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**PERCEIVED SERVICE QUALITY IN THE AIR FREIGHT
INDUSTRY**

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ABSTRACT

The study of service quality is still at its infancy. Service quality can be addressed from the service provider's perspective or from the customer's perspective. From the customer's perspective, it is known as perceived service quality. It is the result of the customer's view of a bundle of service attributes, some of which are technical whilst others are functional in nature. In this study, the attributes of service quality are elicited from the customer's perspective. The customers consist of air freight forwarders and shippers in Singapore and Malaysia.

In freight distribution, other than service, price is also an important dimension. Most of the studies being conducted in freight distribution are limited to the rail and truck freight industry. In the air freight industry, the study on price and service are virtually non-existent. This study addresses both the customers and the airlines. On the customers side (consisting of air freight forwarders and shippers), it addresses the components of perceived service quality and the trade-off among price and service attributes. On the airlines' side, it also covers the trade-off among price and service attributes. This is to measure the size of the gap between the customer expectations and airline's management perceptions of those expectations. Additionally, a comparative study among the airlines is carried out on their emphasis on the key factors affecting the service production system.

The study makes use of the Repertory Grid technique, the Conjoint Analysis, and the Structured Questionnaire. The analyses are conducted using three different programs: INGRID (for the Repertory Grid technique), \$FTROFF (for the Conjoint Analysis), and SPSS (for the Conjoint Analysis and the Structured Questionnaire).

The research shows that there are three components of perceived service quality labelled as Predictability, Capability, and Interaction. Both the Predictability and Capability components address the technical outcome, whilst the Interaction component addresses the functional outcome. The "good" airlines are perceived to have a better performance on all the three components than the "average" and "poor" airlines. However, among the three components, the "good" airlines are perceived to perform better on the Predictability component, whereas the "average" and "poor" airlines are perceived to perform better on the Interaction component.

Within the customers, there are the price sensitive and less price sensitive respondents. The price sensitive respondents place more emphasis on the core service, whereas the less price sensitive respondents place more emphasis on the peripheral services. Within the forwarding company, the price sensitive respondents comprise the top/sales managers, and the less price sensitive respondents comprise the operations personnel. For the shippers, the price sensitive

respondents comprise the manufacturers of consumer electronics, whereas the less price sensitive shippers comprise the manufacturers of industrial electronics.

The research shows that there is a negative gap on the core service between the customer expectations and the airline perceptions of those expectations. On the peripheral services, the gap is positive between the airlines and the top/sales managers in the forwarding company, whereas it is negative between the airlines and the operations managers in the same company.

Among the three categories of airlines, the "good" airlines place more emphasis on seven key factors affecting the service production system than the "poor" airlines. Of these, four could be categorised as management factors, and they are Marketing Research Orientation, Upward Communication, Goal Setting, and Task Standardisation. The other three are operations factors, and they are Team-work, Technology-job Fit, and Perceived Control. The management key factors affect the gap between customer expectations and management perceptions of those expectations, and between management perceptions of customer expectations and the service-quality specifications. The operations key factors affect the gap between service-quality specifications and service delivery.

The research has contributed to the knowledge on perceived service quality and research methodology. In addition, the research findings are useful to the airlines. The important components and attributes of perceived service quality can be used by the airlines to design the service offering. The trade-off analysis can also be used by the airlines to modify the service offering for the specific customer group. The comparative study among the airlines on their emphasis on the key factors will be useful in improving the service production system.

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Chapter 1 - Introduction

1.0 Introduction

There are two possible ways of addressing service quality: from a service provider's perspective or from a customer's perspective. The latter approach is known as perceived service quality, and it is the subject of this research. Perceived service quality is the result of the customer's view of a bundle of service attributes, some of which are technical whilst others are functional in nature.

Perceived service quality is a global judgement relating to the superiority or excellence of the service. Gronroos (1984) suggested that perceived service quality is influenced by both the technical quality and functional quality. On the other hand, Parasuraman, Zeithaml, and Berry (1985) suggested that customers generally use ten dimensions when evaluating perceived service quality. However, in their subsequent study (Parasuraman, Zeithaml, and Berry, 1990), the number of dimensions are reduced to five. These five dimensions are Tangible, Reliability, Responsiveness, Assurance, and Empathy.

There are three main areas in this research. Firstly, it examines the number of components that customers use in evaluating perceived service quality specifically in the air freight industry. In addition to service quality, price is also an important factor to the customers. As such, the second area of this research examines the differences in emphasis on the price and service attributes among customers. Finally, the research focuses on the service providers, that is, comparing the airlines on the key factors affecting the service production system.

This chapter gives a brief introduction on how the topic of this research was chosen, the research design and methodology, and its intended contributions to knowledge.

1.1 Background

There are two basic definitions of quality: conformance to specifications, and meeting customer requirements. The first definition addresses quality from a firm's perspective, whereas the second is from a customer's perspective. The customer's perspective emphasises on customer utility and satisfaction. If one is addressing quality from the customer's own view, then this is referred to as perceived service quality. Although this approach is considered subjective, it is important to study

perceived service quality as it is the customer who decides which product or service to buy. Unlike products, services are generally considered as intangibles, thus making it more difficult for researchers to understand how customers evaluate service quality.

Researchers working on the subject of perceived service quality should understand which attributes are the most important to customers. The set-back, however, is that the subject of perceived service quality is still at its infancy. Despite its infancy, there is enough evidence to suggest the importance of service quality in the service industry. Research has shown that there is a strong correlation between quality and profitability. A good deal of evidence supporting this correlation comes from the Profit Impact of Marketing Strategies (PIMS) studies conducted by Buzzell and Gale (1987). The PIMS database has drawn strategic and financial data from about three thousand business units, and has served as the basis for studies on business strategy. In their study, those businesses in the top 20th percentile ranking of perceived relative quality had an average return on investment of over thirty percent, nearly double that of companies in the bottom 20th percentile.

Perceived service quality results from a comparison of expectations with perceptions of performance. It differs from customer satisfaction as it is a global judgement relating to the superiority of the service, whereas satisfaction is related to a specific transaction. Gronroos (1984) suggested that perceived service quality is influenced by the technical quality and functional quality. Technical quality represents the material context of the service production system, whereas functional quality represents the service delivery process. In the Gronroos model, perceived performance refers to the outcomes of both the technical and functional dimensions of the service production system.

In this thesis, the terms service delivery and service production system are used. The former term is too narrow in scope as it focuses on the delivery of the service only (Gronroos, 1990). In this aspect, it refers to the interactions with the customers. The latter term describes the total service, that is, the production aspect of the service and the delivery of that service.¹

The research focuses on the export sector of the international air freight industry in Singapore and Malaysia. The export sector involves four parties: shippers (manufacturers), air freight forwarders, airport handling agents, and airlines. The airport handling agent is excluded because they are not the customer to the airline. The choice of freight commodity depends on each stage of the research. In Stage 4

¹ Langeard and Eiglier (1987) have suggested the term "Servuction" as an abbreviation of the service production system.

of the research, both perishables and non-perishables are covered, whereas in Stages 5 and 6, only electronics are covered.

1.2 An Outline of the Research

1.2.1 The Research Objectives

There are three main objectives to this research. The first objective is to determine the components of perceived service quality in the air freight industry. The second is to determine the trade-off among the price and service attributes. The third objective is to compare the airlines on the key factors affecting the service production system.

In order to achieve these three objectives, the research is divided into stages. Each stage has its own objectives and methodology.

1.2.2 The Stages of the Research

The research is divided into six stages (see Figure 1.1). Stage 1 reviews the literature on the subject matter, whereas Stages 2 to 6 covers the field work. The objective of Stage 2 is to elicit the attributes of service quality in the air freight industry. These attributes are then reduced to only the common and important attributes for Stages 3 and 4 of the research. The objective of Stage 3 is to group the attributes into the dimensions of service quality. The objectives of Stage 4 are to determine the number of components of perceived service quality, the most important dimension, and the most important attribute. In Stage 4, the airlines are also categorised by the customers into the "good", "average", and "poor" airlines based on their overall perceptions of the airlines' service quality.

The objective of Stage 5 is to determine the trade-off among the price and service attributes. The service attributes are taken from the outcome of Stage 4 of the research. Price is introduced as it is also an important factor to customers deciding on the choice of carriers.

The respondents for Stage 2 to 5 consist of airlines' customers. The customers refer to both the direct shippers (which in this case are the manufacturers) and the air freight forwarders. The air freight forwarders are the intermediary between the airlines and the shippers. However, they cannot be ignored for two reasons. Firstly, they consolidate small cargo and tender it to the airline as one consignment.

Thus, in this case, they ought to be considered as a shipper. Secondly, a high percentage of freight are channelled through them.

Finally, Stage 6 covers the respondents from the airlines. The objectives of Stage 6 are to measure the gap between customer expectations and management perceptions of customer expectations (known as Gap 1), and to compare the three categories of airlines ("good", "average", and "poor") on their emphasis on the key factors affecting the service production system.

1.2.3 The Methodology

Stage 2 makes use of the Repertory Grid technique. This technique allows the service quality attributes to be elicited in the respondents' own terms. Thus, it eliminates the influence of researcher's bias. The technique demands personal contact with the respondents.

Stage 3 makes use of postal questionnaire. However, this technique is limited by non-response bias. Since the objective of this stage is merely to group the attributes of service quality into the appropriate labels (dimensions), it is felt that the use of postal survey would be adequate.

The design of the Stage 4 questionnaire makes use of the Repertory Grid technique. The questionnaire consists of both the positive and negative attributes, which is similar to the Semantic Differential. Furthermore, the questionnaire provides columns for rating the airlines along these attributes. The analysis is done using the Statistical Package for Social Sciences (SPSS). The analysis specifically makes use of Factor Analysis and basic statistics.

Stage 5 makes use of the pair-wise approach of Conjoint Analysis. The purpose is to carry out a trade-off among the price and service attributes. The service attributes are determined from the outcome of Stage 4. The analysis makes use of the trade-off program (known as \$FTROFF) and the SPSS program. The SPSS program is used to aggregate the individual utility values from the \$FTROFF program, and to cluster the respondents based on the similarity of their responses.

Stage 6 makes use of both the pair-wise approach of Conjoint Analysis and the SPSS. The first technique allows the magnitude of the gap between management perceptions of customer expectations and customer expectations to be measured. The second technique allows a comparison among the three categories of airlines on their emphasis on the key factors affecting the service production system to be made.

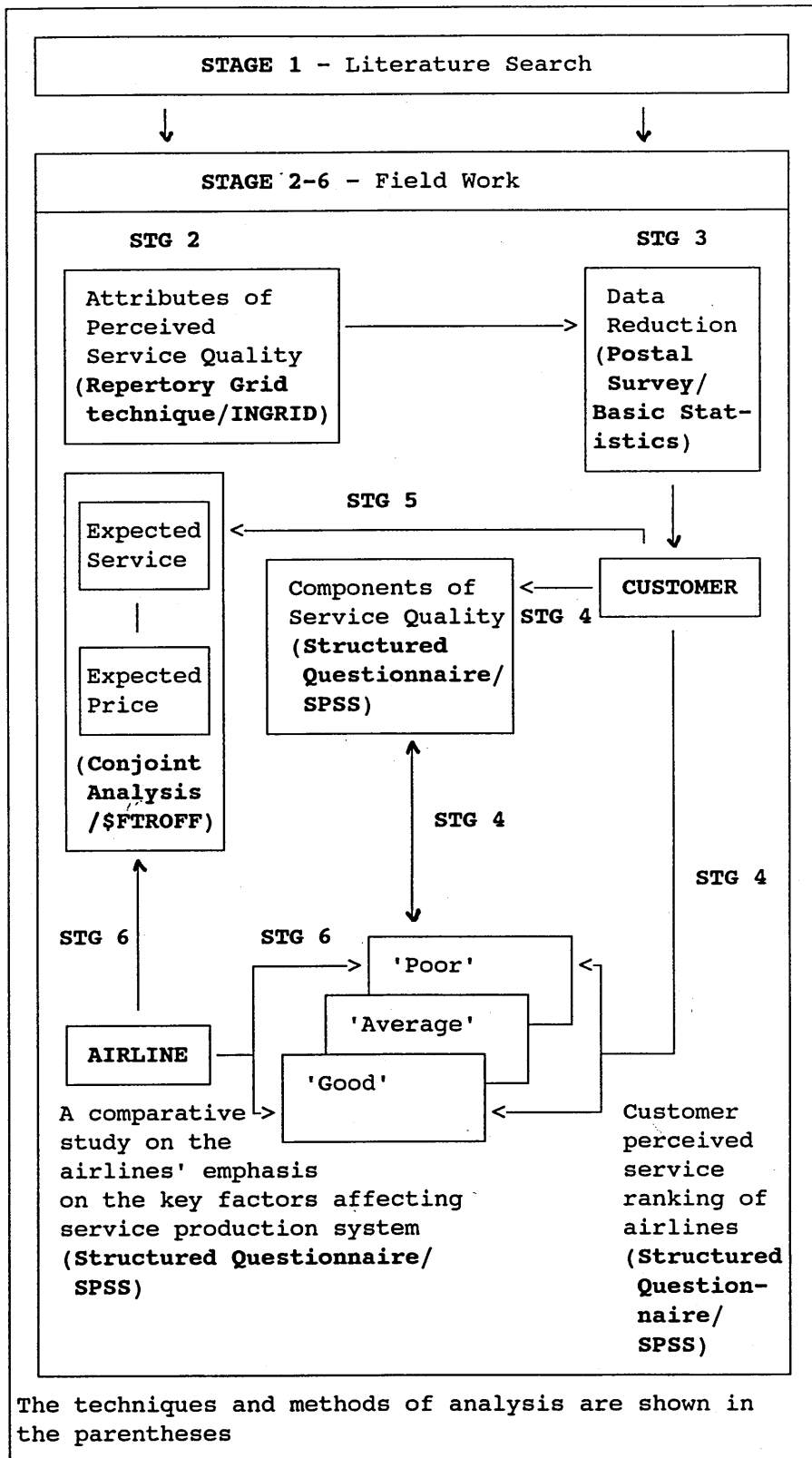


Figure 1.1 - Schematic Illustration of the Research Design, Techniques, and Methods

1.2.4 The Sample Size

The sample size chosen follows the suggestions of Dixon, Bouma, and Atkinson (1987) that the minimum sample size should be thirty or at least five cases in each cell of the analytical table. Random sampling technique is used throughout the research except in Stages 2 and 6. Stage 2 makes use of purposive sampling, whereas the airlines in Stage 6 are taken from the outcome of Stage 4. Purposive sampling is chosen because a broad spectrum of respondents is required.

The research is conducted in Singapore and Malaysia. However, the choice of research location depends on each stage of the research. The proposed sample size and choice of location for Stages 2 to 6 are as follows:

- Stage 2 - ten customers (five forwarders and five shippers) and ten airlines in Singapore and Malaysia
- Stage 3 - thirty forwarders in Singapore and Malaysia
- Stage 4 - thirty shippers and thirty forwarders dealing with perishables and non-perishables in Singapore and Malaysia
- Stage 5 - fifteen forwarders and fifteen shippers dealing with electronics in Malaysia only
- Stage 6 - fifteen airlines operating out of Singapore and Malaysia

1.3 The Intended Contributions of the Research

The intention of this study is to contribute to management knowledge of perceived service quality. The current knowledge of perceived service quality is mainly limited to Gronroos's (1984) model and the Gap model (Parasuraman, Zeithaml, and Berry, 1986). These two studies were done independently of one another. Gronroos (1984) identified two components of perceived service quality: technical and functional. On the other hand, Parasuraman, Zeithaml, and Berry (1985) identified ten dimensions of service quality. This study intends to link the two models. This would give a clearer picture of perceived service quality.

Since the research is conducted in the air freight industry, this research is intended to enrich the current knowledge relating to the price and service attributes in the transport literature. The empirical studies relating to price and service attributes are currently mostly in the truck and rail freight industries. In selecting the mode of

transport between rail and truck, price is seen as more important than service (Chow and Posit, 1984). However, within the same mode of transport, service is seen as more important than price (Bardi, 1973, Evans and Southard, 1974). This research intends to cover both the intermediary (forwarder) and the shipper, and to address both the operational and non-operational groups. This would provide a better understanding of the customer's sensitivity to price and service.

The final stage of the research compares the three categories of airlines on the key factors affecting the service production system. These key factors are related to the magnitude of the various gaps in the Gap model. Additionally, the research compares the magnitude of the gap between customer expectations and management perceptions of customer expectations. The outcome of such comparisons will assist the airlines to narrow the gaps, thus improving the quality of the service production system.

1.4 The Structure of the Thesis

This thesis is divided into eleven chapters. Chapter Two and Three give a comprehensive review of the literature on service quality and the air freight industry respectively. Chapter Four has three parts. Firstly, it identifies some of the areas where research is necessary, and it provides a systematic way in which the research area is focussed. Secondly, it addresses the research questions and hypotheses. Finally, it gives the research design.

Chapter Five covers the research methodology. It provides a rational argument for choosing a specific method and technique for each stage of the research. It also reviews the various computer packages used to analyse the data.

Chapters Six to Ten discuss the results from each stage of the research, including the reliability and validity of the data, the sample size, and the general critiques of the survey. Chapters Eight to Ten compare the results of the survey with the research hypotheses.

Chapter Six covers the findings of Stage 2, that is, the attributes of service quality. Chapter Seven covers the findings of Stage 3 on the results of the grouping of the service quality attributes into the appropriate dimensions.

Chapter Eight discusses the results of Stage 4. This includes the relative importance of the dimensions and attributes of service quality between the air freight forwarder and the shipper, and between the perishable and non-perishable freight

commodities. The final part of this chapter gives the relationship among the "good", "average", and "poor" airlines on the components of service quality.

Chapter Nine describes the service concept that is generally in use in the marketing literature, and the results of Stage 5. The first part of the discussion covers the initial survey with the forwarders and shippers. The second part focuses on the extended survey with the forwarders. This chapter addresses the trade-off among the price and service attributes. It also gives a comparison between the price sensitive and less price sensitive groups on the service attributes.

Chapter Ten gives the grouping of airlines ("good", "average", and "poor"), and the results of Stage 6 on the comparison among the three categories of airlines on their emphasis on the key factors to the gaps affecting the service production system. It also addresses the magnitude of Gap 1.

The final chapter (Chapter Eleven) provides a concluding summary of the research, the contributions of the research, the research limitations, and suggestions for future research.

1.5 Summary

The study conducted by Buzzell and Gale (1987) showed that those companies with a high ranking on perceived relative quality had a higher average return on investment than those companies with a lower ranking. Thus, perceived service quality is an important factor affecting the profitability of service firms.

Despite the importance of perceived service quality, there is not much empirical research work done in this area. The two most prominent models addressing this subject are Gronroos's model and the Gap model. Both of these models are relatively new. More effort should be made to validate their applicability in the service industry or to develop a new model of perceived service quality.

Chapter 2 - Literature Review on Service Quality

2.0 Introduction

This chapter reviews the current literature on service quality. The first part covers the characteristics of services, and why certain generalizations about these characteristics are not necessarily correct.

The second part of this chapter covers the definition of quality. Quality can be defined from a service provider's perspective or from a customer's perspective. Researchers have used the term perceived service quality to address quality from the customer's perspective. Perceived quality is not equivalent to satisfaction. Both perceived quality and satisfaction result from a comparison of expectations with perceptions of performance. However, perceived quality is a global judgement or attitude relating to the superiority or excellence of the service, whereas satisfaction is related to a specific transaction.

The third part covers the models of perceived service quality. According to Gronroos (1984), perceived service quality is influenced by the technical quality (what is delivered), and the functional quality (how it is delivered). Functional quality is considered more important than the technical quality provided that the technical quality has reached a satisfactory level.

On the other hand, according to Parasuraman, Zeithaml, and Berry (1985), customers generally use ten dimensions when evaluating service quality. Using these ten dimensions, they developed the Gap model. The Gap model addresses the shortfall perceived by customers, and the key factors responsible for the shortfalls within the service firms. Therefore, this model provides a logical process for service firms to follow in order to improve service quality.

In addition, there is still a need to treat services as products for successful service management and marketing. The service product is described as a package or bundle of different services which together form the total product (Armistead, 1985). In general, the service product is divided into the core and peripheral services. The core service should take care of the primary needs, whereas the peripheral services should be geared to meet the secondary needs (Edvardsson and Gustavsson, 1991). The set-back with the concept of core and peripheral services is that it excludes the element of interaction. This element is also important in shaping the customer's perceptions of service quality. Therefore, the service product should

include the element of interaction. With the addition of interaction, the service product is referred to as an augmented service offering (Gronroos, 1990).

The last part of this chapter covers the general critiques relating to Gronroos's model and the Gap model.

2.1 The Characteristics of Services

There are two important factors in the development of service quality: the definition of quality, and some means of measuring customer satisfaction. There are a number of definitions found in the literature on product quality (Crosby, 1979; Garvin, 1984). However, the definitions given are not necessarily applicable to services. Moreover, the measurement of customer satisfaction differs substantially between goods and services (Leichty and Churchill, 1979). The difference is due to the unique characteristics of services such as intangibility, inseparability of production from consumption, heterogeneity, and perishability. These unique characteristics make the evaluation of service quality more difficult and complex than product quality.

Morris and Johnston (1987) have addressed the differences between manufacturing and service, and believed that the distinctions between the two are spurious. The assumption that services are different from goods is partly true. Some services do differ from some goods. However, in certain cases, they also have a great deal in common. Whether services are different from goods depends on one's perspectives - just like stating whether a glass is half full or half empty. For example, a man is physically different from a woman in many aspects, but they are also quite similar in many ways.

2.1.1 Intangibility

Because of their intangibility, services are often seen as performances rather than objects (for example, hair cut, professional advice). Thus, there is no such thing as manufacturing specifications with regard to quality.

Performance cannot be measured or tested in advance to assess the quality provided (Parasuraman, Zeithaml, and Berry, 1985; Bateson, 1979; Lovelock, 1981; Shostack, 1977). Thus, buyers are not able to use the traditional and obvious cues such as colour, style, or size for prepurchase evaluation purposes. Instead, they tend to rely on other indicators such as:

- surroundings and equipment (Berry, 1980; Bitner, 1990; Eiglier, 1977; George, 1977; Upah, 1980)

- service personnel (Berry, 1980; Chase, 1978; Gronroos, 1980; Rathmell, 1974; Uhl and Upah, 1978)
- price (Booms and Bitner, 1981; Berry, 1980; Zeithaml, 1981).

The generalisation that services are intangible is incorrect. For example, Judd (1964) has pointed out that there are three kinds of services: rented goods services, consumer-owned services, and non-goods services. The first two categories involve tangible products. Rented goods services require tangible products. For example, car rental services require cars on hand. Even non-goods services require certain equipment, tools and other tangible products. For example, medical services require medicines and facilities to service the patients.

2.1.2 Inseparability of Production From Consumption

One of the unique characteristics of services is the inseparability of production from consumption (Berry, 1980; Venkatesan, 1983; Zeithaml, Parasuraman, and Berry, 1985; Bateson, 1979; Lovelock, 1981; Shostack, 1977). The inseparability of production from consumption leads to a buyer-seller interaction (Rathmell, 1974) whereby both the customer and service personnel have an influence on the production process and therefore the quality of service delivered (Lehtinen and Lehtinen, 1982; Zeithaml, 1981).

According to Solomon, Suprenant, Czepiel, and Gutman (1985), and Czepiel, Solomon, and Suprenant (1985), the interaction between service personnel and customers is an important factor in determining service quality. The fact that the customer is an integral party in the production process makes it difficult for him to make an objective evaluation of the quality of service.

The involvement of customers in the production process is not only limited to services, but it is also applicable to goods. For example, there is no difference between a customer purchasing a high unit value product (for example, a motor-car) and consultancy services; both involve a high degree of interaction. Similarly, there is no difference between a customer buying a chewing gum, and a customer using public telephone services; both involve low interaction.

2.1.3 Heterogeneity

Berry (1980), and Zeithaml, Parasuraman, and Berry (1985) described services as heterogeneous. Since services are heterogeneous, the consumer is unlikely to get consistent service performance and quality. This inconsistency in service performance is more apparent in service firms with a relatively high labour content.

This is due to the little consistency in the behaviour of service personnel (Berry, Zeithaml, and Parasuraman, 1985; Booms and Bitner, 1981; Knisley, 1979; Langeard, Bateson, and Lovelock, 1981). The consumer of services may therefore experience greater perceived risk than the consumer of goods (Eiglier and Langeard, 1977; Guseman, 1981; Zeithaml, 1981).

