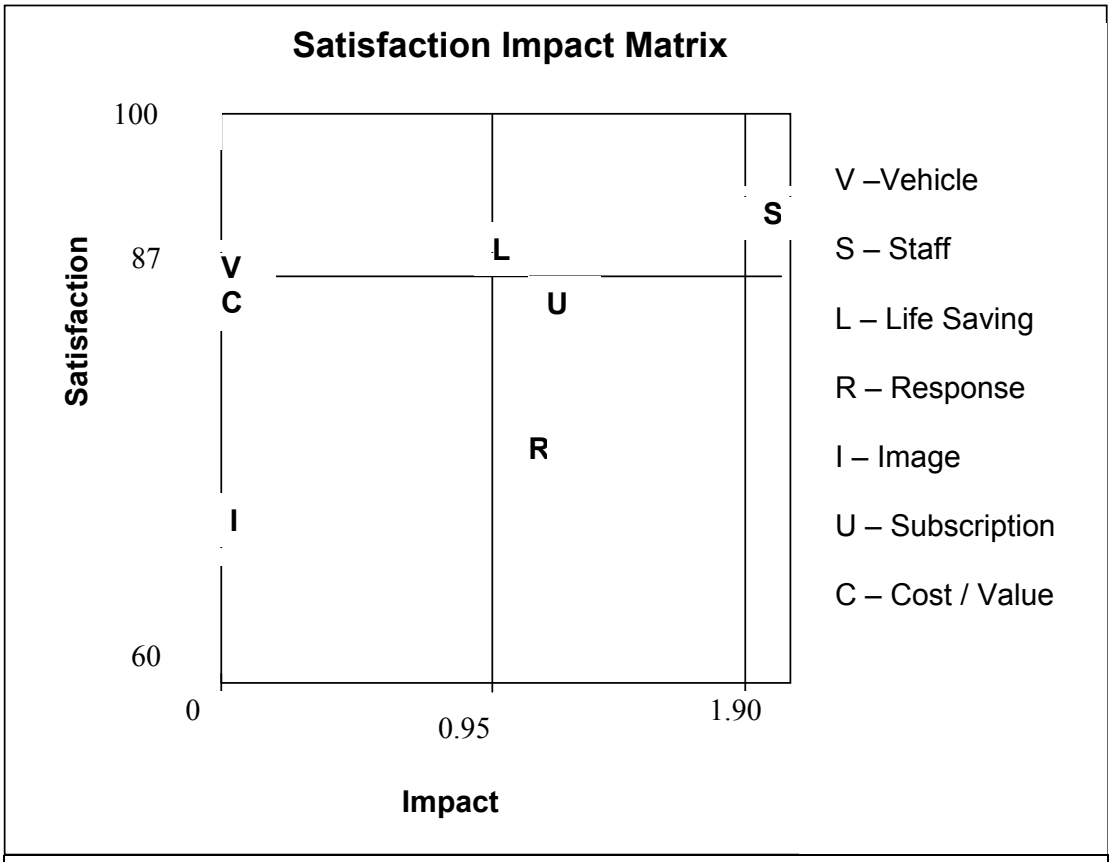


Fig 8 Satisfaction impact matrix

Practitioners tend to use the middle value of the range of the results to set the cross hairs of the graph. In this study, the median value for satisfaction was 87 and the median for impact was 0.95. The Latent Variables *Cost / Value* and *Vehicle* have the same values for satisfaction and impact. The symbols representing the two latent variables are drawn slightly apart for clarity.

Low Impact Maintain	**High impact Maintain**
Cost/Value, Vehicle	Staff, Life Saving,
Low Impact Needs Improvement	**High impact Needs Improvement**
Image	Response, Subscription

Fig 9 Priority matrix.

The above Priority Matrix Figure 9 is produced from the Figure 8 (p.87) Satisfaction impact matrix. It is used by an organisation as a way of setting priorities for efforts to improve overall satisfaction. In any organisation, time and funding are finite, therefore a system for choosing where to focus efforts at improving the overall satisfaction rating. The Priority matrix is often used by organisations to make clear where they should focus their efforts at improving overall satisfaction.

The upper left box has latent variables that have low impacts and high satisfaction, these issues should be maintained but this is not the most efficient area to focus improvement efforts. The upper right box contains latent variables that have high impacts and high satisfaction; it is even more important these are maintained but there may be less of an opportunity for improvement compared to the next two categories. The lower left box has a variable that has low impact and low satisfaction. This grouping needs improvement but because of the low impact, little effect is predicted with changes in the satisfaction of these variables. The lower right box has the variables of *Response* and *Subscription.* These require the greatest investigation and action because of the potential for maximum increase in overall satisfaction from improvements with these variables.

5.5 Satisfaction for Various Subgroups

In the following tables, the satisfaction scores for the Latent and Outcome Variables and overall Satisfaction are compared between different subgroups of the sample. Overall, the various groups tend to be fairly uniform in the way they rated the service. Subgroup population sizes when n = 50 or greater produce statistically significant results. The PLS methodology produces ratings in such a way that differences of more than 2 between the subgroups is significant at the 0.05 level, these marked with "*". 5 points or more are marked "**" while 10 points or more difference are marked with "***".

Table 5 Subscribers compared to health care card holders (HCCH)

Variables	All MAS Subscribers n = 146	All HCCH n = 107
Vehicle	86	88
Staff	91	92
Life Saving	88	90
Response**	73	78
Subscription*	87	83
Cost/Value*	88	84
Image**	69	75
OVERALL SATISFACTION	**88**	**90**
Re - Use	95	94
Recommend	94	94
Re-subscribe***	95	85
Recommend to Re-subscribe*	94	89

Table 6 (p. 89) compares MAS subscribers to health care card holders (HCCH). No significant difference was found in the way the two groups rated, *Overall satisfaction*, *Vehicle*, *Staff*, *Life Saving*, *Re - Use* or *Recommend*. The largest difference was found with the intention to Re-subscribe with subscribers rating it 10 points higher. Other significant differences, more than 2 but less than 10, included subscribers scoring *Recommend to Re-subscribe* 6 points higher than HCCH respondents did. Subscribers were more satisfied with *Subscription* and *Cost/Value*. HCCH respondents recorded significantly higher satisfaction scores with the latent variables *Response* and *Image*.