The generalisation that services are heterogeneous is not necessarily correct. For example, in the case of financial institutions, there exists a high degree of standardisation in the service offerings such as shares, bonds, and treasury bills. This is also true in the case of scheduled airlines, where the routes are heavily standardised.

2.1.4 Perishability

The characteristic of intangibility of services gives rise to the assumption that services cannot be stored and inventoried. In other words, services are considered as perishable. For example, an unsold seat on an airplane cannot be stored for a subsequent flight. This is also true of physically perishable goods such as agricultural products, and economically perishable goods such as newspapers. Once these items perish, they are gone forever.

However, the argument that services cannot be stored is only true for certain types of service industries. In the case of the McDonald restaurant in the fast food service business, they do hold inventories. Likewise in car rental services such as Hertz and Avis, they maintain adequate inventories of cars.

2.2 Definition of Quality

Quality can be defined from either a firm's perspective or from a customer's perspective. From the firm's perspective, the definition of quality means conforming to requirements (Crosby, 1984). It states that, in order to achieve quality, a company must establish requirement specifications. Once these are established, the quality goal of the various functions of the firm is to comply with these specifications. The set-back with this definition is that it does not address whose requirements and whose specifications.

The issue of whose requirements and whose specifications will be taken care of if one is addressing quality from a customer's perspective, that is, fitness for use (Juran, 1982). This approach emphasises customer utility and satisfaction.

However, the set-back with this definition is what should be included in the specifications.

In order to understand what attributes should be included in the specifications, one has to address the perceived quality specifically from the customer's own view. This is referred to as perceived quality (in the case of goods), and perceived service quality (in the case of services). However, they are considered to be subjective. It is nevertheless important to study quality from the point of view of the customer as it is the customer who decides which product or service to buy.

The concept of perceived quality stresses that the quality judgements are dependent on the perceptions, needs, and goals of the consumer. Thus, the knowledge and theories on consumer perception, developed in social psychology, is important to the understanding of how the customer perceives quality.

2.2.1 Perceived Quality

Although there is considerable empirical research on the formation of perceived quality judgements, the theoretical underpinnings of this concept have rarely been discussed (Olson, 1977). Majority of the studies are exploratory in nature. They have been criticised on two aspects:

- for not adequately defining the concept of perceived quality, and
- for not properly conceptualising the quality process (Monroe and Krishnan, 1985).

In the case of product quality, Monroe and Krishnan have proposed the following definition:

"perceived quality is the perceived ability of a product to provide satisfaction relative to the available alternatives."

Monroe and Krishnan (1985, p.12)

This basic definition is rather similar to fitness for use. However, Monroe and Krishnan have included another factor to the definition of perceived quality, that is, the subject of available alternative. For example, the perceived quality of a brand is influenced by the perceived quality of other available brands.

2.2.2 Perceived Quality versus Satisfaction

Perceived quality is a form of attitude, and it results from a comparison of expectations with perceptions of performance (Parasuraman, Zeithaml, and Berry, 1986). Perceived quality is related but not equivalent to satisfaction. In the case of perceived quality, it is a global judgement or attitude relating to the superiority or excellence of the service (Olshavsky, 1985). On the other hand, satisfaction is related to a specific transaction (Holbrook and Corfman, 1985; Parasuraman, Zeithaml, and Berry, 1986). Oliver (1981) described that satisfaction soon decays one's overall attitude toward repeat purchases. Summations or satisfaction over time will result in customer's perceptions of quality.

Howard and Sheth defined customer satisfaction as:

"the buyer's cognitive state of being adequately or inadequately rewarded for the sacrifice he has undergone."

Howard and Sheth (1969, p.145)

Hunt (1979) suggested that satisfaction is influenced by five factors:

- need fulfilment
- pleasure and displeasure
- expectation-performance interactions
- evaluation of the purchase consumption experience
- evaluation of the benefits of consumption.

Subsequently, Oliver summarized satisfaction as:

"Satisfaction is a summary of psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer's prior feelings about the consumption experience."

Oliver (1981, p.27)

Therefore from the above definitions, satisfaction is related to a specific transaction. However, it is not the case with attitude. Oliver differentiated satisfaction from attitude, as follows:

"Attitude is the consumer's relatively enduring affective orientation for a product, store, or process (for example, customer service),

while satisfaction is the emotional reaction following a disconfirmation experience which acts on the base attitude level and is consumption-specific. Attitude is therefore measured in terms more general to product or store and is less situationally oriented."

Oliver (1981, p.42)

2.2.3 Perceived Service Quality

The notion that services are intangible makes it difficult to conceptualise service quality. It is difficult for service firms to understand how customers perceive their service and evaluate service quality. Furthermore, compared to physical goods, services are composed of a larger number of attributes which affect the customers' evaluation of the offering. Most of these attributes are not amenable to physical methods of measurement or control (Czepiel, Solomon, and Suprenant, 1985). On the other hand, physical goods are well defined from engineering stand-point and can be measured against manufacturing specifications (Fitzgerald, 1988).

In manufacturing, products are standardised and can be measured objectively. Similarly, in services, researchers have tried to use certain attributes to measure service quality such as "goodness", "luxury", or "shines" (Crosby, 1979). However, these attributes do not describe a service accurately. Instead, it gives a person the illusion of dealing with a manufactured good rather than a service. Furthermore, they are subjective and do not acknowledge the characteristics of services in total.

Some researchers also define quality as surpassing customer needs and expectations throughout the life of the product (Deming, 1982). This is a very idealistic view. Cravens, Holland, Lamb, and Monorief (1988) gave a more realistic view, that is, satisfactory quality is achieved if the customer expectations are met, and not necessarily surpassing them.

Perceived service quality is the result of the customer's view of a bundle of service attributes, some of which are technical whilst others are functional in nature. When this perceived service is compared with the expected service, it leads to perceived service quality (Sasser, Olsen, and Wyckoff, 1978; Lehtinen and Lehtinen, 1982; Lewis and Booms, 1983; Gronroos, 1984; Parasuraman, Zeithaml, and Berry, 1985). The customer expectations of a service is affected by his previous experience (Gronroos, 1984). On the other hand, the perceived service is the result of customer's perception of the service itself.

Perceived service quality should not be confused with customer satisfaction. Some companies measure customer complaints but it is by no means measuring the overall quality perceptions of customers. Although perceived service quality and customer satisfaction are structurally similar, the two are conceptually different. Service quality pertains to a global assessment of excellence, whereas customer satisfaction pertains to an assessment of a specific transaction only. In other words, customer satisfaction can be part of overall perceived service quality but does not necessarily explain it. Unlike perceived service quality, customer satisfaction can also be derived from other factors such as the price of the service. LeBlanc and Nguyen (1988) suggested that perceived service quality is derived principally from customer satisfaction, that is, the firm's capacity to meet customer expectations.

2.2.4 Perceived Service Attributes

Perceived product quality is regarded as an overall unidimensional judgement. It is a higher-level abstraction and not a specific product attribute (Steenkamp, 1990). Consumers arrive at quality judgements based on two factors: cues¹ and quality attributes². Both represent what the product is perceived as doing or providing for the consumer. Quality attributes cannot be observed prior to consumption.

Quality cues closely resemble Nelson's (1970, 1974) search attributes. They are what the customer observes, whereas quality attributes are what the customer wants or desires. Prior to consumption, benefits are not known, that is, the customer has no direct way to determine the rating of a product on the quality attributes. They can ascertain these beliefs only by consuming the product. Generally, at the point of purchase, customers will use quality cues in choosing between product alternatives. A cue is valued because of its perceived relationship with quality attributes (Steenkamp, 1990).

Quality attributes are categorised as either experience or credence attributes (Darby and Karni, 1973; Nelson, 1970, 1974). Experience attributes are ascertained on the basis of actual experience with the product, whereas credence attributes can be ascertained only after using the product for some time.

Using the same concept, it is possible to relate perceived quality service attributes to search, experience, and credence attributes, with some modifications. For example, the dichotomy extrinsic-intrinsic³ cues, which are not so appropriate for services

1 Quality cues are defined as informational stimuli that are, according to the consumer, related to the quality of the product, and can be ascertained by the consumer through the senses prior to consumption.

2 Quality attributes are the functional and psychological benefits or consequences provided by the product.

(given that services are performances and not objects) can be replaced by the dichotomy tangible-intangible cues. The tangible cues consist of physical facilities, appearance of personnel, and so on. On the other hand, the intangible cues comprise company name, company reputation, and so on.

2.3 The Theories of Service Quality

There are three theories of service quality:

- attribute theory
- customer satisfaction theory
- interaction theory

The attribute theory assumes that service quality primarily reflects the attributes of the service production system. It essentially applies the product quality framework to services (Deming, 1986). It assumes that management has substantial control over the inputs defining these attributes.

The customer satisfaction theory treats service quality as a perceptual phenomenon identified through the eyes of the customer. The meaning, definition, and evaluation of quality exist in the customer's mind. Ultimate quality is the difference between service quality expectations and the perceptions of reality (Parasuraman, Zeithaml, and Berry, 1985). The focus of the theory shifts from the production and output approach to the customer approach. Whilst the attribute theory places primary importance on the technical aspects of production, the customer satisfaction theory places importance on the customer approach.

The concept of the customer satisfaction theory in services is adopted from the customer satisfaction theory on goods. The general finding is that the product that meets or exceeds expectations receive favourable ratings on product performance, whereas those that perform below expectations receive less favourable ratings (Anderson and Hair, 1972; Olshavsky and Miller, 1973). The empirical research conducted by Cadotte, Woodruff, and Jenkins (1987) confirmed that there is a relationship between favourable ratings and satisfaction. From there, they developed a confirmation/disconfirmation paradigm, which explains the process by

3 Intrinsic cues are part of the physical product and cannot be changed without changing the physical product itself. Extrinsic cues, on the other hand, are related to the product but are not (physically) part of it.

which consumers develop feelings of satisfaction or dissatisfaction, as illustrated in Table 2.1 below.

The interaction theory approach to service quality was introduced by Klaus (1985). He defined service quality as a "*shared experience of gain*" by all participants in the service encounter. The experiences of the customer are interrelated with the experiences of the contact employee. Service quality emerges through the mutual satisfaction of the needs of both employees and customers.

Condition (IF)	CS/D Paradigm	Outcome
$P = E$	Zero	Neutral Feelings
$P > E$	Positive	Satisfaction
$P < E$	Negative	Dissatisfaction

CS/D - Customer Satisfaction and Dissatisfaction
P - Perceptions
E - Expectations

Table 2.1 - An Illustration Of The Customer Satisfaction/Dissatisfaction Paradigm
Source: Adapted From Cadotte, Woodruff and Jenkins (1987)

2.4 The Concept of Service Quality

2.4.1 Process Quality and Outcome Quality

The relationship between service process and service outcomes can be conceptualised as means-end chains. In means-end chains, the value of the means is determined by the value of the ends for which they are perceived to achieve. The quality process is important only to the extent that they are perceived to be a means to achieve certain ends that are valued by the customer, that is, the benefits of perceived quality outcomes.

The outcome of any service production process is dependent on the quality of the process. Thus, by controlling the quality of the process, one is also controlling the quality of the output. In a service production, there are two components that need to be considered: service process and service outcome⁴. The service process is a

prerequisite to the outcome, that is, a poor service process will lead to a poor outcome, and a good service process will lead to a good outcome.

In the literature on consumer goods, Swan and Comb (1976) suggested that the perceived performance of a product can be divided into two sub-processes: instrumental performance and expressive performance. The instrumental performance of a product is the technical dimension of the product. On the other hand, the expressive performance is related to the psychological level of performance.

2.4.2 The Gronroos Model

Relating Swan and Comb's (1976) concept to services, the instrumental performance is the technical result of a service production process (Gronroos, 1984). For example, in air freight services, the technical result would be whether the goods have arrived at the destination, on time, and in good condition.

In services, the expressive performance is related to the buyer-seller interactions, that is, those interactions that the customer has with the service firm during the service production process (Gronroos, 1984). During those interactions, the service is rendered to the customer. What happens in those interactions will have an impact on the perceived service.

According to Gronroos (1984), perceived service quality is influenced by the technical quality and the functional quality (see Figure 2.1). Technical quality represents the material context of a service production process, that is, what the customer is left with. It corresponds to the instrumental performance described by Swan and Comb (1976). In most cases, technical quality can be measured by the customer in a rather objective manner, as in any technical dimension of a product. It could be either tangible or intangible, depending on whether it is a pure service or not. The technical quality dimension comprises the technical abilities of the employees, the firm's general know-how, and the appropriate use of computerised systems and machines.

Functional quality is how the service is rendered to the customer during the buyer-seller interactions. It corresponds to the expressive performance described by Swan and Comb (1976). It consists of accessibility, appearance, relationship with the firm, attitudes, behaviour, and service mindedness of the service personnel (Gronroos, 1983).

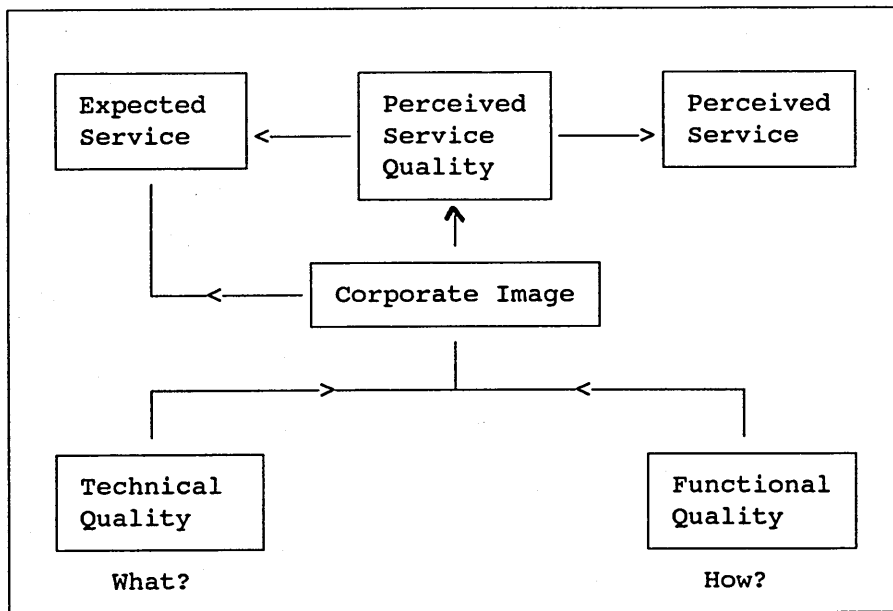


Figure 2.1 - Perceived Service Quality And Corporate Image
Source: Gronroos (1982, p.41)

Therefore, it appears that both the technical quality and functional quality are the outcomes of the service process⁵.

2.4.2.1 General Critiques of the Gronroos Model

There are three main critiques on Gronroos's model, relating to the image dimension, the functional quality, and the empirical data supporting the model.

Gronroos (1984) suggested a third dimension in his model of perceived service quality: corporate image (see Figure 2.1). It is the result of how customers perceive the firm, and it is shaped by the technical quality and functional quality. The set-back with Gronroos's study is that the empirical evidence is limited only to the technical quality and functional quality, and does not cover corporate image. Thus, the following need to be empirically verified:

- whether the technical quality and the functional quality actually shape the corporate image

⁵ The confusion in this area stems from the word "how" in Gronroos's definition of functional quality. The word "how" tends to reflect a process rather than an outcome.

- whether the technical quality and the functional quality affect perceived service quality via the corporate image, or whether the two qualities are affecting the perceived service directly

It is also not very clear whether functional quality is addressing the service process or the outcome of the process. The researcher believes that it is addressing the outcome of the process. In the examples given by Gronroos (1983), he referred to the functional quality as consisting of accessibility, appearance, relationships with the firm, attitudes, behaviour, and service mindedness of the service personnel. These examples appear to be related more to the process outcomes than the service process itself.

If the functional quality is addressing the outcomes of the service process, then the customer is actually measuring the benefits of outcomes from both the technical dimension and functional dimension. Therefore, the process dimension has no direct impact on the customer evaluating the service. The concept is the same as the manufacturing of tangible products where the manufacturing process in the factory has no direct impact on the customer.

According to Gronroos (1984), the functional quality is considered more important than the technical quality provided that the technical quality dimension has reached a satisfactory level. However, his empirical findings should be qualified because of the sample and questionnaire used.

His sample of respondents was drawn from a population of Swedish service firm executives who had participated in service marketing seminars. Thus, it is likely to contain some form of bias. Also, had an equivalent survey been conducted outside Sweden, different results could have been obtained because of differing environmental factors.

Furthermore, the survey was not conducted with the actual customers of those services. Therefore, the findings were that of the service providers' perception of customers' view and not that of the customers'.

Gronroos's study also did not address specific service industries. The respondents came from the following service industries: banking and finance, hotel and restaurant, transportation, travel agency, professional services, public sector, and so on. Customers in different industry have different needs. Therefore, general service attributes may not be applicable to meet those needs. Furthermore, the service attributes differ from one industry to another.

2.4.3 Dimensions of Service Quality

The component dimensions of service quality have been described by a number of researchers. They include Sasser, Olsen, and Wyckoff (1978), Lehtinen and Lehtinen (1982, 1991), LeBlanc and Nguyen (1988), and Parasuraman, Zeithaml, and Berry (1985, 1990). According to Sasser, Olsen, and Wyckoff (1978), service quality is affected by the level of materials, facilities, and personnel.

2.4.3.1 Lehtinen and Lehtinen's Study

Lehtinen and Lehtinen (1982, 1991) related the dimensions of service quality with the elements of the service production process. The dimensions are physical quality, interactive quality, and corporate quality. Physical quality originates from the physical elements of service. It covers both the quality of materials and facilities. The materials are basically the physical product that is consumed during the service production process. On the other hand, facilities cover the physical support or framework which enables or facilitates the production of a service. Physical support can be divided into two categories: the environment (interior decorations) and instruments (equipment).

Interactive quality originates from the interaction between the customer and the interactive elements of the service organisation. Interactive elements are those company resources (for example, service personnel or equipment) which are in direct contact with customers.

Finally, corporate quality is how customers perceive the corporate entity, its image or profile. It is developed during the history of the service organisation, and is symbolic in nature. According to Lehtinen and Lehtinen (1982, 1991), it is the only dimension that the customer can experience before participating in the service production process. Their finding on corporate quality has some similarities with Gronroos's (1984).

2.4.3.2 LeBlanc and Nguyen's Study

Based on Gronroos's finding, LeBlanc and Nguyen (1988) identified five dimensions of service quality:

- corporate image
- customer and service provider interaction
- physical support of the service producing system
- the degree of customer satisfaction

- internal organization

The first three dimensions are similar with Lehtinen and Lehtinen's (1982, 1991): corporate image, interactive quality, and physical quality. The fourth dimension, that is, customer satisfaction is in line with the findings of other researchers (for example, Lewis and Booms, 1983; Nightingale, 1983; Parasuraman, Zeithaml, and Berry, 1984; Eiglier and Langeard, 1977), in that service quality is derived from customer satisfaction.

The fifth dimension is internal organisation. It refers to the instruments and staff that are not visible to customers (back office support) but which are necessary for smooth operations.

LeBlanc and Nguyen's research, however, does not address the process by which customer expectations are formed and compared to actual performance. It also does not address whether satisfaction and quality are two different concepts, or whether satisfaction is a component of quality.

2.4.3.3 Parasuraman, Zeithaml, and Berry's Study

Parasuraman, Zeithaml, and Berry (1985, 1990) did a research to determine the dimensions of service quality. The research was conducted in few stages. The first stage is an exploratory study with the focus groups. Parasuraman, Zeithaml, and Berry contended that, regardless of the type of service, customers use ten service dimensions in evaluating service quality. The ten service dimensions are:

- Tangibles - the physical appearance of the service facilities, personnel, and equipment
- Credibility - trustworthiness, believability, and honesty
- Access - approachability and ease of contact
- Courtesy - politeness, respect, considerate, and friendliness of contact personnel
- Reliability - consistency of performance and dependability
- Responsiveness - willingness or readiness of employees to provide service

- Understanding the customer - making an effort to understand the customer's needs
- Communication - keeping customers informed and listening to them
- Competence - possession of the required skills and knowledge to perform the service
- Security - freedom from danger, risk, or doubt.

The second stage is a quantitative research using the SERVQUAL instrument⁶. The research shows that there are considerable correlations among the ten original dimensions (see Table 2.2). The correlations grouped four dimensions (Competence, Courtesy, Credibility, and Security) into a broader dimension which is labelled "Assurance". It also grouped another three dimensions (Access, Communication, and Understanding the Customer) into another broader dimension which is labelled "Empathy".

The Reliability dimension is primarily concerned with the main service outcome, that is, whether the promised service has been delivered. The other dimensions are more concerned with the outcomes of the service process dimensions, that is, how the service is being delivered. Reliability is the most important dimension, whereas Tangibles is the least important. The score on Tangibles implies that the companies in the survey (on average) exceeded customers' expectations on this dimension. It is the only dimension that has a positive score on the SERVQUAL scale⁷.

6 SERVQUAL is the 22-item instrument for measuring customers' perceptions and expectations along five quality dimensions: tangibles, reliability, responsiveness, assurance, and empathy (parasuraman, Zeithaml, and Berry, 1990).

7 The more negative the service quality score, the more serious is the service quality shortfall in the eyes of customers.

Dimension (original)	Dimension (revised)	Definition
Tangibles	Tangibles	appearance of physical facilities, equipment, personnel, and communication materials
Reliability	Reliability	ability to perform the promised service dependably and accurately
Responsiveness	Responsiveness	willingness to help customers, and provide prompt service
Competence	Assurance	the knowledge and courtesy of employees, and their ability to convey trust and confidence
Courtesy		
Credibility		
Security		
Communication		
Access	Empathy	the caring and individualised attention provided to the customer
Understanding the customer		

Table 2.2 - The Original and Revised Dimensions of Perceived Service Quality

Source: Adapted from Zeithaml, Parasuraman and Berry (1990, p.25)

2.4.4 Search, Experience, and Credence Dimensions

In Parasuraman, Zeithaml, and Berry's exploratory research, the three properties of service attributes, that is, search⁸, experience⁹ and credence¹⁰ attributes, were mentioned. These three attributes originated from Nelson (1974), and Darby and

8 Search attributes are those attributes which a consumer can determine prior to purchasing a product or service.

9 Experience attributes are those attributes which can only be discerned after purchase or during consumption.

Karni (1973), who suggested that goods can be categorised according to the degree of the search, experience, and credence properties which they possess.

Parasuraman, Zeithaml, and Berry (1985) believed that the categorisations could also be applied in the service context. In general, service offerings which are high in search properties are easiest to evaluate, those high in experience properties are more difficult to evaluate, and those high in credence properties are the most difficult to evaluate. Most services contain few search properties, but they are high in experience and credence properties, thus making the assessment of service quality more difficult to evaluate than that of product quality (Zeithaml, 1981).

Only two out of the ten original dimensions (that is, Tangibles and Credibility) are known prior to purchase. Most of the dimensions are considered having experience properties: Access, Courtesy, Reliability, Responsiveness, Understanding the Customer, and Communication. Each of these dimensions can be known only when the customer is purchasing or consuming the service. Only two of the dimensions, that is Competence and Security, have credence properties. Consumers are probably never certain on these attributes even after consuming the service.

According to Wright and Weitz (1977), credence attributes are generally expected to be less important than experience attributes in shaping quality perceptions. This is because outcomes related to credence attributes are not immediate, and customers tend to attach less importance to distant outcomes.

Despite the extensive research conducted by Parasuraman, Zeithaml, and Berry (1985, 1990), four areas were not clearly addressed. First, Parasuraman, Zeithaml, and Berry did not suggest how customer judgements are acquired and categorised to form inferential beliefs about the experience and credence dimensions. Second, when the dimensions were reduced from ten to five, the new dimensions were not categorised into search, experience, and credence dimensions. Third, they did not address which of the dimensions are important in shaping the customer's judgement on service quality. Finally, they also did not address the influence of personal, functional, and situational variables affecting perceived service quality.

2.4.5 The Consumer Psychology Theory

It is believed that higher performance by service organisations leads to higher perceived service quality if expectations are held constant (Oliver, 1977). There are four main psychology theories relating to the consumer evaluation process, which may help in understanding perceived service quality better. The four theories are:

10 Credence attributes are those attributes which the consumer may find impossible to evaluate even after purchase or consumption.

- cognitive dissonance (assimilation) theory
- contrast theory
- generalised negativity theory
- assimilation-contrast theory

According to the cognitive dissonance theory, disparity would occur if a consumer has a high expectation of a particular product or service and subsequently found that the product or service received is below expectation. This disparity would create a state of dissonance or psychological discomfort (Festlinger, 1957). The existence of dissonance would lead the consumer to adjust the perceived discrepancy between expectations and performance in order to achieve satisfaction. One method is that the consumer would raise the evaluation of the product or service performance.