Table 6 Subscribers that have used the MAS compared with those that have not used the MAS

Variables	MAS Subscribers Who have used n = 80	MAS Subscribers Who have never used n = 66
Vehicle	86	86
Staff**	92	88
Life Saving***	89	68
Response*	75	68
Subscription	87	87
Cost/Value*	90	83
Image	70	68
OVERALL SATISFACTION	**89**	**90**
Re – Use*	96	90
Recommend*	96	89
Re-subscribe*	97	92
Recommend to Re-subscribe*	96	90

Table 7 above compares MAS subscribes that have used the Ambulance services with those that have not. The scores *for Overall Satisfaction* were not significantly different between the two groups, (89 c.f. 90). The two groups rated *Vehicle* and *Subscription* the same and the rating for *Image* was not significantly different. Yet, *Staff* was rated significantly higher in the group that had used MAS. They also assessed *Response* and *Cost/Value* to be very significantly higher. The biggest difference was the *Life Saving* variable, which was **much** more highly rated by the subscribers that had used,

compared to those that had not (89 c.f. 68), a difference of 21 points. Notably all the outcome variables were at least 5 points higher in the group that had used the ambulance.

Table 7 Health care card holders (HCCH) that have used the MAS compared to those that have not used the MAS

Variables	HCCH Who have used MAS n = 59	HCCH Who have never used MAS n = 50
Vehicle	88	86
Staff	92	92
Life Saving	90	90
Response	79	77
Subscription	82	83
Cost/Value	84	84
Image	76	75
OVERALL SATISFACTION	**90**	**90**
Re - Use	95	93
Recommend	94	93
Re-subscribe**	87	82
Recommend to Re-subscribe	90	88

Table 8, above, compares Health Care Card Holders that have used ambulance services with those that have not. The only significant difference between the two groups is that those that have used ambulance are more likely to re-subscribe. The homogeneity of

the two groups of HCC holders contrasts sharply with the large differences found in the subscribers groups in Table 4.

Table 8 Respondents that have never used MAS compared to those that have used once or twice and those that have more than twice

Variables	Never Used MAS n = 95	Called or used MAS once or twice n = 99	Used MAS more than twice n = 69
Vehicle	87	87	87
Staff	91	91	92
Life Saving**	88	90	91
Response**	73	77	77
Subscription	85	86	85
Cost/Value**	84	88	90
Image**	72	73	71
OVERALL SATISFACTION*	**86**	**89**	**91**
Re-Use*	91	95	97
Recommend*	91	95	96
Re-subscribe*	88	95	94
Recommend to Re-subscribe*	89	94	94

Table 9 above, compares groups that have either, not used, used one or twice, or used MAS more than twice. The groupings were constructed in this way to investigate the MAS belief that (a) most people only call MAS one or twice in their lifetime and (b)

that patients who make multiple trips via ambulance, often referred to colloquially by paramedics as "frequent fliers", are different to other customers.

Overall there seems to be a correlation between increasing use of Ambulance services and increasing satisfaction score both overall and individual variables. However, the differences are generally largest between the non-user group and the two groups that have used.

5.5.1 Summary of overall trends between the subgroups

Overall Satisfaction is similar in all groups. HCCH satisfaction ratings do not change depending on usage. Subscribers who have used MAS show a strong positive trend in their satisfaction with latent and outcome variables. Subscribers have a higher satisfaction with *Subscription* and *Cost/Value* compared to HCCH. HCCH are less likely than subscribers to state that will subscribe or recommend subscription.

5.6 *t* - test Results on Satisfaction and Outcomes

Table 9 *t*-tests on outcome variables

#	Statement	Subscribers		Health Care Card Holders		*t*	Degrees of Freedom	Exact probability
		Mean	S.D.	Mean	S.D.			
29	Subscription is a way of avoiding a large bill	9.476	0.915	8.910	1.962	2.900	220	0.0044**
30	Subscription provides better equipment	8.542	1.798	7.929	2.332	2.016	189	0.0425*
31	Subscription provides a service to all people	8.515	2.083	8.149	2.300	1.124	198	0.2612
32	Subscription helps a worthy cause	8.971	1.639	8.620	2.065	1.340	210	0.1784
33	The MAS meets my idea of an ideal ambulance service	8.430	1.628	8.824	1.380	1.872	218	0.0592
34	The MAS has met my expectations	8.948	1.324	9.188	0.976	1.407	199	0.1574
35	My overall satisfaction with the MAS	8.853	1.227	9.021	1.015	1.090	225	0.2762
36	My willingness to re-use the MAS	9.492	0.828	9.443	0.952	0.395	211	0.6958
37	My willingness to recommend others use the MAS	9.406	0.910	9.351	0.862	0.465	229	0.6475
38	My willingness to re-subscribe to the MAS	9.539	0.821	8.525	2.506	4.281	201	0.0001**
39	My willingness to recommend others subscribe to the MAS	9.445	0.935	8.889	1.714	3.084	217	0.0027**

"*" Indicates significant at 0.05 level. "**" Indicates significance at 0.01 level.

In table 10 above, the *t*-test values for the outcome variables are show. The *t*-tests are evaluating the all subscribers and all health care card holders groupings. The *t*-test found significant difference at the 0.01 level for the statement (29) *Subscription is a way of avoiding a large bill*. Question (30), *Subscription provides better equipment*, was found to be significantly different at the 0.05 level. Question (33), *The MAS meets*

my idea of an ideal ambulance service, was close to significance with a probability of 0.0592. Question (38), *My willingness to resubscribe to the MAS* was very significantly different with a 0.0001 probability. *My willingness to recommend others subscribe to the MAS*, question (39), was different at the 0.01 significance level.