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The contrast theory implies that a consumer will magnify the difference between the product or service received and the product or service expected if he perceives that the product or service is below his expectations. Spector (1956) had the same theory, that is, the disappointed consumers tend to exaggerate the difference between what they expect and what they receive.

The generalised negativity theory implies if a consumer expects a specific performance from a product or service, but a different performance is provided, the consumer will judge the performance to be less satisfactory than if he had no previous expectations (Carlsmith and Aronson, 1963).

Finally, the assimilation-contrast theory suggests that expectations serve as an anchor for the judgement of the product or service performance (Sherif and Hovland, 1961). Assimilation will occur as a function of the level of difference between perceived and expected performance. If the difference is small, assimilation will occur. However, if the difference is large, then the difference will be exaggerated.

Table 2.3 summarises the above theories.

Theory	Advocates that if:	Consumer's Perceptions
Cognitive Dissonance	$P < E$	$P = E$
Contrast	$P < E$ $P > E$	$P < < < E$ $P > > > E$
Generalised Negativity	$P < E$ $P > E$	$P < < < E$ $P < < < E$
Assimilation-Contrast	small $P < E$ large $P < E$	$P = E$ $P < < < E$

P = performance
E = expectations

Table 2.3 - Summary Of The Main Psychology Theories
Source: Adapted From Oberoi (1989)

2.5 The Service Concept and Customer Needs

A key factor of successful service management and marketing is conceptualising the service as a product. However, the problem with the current literature on services reveals three things. Firstly, there is nothing mentioned on services as products (see, for example, Pessemier, 1977; and Booz-Allen and Hamilton, 1982). Secondly, it does not recognise services as products with special characteristics (Gronroos, 1983). Thirdly, according to Bower (1987), service firms do not follow a formal development procedure as they do in product development.

Even though service quality has been addressed in the literature on service operations (see, for example, Sasser, Olsen, and Wyckoff, 1978; Wyckoff, 1984; Johnston and Morris, 1985; and Johnston, 1987), there seems to be a difficulty in defining services as products, thus making it difficult to develop a service quality model (Johnston, 1987).

Most of the conceptual development and empirical testing which have taken place in this area also fail to consider services as products. Instead, they are based on a consumer behaviour perspective (see, for example, Gronroos, 1982, 1984; Lehtinen

and Lehtinen, 1982; Parasuraman, Zeithaml, and Berry, 1985; and Lewis and Klein, 1987).

The service product is described as a package or bundle of different services, which together form the total product (Armistead, 1985). This package is divided into two main categories: the main service and the auxiliary service. For example, a hotel service may include the use of a room and bed as the main service, whereas reception services, valet services, and so on, are considered as auxiliary services.

The set-back with the current concept of the service product is that it does not include the functional process dimensions. Instead, it considers only the technical dimension. The service package conceptualisation in the current literature is not based on the consumer's perception of a service (which is a function of technical quality and functional quality).

According to Gronroos (1987), the service offering consists of a basic service and an augmented service. The basic service package describes what the customers are likely to receive, whereas the augmented service includes the service product and interactions between the customers and service firm. The basic service comprises core service, facilitating service, and supporting service. The core service, which is the reason for being in the market place, determines what the customers are about to receive. In order to make it possible for customers to use the core service, some additional services are often required. Gronroos termed it as facilitating services (it facilitates the core service), and supporting services (introduced as a means of competition).

There are some set-backs with Gronroos's terminology. The distinction between facilitating services and supporting services are not always clear. The facilitating services may also be designed as a competitive tool.

If one refers to the general conceptualisation of the service package, it has always been two-dimensional: for example, main service and auxiliary service, or core service and peripheral services (Edvardsson and Gustavsson, 1991). According to Edvardsson and Gustavsson (1991), there should be a correlation between the service concept and customer needs (see Figure 2.2). The customer needs comprise primary needs and secondary needs. For example, in air travel, the primary need of a customer is to get from point A to B. On the other hand, his secondary need might include accessibility to the airline, for example, making reservation and purchasing the ticket. On the aspect of service concept, Edvardsson and Gustavsson (1991) suggested that the offering should include a core service and peripheral services. As such, the core services should take care of the primary needs, and the peripheral services should be geared to meet the secondary needs.

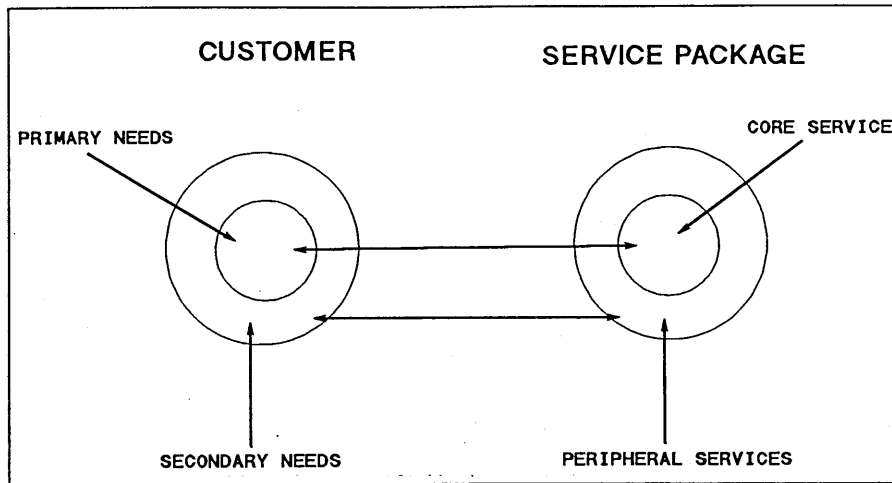


Figure 2.2 - Customer Needs and Service Offerings
Source: Edvardsson and Gustavsson (1991, p.334)

Thus, from a service management and marketing point of view, one can conclude that an explicit conceptual model of the service as a product should be developed, positioned, and marketed. This conceptual model should take into account the consumer behaviour aspects.

2.6 The Gap Model

According to Parasuraman, Zeithaml, and Berry (1986), perceived service quality is the difference between the expected service and perceived service (referred as to Gap 5; see Figure 2.3). By measuring the gap (expectation-perception gap), one can determine the degree and direction of the perceived service quality. A perception that is higher than expectation would lead to a higher level of perceived service quality, whereas a lower perception would lead to lower perceived service quality. The customer's expectation-perception gap is the service quality shortfall perceived by customers.

It is important to note that the term "expectations" as used in the literature on service quality differs from that in the literature on consumer satisfaction. In the literature on consumer satisfaction, expectations are viewed as predictions made by consumers about what is likely to happen during an impending transaction or exchange (Oliver, 1981). However, in the literature on service-quality, expectations are viewed as desires or wants of consumers, that is, what they feel a

service provider should offer rather than would offer (Parasuraman, Zeithaml, and Berry, 1986).

On the side of the service provider, the shortfall is referred to as Gap 1 through 4, as described below:

- Gap 1 - the difference between customer expectations and management perception of customer's expectations
- Gap 2 - the difference between management perception of customer's expectations and service-quality specifications
- Gap 3 - the difference between service-quality specifications and the service actually delivered
- Gap 4 - the difference between service delivered and what is communicated about the service to customers

The conceptual model is a logical process by which service firms can undertake to measure and improve service quality.

In this model, the Gap 5 is influenced by Gaps 1 through 4 (see Figure 2.3). Of concern are the key factors responsible for the size of those gaps.

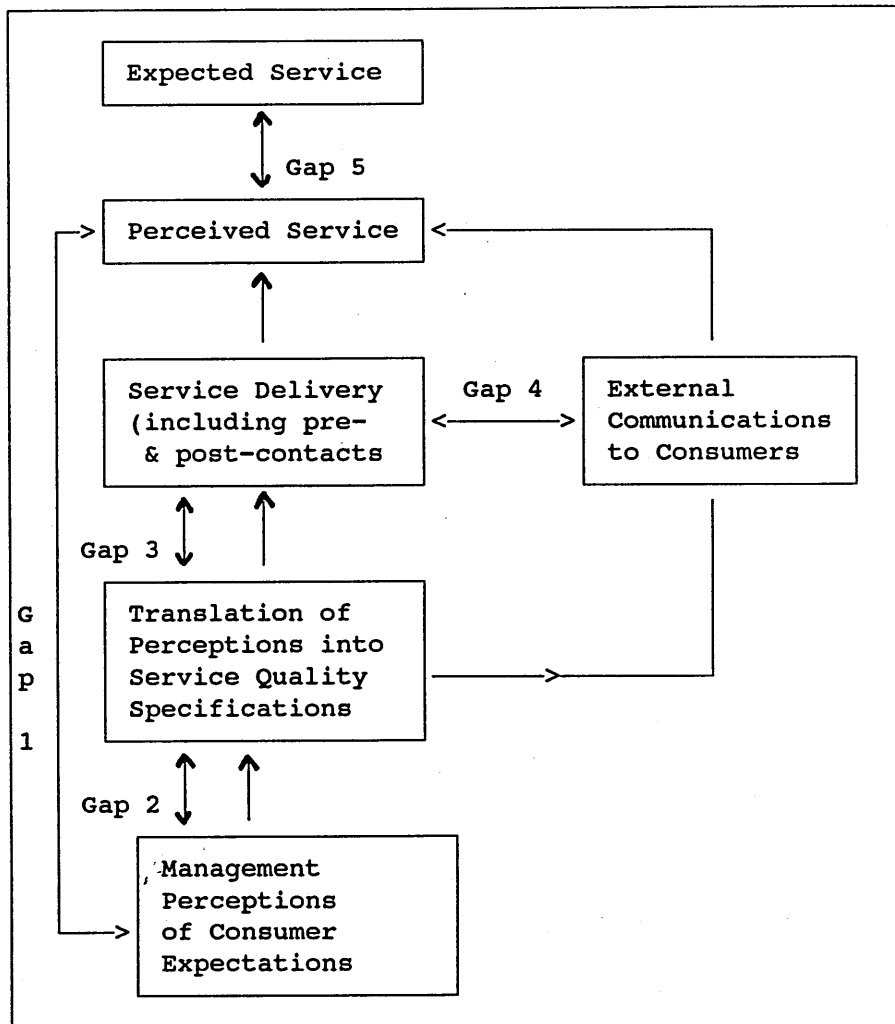


Figure 2.3 - A Conceptual Model Of Service Quality
Source: Parasuraman, Berry, and Zeithaml (1990, p.4)

2.6.1 Customer Perception - Customer Expectation Gap (Gap 5)

In Parasuraman, Zeithaml, and Berry's (1986) model of service quality, the customers' desires or wants are influenced by four factors:

- word-of-mouth communications
- personal needs
- past experience with the service firm
- external communications by the service firm

The study was conducted with four service firms: retail banking, credit cards, securities brokerage, and product repair and maintenance. The respondents came from various departments: marketing, operations, customer relations, and senior management.

The customers used ten dimensions to assess service quality (see Figure 2.4). Of these, Reliability is the most important dimension, and Tangibles is the least important. The study was conducted using the SERVQUAL instrument, which was developed by Parasuraman, Zeithaml, and Berry (1990). It measures both the customers' perceptions and expectations of the service, using similar and identical questionnaire. The more negative the Gap 5 (that is, perception - expectation) scores, the more serious is the quality shortfall in the eyes of customers. The study shows that all the dimensions have negative score except for the Tangibles dimension which has a positive score. Thus, it implies that the service firms (on average) exceeded customers' expectations on Tangibles but not on the other dimensions.

The findings from the study should, however, be qualified. Firstly, the measurement of perceptions and expectations were done at the same time. In theory, the expectations should be measured prior to the service (that is, at time t_0), whereas the perceptions should be measured after the service delivery (that is, at time t_1). By doing it together, one is not measuring the expectations. Instead, one is measuring the customers' perceptions of their expectations.

Secondly, the respondents came from four different functional areas. In the study conducted by Cooper, Droge, and Daugherty (1991), they suggested that personnel tend to focus on those functions and activities that have a direct impact on their performance. Thus, personnel from different functional areas would use different criteria in evaluating service. However, this is not addressed in Parasuraman, Zeithaml, and Berry's study (1986).

Thirdly, the study did not consider the effect of different market situations. For example, in a situation where supply is greater than demand, the perception of service quality could be different from that where supply is less than demand. The services offered in a monopoly market and a free market could be also different. The different market situations may have an influence on customers' expectations.

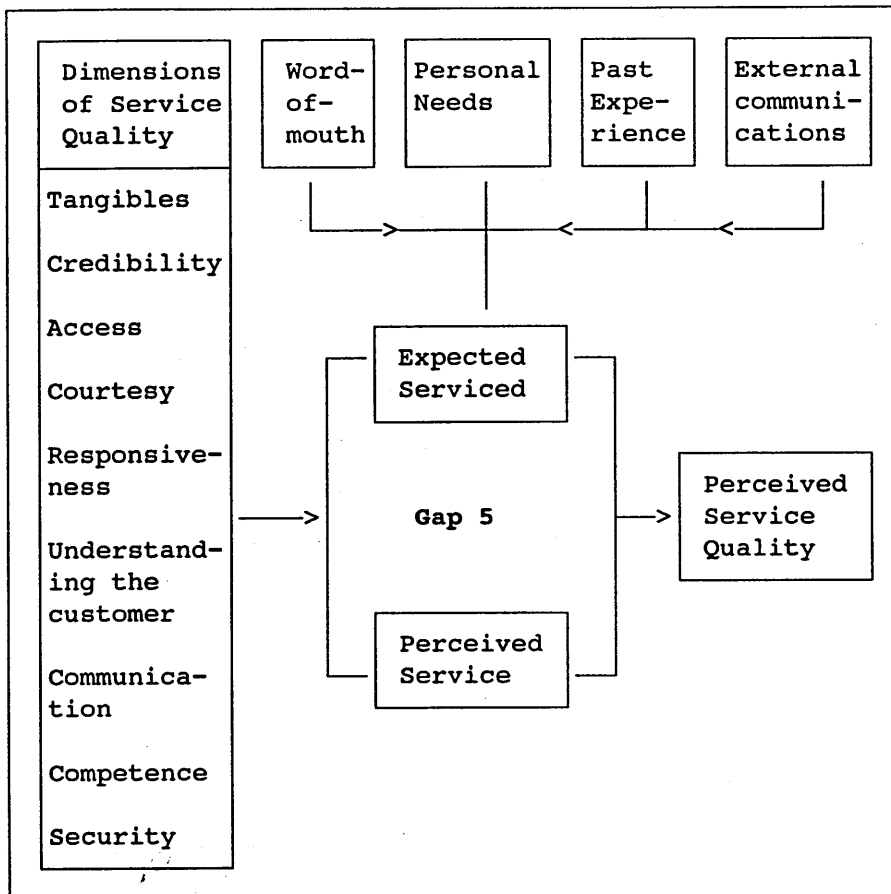


Figure 2.4 - Customer Assessment Of Service Quality
 Source: Zeithaml, Parasuraman and Berry (1990, p.37)

2.6.2 Customer Expectation - Management Perception Gap (Gap 1)

Gap 1 is the discrepancy between customer expectations and management perceptions of customer expectations (see Figure 2.3). In other words, it is the difference between what customers want and what management perceives the customer is looking for. Parasuraman, Berry, and Zeithaml (1990) have identified three conceptual factors affecting the size of Gap 1. The three factors are:

- lack of marketing research orientation
- inadequate upward communication
- too many levels of management

2.6.2.1 Marketing Research Orientation

Marketing research orientation is the extent to which managers make an effort to understand customer's needs and expectations. This could be done either through formal or informal information-gathering activities. The shortfall in this area could be contributed by insufficient marketing research, inadequate use of research findings, or lack of interaction between management and customers.

It is believed that marketing research is important towards a good understanding of customer's expectations and perceptions of services (Parasuraman, Berry, and Zeithaml, 1990). A firm that does not collect this information is likely to have a larger gap than a firm that does collect the information. It is important that the information collected is focused on customer's expectations.

To understand the customer's needs, companies should encourage and facilitate customer's feedback about service problems. For example, British Airways installed customer-complaint booths at Heathrow Airport where passengers who are not happy with the services could video-tape their complaints (Bruce, 1987).

Having done the marketing research, the company must use the research findings in a constructive way. In addition, the managers must be able to put the recommendations from the marketing research into specific action.

2.6.2.2 Upward Communication

Upward communication is the extent to which top management seeks, stimulates, and facilitates the flow of information from employees at lower levels.

Customer-contact personnel that are in regular contact with customers play a very important role in upward communication. It is through the interactions they have with the customer that enable them to understand the customer better. The information obtained should be passed to top management in order for them to understand the customer's problems and expectations. If the channels of upward communication are disrupted, management may not be able to get the feedback on service delivery related problems encountered by customers. They may also not be able to get the basic information about what the customer is looking for.

2.6.2.3 Levels of Management

Having too many levels between customer-contact personnel and top management could inhibit communication and understanding between the two groups. Generally, the top management of the organization is responsible to set the standards for

service quality and to design the service delivery systems. It is, then, the task of the customer-contact personnel to deliver the services to customers according to the standards. Thus, if there are too many levels between them, there is a greater tendency for miscommunication to occur, and the size of Gap 1 is likely to increase.

Zeithaml, Parasuraman, and Berry (1990) conducted an empirical study on five service companies¹¹. The study reveals that the number of levels between customer-contact personnel and top management is a more significant factor affecting the size of Gap 1 than lack of marketing research orientation and inadequate upward communication.

2.6.3 Management Perception - Service Quality Specification Gap (Gap 2)

Gap 2 is the discrepancy between management perceptions of customer expectations and the service-quality specifications. Even if the management has understood the customer's expectations, they may not be willing or able to translate them into service quality specifications and put the systems in place. Zeithaml, Parasuraman, and Berry (1990) have identified four factors responsible for this:

- inadequate management commitment to service quality
- lack of perception of feasibility
- inadequate task standardisation
- absence of goal setting

2.6.3.1 Inadequate Management Commitment to Service Quality

Many companies believe that they are committed to service quality. However, their commitment is from the company's own internal and technical perspective. In many companies, service quality means meeting the company's self-defined productivity or efficiency standards, many of which customers do not notice or desire. In some other companies, quality is defined in terms of advanced technology in order to keep pace with competitors.

For example, British Airways developed a five-day management programme known as "*managing people first*". It is to project their seriousness and management commitment to service quality. The objectives of the programme are to make managers more decisive and creative, more responsive to the needs and concerns of their staff and colleagues, and more effective in motivating their subordinates to use

¹¹ The five service companies are one telephone company, two insurance companies and two banks.

their own judgement and initiative (Bruce, 1987). In addition, the airline linked direct financial incentives to managers who achieve these objectives.

2.6.3.2 Perception of Feasibility

According to Parasuraman, Berry, and Zeithaml (1990), the size of Gap 2 is strongly affected by the extent to which managers perceive that meeting customer's expectations is feasible.

The manager's perceptions may or may not be related to the actual constraints in the organisation. It could be related to technological constraints, financial constraints, and so on. In addition, it could be due to the manager's own complacency.

2.6.3.3 Inadequate Standardisation of Task

The translation of managerial perceptions into specific service quality standards depends on the degree to which tasks can be standardised or made routine. In services, managers tend to believe that standardisation would be perceived by customers as impersonal. Furthermore, managers argue that services are too intangible to be measured, thus making standardisation difficult.

According to Levitt (1976), there are three forms of standardisation:

- substitution of personal contact and human effort for hard technology (for example, Automatic Teller Machines, automatic car washing machines, and so on).
- improvement of work method
- combinations of these two methods

2.6.3.4 Absence of Goal Setting

Some service firms measure and monitor internal standards on features that are of concern to them rather than what customers need. The goals set by service firms should be based on customer's requirements and expectations rather than internal company standards.

Service-quality goals should not be based solely on customer's requirements; it must also be specific, practical, well accepted by employees, and measurable.

2.6.4 Service Quality Specifications - Service Delivery Gap (Gap 3)

Gap 3 is also known as the service-performance gap. It is the discrepancy between service-quality specifications and actual service delivery. The discrepancy is due to two main factors: employees are unable and unwilling to perform the service at the desired level. Willingness to perform may be described as discretionary effort, that is, the difference between the maximum amount of effort and care that an individual could bring to his or her job, and the minimum amount of effort required to avoid being fired or penalised (Yankelovich and Immerwahr, 1983).

There are seven conceptual factors that contribute to Gap 3 (Parasuraman, Zeithaml, and Berry, 1990):

- role ambiguity
- role conflict
- poor employee-job fit
- poor technology-job fit
- inappropriate supervisory control systems
- lack of perceived control
- lack of team-work

2.6.4.1 Employee Role Ambiguity

The role attached to any position in an organisation represents the set of behaviour and activities to be performed by the person occupying that position (Katz and Kahn, 1978; Walker, Churchill, and Ford, 1977). The role is defined through the expectations, demands, and pressures communicated to employees by individuals (for example, top managers, immediate supervisors, customers) who have a vested interest in how employees perform their jobs (Katz and Kahn, 1978). When employees do not possess the information or training necessary to perform their jobs adequately, they are uncertain about what managers or supervisors expect from them and how to satisfy those expectations. In this situation, they experience role ambiguity.

Employees may also suffer from role clarity. They need specific and accurate information about their roles in the organisation. One way to achieve this is through training. Communication, feedback, confidence, and competence also improve role clarity.

2.6.4.2 Role Conflict

Role conflict is the extent to which employees feel pressured due to competing or conflicting demands made on them by customers, supervisors, and top managers (Parasuraman, Berry, and Zeithaml, 1991). Research has shown that perceived role conflict is negatively related to job satisfaction (Greene and Organ, 1973).

Because the customer-contact personnel are the links between the company and the customer, they must satisfy the needs of both the managers and customers. At times, the expectations of the company and that of the customer conflict. For example, conflict occurs when the firm expects the customer-contact employees to service as many customers as possible within certain allocated time. On the other hand, the customers demand personal attention from the customer-contact personnel.

Perceptions of role conflict are psychologically uncomfortable for the employee (Kahn, Wolfe, Quinn, Snoek, and Rosenthal, 1964; Walker, Churchill, and Ford, 1977). It can lead to a negative effect on the employee's satisfaction and performance in the organisation and subsequently affect the size of Gap 3 (Zeithaml, Berry, and Parasuraman, 1988).

2.6.4.3 Poor Employee-Job Fit

The exploratory study conducted by Zeithaml, Berry, and Parasuraman (1988) indicated that service quality problems often occur because customer-contact personnel are not well suited to their positions. In most cases, the customer-contact personnel tend to be situated at the lower levels of the company structure. Personnel holding these jobs are frequently less educated and lower paid. Thus, they may be lacking on language proficiency, interpersonal skills, and other related skills necessary to serve customers effectively.

The recruitment process is important to ensure that the right people are selected for the right jobs. Thus, matching the employee to the job through the selection process is important. The ability of employees to perform the job well affect the size of Gap 3 (Zeithaml, Berry, and Parasuraman, 1988).

2.6.4.4 Poor Technology-Job Fit

High service quality depends on the availability of the appropriate tools or technology for the employees to perform their tasks. The usage of appropriate equipment (for example, computers for cargo space booking) can enhance the

service employees' performance. The equipment used must also be reliable in order to deliver high quality service.

2.6.4.5 Inappropriate Supervisory Control Systems

In some service firms, the performance of customer-contact employees is measured by their output (for example, number of transactions made per day). In certain cases, the performance of individuals are monitored and controlled through a system known as "*output control systems*" (Ouchi, 1979; Ouchi and McGuire, 1975). In this system, employee performance is measured based on documented outputs. The set-back with this measurement is that it may affect the delivery of service quality.

Performance can also be measured through behavioural control systems (Ouchi, 1979; Ouchi and McGuire, 1975). It consists of observations or other reports on the behavioural aspects of the employee at work, rather than the output control system. An example of a behavioural control system is by conducting a survey with customers who have used the service recently. The survey should focus on the behavioural aspects of the customer-contact personnel. This method encourages the employees to give a high quality service to the customer.

2.6.4.6 Lack of Perceived Control

Organizational control is a function of organisational rules, procedures, and culture that tend to limit the flexibility of the customer-contact personnel to serve customers. Perceived control is what the customer-contact personnel perceive the limitations to be. It is also a consequence of the degree to which his authority to serve customers lies elsewhere in the organisation, that is, poor streamlining of job functions. This will affect the quality of service delivered to the customer, although he may be totally committed to serving the customer.