5.7 ANOVA's on Satisfaction and Outcome Variables

Table 10 ANOVA's on satisfaction and outcome variables
"*" Indicates significant at the 0.05 level. "" Indicates significance at the 0.01 level.**

		Subscribers		Health Care Card Holders		F-Ratio	Degrees of Freedom	Probability
		1 Used	2 Never Used	3 Used	4 Never Used			
#	Statement	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.			
29	Subscription is a way of avoiding a large bill	9.160 1.43	9.320 0.89	9.42 1.53	9.29 1.32	0.430	229	0.7320
30	Subscription provides better equipment	8.557 1.226	8.353 1.185	8.483 1.932	8.280 2.490	0.158	197	0.9242
31	Subscription provides a service to all people	8.515 1.959	8.053 2.089	8.446 2.287	8.444 2.208	0.229	205	0.8767
32	Subscription helps a worthy cause	8.733 1.784	8.263 1.742	9.114 1.703	8.893 1.924	1.279	219	0.2818
33	The MAS meets my idea of an ideal ambulance service	8.419 1.443	8.059 1.259	8.789 1.373	8.761 1.805	1.641	228	0.1791
34	The MAS has met my expectations	8.860 1.217	8.688 0.982	9.081 1.160	9.246 1.221	1.555	208	0.2001
35	My overall satisfaction with the MAS	8.557 1.226	8.706 0.956	9.114 0.993	9.159 1.175	4.423	234	0.0051**
36	My willingness to re-use the MAS	9.131 1.078	9.563 0.864	9.493 0.900	9.710 0.541	4.926	220	0.0029**
37	My willingness to recommend others use the MAS	9.065 1.073	9.353 0.904	9.513 0.803	9.618 0.642	5.574	237	0.0014**
38	My willingness to re-subscribe to the MAS	8.803 1.963	9.500 0.833	9.452 1.228	9.400 1.579	2.496	211	0.0597
39	My willingness to recommend others subscribe to the MAS	8.907 1.416	9.500 0.764	9.384 1.299	9.426 1.194	2.637	226	0.0495*

Table 8. (p.97), shows the ANOVAs for the satisfaction and outcome variables. Significant difference at the 0.01 level was found in outcome (35), *My overall satisfaction with the MAS*. Outcomes (36), *My willingness to re-use the MAS*, and (37), *My willingness to recommend others use the MAS*, were also found to be significant at the 0.01 level. Outcome (39), *My willingness to recommend others subscribe to the MAS*, was significant at the 0.05 level.

6. Discussion

In this the final chapter the results which would be found in conventional satisfaction surveys are discussed and compared to the PLS results found in the survey of MAS clients. Finally the chapter will briefly outline issues which would need to be included in a further development of the use of the PLS methodology.

In this section the application of the traditional statistics and partial least square modelling outlined in chapter 5, will be discussed.

6.1 Conventional Statistics Results

As discussed in section 3.3.3 (p. 52), the data produced by the satisfaction studies is frequently skewed and therefore inappropriate for parametric statistical methods. In this study, the data for most of the variables was found to have large negative skewed values and high kurtosis. Partial Least Squares Modelling (PLSM) is claimed to be superior to other methods in satisfaction research as it can also effectively deal with relatively small sample sizes, high level of "noise" in the data and a large model with many variables. Reported customer satisfaction surveys, however, have traditionally employed statistical methods of descriptive statistics such as mean and standard deviation and also the more complex computations such as *t*-tests and Analysis of Variance (ANOVA). To examine the differences between the results obtained by PLSM and the conventional statistical methods, both were included in chapter 5, they will be discussed below.

The conventional statistical results appeared in Chapter 5, table 5 (p. 80) for the descriptive statistics, table 10 for the *t*-test (p. 94) and table 11 (p. 96) for the ANOVA to give a basis from which to compare the PLSM results in figures 5 to 9 and tables 4 to 9.

6.1.1 *t*-tests

As might be expected given the difference in payment for the MAS services the subscribers and HCCH were found to give significantly different answers to some of the satisfaction and outcome statements. In the satisfaction statements, (29) "*Subscription is a way of avoiding a large bill"* and (30) *"Subscription provides better equipment"*, the non membership paying HCCH participants agreed significantly less with the statement than membership paying subscribers. The health care card holders received the same free service as the subscribers without having to pay an annual fee. As would be expected a percentage of the HCCHs disagreed that subscription was a way of them avoiding a large bill. A similar explanation would hold for statement 30. Significant differences were not found between the groups for the altruistic statements 31 and 32 that relate to providing a service to all and helping a worthy cause.

The satisfaction statement 33, "*The MAS meets my idea of an ideal ambulance service*", was close to being significant at the 0.05 level ($p = 0.0592$). Interestingly it was the HCCHs that had the higher mean score. This suggests that subscribers were less satisfied than HCCHs with the MAS. Given that the same level of service was provided to both groups this suggests that either the subscribers were expecting more or the

HCCH participants, because of their personal histories, had a greater appreciation of the life saving capacity of the MAS.

The statement (38), "*my willingness to re-subscribe to the MAS"*, produced a very significant difference between the groups, (p = 0.0001). This is understandable, as the HCCHs have no need to resubscribe as they receive the service free of charge. The statement (39) "*My willingness to recommend others subscribe to the MAS"* also produced a significant difference (p=0.0027). The HCCHs were less willing to recommend. As they were more likely to have friends and relatives who were health care card holders, they would have had less opportunity to recommend the service to people who could subscribe to the MAS.

6.1.2 Analysis of variance

The analysis of variance found a highly significant difference (p=0.0051) with overall satisfaction between the groups. This was not found using the *t*-test.

Re-use and recommendation to re-use were also found to be significantly different with health care card holders more likely to reuse and recommend the service. Subscribers that had used MAS were significantly more likely to recommend others to re-subscribe. This was similar to the findings with the *t*-test.

Contact with the service significantly increased the positive perception of the service and its likelihood of being recommended.

6.2 Partial Least Square Results

The overall satisfaction with MAS, among subscribers and health care cardholders as a whole, rated 89 satisfaction points. This is a very high score. Unfortunately, no other ambulance services have been publicly reported using the method. However the MAS results could be compared with USA values, that reports an industry average for hospitals (Fornell, 2000) of 70 and a 70.4 average for all services industries. Amongst service companies, Federal Express was the top scorer with 83. The top federal government agency was NASA, which was rated 86 by educators participating in their programs (Fornell, 2000).

6.3 Comparison with other Medical Satisfaction Studies

Comparing the MAS results with those from other ambulance services is difficult due to the differences in methodology. Patterson's (1996) survey of the Queensland Ambulance Service is not directly comparable to the MAS PLS results, due to her using the top-box method. She reported that 80% of respondents rated QAS as excellent and 17% as good. The NWR–ASV 's (1999) survey results of 99% satisfaction are even harder to compare due to the use of just a "yes-no" option. Perhaps they can be compared on a qualitative basis, rather than being able to directly compare them with this study's results. The data suggest that ambulance services in Australia are rated very highly by their users.