Perceived control can be a function of management demand, which is a major problem in service businesses (Zeithaml, Parasuraman, and Berry, 1985).

2.6.4.7 Lack of Team-work

Team-work and group cohesiveness are important in achieving organizational goals (Davis, 1969; Shaw, 1976; Salancik, 1977).

In high performance groups, people function as a team and allow group members to participate in decision-making and share the group's success (Lawler and Cammann, 1972)

2.7 General Critiques on the Previous Research

The research on service quality is still at its infant stage. There are not many researchers who have done empirical research on the subject. The two most prominent models of perceived service quality are the Gronroos model and the Gap model. However, these research have some limitations.

Firstly, the previous research rests too heavily on a single unit of analysis, for example, service quality as perceived by the customer. Furthermore, the analysis of the customer's perception of service quality is not in-depth. In most cases, the only aspect or unit of analysis considered is a comparison between the service expected and that perceived by customers. No consideration has been given to the various references that the customer might use for judging the quality of service.

Gronroos (1984), Gummesson (1988), and Parasuraman, Zeithaml, and Berry (1985) assumed that the customer's perception is determined by his expectations before the service is provided, and how well the service actually meets these expectations. However, other researchers have commented on the factors influencing such expectations. For example, Parasuraman, Zeithaml, and Berry (1985) suggested word-of-mouth, communication, personal needs, and past experience as factors influencing expectations. However, these factors were not incorporated when measuring the level of expectations.

Secondly, most of the researchers have identified only general quality attributes (see, for example, Parasuraman, Zeithaml, and Berry, 1985). It is not sufficient to deal with service quality from a management perspective only and to establish general quality attributes that would be valid for various kinds of services and situations. Instead, a situation-specific approach is required.

Thirdly, the research also neglected the cost aspects of service quality. The relationship between cost and errors in both internal and external service production process should be taken into account when assessing quality. Also, when judging perceived service quality in relation to expected service, the price of the service is often ignored. This is unrealistic as quality is multidimensional.

Fourth, to date, there are very few empirical studies done using different techniques. In both the Gronroos model and the Gap model, the technique used has been limited to structured questionnaire. The data analysis is limited to basic statistics and factor analysis using the Statistical Package for Social Sciences (SPSS). This could be due to the difficulties involved in finding valid tools to measure customer expectations. Even if one is able to measure the customer

expectations, it is still difficult to verify the validity of the data. It is unlikely that one can measure the actual expectations of the customer.

Fifth, there is a problem in the origin of the concept of perceived service quality. Gronroos was the first researcher to propose a service quality model (Gronroos, 1982). The objective was to assist service marketing personnel in understanding the subject of service quality. However, the empirical data used to support his model is limited to the management perceptions of customer expectations and not the actual customers'.

The origin of Gronroos's model has some bearing on post-consumption evaluation which are found in the literature on buyer behaviour. The main reference seems to be the information processing theory proposed by Bettman (1979). Bettman's linking of expectations to outcome concerns the possible assessment of the outcome. He gave several examples which, to the researcher's understanding, partly highlights the possibility of linking the comparison of expectations and outcome to a judgement on the choice. Therefore, in the absence of a well grounded theory, the concept of perceived service quality becomes debatable.

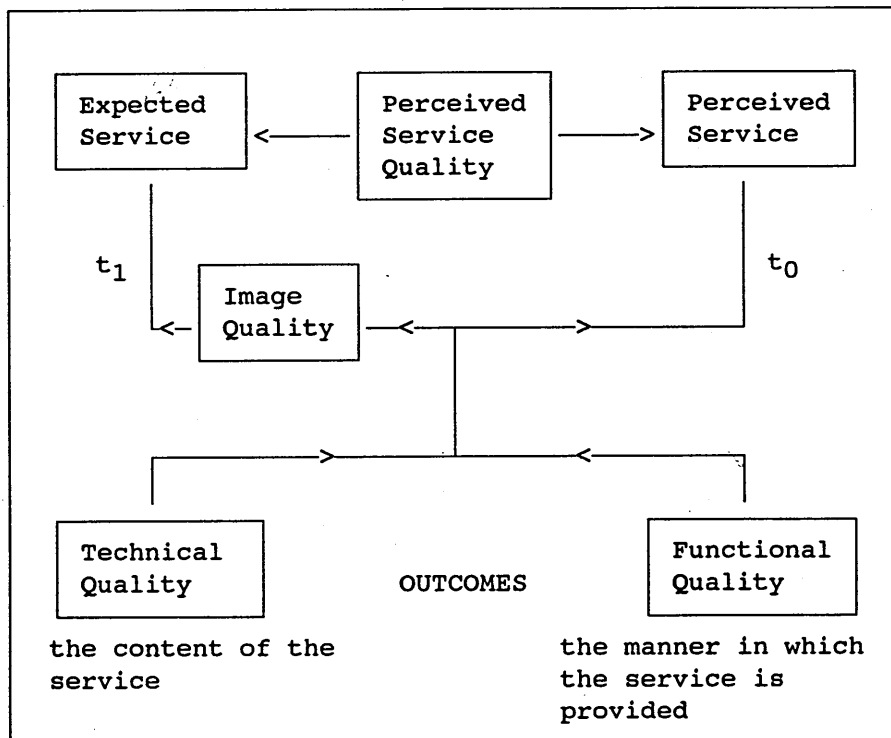


Figure 2.5 - Perceived Service Quality Model

Finally, Gronroos's model of perceived service quality (see Figure 2.1) shows that the technical quality and functional quality influence perceived service quality via image quality. The researcher is of the opinion that the two dimensions affect either the perceptions or the expectations or both but not the perceived service quality. This is because the perceived service quality is an outcome of perceptions and expectations. Image quality will affect future expectations (at time t_1) and current perceptions (at time t_0). Therefore, there is a need to modify the model as shown in Figure 2.5.

2.8 Summary

The concept of perceived service quality is still at its infant stage. Gronroos was the first to develop a model of perceived service quality (Gronroos, 1984). In his model, perceived service quality is influenced by the two dimensions: technical dimension and functional dimension. Parasuraman, Zeithaml, and Berry (1985) identified ten dimensions that customers generally use in evaluating service quality. In addition, their model addresses various gaps, that is, the shortfall perceived by customers, and the shortfalls within the service firms. The key factors affecting the shortfalls are important if one is to improve service quality. This model provides a logical process that service firms can use to measure and improve service quality.

The literature on service quality is mostly descriptive in nature. There are three principal schools of thought on how customers evaluate quality.

- Firstly, service quality resides in the physical environment associated with the service offering. These are the tangible elements of the service production system, which act as indicators of perceived quality.
- Secondly, service quality is achieved through the performance of customer contact-personnel. Perceived service quality lies in the staff's attitudes and behaviour.
- Thirdly, service quality perception results from a comparison of customer expectations with actual service performance. The service performance is a function of technical quality and functional quality.

Since perceived service quality is a function of perceived and expected services, it is important to understand that expectations are not formed in a vacuum. Instead, it is a result of previous experiences in similar situations. The other variables affecting expectations are personal needs, word-of-mouth communications, and external

communications by service firms. Personal needs differ between industrial and non-industrial customers. The personal needs of industrial customers are influenced by their functional roles in the organisation.

The empirical research on service quality have made use of structured questionnaires. The analyses were limited to basic statistics and factor analysis using the Statistical Package for Social Sciences (SPSS). Further empirical research should be done using different techniques of data collection and different forms of analysis. The purpose is either to validate the current model of perceived service quality or to expand the model. In addition, the research should include other factors (for example, functional roles) that may have an effect on customer's expectations.

Chapter 3 - Literature Review on the Air Freight Industry

3.0 Introduction

Air cargo is a composite term used in the United States when referring to the carriage of mail, air freight, and air express (Cook, 1973). Air freight refers to goods (excluding mail and express) carried in all-cargo aircraft and in the bellies of passenger aircraft, under an airwaybill¹. Air express refers to the movement of express goods which normally weigh less than 30 kilograms (Sparks and Mathe, 1991). Air express differs from normal freight in that it has priority over normal freight for loading onto an aircraft.

The air cargo industry is divided into the air freight industry and the air express industry. The air freight industry is further divided into two segments: integrated and non-integrated services. The air express industry, on the other hand, can be divided into three broad segments: documents, parcel, and door-to-door freight (Sparks and Mathe, 1991).

This chapter covers the various aspects of the air freight industry which is the main focus of the research. The first part gives an overview of the five different modes of transport (sea, air, road, rail, and pipeline). The second part of this chapter covers the differences between the integrated and non-integrated air freight services, the development of the air freight industry, and the parties involved in the distribution system.

In the distribution system, price and service are the two major factors affecting the choice of air freight carriers. These two dimensions are related to the types of commodity being shipped. The final part of this chapter covers the three major classifications of freight commodity: emergency, perishables, and freight that can be diverted. It also reviews the shippers' requirements in terms of price and service in relation to the type of commodities being shipped.

Most of the literature are quite dated, and some of those findings are not supported empirically. Therefore, they have to be treated with caution.

¹ Equivalent to the term air consignment note. It is a document which evidences the contract between the shipper and the carrier for the carriage of cargo over the routes of the carrier.

3.1 The Different Modes of Transport

There are five modes of transport that handle the bulk of freight movement: rail, road, sea, pipeline, and air. The rail, truck, and pipeline modes are generally limited to domestic freight movement, or to movement over land between countries. Air and sea modes are used extensively between countries separated by sea.

The relative importance of the mode of transport is dependent on the following factors:

- the proximity of the trading partners
- the composition of the freight handled
- the inherent advantage of the specific mode of transport

For example, the pipeline is an efficient mode for moving products over long distances. However, the use of pipeline tends to be limited to liquid (almost entirely oil) and gas products (moving in high volume) moving over land². Therefore, the pipeline industry does not compete with the other forms of transportation.

Rail and road compete essentially over the same routes for much the same freight. The products carried by each mode are dependent on the cost-service trade-off. Rail has lower rates and a slightly lower level of performance compared with truck. Thus, rail concentrated more in hauling lower value products. Examples of freight commonly moved by rail are chemicals, plastics and steel products. Typical products that are moved by trucks are instruments, fabricated metal products, beverages and so on.

Sea transport is slower than air. However, sea carriers offer tremendous capacity. They deal mainly with bulk commodities such as coal, ore, gravel, oil, gas, semi-manufactured iron and steel, which are low in value when compared to air freight. Air transport is relatively more expensive as compared to sea transport. Common products carried by air are electric and electronic parts or equipment, optical instruments, wearing apparel, emergency items, and certain perishables (for example, cut flowers). Generally, these products have relatively high in value compared to their weight and they tend to benefit from the speed in delivery.

² Transportation of oil and gas are not limited to pipelines. Specialised sea tankers are also in use for transporting oil and gas over sea.

The five modes of transport may be used exclusively or in combination with other modes of transport. The user tends to select a single mode or a combination of different modes that can provide them with the best balance between quality of service and price. According to Ballou (1987), there are four basic criteria to consider when selecting the transport mode:

- cost of service
- average delivery time
- transit-time variability
- loss and damage

The total cost of a transport service is the rate charged for the transfer of goods between two points, plus any other additional charges for pick up, delivery, insurance, and other costs related to preparing the goods for shipment. Cost comparisons among the different modes of transport must be made on the basis of total cost.

Delivery times are usually referred to as the average time taken for a shipment to move from its point of origin to the point of destination. Transit-time variability is a measure of the uncertainty in carrier's performance.

Loss and damage affect the user's service delivery to their customers. Furthermore, the claims procedure is cumbersome because it takes time to gather pertinent facts about the claim, and it requires extra effort on the part of the shipper to prepare the relevant documentation. The fewer the claims against a carrier, the more favourable is the service to the user.

Table 3.1 shows the ranking of the five modes of transport based on cost and performance characteristics.

Mode	Performance Characteristics			
	Cost ^a 1=Highest	Average Delivery Time ^b 1=Fastest	Delivery Time Variability 1=Least	Loss & Damage 1=Least
Pipe	4	4	2	1
Rail	3	3	4	5
Truck	2	2	3	4
Sea	5	5	5	2
Air	1	1	1	3

^aCost per ton-mile
^bDoor-to-door speed

Table 3.1 - Relative Ranking of Cost and Operating Performance Characteristics by Transportation Mode
Source: Ballou (1987, p.125)

3.2 The Development of the Air Freight Industry

There are two factors that contribute to the development of the air freight industry: market development and technical development (Taneja, 1979; Boeing, 1979). The market development of air freight is considered to be closely connected to the general global economic growth (Comen, 1988). High economic growth in industrialised and newly industrialised countries will increase the need for air transport of goods. On the other hand, the technical development is contributed by the mechanisation of the air freight handling systems, and the development of aircraft capacity and range capability.

3.2.1 Market Development

There is a substantial amount of literature on consumer demand for air freight services (see, for example, Hollyer, Mailing, and Wong 1979; Mc Kinnel, 1969; Schad, 1970; Neufville's, 1984). According to the studies, two main factors are responsible for the market development:

- general economy
- changes in transportation costs

It is generally accepted that if the economy is in a period of expansion, then the volume of shipments is also expected to increase. All transportation modes will benefit from the increase in freight traffic, including air mode. Conversely, in a recession, the volume of freight will be adversely affected (Maio, Wang, and Meltzer, 1977).

The study conducted by the Civil Aeronautics Board has an equation for forecasting air freight traffic. The equation implies that a 1% change in Gross National Product (GNP) will result in a 2.78% increase in the volume of air freight traffic (see Sagnor and Richards, 1971). The study by Boeing (1979) also confirmed that when GNP increases, air freight traffic will also increase. The study shows that a 1% increase in world GNP will result in a 2.30% increase in the world's air freight traffic.

The volume of freight shipped by air will also be sensitive to the shipping tariffs of other modes of transportation. If air freight rates go up relative to those of truck, sea, and rail transportation, then part of the freight usually carried by air will be diverted to the other modes of transportation. Conversely, if air freight rates drop relative to the rates of the other modes, then more freight will be shipped by air.

3.2.2 Technical Development

Technical progress in transportation has boosted passenger traffic, and indirectly opened up new markets for air freight services. However, few factors hinder the technical development in this area.

Firstly, the cargo planes were practically all normal passenger planes. Some have been modified for air freight purposes, for example, a wider cargo door and nose loading on Boeing 747 aircraft. There are also few specially built aircraft to meet the shipping needs, for example, the Lockheed Hercules used for military needs. The probability of designing an aircraft specifically for air freight in the next decade is quite low because of the high development costs involved.

Secondly, even if there is a faster aircraft, the long handling time at the terminals still need to be overcome. An air shipment spends approximately 85 to 90% of the total transportation time (door-to-door) on the ground (Comen, 1988). According to a study done by a German company, Siemens, 84% of the total time is taken up by the ground handling, mostly by the handling company, followed by the airline (see Figure 3.1).

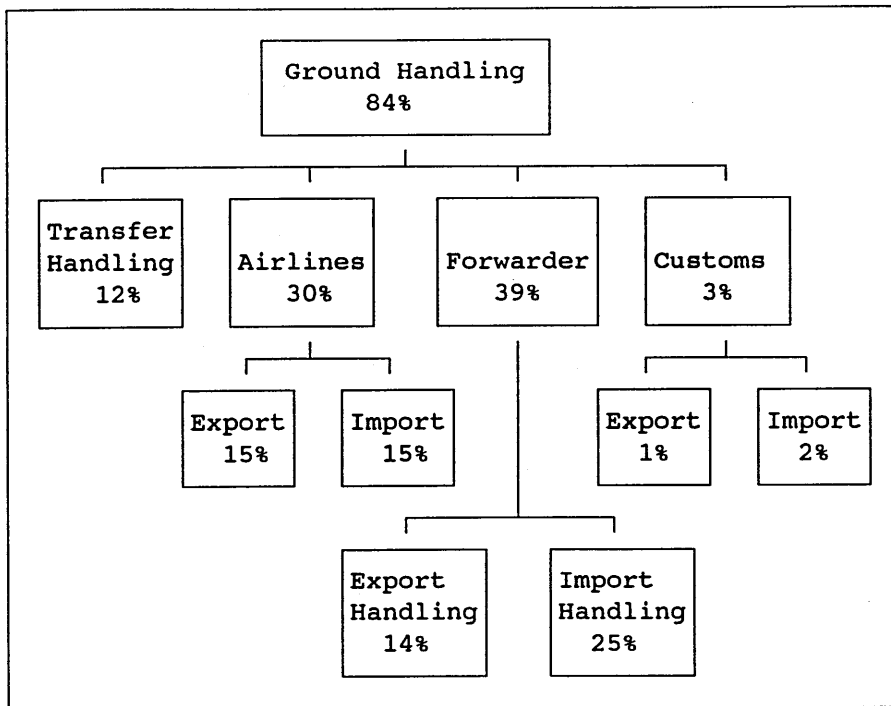


Figure 3.1 - The Break Down of the Ground Handling Time
 Source: Transport Teknik, Scandinavia, 11/1987, p.50

Several air cargo terminals have made many changes to rationalise and use computers to simplify the flow of cargo and documents. One solution is to have a well coordinated computerised system or electronic data interchange (EDI) between airport. This allows dialogue between different individual computer systems, so that the information is available and can be processed even before the goods arrive. Currently, Air France, Cathay Pacific, Japan Airlines, and Lufthansa is jointly developing a system called "Traxon" to do this.³

3.3 The Distribution System

Basically, there are three stages in the transportation of goods:

- from the shipper's door to airport
- airport to airport

³ See Aviation Information, July-August, 1992, p.9

■ airport to the consignee's door

In general, air freight forwarders are responsible for the two ends of the distribution system, leaving the centre to the airlines. This may not be the case with integrators, who provide door to door services and are responsible for all the services in the distribution system.

The air freight is moved from the shipper to the consignee, usually through the air freight forwarder by one or more airlines. It also uses the premises and infrastructure provided by the airport authorities (see Figure 3.2). Any of the activities necessary to move the freight by air may go wrong, and yet the airline may have no control over that activity. This could undermine the total service offered to the shipper.

It is always not clear as to who should provide some of the services in the air freight distribution system. There are two diverse views on the subject: the airline's view and the forwarder's view (Smith, 1974).

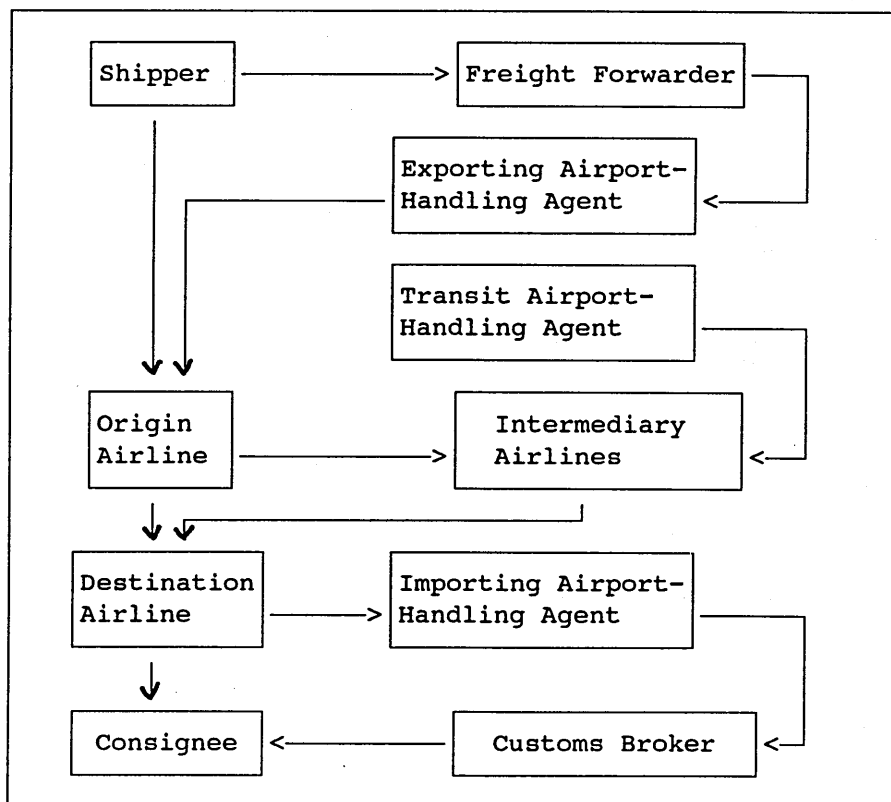


Figure 3.2 - Relationships Between Parties in the Air Freight Distribution System

Source: Adapted from Ashford, Stanton, and Moore, 1984

3.3.1 The Airline's View

The airlines themselves have two views on the distribution system: the traditional view and the wider view (Smith, 1974). The traditional view is that the airline operates only from the reception of the consignment at their acceptance point at the airport to the destination airport, that is, airport-to-airport. The other aspects of the distribution system are the function of the air freight forwarders or shippers. This could be due to the restrictive regulations of the International Air Transport Association (IATA)⁴ concerning the involvement of airlines in the ownership of air freight forwarders. IATA has appointed air freight forwarders all over the world to act as their freight representatives. Thus, IATA is obliged to protect them from being taken over by the airlines.

The wider view is that the airline may operate from any point in the distribution system. Thus, the airline can offer a door-to-door service and/or an airport-to-airport service. The airline may also be responsible for the packing and documentation of the consignments. This view is gaining acceptance among the airlines because they see the importance of the peripheral activities affecting their competitiveness in the air freight industry. This view does not necessarily imply a desire to move into forwarding but a need to work more closely with the air freight forwarders.

The traditional view is widely accepted by the traditional passenger airlines and the non-integrated all-cargo airlines, whereas the wider view is preferred by the integrators.

3.3.2 The Forwarder's View

Unlike the airlines, the air freight forwarders prefer to think of transportation as a system. They are of the view that there is a need to assist their customers in the distribution logistics. As such, the air freight forwarders would prefer to provide both the ground services and the air transportation. Their commitment to cover the two ends of the distribution chain is evident by the cooperation among freight forwarders in different countries. On the air transportation, they have to rely on the airlines to provide the space.

Some big air freight forwarders book the space from airlines well in advance of the actual flight date. In certain countries (for example, Singapore), the air freight forwarders have to pay for the allocated space regardless of the subsequent

4 IATA is a voluntary organisation for the scheduled airlines. Its role is to coordinate price, rate, promotional rules, traffic document, and so on among its members. In the case of air freight, IATA market share of the world's total scheduled air freight volume in 1986 was about 74% per freight ton kilometre share (see World Air Transport Statistics, IATA, Geneva, June, 1987)

utilisation. The space are normally booked six months in advance. In certain countries (for example, Malaysia), the air freight forwarders need not pay if they do not utilise the allocated space. However, they may be black-listed in the future space allocation. It is basically a demand and supply situation of the air freight capacity.

A high percentage of the air freight carried by airlines come from the air freight forwarders. According to Davies (1984), 90 to 95% of air freight come from air freight forwarders. Smith (1974) suggested a lower figure of 70 to 80%. Both figures may no longer be correct especially with the introduction of integrators (Nelms, 1991).

3.4 The Air Freight Industry: Non-Integrators and Integrators

The air cargo industry is divided into the air freight industry and the air express industry. The air express industry can be further divided into three broad segments: documents, parcel, and door-to-door freight (see Figure 3.3). The courier companies primarily concentrate on documents, but they may consider small parcels weighing up to 30 kilograms. Parcel companies are primarily concerned with express goods, but they may also deliver documents. The individual parcels carried by these companies will not normally weigh more than 50 to 60 kilograms. Door-to-door freight companies handle express consignments but will also offer other services like airport-to-airport or non-express freight services.

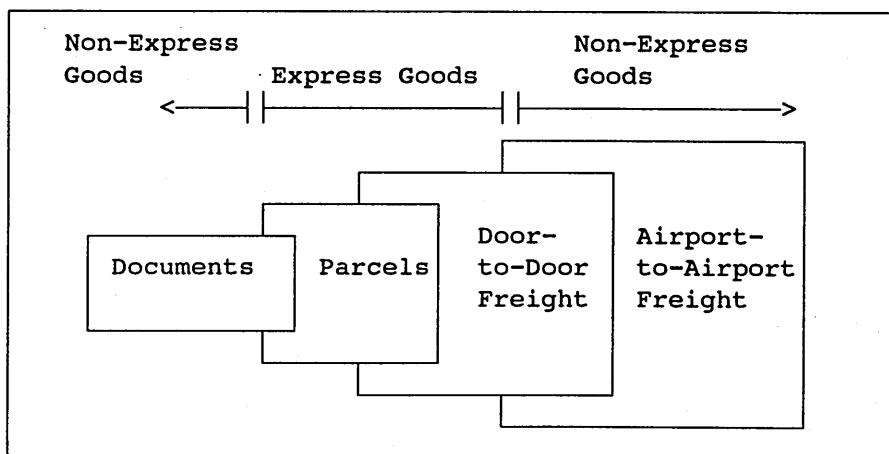


Figure 3.3 - Overlap of the Air Cargo Industry Sector
Source: Adapted from Sparks and Mathe (1991, p.63)

In general, the air freight industry handles non-express goods. However, some airlines also provide express door-to-door service for small consignments. Examples of airlines providing this type of services are Singapore Airlines, British Airways, and Swissair⁵. The revenue from this type of service is negligible as compared to that of the airport-to-airport freight.

Neufville (1984) suggested that the air freight industry can be divided into two segments: the traditional passenger airlines and the integrated all-cargo specialists. However, he did not consider the existence of non-integrated all-cargo airlines (for example, Cargolux Airlines and Air Nippon Cargo). In general, these airlines provide only cargo services to the customers, but their services are generally limited to airport-to-airport. Therefore, their operations are similar to that of the traditional passenger airlines.

The integrated all-cargo carriers are generally referred to as integrators. They provide door-to-door services, that is, from the pick up at the customer's door to the delivery at the consignee's door. Generally, the integrators use their own aircraft and ground transport vehicles in providing these services.

On the other hand, the traditional passenger airlines emphasise the use of belly capacity on the passenger aircraft, and provide mainly airport-to-airport services. In addition to the normal passenger aircraft, some of these airlines also operate combi-aircraft⁶. Thus, these airlines could offer both the belly space and the main deck space on the aircraft to the customers. Some of the airlines have gone a step further by operating a freighter aircraft in addition to the passenger aircraft. In this situation, the freighter services offered by these traditional passenger airlines are similar to that offered by the non-integrated all-cargo carriers.

From the above discussions, the classification of air freight carriers is dependent on two criteria:

- whether the carrier is providing airport-to-airport or door-to-door services
- within the airport-to-airport services, whether the carrier is providing only cargo services or a combination of cargo and passenger services

Based on the types of services offered, one can classify the types of carriers into two broad categories: integrator and non-integrator (see Figure 3.4).

5 Singapore Airlines has introduced the express service (for consignments less than 100kg.) known as 'Swiftrider'. In the case of British Airways, it is known as 'Speedbird', whereas in Swissair it is known as 'Skyracer'.

6 Combi-aircraft is where both passengers and cargo are carried on the main deck. For example, Boeing 747 Combi and DC10 Combi.

The integrator and non-integrator are operating in different market segments (Sparks and Mathe, 1991). The two groups are not directly competing with each other, nor are they complementing one another in the way they do their business.

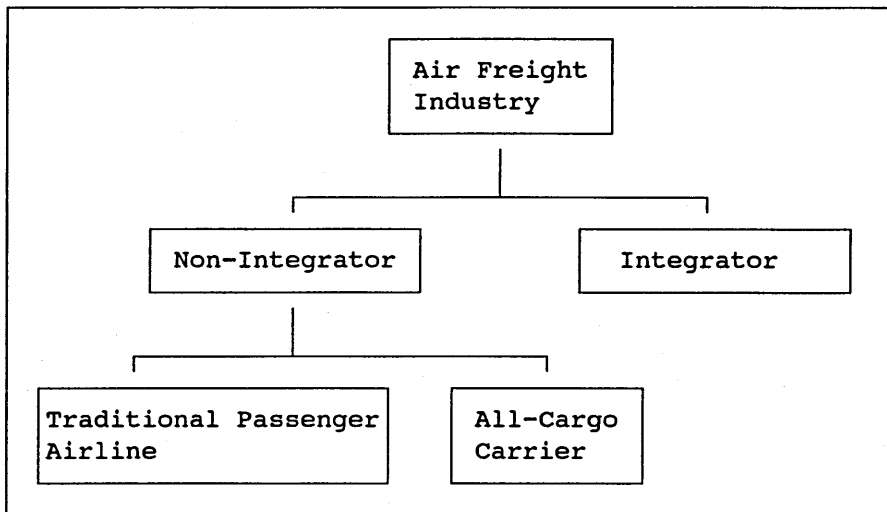


Figure 3.4 - The Segmentation of the Air Freight Industry

3.4.1 The Non-Integrators

The two main parties involved in the non-integrated services are the airlines and the air freight forwarders. The airlines basically provide the air transportation. Their services are limited to the transfer of goods between airports. On the other hand, air freight forwarders provide the ground services for the shippers.

There are some airlines that provide only passenger services. In general, these airlines are non-scheduled airlines. They are targeting at the holiday travellers, and they provide charter services to the tour operators. These airlines are not in the business of carrying cargo. Examples of the airlines in this category are Monarch Airlines and LTU (Germany). According to the 1990 airline statistics, the volume of cargo in Revenue Tonne Kilometre (RTK) compared to the total RTK (cargo and passenger) was 0% and 0.5% for Monarch Airlines and LTU respectively⁷. Since the revenue from the cargo operations is negligible, this category of airlines is excluded from the classification of air freight industry.

Traditional passenger airlines generally carry passengers as the main portion of their business, but they may carry cargo as well. The carriage of cargo is either to fill

⁷ See Airline Business, September 1990 issue.

the belly space in the aircraft or as part of their business strategy to compete in the air freight industry. Examples of airlines in this category are British Airways, Korean Airlines, Malaysia Airlines, and so on. These carriers may operate combi-aircraft and/or freighter aircraft in addition to the normal passenger aircraft.

On the other hand, the all-cargo airlines operate only freighter services, which means that they generally do not carry passengers. They may be carrying passengers on a charter basis, but the revenue from the carriage of passengers is negligible compared to the cargo operations. An example of airlines in this category is Cargolux Airlines.

Because of the international restrictions on passenger transport, the traditional passenger airlines are limited to the routes they are authorised to fly. Furthermore, the routes selected are meant to serve the passenger market. Thus, some shipments have to proceed through several airlines. Some shippers and air freight forwarders, especially those dealing with perishables, would prefer to have a direct service between two points. This requirement would place the traditional passenger airlines at a disadvantage compared to the all-cargo airlines.

In addition to the air freight forwarders, there are other parties involved in the non-integrated air freight industry: customs brokers and insurance agents. The customs brokers are responsible for clearing the goods from the customs warehouse at the arrival airport. Thus, for a simple shipment from point A to point B, it may involve five different parties. For example:

- an air freight forwarder and an insurer at point A
- an airline to carry the goods from point A to B
- a customs broker and local moving company at point B. It is important to note that (in most cases) the air freight forwarders at point B will generally arrange for the local ground transportation services.

3.4.2 The Integrators

Unlike the non-integrated airlines, the integrators provide both the ground handling and the air transportation services. The integrator is commonly perceived to be represented by Federal Express (Neufville, 1984). This is because in the air freight industry, only Federal Express offers door-to-door transportation services. There are other companies in the air cargo industry that provide door-to-door transportation services, but their operations are mainly in the express service industry.

The salient feature of the integrated service is that only one company assumes the entire responsibility for the shipment from the original pick-up to the final delivery. They pick-up, sort, transport, and deliver the shipment in the company's own trucks, cargo centres, and aircraft. For international shipments, the company may arrange for customs brokerage through its own subsidiary company or appointed customs brokers.

An associated feature of the integrators is that it is virtually independent of the airlines and the location of the existing cargo facilities. It carries cargo in its own aircraft; thus it does not need to be near other airlines. It does not need their cargo capacity or requires their proximity for transfers. Since it operates its own ground transport, it does not need the services of air freight forwarders or custom brokers.

The integrators locate their activities away from the cargo centres developed by the airlines or the Government authorities at major airports. This phenomenon assists the integrators in two ways. Firstly, the integrators can design their transport networks and systems for their own efficiency. Secondly, by using a secondary airport for their operations, the operating costs are lower. Congestion at this airport is low, and therefore delays are minimised; this helps them in delivering their pledge of on-time arrival. Furthermore, the crew and excess fuel costs are also minimised.

As a result of their independence, the integrators can design systems that they believe best meet their needs. They have the freedom to optimise their schedules, lay out their networks, and locate the ground facilities. They could also guarantee delivery times as they have better control on their schedules and timing. As such, it is possible for the integrators to deliver high quality service compared to the non-integrators.

3.4.3 The Differences Between the Non-Integrators and Integrators

In the transfer of goods, numerous transactions are required to organise and coordinate the shipments. Compared to the services offered by the integrators, the services offered by the non-integrators are relatively inaccessible, unreliable, and inefficient.

The operations of the integrators are focused. Unlike the non-integrators, the integrators specialise on small packages. They limit the weight and the maximum dimensions of any package. Historically, the size of any individual package has been limited to 30 kilograms (Sparks and Mathe, 1991), a maximum defined by the ability of individuals to lift (Comen, 1988). The limit has since then changed due to mechanisation; for example, Federal Express raised the limit for the express

may simultaneously handle large aircraft engines and small packages, live cattle and ornamental fish, and refrigerated goods and high value items requiring special handling.

On the other hand, the services provided by the integrators are relatively efficient. The standardisation of procedures and shipments imposed by the integrated carrier has been the essential ingredient for this achievement.

3.5 The Main Parties Involved in the Non-Integrated Air Freight System

The air freight distribution system is very complex. It involves space booking, packaging, extensive and complex documentation, arranging insurance, collection from shipper, customs clearance, and delivery to the consignee. The complexity has encouraged the growth of specialists: air freight forwarders, customs brokers, consolidators, and wholesalers.

Air freight forwarders are those who carry some or all those tasks for the shipper and provide an interface between the shipper and the airline. Therefore, the air freight forwarder acts as an agent to the shipper. On the other hand, customs brokers are those who move consignments from one customs warehouse to another, or clear them from the warehouse.

The air freight forwarders handle export shipments and all related documentation, whereas the customs brokers handle import. The governing of each one is different and it varies between countries. For example, in Malaysia, the air freight forwarder is registered with the Registrar of Companies, whereas the air freight customs broker is registered with the Customs Authorities. In the United States, the air freight forwarder is licensed by the Federal Maritime Commission, whereas the customs broker is licensed by the Department of Treasury (Taneja, 1979).

Consolidators are forwarders who consolidate cargo from shippers and tender them as one shipment to the airline. In this case, they issue a house airwaybill⁸ for each consignment received from the shipper. When the consignments are consolidated from individual shippers and sent as one shipment to the airline, the consolidators issue a master waybill. This differentiates the transaction between normal forwarding and consolidating. In reality, both forwarders and consolidators are generally referred to as forwarders. The airlines tend to differentiate between the two based on the amount of transactions using the house airwaybill. If the volume

⁸ A house airwaybill is a document which evidences the contract between the shipper and the air freight forwarder for the carriage of goods over the routes specified in the document.

market to 60 kilograms in August 1983 (Neufville, 1984). The integrators are also selective about the kinds of shipments they will handle. For example, Federal Express does not handle live animals, hazardous materials, and refrigerated goods.

By not carrying certain types of cargo, the integrators can achieve real savings. Firstly, they avoid the extra cost of having to provide specialised facilities such as cold storage rooms. Secondly, they avoid the complexity of having to deal with a wide variety of shapes, sizes, and weights of shipments, which requires an extremely flexible system. In general, flexible systems are expensive to maintain and operate. For example, a wide range of equipment must be available, and the equipment must be able to accommodate the largest sizes.

3.4.3.1 Accessibility

The shippers using the air freight services take time to learn how to use the system and to organise any movement. Large shippers who can afford to employ specialists and set up their own shipping departments are able to cope with the system smoothly. However, infrequent shippers or individuals do not have the luxury to do so.

On the other hand, the services provided by the integrators are accessible because all one has to do is to call and give the address for the consignment to be picked up. Packaging is also not essential as the company frequently provides standard boxes suitable for many items, and they do the packing.

3.4.3.2 Reliability

In the non-integrated services, no one party is responsible for the entire shipment, and is in a position to prevent or remedy the mishandling.

On the other hand, the integrators seem more reliable than the non-integrators. The reliability is facilitated by the integration of the various systems. It is reinforced in some companies (for example, Federal Express) by the various computer-based, radio procedures for tracking the shipments, and the vehicles that pick up and distribute the shipments.

3.4.3.3 Efficiency

The non-integrators lack an essential ingredient which is standardisation. The containers used to hold shipments vary widely in shape, depending on the aircraft type. The problem is further compounded by the fact that there is virtually no limit on the size, shape, configuration, or density of shipments. A single cargo terminal

of transactions is high, then the forwarder is (in general) referred to as a consolidator.

Wholesalers are simply brokers of the air freight capacity. They sell their services only to air freight forwarders. Unlike forwarders and consolidators, they do not provide any of the ancillary services such as surface transportation or packaging. Their main interest is in getting space from the airlines.

3.5.1 The Air Freight Forwarder

An air freight forwarder is the middleman between the shipper and the airline. He supplements the ground and marketing services offered by the airlines. The air freight forwarder's revenue is derived from two sources. The first is from the transportation of consolidated freight for which the airline charges a lower rate because of the volume. The revenue is based on the margin between what the air freight forwarder can charge the customer and what he pays to the airline. The second is from a percentage fee (commission) from the airlines. The normal commission is 5%.

Air freight forwarders provide a number of valuable services to airlines. In addition to pick up, delivery, and documentation, they consolidate or containerise shipments, thereby converting small-package business into bulk-shipment business for the airlines. By doing so, they reduce the ground-handling costs of the airlines. The airlines then begin to act more like wholesalers than retailers. Furthermore, the ground handling at the airport terminal for the airlines can be simplified and reduced. The air freight forwarders can do the containerisation at their own warehouses. This reduces congestion at the airport cargo complex as individual shippers are no longer trucking their small shipments directly to the airport.

3.5.2 The Airlines

In general, the airlines concentrate on consolidated shipments. However, they are also interested in the smaller packages because of the relatively high yield. In this respect, the air freight forwarders could assist the airlines to promote and develop the market. Without the forwarders, the airlines would have to expand their sales force in order to capture the small shipments. Thus, from this point of view, air freight forwarders are a marketing arm to the airlines.

The airlines are, however, concerned about losing control if they rely too heavily on the air freight forwarders. They reckon that large air freight forwarders could use their leverage to obtain low rates from the airlines, and these low rates are not necessarily passed to the shippers.

In general, the airlines are responsible to accept and deliver the freight to the airport cargo complex. For export, the air freight forwarder tenders the goods to the airline's personnel, who then complete the necessary documentation. In certain countries (for example, Singapore and Taiwan), the handling at the airport cargo complex is the responsibility of the ground handling agent, and not the airline. In this situation, the ground handling agent will accept the goods and load the goods into the aircraft.

On the import side, the handling agent will unload the goods from the aircraft and then transfer them to the airport cargo complex. They will release the goods to the customs brokers for customs clearance. Thus with the existence of the airport handling agent, the airline's responsibility is limited solely to the carriage of freight.

3.5.3 The Shippers

The shipper is the person who organises the shipment or movement of cargo. He can be a middleman (especially those that consolidate cargo from few exporters) rather than an exporter. The air freight forwarders can use the services of the airlines for part or all of the distance. Therefore, to the shipper, the air freight forwarder is the carrier. However, to the carrier, the air freight forwarder could also be the shipper, especially in the case where the forwarder consolidates the consignments. For this research, the shipper is the manufacturer of the goods.

To the shipper, the services of an air freight forwarder are particularly important for shipments requiring more than one airline, and for surface transportation (that is, for pick up and delivery). The air freight forwarder will not only coordinate the handling of shipments by several carriers but will also take complete responsibility for the transportation by multiple parties. Thus, confusion on who is responsible is eliminated, and the air freight forwarder becomes the single point of contact to the shipper.

3.5.4 Coordination Problems Between the Air Freight Forwarders and the Airlines

There are three aspects of coordination between the air freight forwarders and the airlines: service, rate, and competition. The most significant is related to service. Air freight forwarders are concerned not only about the amount of service but also the quality of service offered by airlines. For example, although the airlines claim that there is sufficient belly freight capacity on wide-body aircraft, the air freight forwarders would prefer to move shipments on freighter aircraft because of the higher probability that consolidated freight will move intact in one aircraft.

The second is related to air freight rates. Basically, air freight forwarders (particularly large forwarders) are interested in obtaining large incentive rates from the airlines for the large volume generated. This would allow them to offer lower rates to the shippers and remain competitive in the market. If the air freight forwarders could sell at a higher selling price to the shippers, then they would get a larger margin. The larger margin would boost their revenue earnings.

The third is related to the competition between air freight forwarders and airlines. Some forwarders would argue, for example, that airlines should stay away from transporting small shipments, which are supposed to be theirs. Despite the argument, some airlines seem to be promoting these services, for example, priority freight services and small-parcel service.

3.6 The Classification of Air Freight

Air freight is very heterogeneous with a wide range of manufactured and semi-manufactured goods, raw materials, and agricultural products. However, some broad generalisations can be made.

Smith (1974) classified air freight by the types of demand on goods: emergency demand, regular demand, and planned demand. Emergency demand refers to items that are urgent in nature. Regular demand are those items with limited life: for example, physically perishable and economically perishable goods. Planned demand refers to cargo that are planned to travel by air.

However, there is some overlapping in Smith's classification. For example, regular demand is actually routine cargo and not necessarily those with limited life. It could also be general cargo that needs to be moved regularly. Furthermore, there could be overlapping between planned demand and regular demand, that is, regular demand can be part of planned demand.

Shaw (1990) classified air freight as either emergency or routine. Emergency situations occur when goods have to be moved by the fastest possible mode of transport, and the cost is a secondary consideration. Routine situations are those where goods are sent by air on a planned basis. The routine classification would encompass both the regular demand and routine demand in Smith's classification.

Doganis (1985) classified air freight based on the types of commodities (perishables or non-perishables), the weight of individual consignments (whether it is of high value), and the speed of delivery (emergency or normal). There is some similarity between Doganis's classification and the above classifications. The classification

appears complete except on the subject of value. It is not appropriate to classify freight based on its relative value. Although the value has an influence on the decision to use air freight, it could always be overridden by the demand on those goods, for example, the urgency of requirement. The argument that value is not the main criterion in using air transport is further supported by Taneja's (1979) study which suggest that other characteristics are also important, for example, density, fragility, and so on⁹.

Schneider (1973) classified air freight into three categories based on its characteristics: emergency, perishables, and those that can be diverted. It appears that Schneider's (1973) classification offers the best approach for this research. It is easier to relate the service and cost aspects to this classification. Firstly, the classification addresses the nature of business operations, that is, whether it is an emergency situation or not. If it is an emergency situation, then the flight frequency and availability of space become more important than cost (Shaw, 1990). Secondly, it considers the characteristic of the goods (perishable or non-perishable) which is an important factor affecting the choice of the mode of transport (Graham, 1964). If the goods are perishable, then a direct service is more important than a service with multiple stops. Finally, it addresses whether the goods can be diverted to the other modes of transport. If it can be diverted, then cost is of prime consideration to the shippers.

3.6.1 Emergency Freight

Emergency freight is divided into operating emergency and marketing emergency (Shaw, 1990). An operating emergency occurs when a company has to rectify an operational problem, for example, a spare part to repair a machine. A marketing emergency occurs when a supplier is in danger of missing a deadline.

Both operating and marketing emergency freight are highly sensitive to time. The opportunity cost is more significant than the transportation cost. For example, operations may be shut down while waiting for a critical part to repair a broken-down machine, or sales may be lost due to delayed delivery. The important characteristic of emergency freight is that it is not planned. For such consignments, cost of transportation is of little importance.

Since time is of the essence, the system must respond quickly to the needs of the customer. The image of air freight has been built largely on the concept of providing emergency service. There are many who believe that this image made it

⁹ See also, Boeing Commercial Airplane Company (1977), *Potential Air Commodity Identification: A suggested Methodology, Cargo Analysis and Development*, March; Lockheed-Georgia Company (1978), *Cargo/Logistics Airlift System Study, NASA Contractor Report 158915*, November, Vol.1, pp. 1-60.

difficult for the airlines to tap new markets. As long as the shippers perceive air transportation to be an expensive premium for emergency shipments, they will not even consider the service for routine traffic.

The literature suggested that the following attributes are important for emergency freight (see, for example, Doganis, 1985; Shaw, 1990):

- short transit time
- high frequency of flight
- availability of space
- definite uplift
- safe and reliable ground handling
- good tracking and monitoring

3.6.2 Perishable Freight

This traffic is also time sensitive, but unlike emergency traffic, it is planned. The perishability may be physical, or it may be related to the product's demand. Examples of physically perishable goods are cut flowers, fruits, and vegetables. Examples of demand related perishables are magazines and fashionable clothes. The demand related perishable goods are also known as economically perishable goods.

The decision to use air freight for routine perishable goods is usually based on demand and service factors, and not cost. The transportation demand is derived from the demand for the basic product. The extent to which the shipper or consignee is willing to pay a premium price for freight is largely dependent on the extent to which the ultimate customer is willing to absorb the extra costs.

By definition, its dependence on time makes it impossible for it to move via other modes of transport and still meet the needs of the shipper and consignee. If technology reduces the cost of air freight and permit lower rates, then this type of traffic could grow dramatically as new markets are created, or as new products are brought into the market. On the other hand, this traffic is vulnerable to changes in consumer demand. Should the consumer refuses to pay a price which includes the premium cost of transportation, the traffic would cease.

Some airlines prefer not to carry perishable goods because they are less profitable compared to non-perishable goods. This is due to high costs involved in the handling of these goods. For example, the extra maintenance costs may be incurred in treating corrosion problems on the aircraft skin due to the spilling of sea water from certain perishable goods such as fish, lobster and shrimps¹⁰.

According to Shaw (1990), the following service attributes are important to shippers dealing with perishables:

- space availability at the right time (based on seasonal production)
- special handling
- definite uplift
- good tracking and monitoring

3.6.3 Freight That Can Be Diverted

This category of freight is planned, but it is more sensitive to the cost of transportation than the other two categories mentioned above. However, for this category of freight, the total cost for using air transportation is usually less than that for the other modes of transport. In such cases, the total costs should include the inventory carrying costs and the transportation costs.

Unlike emergency and routine perishable goods, this category of freight is less demanding on service. The freight can be moved by surface or sea modes (usually in combination with field warehousing) and still meet the time requirements of the shipper. This category of freight represents a large potential for the air mode. Examples of the types of freight in this category are electronics (industrial and consumer), and general cargo.

3.7 Pricing Policy

Pricing policy has been the most debated issue in the air freight industry. The traditional airline may favour the implementation of low rates using marginal costs based on the by-product theory. On the other hand, an all-cargo airline may favour rates based on fully allocated costs, which reflect the full costs of providing the service. Conflict between the two groups arises from their perception of the price

¹⁰ Japan Airlines conducted the research on the method of transporting living fish without water. This is done by putting the fish into a state of hibernation (see Shipping Times, Vol.23, 1st November, 1990).

elasticity of demand, the trade-off between service and price, the role of air freight compared to other modes of transport, and the overall objectives of the carrier.

3.7.1 Price Elasticity

Traditional passenger airlines have considered air freight to be price elastic and have set prices based on marginal cost. A number of these airlines view sea and surface modes of transportation as competitors rather than as partners or complementary modes to air transportation. These airlines view incremental pricing as a way of filling the aircraft bellies. By having this view, it reduces their fear of losing a market share to the all-cargo operators, and at the same time it allows them to compete with the air freight forwarders on the small-package business.

The traditional passenger airlines claim that the total freight volume would have grown at the expense of sea or surface carriers, had the rates been competitive. On the other hand, the all-cargo airlines claim that growth has been suppressed due to inadequate service resulting from low rates. Despite the availability of lower pricing, the all-cargo operators have also been able to compete effectively.

It cannot be stated with certainty whether the market for air freight is price elastic or price inelastic. For example, in the empirical study conducted by Lockheed (1978), service and rates scored almost equally. Thus, it suggests that the market for air freight is neither price elastic nor price inelastic. However, in the study conducted by Douglas Aircraft Company (1978), it was concluded that the market is elastic; a 10% decrease in rates will result in a 13% increase in traffic. There is no recent empirical study to support or dismiss these findings.

3.7.2 Air Freight Rates

The international rates have also been heavily discounted because of fierce competition among airlines. The international rates are established through the traffic conference machinery of the International Air Transport Association (IATA). IATA uses the weight break of 45 kilograms for bulk freight and 100 kilograms for containerised freight.