Cohen, Forbes and Garraway (1996) reported that customers tend to score their satisfaction with health services in a hysteretic method where by such an organisation

achieved high satisfaction scores over a range of high to moderate performance. When the heath service functioned poorly, they were rated as performing very badly. They then continued to score very low until the health service was back to a high quality state. Berry (1995) suggested that customers were less tolerant for services that were vital to their financial security or health, such as insurance and health-care. MAS and its subscription scheme have aspects of both. Quint and Fergusson, in their 1997 report into Victorian Hospitals stated that patients tended to give very high ratings to a hospital in overall terms, although some specific issues did not rate highly. While the scores were obtained by Quint and Fergusson (1997) used the "top box method" parallels can be drawn in *Image* and *Response.* They were two of the lower scoring latent variables in the PLS results.

6.4 Latent Variables and Impacts

The Latent Variable *Staff* had the highest impact and the highest value. This is the major factor in the high overall score. *Staff's* high impact is not unsurprising. MAS is a service organisation. The MAS staff member with whom the customer deals with is the face of the organisation for that patient. Studies such as that by Williams and Calnan (1991) have shown that the most important aspect of a service organisation is staff interaction with the customer. However, the fact that *Staff* has around twice the impact of other latent variables such as *Response*, *Life Saving* or *Subscription* needs more exploration.

The Quint and Fergusson (1997) hospital study suggested that the key drivers of very high satisfaction are communication aspects (particularly at admission), compassionate,

reassuring attitude of all staff, courtesy of nurses and doctors and availability of medical staff. The key drivers concept can thought of as analogous to the impact value in the PLS methodology. Weinsing et al. (1998) found that patients, in general practice care, put high priorities on aspects such as "informativeness", "humaneness" and "competence /accuracy". Quint and Fergusson (1997) also found that "technical" skills of medical staff are assumed to be high, and it is the "personality" aspects of a hospital, which appear to play the greater role in patient satisfaction.

As previously discussed in chapter 2, the "black box" nature of paramedical services makes it difficult for customers to judge quality of the services, even after they have been performed. It is implied from the impact scores that the customers were basing their overall satisfaction more on issues that they could judge such as attitude or professional look of the uniform than on arguably more important but harder to evaluate issues such as quality of medical care.

While the clinical performance of ambulance paramedics has been the focus of attention (Baragwanath, 1997a), inadequate attention has been paid to the selection, training and monitoring of customer service aspects.

Staff, with a satisfaction rating of 92 and an impact of 1.940 was composed of a large number of high scoring questions. The lowest scoring was question (13), "*Level of explanation of ambulance officers' actions*" with 8.69. This result is still very high. The score is suggestive of a training need to ensure the paramedic explain the medical procedures being performed to the patient in language that they can understand. Question (16), "*Perceived level of training of MAS staff*", was also relatively low,

compared to the other questions, with 8.95. Given that the general public has little idea of the actual schooling, the score of this manifest variable may be marginally increased by a marketing campaign highlighting the university education of the Ambulance Paramedics.

The latent variable *Subscription* had the next highest impact (1.180) and a mid-range satisfaction score (86). The manifest variables that comprised *Subscription* were questions 29-32. The highest score, 9.29, was for Q29 "*Subscription is a way of avoiding a large bill*". This was followed by Q32 "*Subscription helps a worthy cause*" with a score of 8.87. Q31, "*Subscription provides a service to all people*" scored 8.45 while "*Subscription provides better equipment*" rated 8.37. The prime motivation appeared to be fiscal, while the more altruistic motives still scored well. While avoiding a large bill was the most important factor, providing better equipment, a service to all people, and helping a worthy cause were also strong motivational factors for subscription.

The high impact score of *Subscription* is, at first glance, inconsistent with Sing's (1990) finding that medical insurance was a very independent dimension from satisfaction with medical care. It seems that the subscription scheme is perceived as being part of MAS rather that just another form of insurance; hence the high level of support for the concept of paying subscription being analogous with a donation to a worthy cause.

Given the high satisfaction score of *Subscription*, it would appear that subscribers are generally happy with the current cost of membership. Comments written on the survey forms supported the contention that it was seen as a good value form of insurance.

However many saw it as a donation or a way to support a worthy cause. Some pensioners maintained their subscription even though they would have received a free service. From the data, *Subscription* is not price critical and could withstand a significant price increase without a large drop in subscription rates.

The latent variable *Response* had a high impact and a relatively low satisfaction score. It was composed of manifest variables 21, 22, 23 and 26. Q21, "*Availability of an ambulance at all times*", rated 7.87. Q22 "*Response time of ambulance to an emergency*" scored 8.10. Q23, "*Speed of admittance to hospital*" scored 8.14. Q26, "*Perception of Government support of MAS*", rated the lowest of all the manifest variables with 5.57. Q26 was not expected to be in the *Response* latent variable but modelling suggested that the customers perceived that government support, ambulance availability and response to be closely related. At the time of the data collection, a number of high profile cases involving long ambulance response times were featured in the mass media, although Baragwanath's (1997a) audit found that response times had progressively improved since the early 1990's. Waiting times at hospital was also an issue in the media at the time and this may of impacted on manifest variable Q23.

The *Life Saving* latent variable was composed of just two questions, Q17 "*Professional look of MAS uniform*" and Q20 "*Probability of MAS officers keeping me alive until I reached hospital*". Q17 scored 8.77 while Q20 scored 9.07. It was not obvious at the preliminary stage that these two questions were related, however, in the modelling they were correlated. These results support the discussion above that patients have little medical knowledge and are therefore unable to assess quality of care. A major way in

which customers judged the ability of paramedics to maintain life was by how professional they appeared.

The MAS currently has two basic version of the uniform. The older style is a typical dark blue shirt and trousers with shoulder badges while the newer uniform is the same colour overalls with large ambulance labels and reflective tape. The newer uniform was introduced mainly on occupational health and safety grounds. Given that medical skill is appeared to be judged by appearance of the uniform, further research needs to be done on the different uniforms impact on various sections of the MAS client base.

The latent variable *Image* had the lowest satisfaction score (72) and almost zero impact (0.060). An interpretation of this is that the respondents were media worldly, whilst they may receive media reports they do not necessarily believe them. *Image* consisted of just two questions. Q24, "*Public perception of MAS*" rated 7.74 while Q25, "*Media image of MAS*" scored 6.72. These are the second and third lowest rated items in the survey and combine to give the *Image* latent variable a comparatively low satisfaction rating. It should be noted that the data collection was carried out in a period of time just after a string of negative media reports concerning ambulance delays in responding to patients. However to put that in some perspective the rating of 72 for *Image* was higher than the American Customer Satisfaction Index, 2001 average for hospitals (68), hotels (71) and federal government agencies (69) (Fornell, 2001).