Ignoring the levels of discount, there is already a large variation in air freight rates in major international markets. According to the survey carried out by the International Civil Aviation Organisation (1976), the lowest rates measured in US cents per tonne-kilometre were found to be between Canada, Mexico, and USA. The highest rates existed on local European routes. For example, for a distance of 1,000 kilometres, the average rate for shipment of less than 45 kilograms was USD

1.00 per tonne-kilometre for local Europe, USD 0.53 between Canada, Mexico, and the USA, and USD 0.83 for the world average.

It is not possible to measure the actual rates (taking the levels of discount into consideration) in the international markets because of the discreet style of discounting. The airwaybill documents show the published rates and not the discounted rates. The discount is not reflected in the freight documentation, and it is returned to the shipper or air freight forwarder through other forms of payment.

3.7.2.1 General Commodity Rates

General commodity rates vary with shipment weight, distance, direction, and other aspects of the movement. There is an incentive for heavier shipments in the form of weight breaks, and longer distance.

There are two controversies with respect to the establishment of General Commodity Rates. The first is the issue of directional rates to fill unused capacity. Critics of directional rates claim that air freight is more sensitive to service than to price, and that demand is price inelastic (Taneja, 1979). Transportation costs represent only a small part of the cost of these high-value goods; thus, it could be implied that speed and condition of delivery are more important than price. Furthermore, emergency shipments are not price sensitive. Therefore, it is argued that if demand is inelastic, then price discounts (such as directional rates) are not meaningful. Instead, it will dilute revenue from traffic moving at standard General Commodity Rates. Although directional rates may equalise directional volumes, there will be a disparity in revenues.

The second controversy is related to the costs used in determining rates. Freight is carried both in the belly of passenger aircraft and in all-cargo aircraft. The traditional passenger airlines, particularly those without freighter aircraft, would tend to develop rates based on the by-product theory. It reflects the incremental costs of providing cargo service on passenger aircraft. The use of this concept could establish rates that are competitive with the other modes of transport.

3.7.2.2 Specific Commodity Rates

Specific commodity rates have been used to attract the two types of commodities: those moving by surface or sea mode, and those not moving at all in long distance markets. In the case of commodities that can be diverted from a surface or sea mode, the objective is to introduce Specific Commodity Rates that are competitive with rates offered by the surface or sea mode. In the case of commodities that are

not moving at all, the objective is to establish Specific Commodity Rates that can put those commodities in the market economically (for example, perishables).

In determining rates for specific commodities, attributes such as density, value, and special handling requirements are important. Density is important since it determines the volume required per unit weight shipped. Value per kilogram is important because it can be used to implement the value-service concept; higher rates for higher-value commodities. Finally, shipments that need special handling (such as temperature control) will have additional costs, which lead to higher rates.

3.7.2.3 Container Rates

Container rates, which apply to shipper-loaded containers, were introduced for shipments of certain weight to provide consolidating and a density incentive. The consolidation reflects the reduction in terminal-handling costs, whereas the density incentive reflects the inducement to pack more freight in a container in order to enjoy lower cost per kilogram.

With the introduction of wide-body aircraft (for example, Boeing 747 Freighter, Douglas DC10 Freighter), a number of airlines have implemented low container rates to compete directly with either the surface or sea carriers.

3.7.2.4 Contract Rates

Contract rates were introduced in 1976 by British Airways (Taneja, 1979). They are a contractual agreement between the airline and the direct shipper (or air freight forwarder) for transportation of a guaranteed minimum weight per year. This rate should not be confused with the above three published rates.

The rate was proposed to reduce diversion of scheduled traffic to other carriers, and to encourage freight traffic movement between two countries. British Airways justified the rationale of contract rate on its simplicity and economic advantage. For example, the shipper would know the price in advance, and can therefore plan the distribution accordingly.

3.7.2.5 Other Rates

Some airlines have introduced a number of comparatively new services and charge premium pricing for them. The two new services are priority and small-package services.

Priority services offer shippers fast and reliable services at charges approximately 30 to 50% higher than General Commodity Rates. Here, the airline guarantees that the shipment will receive priority in that it will move on a specified flight. In the past, if the shipment is not on the specified flight, the 30 to 50% premium is returned to the shipper, and the shipment would be moved on the next available flight. Nowadays, if the airline fails to uplift on the specified flight, the shipment will be moved on the next available flight on free of charge basis.

Some airlines (for example, British Airways, Singapore Airlines, and Swissair) have also introduced some form of small-package service (less than 100 kilograms). These packages are tendered at the airline's baggage counter and picked up by the consignee at the arrival baggage counter. They can be tendered about 30 minutes before the flight, and they are usually put on the next flight out. The charges, however, are higher than General Commodity Rates. Some airlines (for example, Singapore Airlines) have also introduced free delivery to the consignee at certain cities. In the case of Singapore Airlines, the free delivery is limited to Singapore and the London city area.

3.8 Shippers' Requirements

The shipper has particular needs and requirements. If these needs are not fulfilled, she will not use air freight service on any planned basis. Instead, she may use the system only to meet unexpected or emergency requirements.

The shippers' needs are suppressed by the constraints and complexity of the air freight system. The constraints and complexity are due to various factors: transportation costs, route network design, regulatory constraints, airport curfews, and so on. Although, it is possible to demonstrate the advantage of air freight using basic distribution cost principles, the analysis must be planned in terms of fulfilling total shipper needs and requirements, that is, it must take into account service as well as cost considerations.

Despite the availability of low cost, and alternative service and price options, shippers also require a reasonable rate structure containing appropriate incentives, knowledgeable sales personnel, accurate billing, sufficient liability, and stable prices. For air freight to be used on a planned basis, consistency of services and reasonable pricing are extremely important.

3.8.1 Service Requirements

Numerous surveys have shown that service ranks consistently high among the shipper requirements. The survey by Boeing ranked '*delivery schedule*' as the primary shipper's air transport requirement (see, Bienn 1979). The survey by Douglas's (1978) called it '*consistent, on-time pick-up, and delivery.*' Some airlines (for example, Federal Express) call this requirement '*dependable, reliable, and consistent*' service. Although different shippers would include different features under the term service, many of them would include '*timeliness*' and '*completeness*'.

3.8.1.1 Timeliness

One of the important characteristic of air freight service is its timeliness, that is, arrival and departure times, frequency, and on time performance. Some shippers and air freight forwarders are willing to pay premium price to have the consignments delivered at the specific time.

Some consignments (for example, cut flowers) are best served by overnight delivery. Flowers are normally harvested during early morning and shipped to packing houses, where they are graded, packed into containers, and transported to the air freight terminal. By the time they arrive at the terminal, it is late afternoon or early evening. The flowers are transported during the night to arrive early next morning for sale by wholesalers to retailers at the start of each day for that day's market. A reduction or delay in late night departures might mean that the flowers would be held at the terminal overnight and not moved until the following morning, or would arrive too late the next day for that day's business.

In addition to good departure and arrival times, shippers are also concerned about on-time performance. The shippers require reliable, dependable, and consistent schedules. If a consignee wants a particular shipment delivered by 0900 hours, then he needs it by 0900 hours and not later. Furthermore, the delivery must be made by 0900 hours every time.

3.8.1.2 Completeness

Shippers would also prefer a complete service. This includes broad coverage, pick-up and delivery, good tracing, the ability to handle special problems and consignments, insurance claims, and security. Broad coverage refers to the ability to reach all destinations. Since this is often not possible, it is necessary to have an effective interline service. If the airline is operating in a secondary market, the shipment may need to be trucked, and this may lengthen the total delivery time.

Shippers do not like to deal with multiple parties, for example, an airline, and a surface carrier. Shippers prefer to deal with a single carrier for convenience, ease of tracing, and insurance coverage, and it offers better security.

The last element of complete service relates to the ability to handle special consignments and problems such as special customs documentation or the transportation of oversize shipments. In this respect, the air freight forwarders tend to be of greater help than direct air carriers.

3.8.2 Cost Requirements

Many shippers still view low price to be a deciding factor for them to switch between modes of transportation (Fair and Williams, 1975; Ballou, 1987). Some shippers are more sensitive to price than to service. In the survey by Boeing (1979), transportation cost ranked third as a shipper requirement. In the survey by Douglas (1978), transportation ranked second. Both studies show that low price is an important requirement, above twenty-one other service requirements.

Shippers are also interested in the availability of alternative service and price options. Some carriers, for example, Federal Express, offer three types of service: priority, standard, and deferred. These services are offered at different rates; for example, the rates for priority service are more expensive than the standard and deferred services.

Another service and price option would be the sea-air combination service offered by a number of carriers. For example, Singapore Airlines offer sea-air link via Singapore Port for freight from the Far East and Australia/New Zealand to Europe and USA. Some of the Middle-East airlines (for example, the Gulf Air) offer sea-air link via Port Rashid (located in Dubai) for freight from the Far East to Europe and vice-versa. The sea-air link can provide a substantial saving in cost over the all-air mode. It can also reduce the transport time by approximately two weeks for freight from the Far East to Europe (Taneja, 1979).

3.8.2.1 Total Distribution Cost Analysis

In the early 1960s, the Stanford Research Institute analysed the reasons why shippers and consignees use air transportation for their freight (see, Graham, 1964). The general conclusion was that the use of air freight does not depend on the commodity or industry. Instead, it depends on a combination of characteristics that benefits the business from using the air freight system. These characteristics relate to the commodity shipped, the market or supply situation, and the distribution system used.

According to the study, there are three general reasons for the use of air freight: lower transit time, lower cost of handling goods in inventory, and an improvement in the condition of carriage. Reduced transit time results in reduced investments in goods in transit. A reduction in the costs of holding goods in inventory implies a potential reduction in risk of inventory loss or obsolescence. A specific advantage of the superior conditions of carriage is the reduction in the risk of goods being damaged, lost or stolen.

Thus, in order to appreciate the advantages of using air freight over sea or surface modes, one has to understand the concept of total distribution cost. The concept takes into account all costs relating to the distribution system, including inventory-related costs and transportation-related costs. Inventory-related costs include the value of the inventories itself as well as associated costs of warehousing. Similarly, goods in-transit tie up capital and affect the cash flow of the firm. For some commodities, particularly those that have been identified as air eligible, the use of air freight can reduce some of the inventory-related costs sufficiently to offset somewhat higher transportation-related costs (see Figure 3.5).

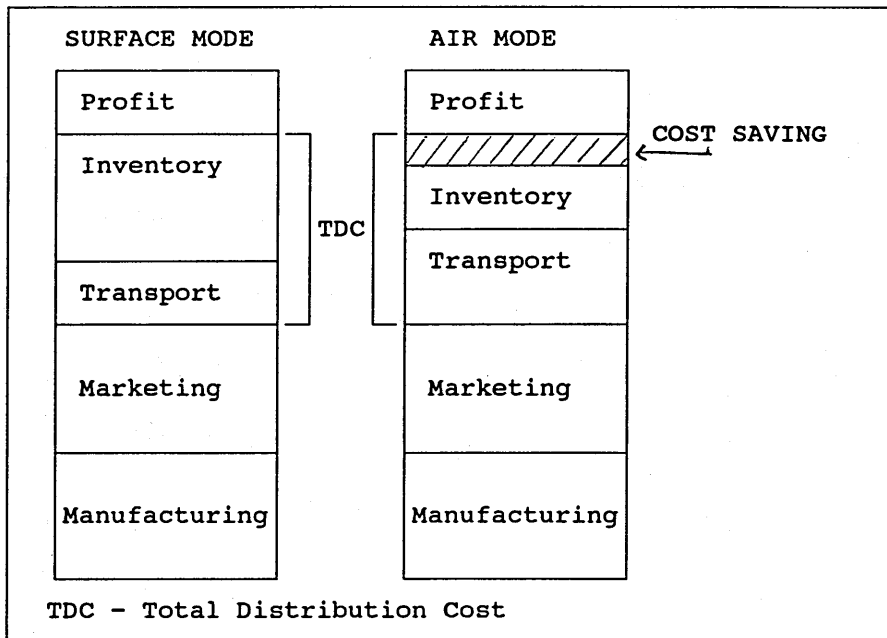


Figure 3.5 - Surface and Air Distribution Costs: A Comparison

Source: Douglas Aircraft Company (1976, p.3)

Despite the potential benefits, very few shippers have attempted to use the total distribution cost concept or other tools to evaluate the modes of transportation. The reasons are complex. First, most people believe that air freight costs more than other modes of transport, and that air mode should be used for emergency purposes only. Second, traffic managers (those responsible for distribution) are usually more interested in cutting their transportation budget than in broadening the market horizon of their companies. Third, changing to the air mode would require a change in the overall corporate policy, not just a change in the mode of transport. Inventory policy will need to be changed, warehousing may have to be eliminated or reduced, and factory production rates have to be recalculated. These changes require top management approval, and airlines have found it difficult to penetrate this level to sell the air freight services.

3.9 Summary

One of the important factors that may influence the decision to use air freight is price. Some all-cargo carriers and air freight forwarders consider the market to be price inelastic, whereas almost all of the traditional passenger airlines and some freight forwarders consider the market to be relatively price elastic. The two views are necessary for setting the right price for the respective market segments.

According to Lockheed's (1978) study, about half of the shippers surveyed were more sensitive to service than to price; the other half valued price more than service. However, the literature on the subject is quite dated, and there is no current literature to support or dismiss the findings.

The literature suggest that the future growth of the air freight industry depends on two factors: Gross National Product and pricing. It is also important to note that the other factor influencing the growth is the degree in which air freight can complement the other modes of transport. The latter factor depends largely on the customers' knowledge of the markets and the distribution systems. Thus, the issue of total distribution cost plays an important role to the customer in selecting a specific mode of transport or a combination of different modes of transport.

In the air freight industry, an integrated service has emerged. It provides a door-to-door service. In this case, the carrier is known as an "*integrator*". The integrated service does not have the same limitations of traditional passenger airlines. It is accessible to any customers, highly reliable, and efficient because of the standardised procedures. Furthermore, the operations are easily controlled or managed because only one party is responsible for the total operations.

Chapter 4 - The Research Focus: Research Questions and Hypotheses

4.0 Introduction

The objectives of this chapter are to identify the research questions and hypotheses, and to form the research design.

It is not appropriate to use general quality attributes when dealing with service quality. Specific service quality attributes are required for a specific service industry. In the absence of specific service quality attributes from the existing literature, the research has to be undertaken from a zero-based approach.

The first part of this chapter provides a systematic way to focus on the research area. It starts with the classification of services, and within the classification, it addresses the types of service industries. The chapter then focuses on the transportation industry and then specifically on the air freight industry.

The second part gives a brief summary on the subject of service quality found in the service and transport literature. This forms the basis for designing the research questions and hypotheses.

The final part shows how the research will be undertaken systematically. The research is divided into 6 stages. The first stage covers the literature review on service quality and the air freight industry. The rest of the stages cover the fieldwork. The scope includes eliciting and grouping the service quality attributes, the trade-off between service and price, and a comparative analysis of airlines on the key factors to service quality.

The schematic illustration of the research is shown in Figure 4.1.

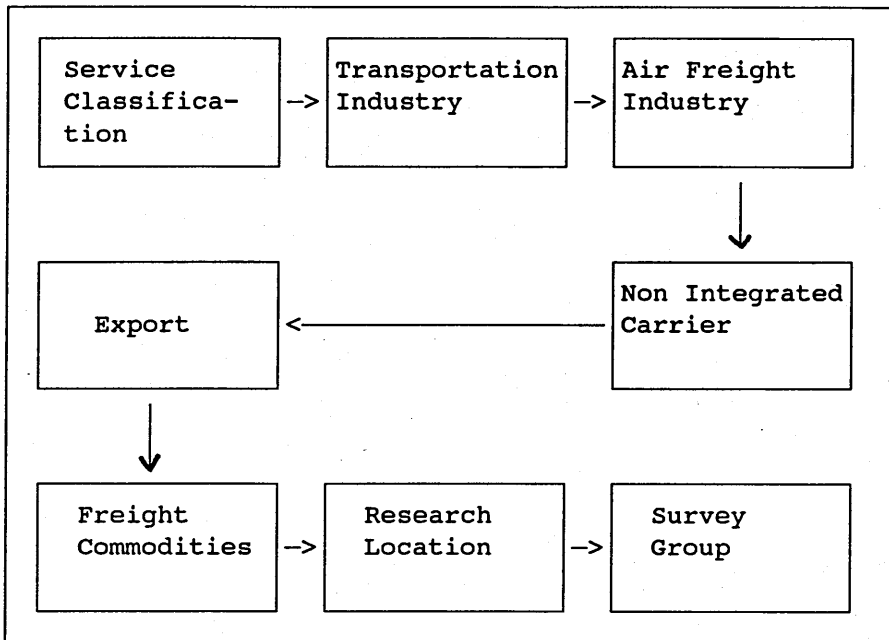


Figure 4.1 - Schematic Illustration Showing the Approach to the Research Area

4.1 Why the Business Sector?

The first task is to gather the broad classifications of service industries and then to focus on one specific industry in order to obtain the service quality attributes for that industry.

There are many ways of classifying services. This goes back as far as the work of Adam Smith in 1776, who classified the economic sector into productive activities creating tangible products, and non-productive activities creating intangible services (Smith, 1977).¹ Clark (1940) described the economic sector as primary (extractive), secondary (manufacturing), and tertiary (services). Gersuny and Rosengren (1973) expanded the tertiary sector into domestic, social, and business services.

Cowell (1987) classified services into three categories:

- The Government Sector - for example, employment, hospital, and post office services

¹ Originally published in 1776.

- The Private Non-Profit Sector - for example, museum, charity, and educational services
- The Business Sector - for example, airline, bank, hotel, restaurant, insurance, and private hospital services

The business sector is an important contributor to economic growth. It is governed by two important variables: price and service. Firms that offer services of high quality could command relatively higher pricing. For example, the study conducted by the Strategic Planning Institute (SPI) using the Profit Impact of Market Strategy (PIMS) data base shows that the above average firms charged an average of 9 to 10% more for their basic services than those rated below average (Buzzell and Gale, 1987). Furthermore, the above average firms had an average return of 12% on sales, and their market share grew by 6% a year. In comparison, the below average firms had a return of only 1% on sales, and their market share declined by 2% a year.

The goal of a business entity is to provide a type of service that is generally satisfactory to the customers and at the same time profitable. It has been found that service and unit profitability are significantly related (Schneider, 1986). A positive relationship has also been found between the bank customers' perceptions of service quality and their intentions to remain with the bank (Parkington and Schneider, 1979; Schneider, 1973).

4.1.1 Why the Transportation Industry?

Berry (1980) described service as a "deed, act, or performance". However, at whom (or what) is the act directed, and is this act tangible or intangible in nature? These two questions result in the following four-way classification matrix (see Figure 4.2):

- tangible actions to people's bodies such as passenger airlines, hair-cutting, restaurants, and surgery
- tangible actions to goods and other physical possessions such as air freight, car repair, industrial equipment repair and maintenance, and janitorial services
- intangible actions directed at people's minds such as broadcasting, information services, and education

- intangible actions directed at people's intangible assets, such as insurance, investment banking, securities, and consulting

Who/What is The Direct Recipient of The Service?			
		People	Things
What is The Nature of The Service Act?	Tangible Actions	Services directed at people's bodies	Services directed at goods or things
	Intangible Actions	Services directed at people's minds	Services directed at intangible assets

Figure 4.2 - Understanding the Nature of Service Act
Source: Adapted from Lovelock (1983)

The set-back with any classification matrix is that there is always a degree of overlapping between two or more categories. In the above matrix, there is some overlapping between the tangible and intangible actions. For example, the delivery of financial services may require a visit to a bank to transform intangible financial assets into cash. The delivery of airline services may affect some traveller's state of mind as well as physically moving their bodies from one airport to another. Despite the overlapping, the matrix provides a good illustration of service industries.

The nature of intangibility makes it difficult to evaluate service quality. Therefore, only the tangible nature of the service act, that is, services directed at people and goods, is addressed in the research.

The next task is to eliminate those service industries that have been researched (see Figure 4.3). Since the transportation industry has not been researched on, and there is a strong interest in the industry, it is therefore a good area to focus on for this research. Transportation refers to the movement of freight and people. It may include the system for delivering intangibles such as telephone messages and electrical power. However, since it has been decided to exclude intangibles, the scope will cover only the movement of freight and people.

Industry	Researcher
Retail Banking	[1], [11]
Credit Card	[1]
Securities Brokerage	[1]
Product Repair & Maintenance	[1]
Telephone	[1], [4]
Insurance	[1]
Credit Union	[2]
Private Hospital	[3], [12]
Sea Cruise	[5]
Hotel	[6]
Professional Service	[7], [10]
Pharmacy	[8]
Restaurant	[9]

[1] Parasuraman, Zeithaml, and Berry (1985)
 [2] LeBlanc and Nguyen (1988)
 [3] Brown and Swartz (1989)
 [4] Bolton and Drew (1991)
 [5] Lindqvist (1987)
 [6] Oberoi (1989)
 [7] Bojanic (1991)
 [8] Hedvall and Paltschik (1992)
 [9] Lehtinen and Lehtinen (1991)
 [10] Lewis and Klein (1987)
 [11] Smith (1989)
 [12] Saleh and Ryan (1991)

Figure 4.3 - Summary of the Previous Studies
on Service Quality

4.2 Why Freight?

There are distinct differences between freight and passenger transportation in terms of the operations and the buyer. The following explains the differences in the nature of the two operations.

- Freight movements are in one direction, whereas passenger transportation is generally on a round-trip basis.
- Unlike the passenger market, the freight market is heterogeneous. Shipments vary in size, shape, weight, fragility, and value.

- Compared to passengers, freight is passive. It therefore requires a wide range of ground-handling services, whereas passenger transportation is self-handling.
- In airfreight transportation, flight routing is not as important as it is in passenger transportation so long as the operator meets a promised delivery schedule.

The other main difference between the two is that freight transportation deals with industrial buyers, whereas passenger transportation (in general) deals with consumer buyers.

There are two reasons for choosing freight. Firstly, all the empirical research findings on perceived service quality have previously focused on consumer buyers (see Figure 4.3). If the concept of perceived service quality is to be applied to industrial buyers, then the expectations against which the service outcome is compared are not those of an individual but rather those of a group of individuals. This group of individuals represents the buying centre, referred to as the Decision Making Unit (Webster and Wind, 1972).

Each member of the buying centre has different expectations because they have different needs in the organisation. It is therefore not surprising to see different perceived service quality among the members, even though all of them are with the same firm. Therefore, the expectations of the buying centre would be the average of all the expectations of its members, taking into consideration the weighted importance of each member in the organisation. Thus, the concept of perceived service quality with industrial buyers is different from that of consumer buyers.

Secondly, it is felt that there is a need to physically remove the customer from the service "factory". If the customers need to be physically present during service delivery, then they must be in the service "factory" while the service is performed. Their satisfaction with the service will be influenced by the interactions with the service personnel and the service facilities in the "factory". In freight transportation, the "factory" element is removed from the customer's perceptions of the service delivered. If this is achieved, it will be possible to see the effect of the add-on "factory" element on the concept of perceived service quality.

In Lehtinen's (1986) study, the service delivery is divided into three phases: the joining phase, the consumption phase, and the detachment phase. In air freight services, the customer is not present in the consumption phase. In contrast, in passenger airline services, the customer is present in the consumption phase; for

example, the customer travels in the cabin. In this research, the terms "service factory" and the consumption phase are used interchangeably.

4.2.1 Why Air Freight?

The bulk of freight movement is handled by five basic modes of transportation: rail, truck, sea, pipeline, and air. The rail, truck, and pipeline modes are generally limited to domestic freight movement or to international movement over land between countries (for example, in Europe). Air and sea modes are used extensively between countries separated by water.

The research will focus on the international air freight only. Sea freight is excluded because the commodities transported are low in value compared to air freight. The customer using sea freight services can accept relatively low service in exchange for lower rates. Thus, it may not be possible to study the trade off between service and price. In contrast, commodities which are air freighted are generally high in value. The use of air freight is limited to products that can effectively trade-off the premium costs for better service. Therefore, it will be possible and meaningful to carry out a study on the trade-off between service and price. This is done in Stage 5 of the research.

Domestic air freight is excluded from the study for the following reasons.

- In Malaysia, there is only one major airline operating domestically.² In the absence of competitors, it is impossible to conduct the trade-off analysis between service and price (Stage 5). The trade-off requires the variables (service and price) to vary at different levels. In this case, the domestic freight rates are fixed, and thus it will not be possible to undertake Stage 5 of the research.
- The types of freight commodities are limited mainly to perishables (for example, newspapers, cockles, and shrimps). There are also some non-perishables, but the volume is low. These non-perishables are mainly machine and equipment spare parts for urgent needs. The limited types of freight commodities in the domestic sector may limit the dimensions of perceived service quality. In order to have a good understanding of the dimensions of perceived service quality, it is necessary to choose a broad spectrum of freight commodities.