The low impact rating of *Image* also suggests that a media campaign just targeting the image of an ambulance service would have little effect on overall satisfaction. Such a

promotion, to be effective, would need to focus on the paramedics medical and interpersonal skills, ambulance availability and short response times.

The latent variable *Vehicle* with a satisfaction of 87 and an impact of 0.030 was calculated from manifest variables Q1 to Q5. These referred to aspects of the ambulance and to the adequacy of equipment in general. The lowest of these was, Q3 "comfort of ride in the ambulance". Ride comfort was one of a number of issues MAS managers commented on in the initial interviews referred to in chapter 4. If this variable score were to be significantly increased, the comfort of ride would be the first area to be investigated. However, because of the almost zero impact of *Vehicle*, this initiative would have an insignificant effect on predicted overall satisfaction.

The latent variable *Cost/Value* relates to the cost and value for money of the subscription scheme. Both manifest variables rated on the high eights, resulting in a high satisfaction rating of 87. As with *Vehicle*, the impact is virtually nil, 0.03. Given the high satisfaction rating of *Subscription*, the current cost of subscription does not seem to be price critical and could therefore withstand an increase in price without a predicted corresponding large drop in re-subscription.

6.5 Differences between Groups

Overall, satisfaction was similar in all groupings. The biggest variations were based on usage (see Table 9, p. 93). Those who had never used the MAS rated it at 86 overall while those that had used in more than twice scored it significantly higher at 91. In almost all the variables, there is a positive correlation between increasing use and a

higher satisfaction rating. This suggests that actual MAS performance was better than the a pori perception and expectation. To add weight to this argument, the rating of *Image* is lowest with those that used MAS the most. It is possible they were comparing the media image with their own experience and perceived a large gap, therefore rating *Image* lower as their esteem of MAS rose.

In Chapter 5, Table 6 (p. 89) compared HCCH and subscribers. Both groupings scored the overall satisfaction at similar levels however, the scores for the latent variables differed significantly. As would be expected the subscribers rated *Subscription*, *Cost/Value*, *Re-subscribe* and *Recommend to Re-subscribe* more highly than the HCCH who did not need to subscribe. HCCH would have had by definition a lower average income and hence the cost of subscription would have relatively greater. In addition, as stated previously HCCH participants received the service for free and did not need to subscribe, hence they were less likely to score a question regarding subscription highly.

In an analogous setting Quint and Fergusson's (1997), hospital study found there was no significant difference in the satisfaction levels of public and private patients. Unfortunately, they did not report the individual factors so a more thorough comparison cannot be made.

While Subscribers who have used MAS showed a strong positive trend in their satisfaction with latent and outcome variables, HCCH satisfaction ratings did not change significantly with usage. This is shown in table 7 (p. 91) and table 8, (p. 92). Fornell (2001) suggested that satisfaction varied depending on whether a customer was receiving a service or collecting earned benefits. Possibly it is that subscribers

perceived that the MAS was a service that they had chosen to use while HCCH participants believed that it was a service they are forced to use and as a result had a slightly different model of satisfaction.

Recent work using a finite mixture PLS approach (Hahn, Johnson and Herrmann, 2000) showed promise for capturing the heterogeneity that has been evident in this paper amongst the different groups of MAS customers. Indeed there may be segments in the MAS client population that have differing needs and priorities but are not easily described using traditional demographic values. More work needs to be done on the different requirements for satisfaction of the various segments of the MAS customer base.

6.6 Comparison of the PLSM and other Methods

All the different statistical methods employed in this paper agreed that the customers were highly satisfied the MAS. However, the information provided from the methods and what can be done with that information did differ. PLS provides additional insights over and above those provided by the traditional statistics of mean, median, t-tests and ANOVA. The major benefit is the predictive nature of PLS that enables the accurate targeting of quality to maximise customers satisfaction and repurchase.

The objective of most customer satisfaction surveys is to find which areas to target for improvement. The descriptive statistics found the lowest results to be in the areas regarding government support and media image of MAS. The PLS modelling suggested that these areas had little impact on the overall satisfaction and hence reuse

and recommendation. Even a significant increase in the satisfaction associated with these areas was predicted to have very little effect on overall satisfaction. Time and effort would have been better spent with factors that had high impact such as *Staff* or *Response*.

The *t*-tests found that subscribers and HCCH had differing satisfaction with issues regarding subscription. This is an unremarkable finding given the fundamental difference between the two groups is that one paid for a subscription and the other did not. The PLS modelling also found this differentiation but also provided a number of other insights that were not apparent from the traditional statistical methods. These included the importance of the interpersonal aspects of the staff above their medical skills and availability. The perceived correlation between life saving ability and professional appearance was unexpected.

Like the other statistics, ANOVA found differences between the groups regarding subscription issues. However, ANOVA found a significant difference between subscribers and HCCH with overall satisfaction and willingness to recommend to others that was not found in the *t*-test or PLS results.

Given the unsuitability of the parametric test to analyse satisfaction survey data, greater confidence should be placed in the PLS results.

Unlike traditional statistics, PLS provides explains variance in the endogenous variables and is able to cope with "noisy" data and complex models. PLS methodology predicts and provides managers with explicit benchmarks for evaluating performance. The

impact score in the PLS model provides information that managers need to make resource allocation decisions.

6.7 Acknowledged Weaknesses of the Study.

From a total mail out of 450, there were 265 returns as shown in Table 3 (p. 75). However, 10 respondents did not reveal their subscriber or use status leaving 255 valid responses for an overall valid return rate of 57%. Subscribers that have used had a good return rate of 80% while health care card holders that have not used only replied 30% of the time. As a result the finding for the subscribers are more likely to be accurate than the for health care card holders. Likewise, the results for users are likely to be more exact than for non users.

In common with most other mail out surveys, this process would select against those that were illiterate, non-English speaking or visually impaired. It is possible that some of the replies were from these groups but it is likely that they were under represented in the sample. People who were homeless or had changed address in the time from ambulance attendance and the survey being sent would also be under represented. Customers that had died would obviously not be able to reply to the survey but their relatives could and in at least two cases did respond. This was judged valid as these individuals were also considered customers.

A common problem with satisfaction studies is that the data is not normally distributed and hence commonly used statistics such as *t*-tests are inappropriate. The data in this study showed large negative values for skewing and high positive kurtosis values.