² In addition to Malaysia Airlines, there is another airline (Pelangi Air) operating domestically. However, the operations are limited to few places in West Malaysia only.

4.2.2 Why the Non-Integrated Airline?

Air freight services are divided into the express and non-express segments. For the express segment, the customer listings can be obtained only from the service providers. However, they are not available for the research due to their confidentiality. Thus, the express segment is excluded from the study.

The non-express segment consists of the integrated and non-integrated services. In Malaysia and Singapore, the only integrator offering door-to-door freight services is Federal Express. The absence of other integrators in these two countries may affect the validity of the research work. The data drawn from one source may not be representative of the industry. Therefore, the research will concentrate mainly on the non-integrated airlines.

In the case of Federal Express, they also offer airport-to-airport services. Initially, they offered only express services limited to documents and small parcels. After they took over Flying Tigers, they expanded the operations to include airport-to-airport services for normal freight commodities. Thus, Federal Express (the airport-to-airport operations only) is also included in the listing of airlines for the research.

4.3 Why Export?

The air freight distribution system comprises export and import activities. The parties in the export section are shippers, forwarders, airport handling agents, and airlines. On the import section, they involve the consignees, customs brokers, and airport handling agents.

The import section is excluded from the scope of this research for two reasons. Firstly, it is difficult to obtain the list of consignees which is available only from the airlines or forwarders. From the preliminary survey, it was found that both parties are not willing to disclose their customer listing. In the case of the export section, the list can be obtained easily from the Government agency. For example, in Malaysia, it can be obtained from the Malaysian Industrial Development Authority (MIDA).

Secondly, most of the non-integrated airlines provide airport-to-airport services only. Thus, their responsibility ends when the goods are transferred to the airport handling agent on arrival. The ground handling agent will then transfer the goods to the customs brokers for customs clearance and subsequent delivery to the consignees. From the preliminary survey, it appears that the perceived service

quality is limited to the documentation clearance only. Hence, this area is excluded from the research.

For export, the customers have more interactions with the airlines because of the numerous activities involved, for example, checking the airlines' flight schedule, route structure, the types of aircraft for the specific route, and space allocation, delivering the goods to the airline's warehouse, and so on. As such, it is possible to identify and classify those activities according to the technical and functional dimensions suggested by Gronroos (1984).

4.4 Freight Commodities

There are several ways of classifying air freight commodities. One way is to classify them as perishables and non-perishables, or from the view point of service requirements, that is, emergency or routine. This research covers only the routine freight. The emergency freight is excluded because it is ad-hoc, and the ad hoc nature makes it difficult to identify the shippers for the research.

Routine freight covers both perishables and non-perishables. Stage 4 takes into account both the routine perishable and non-perishable goods. The perishable freight commodities selected for Stage 4 are ornamental fish, fashion clothing, fruits, birds, and tuna fish. The non-perishable goods are mainly electronics, electrical goods, and office equipment. Electronics products are classified into industrial and consumer products. The industrial products cover, for example, integrated circuit boards, transformers, semi-conductors, and so on. These products are normally air freighted for further assembly at another plant.³ The consumer products include cameras, video cassette recorders, quartz watches, quartz components, and so on.

Stages 5 and 6 deal with electronics goods only as it is difficult to manage the research if more than one freight commodity is selected. There are three reasons for choosing electronics. Firstly, electronics are normally air freighted. Secondly, electronics are less price sensitive compared to other non-perishable goods, thus making it suitable for the service-price trade-off analysis in Stages 5 and 6. Thirdly, most of the foreign firms operating in Singapore and Malaysia are manufacturing electronics parts (for example, integrated circuits, semi-conductors, resistors, and so on). These parts are required for further assembly in other factories located world-wide, and therefore air freight plays an important role in fulfilling the logistics requirements.

³ See Air Cargo, International Herald Tribune, October 21, 1992, p.12.

4.5 The Research Location

Majority of the research work is done in Malaysia. Singapore is included in Stages 2, 3, and 4 of the research. The inclusion of Singapore in Stages 2 and 3 is because of the requirements in Stage 4 of the research. There are two reasons for including Singapore in the Stage 4. Firstly, the shippers dealing with ornamental fish, tuna, and fashion clothing could not be located in Malaysia. Secondly, Singapore and Malaysia complement one another in terms of the air freight industry. Goods are trucked from Malaysia to Singapore for air freighting and vice-versa, because of the price differential and service limitations. For example, if the shippers are not able to get certain space allocation out of Singapore, they will then truck the goods to Malaysia for subsequent air freighting. Since there is a need to include Singapore in Stage 4, it is therefore necessary to include it in Stage 2 and 3 of the research. This is to ensure that the attributes and dimensions of service quality are applicable to both countries.

The reasons for choosing Malaysia are as follows:

- familiarity with the country
- accessibility into the various organisations

4.6 The Survey Groups

There are four parties involved in the export section of the air freight distribution system. However, only three parties are involved in the research:

- Airlines - There are 55 and 38 airlines operating in Singapore and Malaysia respectively.⁴ All of the 38 airlines operating in Malaysia are also operating in Singapore. Majority of the airlines operating in these two countries are traditional passenger airlines; only few are all-cargo airlines (refer to Appendix 4A). Singapore Airlines and Malaysia Airlines are the two major airlines operating in these two countries.
- Air Freight Forwarders - There are 190 and 90 air freight forwarders operating in Singapore and Malaysia respectively.⁵

⁴ Based on the A-Z World Wide Air Freight Directory, 1990.

⁵ Based on the A-Z World Wide Air Freight Directory, 1990.

- Shippers - The shippers could be anyone exporting goods out of Singapore and Malaysia. The shippers are limited to those that manufacture or produce the freight commodities selected for this research.

The airport handling agent is excluded from the research because he is not a customer to the airline. Instead, he is seen as a sub-contractor providing the ground services within the airport perimeters. The airline, however, is still responsible for the total services.

4.7 The Research Questions and Hypotheses

4.7.1 The Components of Perceived Service Quality

According to Gronroos (1984), perceived service quality is influenced by two components: technical quality and functional quality. Technical quality represents the outcomes of the material context of the service. For example, in the air freight industry, it is whether the goods have arrived at the destination, on time, and in good condition. In other words, it describes the main aspect of the service. On the other hand, functional quality is related to the outcomes of the buyer-seller interaction. It is not considered the main aspect of the service, but it is considered more important to the perceived service than the technical quality provided that the technical quality has reached a satisfactory level. However, as discussed in Chapter 2, this observation should be qualified. Gronroos's finding is not the view of customers, but it is the view of the service firms executives on customers' expectations. Therefore, Gronroos's finding should not be used as a basis to form the research questions.

On the other hand, Parasuraman, Zeithaml, and Berry (1990) stated that consumers use five dimensions in evaluating service quality: Reliability, Responsiveness, Assurance, Empathy, and Tangibles. From their study, the Reliability dimension is the most important dimension to perceived service quality. This Reliability dimension relates to the main service outcome (whether the promised service is delivered). It can be referred to as the technical outcome in Gronroos's terminology. The other four dimensions are related to the outcomes of the service process dimension, that is, the functional outcome in Gronroos's terminology. Thus, the technical outcome is more important than the functional outcome.

Therefore, based on Parasuraman, Zeithaml, and Berry's (1990) finding, the research questions and hypotheses are:

- Q1.1 - What are the components of perceived service quality in the air freight industry?
- H1.1 - Perceived service quality is influenced by two components: the technical and functional quality components.
- Q1.2 - Which of the two components is important in shaping the customer's perceptions of service quality?
- H1.2 - The technical component is more important than the functional component in shaping the customer's perceptions of service quality.

4.7.2 The Relative Importance of Service and Price in the Air Freight Industry

There is a substantial amount of literature on the relative importance of service and price in freight transportation. However, there is none specifically for the air freight industry. The empirical studies relating to service and price are mostly in the truck and rail freight industries. The studies were conducted in the pre-deregulated and post-regulated era in the United States. It is felt that the studies could be used to form the basis of the research questions as they relate to the same technical subject (physical distribution).

There are two issues that need to be addressed: the choice attributes and the service performance attributes. Both of them are related (see, for example, Stock and LaLonde, 1977).

Saleh (1970) has examined the determinants in the motor carrier selection process and hypothesized that "shipping charges are a prime factor in selecting a given motor carrier". His hypothesis is, however, not supported. Instead, the service attributes (consisting of pick-up, transit time, and delivery time) are far more important in the selection of motor carrier. However, the studies of Bardi (1973), and Evans and Southard (1974) confirmed that price is less important than service. The service attributes are reliability, security, availability, dependability, and transit time.

Chow and Posit's (1984) study suggested that the relative importance of price and service attributes differed among the choice of transport modes, and carrier within a mode. Price is more important in the selection of transportation modes. However, in selecting a carrier within a mode, transit time reliability is more important.

In another study, Brunig and Lynagh (1984) examined the process of carrier evaluation by distribution managers. Using factor analysis, they reported that pick-up and delivery, line-haul, and price incur the highest factor weights. However, the relative importance of these three factors vary among the different commodity types in the study.

According to Brand and Grabner's (1985) longitudinal study:

- for the choice attributes, competitive rates are less important than service consistency
- for the service performance attributes, distribution cost is relatively less important than five other service attributes: on-time delivery, on-time pick-up, customer complaints, claims experience, and prompt shipment tracing

Although the above studies vary in methodology, sample, means of analysis, and terminology, a close examination of their findings indicate that the service attributes are more important than price.

The above studies lead to the following research question and hypothesis.

- Q2 - Is price more important than the service attributes to the forwarder and shipper in the air freight industry?
- H2 - Price is less important than the service attributes to both the forwarder and the shipper in the air freight industry.

4.7.3 The Expectations Between the Operational and Non-Operational Groups

According to Sheth's (1973) model of industrial buyer behaviour, few factors influence the choice of supplier:

- expectations of the individuals involved in the decision making. The expectations of individuals are influenced by their own personal characteristics, and their past experiences with the supplier.
- the industrial buying process itself
- the resolution of conflict when joint decisions are required

■ situational factors

Feldman and Cardozo (1969) suggested that the expectations of individuals are also affected by external factor, that is, organisational characteristics. For example, while the decision maker may be expected to select the supplier which best meets the firm's needs, he or she may be under constraint (time or pressure) to consider other available alternatives.

Granzin, Jackson, and Young (1986) suggested that the interplay between organisational and personal characteristics produces formal job descriptions, that is, the decision maker's domain of responsibility and authority. The decision maker must make decisions within the constraints of the formal job descriptions and act in a manner consistent with his or her perceived role (see Figure 4.4)

Cooper, Droge, and Daugherty (1991) also suggested that personnel with different job descriptions in the organisation tend to focus on different functions and activities. Basically, they tend to focus on those functions and activities that have the most direct impact on their performance. Therefore, personnel from different functional areas are likely to use different criteria in evaluating service.

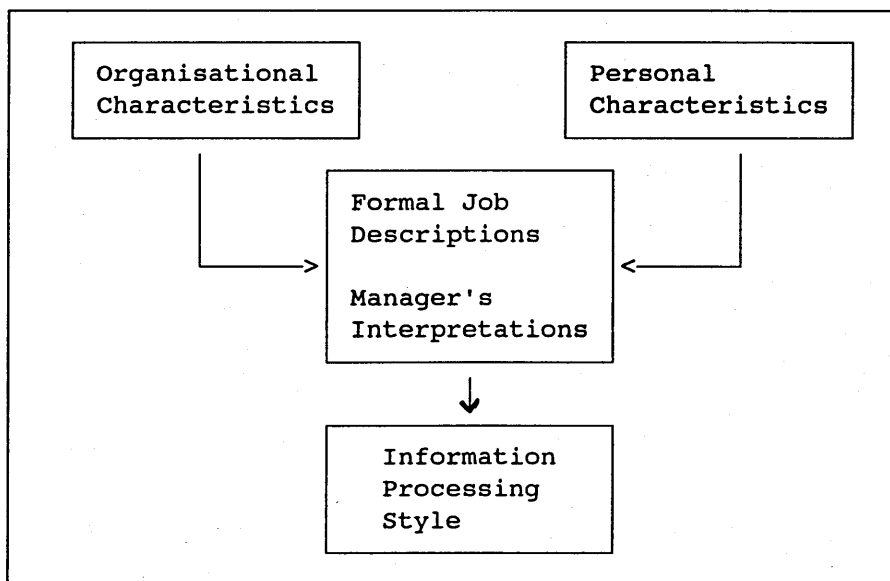


Figure 4.4 - A Conceptualisation of Influences on the Transportation Decision Process

Source: Granzin, Jackson, and Young (1986, p.54)

The above studies lead to the following research question and hypothesis:

- Q3 - Are there different emphasis on the price and service attributes between the operational and non-operational groups in organisations within the same industry?
- H3 - There is a significant difference in emphasis on price and service attributes between the operational and non-operational groups in organisations within the air freight industry.

4.7.4 The Gap Between the Customer Expectations and Management Perceptions of Customer Expectations

Under the marketing concept, the supplier should know what the customer expects and satisfy those expectations at a profit. However, the service marketing research conducted by Parasuraman, Zeithaml, and Berry (1986) discovered that managers are unaware of certain critical customer expectations and their importance.

They identified three key conceptual factors contributing to this gap:

- lack of marketing research orientation
- inadequate upward communication
- too many levels of management

In Parasuraman, Zeithaml, and Berry's (1990) empirical research, the finding does not reveal a strong correlation between the gap and the three key factors. However, the correlations between some individual items within the key factors and the gap are high. Therefore, the same key factors can be used for this research.

According to Zeithaml, Berry, and Parasuraman (1988), a gap always exists between customer expectations and management perceptions of customer expectations. Jerman, Anderson, and Constantin (1978) stated that there are differences between the carrier and shipper on the choice attributes. However, the study fails to differentiate among the various modes of transportation. Abshire and Premeaux (1991) did a study specifically in the trucking industry and noted that there are differences in the perceptions of carriers and shippers on the choice attributes.

There is no comprehensive study that has addressed the difference in perceptions specifically in the air freight industry. The studies are either too general (see,

Parasuraman, Zeithaml, and Berry, 1986), or too narrow (see, Chow and Posit, 1984). The work of Chow and Posit (1984) focused only on the customer side of the transportation seller-buyer dyad in the rail and truck industry. The other setback of the past studies is that they fail to address the price factor. Price should not be ignored because it is one of the two important dimensions in distribution (the other being service). Thus, when measuring customer expectations, one should include both the service and price attributes.

The above lead to the following research questions and hypotheses:

- Q4.1 - Are there significant differences in customer expectations and management perceptions of those expectations? If there are, will the size of the gap differ between the operational group and the non-operational group?
- H4.1.1 - There is a significant gap between customer expectations and management perceptions of those expectations.
- H4.1.2 - The size of the gap between customer expectations and management perceptions of those expectations differs between the operational and non-operational groups.
- Q4.2 - Are there differences among the three categories of airlines rated as "good", "average", and "poor" on their emphasis on the key factors to the gap between customer expectations and management perceptions of those expectations?
- H4.2 - There are differences in emphasis on the key factors to the gap between customer expectations and management perceptions of those expectations among the "good", "average", and "poor" airlines.

The second part of the research question (Q4.1) considers the two groups of customers. The subject has been addressed earlier. For the second research question (Q4.2), the airlines are rated by the customers based on their perceptions of the airlines' services.

4.7.5 The Key Factors to the Gap Between Management Perceptions of Customer Expectations and Service-Quality Specifications

Even if the management perceptions of customer expectations are found to be similar to the customer expectations, it still does not ensure that the management

perceptions will be translated into service-quality specifications correctly. Failure to translate the management perceptions will widen the gap between management perceptions of customer expectations and service-quality specifications. Organisational constraints may act as barriers to the proper translation of management perceptions. Examples of organisational constraints are financial, manpower, and technical resources, market conditions and short term profit orientation.

According to the literature, there are few factors that contribute to this gap. Zeithaml, Berry, and Parasuraman (1988) identified four factors:

- management commitment to service quality
- task standardisation
- goal setting
- perception of feasibility

The finding of Parasuraman, Zeithaml, and Berry (1990) shows that only the first three factors are significantly related to the size of the gap. The perception of feasibility is found to be not significantly related to the size of the gap.

It is important to clarify that this stage of the research is not addressing the size of the gap between management perceptions of customer expectations and the service-quality specifications. Instead, this stage compares the differences among the three categories of airlines on the key factors to the gap.

Thus, the research question and hypothesis are as follows:

- Q5 - Are there significant differences among the three categories of airlines on their emphasis on the key factors to the gap between management perceptions of customer expectations and service-quality specifications?
- H5 - There are differences in emphasis on the key factors to the gap between management perceptions of customer expectations and service-quality specifications among the "good", "average", and "poor" airlines.

4.7.6 - The Key Factors to the Gap Between Service-Quality Specifications and the Actual Service Delivered

This gap is referred to as the service performance gap. It is the gap between the service-quality specifications and the actual service delivered to customers. The service performance gap occurs when employees are not able or not willing to perform the service as per the service-quality specifications.

Unlike the previous two gaps, this gap is caused by non-management personnel within the organisation. Seven factors contribute to this gap (Zeithaml, Berry, and Parasuraman, 1988):

- team-work
- employee-job fit
- technology-job fit
- perceived control
- supervisory control systems
- role conflict
- role ambiguity

The finding of Parasuraman, Zeithaml, and Berry (1990) confirmed that the seven factors are statistically significant to the service performance gap. Among the seven factors, team-work and employee-job fit are found to be highly correlated to the gap.

For the service performance gap, this stage of the research will also compare the differences among the three categories of airlines on the above seven key factors.

Thus, the research question and hypothesis are:

- Q6 - Are there significant differences among the three categories of airlines on their emphasis on the key factors to the service performance gap?

- H6 - There are differences in emphasis on the key factors to the service performance gap among the "good", "average", and "poor" airlines.

4.8 The Research Design

The research design is based on the above research questions and hypotheses. The research is divided into six stages: Stage 1 covers the literature search on the subject, and Stages 2 to 6 covers the field work (see Figure 4.5).

The objective of Stage 2 is to obtain the attributes of service quality in the air freight industry. These attributes must be common to both the customers and the airlines. They become the foundation to the construction of the questionnaires for Stages 4, 5, and 6. The service attributes mentioned in the literature are too general, not industry-specific, and not empirically supported.

The objective of Stage 3 is to group the attributes into the dimensions of service quality. In order to avoid any bias, the grouping is done by the customers themselves. The dimensions are taken from Parasuraman, Zeithaml, and Berry (1990).

Stage 4 addresses the two research questions pertaining to the dimensions of perceived service quality and their importance (see 4.7.1). In Stage 4, the airlines will be categorised based on the perceived service into three categories: "good", "average", and "poor". The rating is needed for Stage 6 of the research.

In Stage 5, the price variable is introduced to determine the trade-off among the price and service attributes. This is done to answer the research questions in 4.7.2 and 4.7.3. The questionnaire used in Stage 5 is also applicable to Stage 6, that is, to answer the research questions relating to the gap between customer expectations and management perceptions of customer expectations (refer to 4.7.4).

In Stage 6, the differences among the three categories of airlines concerning the key factors causing the following gaps are compared:

- between the customer expectations and management perceptions of customer expectations
- between management perceptions of customer expectations and service-quality specifications
- between service-quality specifications and the actual service delivered

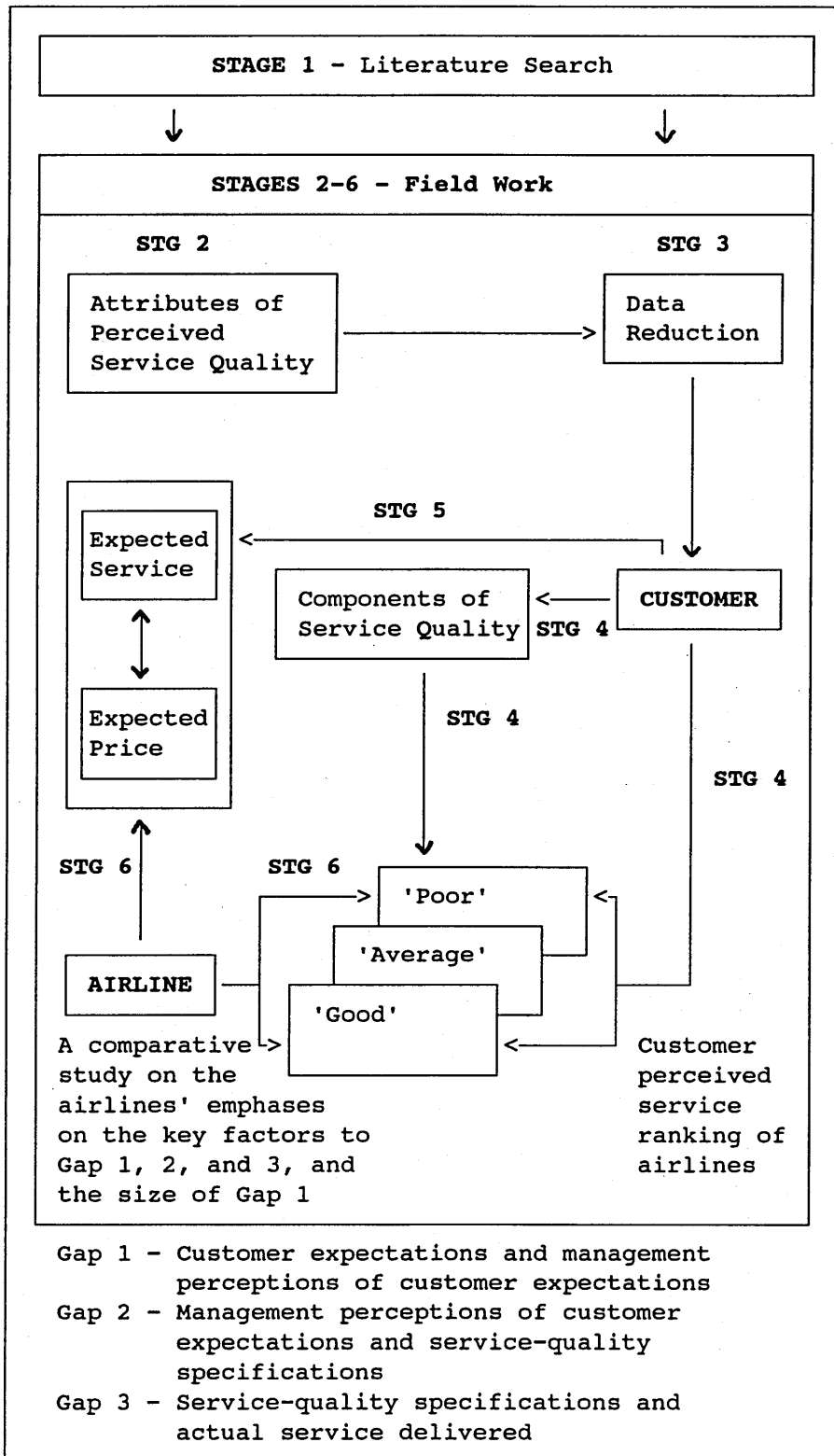


Figure 4.5 - Schematic Illustration of the Research Design

The comparative study between the three categories of airlines enables the research questions in 4.7.4 to 4.7.6 to be answered. The findings from this stage will improve the service delivery of the airlines, which may subsequently improve the perceived service quality.

4.9 Summary

The first part of this chapter covers the approach to the research area. It starts with the broad classifications of services, service industries, transportation industry, and finally the air freight industry. Within the air freight industry, it focuses on the export section.

The second part gives a brief summary on the subject of service quality found in the service and transport literature, and how the research questions and hypotheses are derived. The research questions focus on four areas:

- components of perceived service quality
- the trade-off between the service and price attributes
- the gap between customer expectations and management perceptions of those expectations among the "good", "average", and "poor" airlines
- the differences among the "good", "average", and "poor" airlines on the key factors to the gaps

The research is divided into six stages (Stages 1 to 6). In summary, Stage 1 covers the literature search, whereas Stages 2 to 6 concentrate on the field work. Stages 2 and 3 are used as a vehicle to obtain the attributes and dimensions of service quality respectively. Stages 4 to 6 are geared to answer the research questions and to test the hypotheses.

Chapter 5 - The Research Methodology

5.0 Introduction

There are various research methods and techniques available to researchers. A research method is a systematic and orderly approach taken towards the collection of data. In contrast, research techniques are step-by-step procedures in data collection.