Question (35) dealing with "*My overall satisfaction with the MAS*" for example, had a skew of –1.24 and a kurtosis of 2.14, indicating a peaked asymmetric distribution highly skewed to the right. The inappropriateness of using parametric statistics is acknowledged but these methods were presented because they are in common use for such studies and enabled comparison to be made with the PLS technique.

6.8 Proposed MAS use of findings

The MAS would be able to utilise the findings of this thesis in a number of ways. As discussed previously they include benchmarking, key performance indicator, selection and training of staff and targeting of advertising.

The benchmarking of the result with other organisations would enable MAS to compare its satisfaction levels with that of many other organisations. An exchange of ideas may flow in both directions.

MAS could use customer satisfaction as a key performance indicator (KPI). Along with other KPI's such as response time and patient outcome, customer satisfaction would give a measure of the quality, efficiency and effectiveness of the ambulance service.

In the selection of staff to be employed by MAS, personality traits that correlate with the customer reporting high satisfaction may be selected for. It is suggested that a profile of an individual who is sympathetic, friendly, calm, trustworthy and has a professional "look" should be added to the existing criteria.

The results from this thesis should be made known to the staff of MAS through existing clinical update days. The findings should also be incorporated into the curriculum of the main training providers: Monash and Victoria Universities. A heightened awareness by the paramedic of what is important to an ambulance customer would better enable them to provide a more satisfying service.

Advertising for the ambulance subscription scheme should be targeted with the motivations discussed in this thesis in mind. They include the self-interested "avoiding a large bill" and the more altruistic "helping a worthy cause" or " providing a service for all". The customer generated statements behind the high impact variables such as *Staff*, *Life Saving* and *Response* should be emphasised in the advertising. These include processional look, good response times and availability of ambulances, level of training and compassionate nature of staff.

6.9 Conclusion

The paper showed that the PLS methodology can be successfully applied to the field of satisfaction measurement of the ambulance service customer. It also found the determinants of customer satisfaction in this field. It agreed with work by other researchers that aspects of staff are very important in service industries and that medical services are rated highly unless they are very poor. An unexpected insight was that perceived medical ability was strongly linked to the paramedic's professional appearance.

The model predicted that changes in the satisfaction rating of the *Staff* variable would have a significant effect on *Overall Satisfaction* and hence outcomes such as *Reuse* and

Re-subscription. It also predicted that the model was insensitive to changes in satisfaction with *Image*, *Cost* or *Equipment*.

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8. Appendix

Appendix I Research Questionnaire

Appendix II Correlation Matrix

8.1 Appendix I – Questionnaire

Confidential

Victoria University of Technology
Research Project into the satisfaction of Metropolitan Ambulance Service (MAS) customers.

Victoria University of Technology
Phone: 9248 1076

As a resident of Greater Melbourne you already have, or at some future time may need, the services of the Metropolitan Ambulance Service (MAS).

This survey has been designed to collect data on your thoughts and perceptions of the MAS.

You are not asked to identify yourself. Your response will be anonymous.

Answering the questions

After most questions there is a scale marked from 1 to 10.

Read each question and mark the position on the scale that is closest to what you think. You do this by putting a circle around that number. An example is:

Poor **Excellent**
1 2 3 4 5 6 7 (8) 9 10 DK

If a question does not apply to you, or if you cannot respond, the circle DK (Don't Know) category at the end of the scale:

Poor **Excellent**
1 2 3 4 5 6 7 8 9 10 (DK)

If you make a mistake when you are answering a question put a cross through the mistake and circle the number you meant to use.

Poor **Excellent**
1 2 3 4 5 X 7 (8) 9 10 DK

Consider each of the following statements and think about the Metropolitan Ambulance Service (MAS). Rate your response on the scale indicated.

		Poor									Excellent	
1	General external appearance of ambulance	1	2	3	4	5	6	7	8	9	10	DK
2	Internal cleanliness of ambulance	1	2	3	4	5	6	7	8	9	10	DK
3	Comfort of ride in the ambulance	1	2	3	4	5	6	7	8	9	10	DK
4	Feeling of security in ambulance	1	2	3	4	5	6	7	8	9	10	DK
5	Adequacy of MAS equipment	1	2	3	4	5	6	7	8	9	10	DK
6	General helpfulness of MAS staff	1	2	3	4	5	6	7	8	9	10	DK
7	Attentiveness of MAS staff	1	2	3	4	5	6	7	8	9	10	DK
8	Sympathetic nature of MAS staff	1	2	3	4	5	6	7	8	9	10	DK
9	Friendliness of MAS staff	1	2	3	4	5	6	7	8	9	10	DK
10	Gentleness of MAS staff	1	2	3	4	5	6	7	8	9	10	DK
11	Ensuring patient comfort	1	2	3	4	5	6	7	8	9	10	DK
12	Calmness of MAS staff	1	2	3	4	5	6	7	8	9	10	DK
13	Level of explanation of ambulance officer's actions	1	2	3	4	5	6	7	8	9	10	DK
14	Efficiency of MAS staff	1	2	3	4	5	6	7	8	9	10	DK
15	Feeling of safety when the ambulance officers arrived	1	2	3	4	5	6	7	8	9	10	DK
16	Perceived level of training of MAS staff	1	2	3	4	5	6	7	8	9	10	DK
17	Professional look of the MAS uniform	1	2	3	4	5	6	7	8	9	10	DK
18	Level of trust in the MAS officers	1	2	3	4	5	6	7	8	9	10	DK
19	Level of competency of ambulance officers	1	2	3	4	5	6	7	8	9	10	DK
20	Probability of MAS officers keeping me alive until I reached a hospital	1	2	3	4	5	6	7	8	9	10	DK
21	Availability of an ambulance at all times	1	2	3	4	5	6	7	8	9	10	DK
22	Response time of ambulance to an emergency	1	2	3	4	5	6	7	8	9	10	DK
23	Speed of admittance to hospital	1	2	3	4	5	6	7	8	9	10	DK
24	Public perception of MAS	1	2	3	4	5	6	7	8	9	10	DK
25	Media image of MAS	1	2	3	4	5	6	7	8	9	10	DK

26	Perception of Government support to MAS	1	2	3	4	5	6	7	8	9	10	DK
		Poor									**Excellent**	
27	Cost of membership to MAS subscription scheme	1	2	3	4	5	6	7	8	9	10	DK
28	Value for money of MAS subscription scheme	1	2	3	4	5	6	7	8	9	10	DK
		Strongly Disagree									**Strongly Agree**	
29	Subscription is a way of avoiding a large bill	1	2	3	4	5	6	7	8	9	10	DK
30	Subscription provides better equipment	1	2	3	4	5	6	7	8	9	10	DK
31	Subscription provides a service to all people	1	2	3	4	5	6	7	8	9	10	DK
32	Subscription helps a worthy cause	1	2	3	4	5	6	7	8	9	10	DK
33	The MAS meets my idea of an ideal ambulance service	1	2	3	4	5	6	7	8	9	10	DK
34	The MAS has met my expectations	1	2	3	4	5	6	7	8	9	10	DK
		Poor									**Excellent**	
35	My overall satisfaction with the MAS	1	2	3	4	5	6	7	8	9	10	DK
		Unwilling									**Very willing**	
36	My willingness to re-use the MAS	1	2	3	4	5	6	7	8	9	10	DK
37	My willingness to recommend others use the MAS	1	2	3	4	5	6	7	8	9	10	DK
38	My willingness to re-subscribe to the MAS	1	2	3	4	5	6	7	8	9	10	DK
39	My willingness to recommend others subscribe to the MAS	1	2	3	4	5	6	7	8	9	10	DK
40	My willingness to re-subscribe to the MAS if say the price increased by $5 to $40 for singles and $10 to $80 for families	1	2	3	4	5	6	7	8	9	10	DK

General Information

Please tick each question in the box that applies to you.

41 Gender

- Male ☐ 1
- Female ☐ 2

42 Age

- Less than 18 ☐ 1
- 18 – 24 ☐ 2
- 25 – 34 ☐ 3
- 35 – 49 ☐ 4
- 50 – 59 ☐ 5
- 60 or older ☐ 6

43 Suburb

Your Post code

☐☐☐☐

44 Payment Method

- Ambulance Subscriber ☐ 1
- Health Care Card Holder ☐ 2
- Private health insurance (with ambulance cover) ☐ 3
- None of the above ☐ 4

45 Have you <u>ever</u> used the MAS?

- Never ☐ 1
- Called an ambulance but not transported ☐ 2
- Transported by ambulance once or twice ☐ 3
- Transported by ambulance more than twice ☐ 4

46 When did you <u>last</u> use the MAS?

- Never ☐ 1
- More than five years ago ☐ 2
- Between five years and six months ago ☐ 3
- Less than six months ago ☐ 4

Are there any other comments you would like to make?

Thank you for completing this survey.

Please return the form as soon as possible.

8.2 Appendix II– Correlation Matrix

	1	2	3	4	5	6	7	8	9	10
Q 1	1.00	.	.	.	.	.	.	.	.	
Q 2	0.71	1.00	.	.	.	.	.	.	.	
Q 3	0.36	0.50	1.00	.	.	.	.	.	.	
Q 4	0.48	0.71	0.60	1.00	.	.	.	.	.	
Q 5	0.55	0.70	0.51	0.65	1.00	.	.	.	.	
Q 6	0.42	0.42	0.33	0.40	0.50	1.00	.	.	.	
Q 7	0.42	0.52	0.49	0.59	0.45	0.68	1.00	.	.	
Q 8	0.37	0.49	0.44	0.53	0.46	0.61	0.82	1.00	.	
Q 9	0.33	0.32	0.35	0.35	0.39	0.69	0.63	0.74	1.00	.
Q10	0.43	0.50	0.51	0.50	0.46	0.53	0.79	0.84	0.70	1.00
Q11	0.36	0.39	0.51	0.47	0.40	0.61	0.77	0.75	0.70	0.74
Q12	0.36	0.44	0.45	0.55	0.47	0.53	0.71	0.69	0.68	0.72
Q13	0.36	0.29	0.37	0.29	0.36	0.50	0.46	0.50	0.51	0.52
Q14	0.48	0.48	0.44	0.52	0.53	0.63	0.74	0.70	0.65	0.67
Q15	0.47	0.45	0.40	0.47	0.46	0.55	0.68	0.68	0.58	0.66
Q16	0.38	0.43	0.27	0.38	0.27	0.47	0.58	0.60	0.48	0.43
Q17	0.30	0.26	0.26	0.31	0.27	0.27	0.42	0.35	0.23	0.37
Q18	0.34	0.28	0.29	0.35	0.44	0.54	0.44	0.47	0.61	0.43
Q19	0.35	0.35	0.38	0.47	0.42	0.58	0.58	0.62	0.69	0.49
Q20	0.27	0.30	0.43	0.43	0.39	0.34	0.50	0.50	0.41	0.55
Q21	0.28	0.24	0.21	0.27	0.29	0.15	0.12	0.15	0.20	0.13
Q22	0.24	0.21	0.18	0.32	0.34	0.12	0.13	0.15	0.22	0.15
Q23	0.29	0.31	0.26	0.28	0.42	0.17	0.09	0.10	0.10	0.07
Q24	0.13	0.06	0.00	0.15	0.24	0.08	0.12	0.07	0.15	0.07
Q25	0.05	-0.00	0.11	0.14	0.13	0.05	0.17	0.07	0.07	0.12
Q26	0.19	0.20	0.20	0.23	0.12	0.11	0.13	0.10	0.11	0.16
Q27	0.22	0.10	0.03	0.07	0.23	0.18	0.15	0.15	0.20	0.10
Q28	0.28	0.18	0.11	0.14	0.31	0.22	0.18	0.19	0.26	0.15
Q29	0.02	0.04	0.06	0.06	0.11	0.19	0.12	0.09	0.14	0.07
Q30	0.20	0.33	0.16	0.32	0.28	0.24	0.25	0.22	0.20	0.19
Q31	0.23	0.28	0.11	0.30	0.20	0.24	0.20	0.22	0.16	0.13
Q32	0.20	0.22	0.16	0.24	0.14	0.33	0.29	0.31	0.29	0.22
Q33	0.43	0.50	0.38	0.55	0.44	0.37	0.45	0.42	0.37	0.44
Q34	0.37	0.31	0.35	0.37	0.34	0.47	0.53	0.49	0.49	0.52
Q35	0.33	0.26	0.26	0.26	0.35	0.45	0.38	0.35	0.40	0.35
Q36	0.20	0.13	0.11	0.12	0.21	0.29	0.26	0.27	0.39	0.20
Q37	0.23	0.14	0.16	0.16	0.26	0.36	0.30	0.31	0.41	0.26
Q38	0.04	0.02	0.01	0.05	0.13	0.16	0.13	0.18	0.24	0.12
Q39	0.03	0.01	-0.00	0.05	0.14	0.17	0.12	0.12	0.17	0.07
Q40	0.05	0.12	0.12	0.16	0.20	0.01	0.07	0.09	0.09	0.09

	11	12	13	14	15	16	17	18	19	20
Q11	1.00	.	.	.	.	.	.	.	.	
Q12	0.78	1.00	.	.	.	.	.	.	.	
Q13	0.48	0.47	1.00	.	.	.	.	.	.	
Q14	0.66	0.70	0.61	1.00	.	.	.	.	.	
Q15	0.61	0.63	0.50	0.74	1.00	.	.	.	.	
Q16	0.55	0.39	0.42	0.52	0.53	1.00	.	.	.	
Q17	0.34	0.28	0.37	0.42	0.48	0.38	1.00	.	.	
Q18	0.56	0.48	0.53	0.59	0.60	0.51	0.52	1.00	.	
Q19	0.63	0.66	0.49	0.69	0.62	0.58	0.33	0.69	1.00	.
Q20	0.49	0.51	0.34	0.53	0.62	0.33	0.46	0.53	0.49	1.00
Q21	0.14	0.14	0.30	0.31	0.30	0.23	0.29	0.31	0.33	0.22
Q22	0.14	0.14	0.22	0.32	0.33	0.18	0.25	0.35	0.37	0.30
Q23	0.11	0.10	0.12	0.20	0.15	0.15	0.19	0.21	0.24	0.20
Q24	0.10	0.10	0.11	0.14	0.10	0.08	0.17	0.26	0.21	0.12
Q25	0.07	0.07	0.22	0.20	0.17	0.05	0.24	0.25	0.12	0.12
Q26	0.13	0.02	0.25	0.14	0.10	0.25	0.19	0.18	0.11	0.01
Q27	0.16	0.16	0.26	0.23	0.25	0.17	0.25	0.24	0.26	0.20
Q28	0.23	0.23	0.25	0.26	0.24	0.22	0.19	0.25	0.28	0.15
Q29	0.15	0.17	0.17	0.15	0.16	0.03	0.08	0.12	0.19	0.15
Q30	0.21	0.25	0.31	0.28	0.26	0.21	0.11	0.22	0.15	0.13
Q31	0.18	0.12	0.23	0.20	0.18	0.21	0.13	0.10	0.14	0.03
Q32	0.30	0.21	0.30	0.28	0.31	0.36	0.13	0.20	0.28	0.10
Q33	0.39	0.43	0.38	0.53	0.55	0.44	0.35	0.47	0.51	0.47
Q34	0.52	0.50	0.47	0.64	0.59	0.55	0.34	0.49	0.58	0.51
Q35	0.41	0.33	0.42	0.51	0.46	0.35	0.36	0.53	0.45	0.40
Q36	0.30	0.37	0.26	0.34	0.39	0.23	0.23	0.33	0.39	0.28
Q37	0.35	0.41	0.29	0.40	0.42	0.29	0.28	0.37	0.48	0.35
Q38	0.16	0.24	0.20	0.23	0.25	0.12	0.11	0.16	0.26	0.16
Q39	0.11	0.19	0.20	0.24	0.22	0.12	0.09	0.14	0.22	0.13
Q40	0.11	0.14	0.08	0.05	0.08	0.16	-0.07	0.08	0.18	0.01

	21	22	23	24	25	26	27	28	29	30
Q21	1.00	.	.	.	.	.	.	.	.	.
Q22	0.84	1.00	.	.	.	.	.	.	.	.
Q23	0.45	0.47	1.00	.	.	.	.	.	.	.
Q24	0.42	0.43	0.20	1.00	.	.	.	.	.	.
Q25	0.32	0.27	0.19	0.59	1.00	.	.	.	.	.
Q26	0.44	0.34	0.30	0.31	0.43	1.00	.	.	.	.
Q27	0.29	0.29	0.21	0.11	0.12	0.07	1.00	.	.	.
Q28	0.36	0.33	0.24	0.21	0.14	0.11	0.81	1.00	.	.
Q29	0.08	0.09	0.06	-0.07	-0.06	0.02	0.36	0.39	1.00	.
Q30	0.13	0.12	0.15	-0.02	0.01	0.02	0.21	0.28	0.48	1.00
Q31	0.22	0.21	0.16	0.08	0.04	0.16	0.28	0.34	0.49	0.72
Q32	0.09	0.07	0.04	0.06	0.03	0.06	0.24	0.32	0.58	0.61
Q33	0.48	0.48	0.38	0.25	0.26	0.30	0.23	0.31	0.16	0.45
Q34	0.42	0.39	0.29	0.19	0.18	0.28	0.24	0.30	0.19	0.27
Q35	0.27	0.26	0.22	0.17	0.13	0.10	0.23	0.27	0.34	0.37
Q36	0.18	0.16	0.10	0.01	-0.01	-0.09	0.23	0.31	0.49	0.38
Q37	0.23	0.20	0.17	0.07	0.02	-0.04	0.31	0.38	0.51	0.37
Q38	0.02	0.04	0.02	-0.08	-0.04	-0.15	0.34	0.34	0.64	0.39
Q39	0.07	0.08	0.03	-0.06	-0.03	-0.12	0.33	0.32	0.69	0.46
Q40	0.04	0.04	0.14	-0.09	-0.09	0.01	0.23	0.27	0.35	0.33

	31	32	33	34	35	36	37	38	39	40
Q31	1.00	.	.	.	.	.	.	.	.	.
Q32	0.67	1.00	.	.	.	.	.	.	.	.
Q33	0.35	0.34	1.00	.	.	.	.	.	.	.
Q34	0.22	0.36	0.66	1.00	.	.	.	.	.	.
Q35	0.30	0.42	0.50	0.59	1.00	.	.	.	.	.
Q36	0.27	0.44	0.30	0.40	0.55	1.00	.	.	.	.
Q37	0.26	0.43	0.39	0.53	0.55	0.86	1.00	.	.	.
Q38	0.37	0.52	0.10	0.20	0.33	0.60	0.53	1.00	.	.
Q39	0.39	0.56	0.18	0.24	0.38	0.70	0.66	0.77	1.00	.
Q40	0.34	0.32	0.28	0.20	0.20	0.28	0.25	0.50	0.44	1.00

A difference of 0.15 is significant at P =0.05