The objective of this chapter is to provide a rational argument for choosing a specific method and technique for each stage of the research. The first part of this chapter covers the various methods and techniques used in research. The second part focuses on the specific techniques chosen for the various stages of this research, namely, the Repertory Grid technique, the Conjoint Measurement, and the Structured Questionnaire. It also reviews the various computer packages used to analyse the data from the three main techniques. The computer packages are the INGRID (for analysing the Repertory Grid Data), the \$FTROFF (for analysing the Conjoint Data), and the Statistical Package for Social Sciences (SPSS). The SPSS is used for the following purposes:

- to analyse the factors of the service quality attributes
- to cluster the respondents into two specific groups (price sensitive and less price sensitive group)
- to aggregate the individual utility values from the \$FTROFF program
- to perform the basic statistical analysis

The final part of this chapter covers the questionnaire design and the sample size. The questionnaire design includes the two main types of questionnaire (structured and unstructured) and their application. The subject of sample size covers the factors affecting the sample size, and the various sampling techniques.

Figure 5.1 illustrates the research techniques and the computer packages used in the various stages of the research.

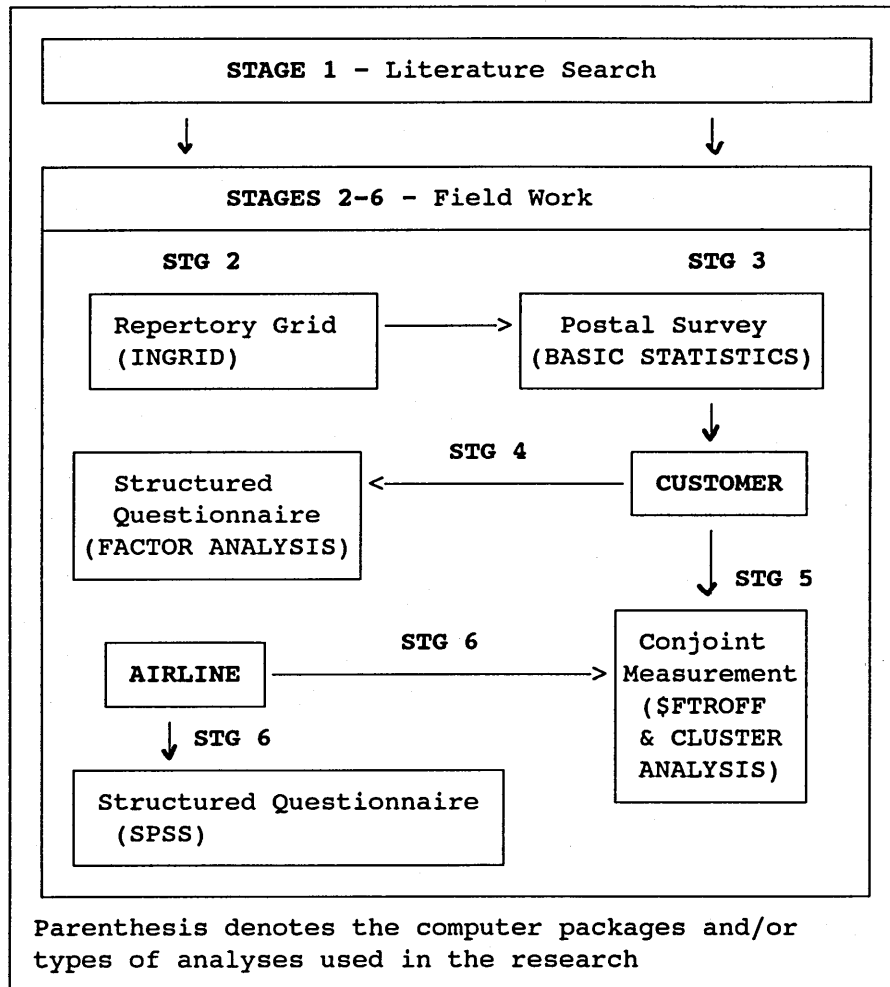


Figure 5.1 - A Schematic Illustration of the Research Methods and Techniques

5.1 The Various Methods Used in Research

There are four basic methods in research: case study, historical review, experiment, and survey (Jankowicz, 1991). There is no definite rule for one to follow in selecting one method over another. The choice varies according to the nature and scope of the thesis, the sources of data, the research questions and hypotheses, and any other constraints affecting the collection of data.

The purpose of this section is to give a brief discussion on each of the methods, their advantages and disadvantages, and why the survey method is chosen for the research.

5.1.1 The Case Study Method

This method is used when the thesis is focused on a set of issues in a single organisation. Yin (1984) gave three situations in which one can choose the case study method:

- if one's research is following a specific theory, and it is likely that an organisation has those factors or circumstances for the critical test of the theory
- in order to identify the distinguishing characteristics of an extreme or rare situation in which an organisation is in
- if it is believed that the circumstances are sufficiently interesting and that something important will be learnt from the study

Alternatively, a comparative case study can be carried out by asking the same questions in several related organisations. It is important to note that the sampling of different organisations is not because that one wishes to generalise the study. Instead, it is to replicate the study and to explore the possibility of different issues involved.

The advantage of case study is that it is comprehensive and informative about an organisation (Jankowicz, 1991). However, the problem with case study is that the research design is subject to influence and interruptions arising from day-to-day events happening in the organisation. If the research demands multiple sources of evidence from the organisation, then it could be very time consuming. Also, there may be a problem of gaining accessibility to the various departments.

5.1.2 The Historical Review Method

The historical review method is used to understand the past situation, and if need be, to relate to the present situation. This method is suitable, for example, for those relating to financial and accounting subjects (see, for example, Orbell, 1987), and market and product performance. The method can also be used to study an organization's performance (past and present) relating to a specific issue. In this case, there is not much difference with the case study method.

The set-back with the historical review method is on data collection. In most cases, the data are limited to secondary data only. However, one can extend the data collection to include primary data by interviewing the relevant personnel. The main

problem with the primary data obtained from interviews is that it may be incomplete; the human memory is incapable of relating the past situation correctly.

5.1.3 The Experiment Method

Experiments differ from other research methods in terms of the degree of control over the research situation. In an experiment, one variable (independent variable) is manipulated and its effect upon another variable (the dependent variable) is measured, while all other variables which have an influence on the relationship are eliminated or controlled.

In an experiment, the data are gathered by observation of a tightly predefined range of behaviour under controlled conditions. In the simplest case, one's attention is confined to two variables to determine a pattern of association between the two. In this situation, one can determine only the relationship between variables but not the direction of the relationship.

If one is to determine the direction of the relationship, one should undertake two further steps. The first is to arrange events for the correct sequence of association (which variable makes a difference if it happens first, and which does not). The second is to eliminate the possible influence of other variables. Elimination is possible if one has sufficient knowledge on the respondents, and the power to arrange respondents (for example, the freedom to move respondents into the appropriate groups). Gill and Johnson (1991) referred to this particular technique as Action Research.

In reality, the task to move respondents into the appropriate groups may not be possible. Therefore, one has two alternatives. The first is to draw a purposive sample by deliberately deciding to observe only those respondents known to have those factors requiring control. The second is to sample randomly from two different groups and assume that the effects of the various factors involved would cancel each other out (Jankowicz, 1991). The problem with these two alternatives is that one needs to start with a fairly large population and know a lot about the respondents involved.

5.1.4 The Survey Method

In contrast to the experiment method, a survey is concerned primarily with addressing the particular characteristics of a specific sample of respondents. This could be done either at a fixed point in time (cross-sectional), or at varying times (longitudinal study) for comparative purposes. The main purpose of using the survey method is to ensure that any subsequent assessment of the attributes of that

sample population are accurate, and the findings can be generalized. In other words, they have population validity.

Thus, survey is defined as a method of primary data collection based on communication with a representative sample of individuals. It involves designing and administering a questionnaire. The decision about how respondents are to be contacted and the requisite information to be elicited depends on three factors:

- the size of the sample
- the geographical dispersion of the sample
- the complexity of the information required

There is a choice between postal survey (self-administered by the respondent) or face-to-face interview (self-administered personally or through another party). The survey could also be conducted through the telephone (Frey, 1989). However, the complexity of the information required might necessitate personal contact.

The advantages of survey is that it provides a quick, inexpensive, efficient, and accurate means of assessing information about the population.

The main problem with the survey method is that one is dealing with reports (verbal or written), and reports are limited to what the respondent is willing and able to report in the first place. Two major types of error can occur:

- random sampling error - the deviation of an observed value from its expected value due to the inherent randomness of the situation under study. This error could be minimised by increasing the sample size.
- systematic error - results from some imperfect aspects of the research design or from a mistake in the execution of the research. There are two types of systematic errors: respondent error and administrative error.

Figure 5.2 outlines the various forms of survey error.

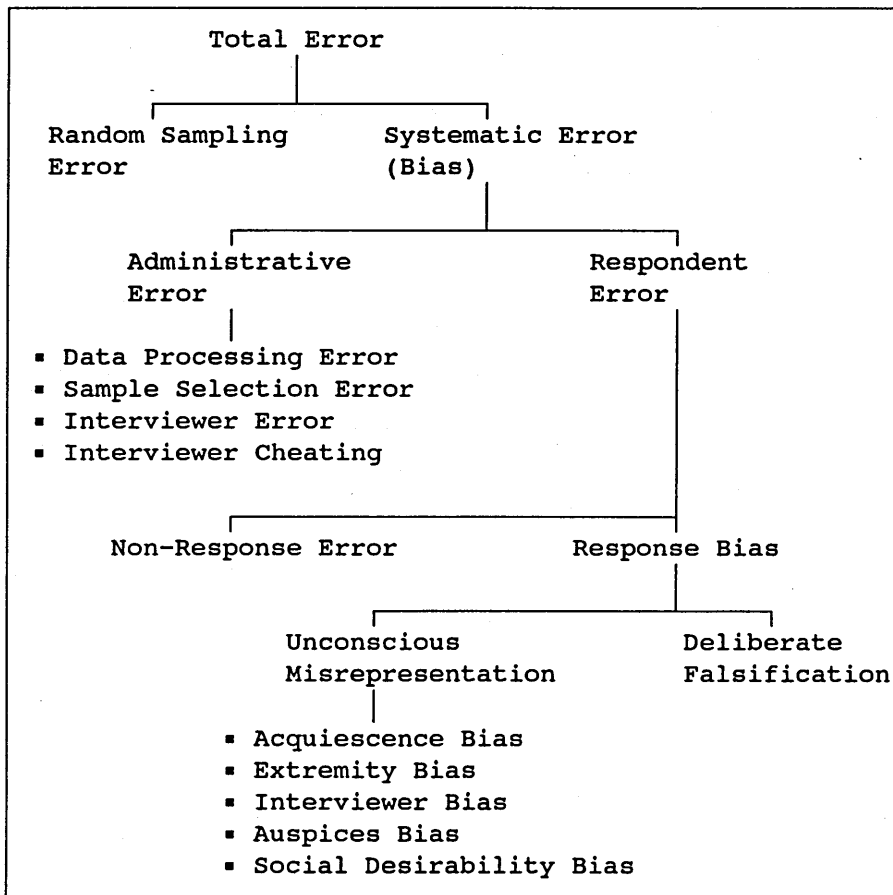


Figure 5.2 - Tree Diagram of Total Survey Error
Source: Zikmund (1988, p.144)

The survey method is chosen over the other three methods. The objectives of this research are to obtain the dimensions of service quality, to analyse the trade-off among the service and price attributes, and to do a comparative study among airlines. Thus, the research demands information from various organizations in the industry. Furthermore, there is a need to generalise the study, thus eliminating the case study and historical review methods.

The experiment method is also not suitable for the research. The experiment method focuses on the causal effect between variables, whereas the survey method addresses the relationship among variables. Thus, the survey method would be the most appropriate method for this research.

5.2 The Various Techniques Used in Research

Techniques are defined as particular, step-by-step procedures which one can follow in order to gather data and analyse them (Jankowicz, 1991). Bennett (1986) suggested that techniques address the "how" aspect rather than "what" and "why" aspects of conducting research. Basically, the techniques can be classified into two major groups: qualitative and quantitative (see Figure 5.3).

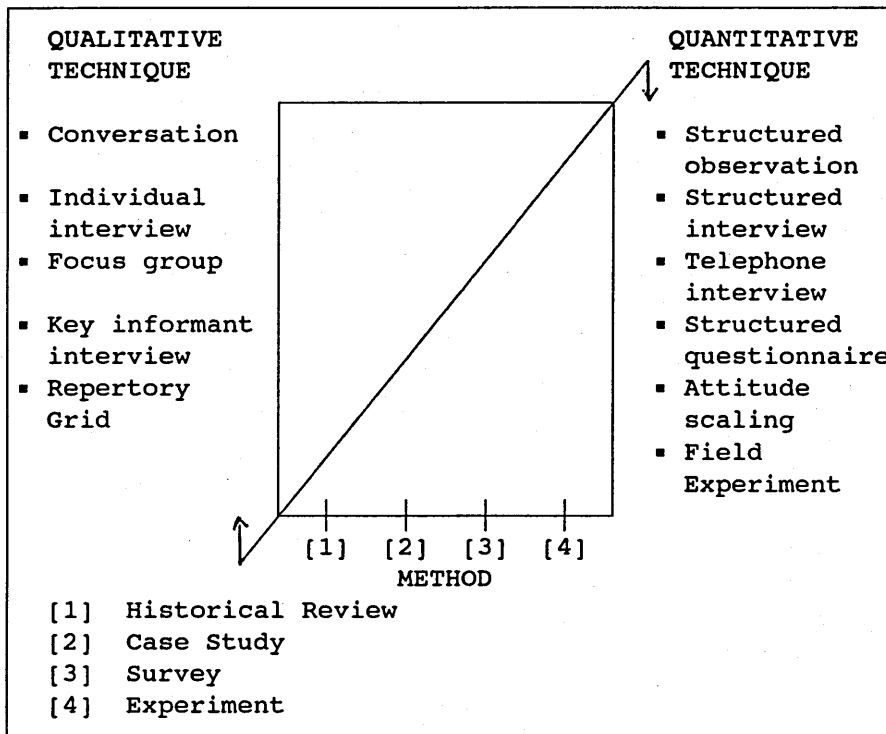


Figure 5.3 - Methods and Techniques, Qualitative and Quantitative

Source: Jankowicz (1991, p.159)

The qualitative techniques encompass, for example, conversation, individual interview, focus group, key informant interview, and Repertory Grid. In general, they make use of semi-structured and open-ended questionnaires. They provide rich but disorganised data. The set-back with this technique is the additional tasks of having to organise the data and extract the relevant information. One way of overcoming this is to use the content analysis technique which classify and categorise the themes in the data. The qualitative techniques are used mainly in the historical review and case study methods. However, they can also be used with the survey method especially if one is conducting an initial unstructured pilot study.

On the other hand, quantitative techniques include structured observation, structured interview, telephone interview, structured questionnaire, attitude scaling, and field experiment. They make use of fully structured questionnaire. The use of structured questionnaires makes it possible to analyse the data statistically, and to test the hypotheses more explicitly. According to Selltitz, Wrightsman, and Cook (1976), the advantage of using a properly devised structured questionnaire is that it is cheaper, and require less skill and sensitivity to administer. This is especially true in the postal questionnaire survey. The set-back with the structured questionnaire is that it requires extensive preparation prior to using it. In terms of analysis, there is a great variety of techniques available. It varies from the simple frequency counts to a more complex use of statistical tests (single or multivariate).

Qualitative technique, namely, the Repertory Grid, is used for the Stage 2 of the research. For the other stages (Stages 3 to 6), quantitative techniques, namely, structured questionnaires and Conjoint Measurement, are used.

5.3 The Repertory Grid Technique (Stage 2)

The Repertory Grid technique was developed by Kelly (1955). The technique was first used to investigate the role relationships between patients and their families. The technique is flexible, has wide applications, and is not constrained by formal procedures as in structured questionnaire. The technique is not only used to investigate constructs¹ about people, but it can also be applied in marketing (Frost and Braine, 1967). Frost and Braine used the technique to investigate how consumer products differ in the consumer's own terms. Other applications in marketing include the work of Myers and Alpert (1968) on airline services, and Scott, Ford, and Lundstrom (1987) on intangible service dimensions.

There are many resemblances between the Repertory Grid technique, the Q-sort technique (Stephenson, 1953), and the Semantic Differential technique (Osgood, Suci, and Tannenbaum, 1957). Fransella and Bannister (1977) suggested that the Repertory Grid technique has features which are common with the Sociometric Technique (Moreno, 1951), and the personal questionnaires (Shapiro, 1961).

There are six stages to the Repertory Grid technique (Smith, 1986):

- eliciting the elements

¹ Constructs are the ways in which the respondent groups and differentiates between the elements. Elements define the material upon which the grid will be based.

- eliciting the constructs
- preparing the grid
- grading the grid
- analysing the grid
- interpreting the results

5.3.1 Elicited Constructs versus Provided Constructs

When using the Repertory Grid technique, it is important to decide whether the elements and constructs should be provided to the respondent or elicited from them. In its original use, the method was to elicit both the constructs and elements from the respondent (Kelly, 1955). Eliciting is in line with the theoretical base (the Personal Construct theory) of the Repertory Grid technique: it emphasizes individuality. Of late, there has been an increasing tendency to provide both the elements and constructs to the respondent.

O'Donovan (1965) and Bonarius (1970) suggested that respondents tend to give extreme ratings when the elements and constructs are elicited rather than provided. Lanfield in his study (1965) provided some constructs, and at the same time, elicited some from the respondents. The study shows that the elicited constructs are ranked higher than the supplied constructs. The polarisation of ratings occurs because a person regards his own constructs as being more important than those selected from a pool of constructs (Isaacson and Lanfield, 1965; Adams-Webber, 1970).

There is no definite evidence as to why provided constructs should not be used. On the contrary, there is some evidence to suggest that using provided constructs produce more meaningful results (Nystedt, Ekehammar, and Kuusinen, 1976; Smith, 1986). The decision whether to provide or elicit the elements and constructs depends on the purpose and application of the research. If one is trying to obtain the constructs, then it is better to provide the set of elements to the respondents.

In the case of this research, the objective of Stage 2 is to elicit the attributes of service quality from the perspective of the airlines and their customers. The main reason for eliciting from the two parties is because common attributes which are applicable to both parties are required. These attributes are used in Stages 4 and 5 (in the case of customers), and Stage 6 (in the case of airlines) of the research.

5.3.2 Eliciting the Attributes of Service Quality

Kelly (1955) developed six methods to elicit constructs:

- the minimum context card form
- the full context form
- the sequential form
- the self-identification form
- the personal role form
- full context form with the personal role feature

The first three methods are significant to this research. In the minimum context card form, the elements are first elicited from the respondent. These elements are then used to elicit the constructs using the triadic-comparison technique. Using the technique, the respondent is presented with three cards (which represent three elements) and asked to specify some important way in which two of the elements are alike and thereby different from the third. Having recorded the reply, the respondent is then asked in what way the third element differs from the other two. The answer to the question concerning the difference is the contrast pole. The process is then repeated with the second and subsequent triads until all the constructs are elicited.

The sequential form is similar to the minimum context card form except each card is removed from the triad and an additional card is introduced.

In the full context form, all the elements (written on separate cards) are presented to the respondent. The respondent then chooses two cards (elements) at a time. After eliciting the constructs using the first two cards, one card is removed and an additional card is introduced. The process continues until sufficient constructs have been elicited.

The choice of methods for eliciting the constructs is a matter of personal preference. The triadic-comparisons method of the minimum context card form is chosen for the research. For the customer, the elements are the airlines. For the airline, the elements are the customers.

During the interview, the respondent is presented with three cards at a time. The following example reflects the process of eliciting the service quality attributes from the customer. The respondent is asked to indicate nine airlines that they have dealt with. Then, the respondent is asked to rate the airlines as "good", "average" and "poor" in terms of service ratings and record them individually on nine cards. In the case of the airlines, they are asked to indicate nine customers.

The cards are numbered 1 to 9. The respondent is presented with three cards at a time following the sequence recommended by Stewart, Stewart, and Fonda (1981) shown below:

123	456	789	147	258	369
159	269	348	169	248	357

The respondent is first asked which of the two cards are similar in terms of the quality of services. Then, the respondent is posed with the question of "*in what way the two cards are different from the third card?*" The answer given is referred to as the emergent pole², and it is written on the left hand side of the form (refer to Appendix 5A). Subsequently, the respondent is asked "*in what way is the third card different from the other two?*" The answer to this question is referred to as the contrast pole³, and it is written on the right hand side of the form (refer to Appendix 5A). The process continues until no new constructs are elicited.

The respondent is then presented with the second, and subsequent sets of cards, and undergo the same process as before. The process stops when the respondent is either exhausted or no new constructs are elicited.

5.3.3 Rating the Element

The next step is to either rank or rate the elements against the constructs. There are three methods to do this. The first is referred to as the "*dichotomous approach*" (Kelly, 1955). This approach requires the respondent to place each of the element on either one of the two poles of the construct. The usual method is to place a tick or a cross under each element. The set-back with this method is that it does not allow finer discrimination between elements.

² Emergent pole is defined as the way in which two of the elements are alike.

³ Contrast pole is in the way in which the single element is distinct from the pair.

The second is to rank the elements (Bannister and Mair, 1968; Fransella and Bannister, 1977). In ranking, each construct uses a scale along which the individual elements can be placed. For example, with the construct '*Reliable Carrier/Unreliable Carrier*', the elements are ranked from the most reliable to the most unreliable. This method does not allow a tie between elements. Thus, it provides for finer discrimination between the elements, but the process is tedious.

The third is to rate the elements on a 5 or 7-point scale (Bannister and Mair, 1968; Fransella and Bannister, 1977). Generally, smaller scales place less burden on the respondent. Bigger scales, on the other hand, tend to be more reliable. However, Jacoby and Mattell (1971) suggested that 3-point scales are sufficient to meet the criteria of test-retest reliability. Therefore, when choosing a scale, it is a matter of trade-off between brevity and reliability.

The 7-point scale is generally favoured by the Semantic Differential (Osgood, Suci, and Tannenbaum, 1957) users. However, in a 7-point scale, the respondent tends to ignore scales 2 and 6, thus reducing the scale to 5 points (Fransella and Bannister, 1977).

Among the three methods, rating is preferred. Compared to ranking, it is less tedious to the respondent. Compared to the "*dichotomous approach*", it provides finer discrimination between elements. On the aspect of scale length, the 5-point scale is chosen. It places less burden on the respondent compared to the 7-point scale.

5.3.4 Measurement Errors

In rating, there is always an element of judgement which may cause two types of errors in the measurement. These errors are known as random and systematic errors. Random errors are simple mistakes caused by lack of attention to the question, exhaustion, and so on. This error can be minimised by repeating the question as and when necessary, and by not extending the interview beyond the allocated time.

Systematic errors are the combination of the "*halo effect*"⁴ and the "*constant error*" (Kerlinger, 1986). The "*halo effect*" in the research is minimised using a specially designed rating form (see Appendix 5A) to record the constructs. The emergent and contrast constructs are recorded on both the right and left side of the form respectively. Thus, the "positive" or "negative" constructs could be positioned on either the left or right hand column depending on the respondent's responses.

⁴ The halo effect is the tendency to rate an object in the constant direction of a general impression of the object.

Furthermore, the elements are not segregated in descending or ascending order of "good", "average", and "poor".

The "*constant error*" is a combination of the error of severity and error of leniency. Error of severity occurs when the respondent has a general tendency to rate the elements too low on all constructs. Error of leniency, on the other hand, occurs when the respondent rates the elements too high. It is not possible to control these two types of errors in research. However, one could measure these two errors by referring to the bias⁵ and the variance ratio⁶.

5.3.5 The Instrument for Analysis: INGRID

The matrix obtained from the Repertory Grid technique can be analysed in varying degrees of complexity using a computer program called the Grid Analysis Package (GAP). It was developed by Dr. Patrick Slater (1972).

The program provides analysis for both the individual case and for a series of grids which are aligned by construct or element, or both. There are five modules in the GAP program:

- INGRID - for individual analysis
- COIN - for comparing two grids having similar and aligned constructs
- DELTA - for comparing two grids having similar and aligned constructs and elements
- PREFAN - for aggregated analyses having similar and aligned elements
- SERIES - for aggregated analyses having similar and aligned constructs and elements

The objective of Stage 2 of the research is to elicit the attributes of service quality. The constructs differ between respondents, and the analysis is therefore limited to the INGRID program.

The INGRID uses the Principal Component Analysis (Slater, 1964), and it shows the variance accounted for by each component in percentage. A component is a measurement in which the constructs and the elements interact. From the Principal

⁵ Bias increases when more elements are rated towards one pole of the construct than the other pole.

⁶ Variance ratio determines the significance of the bias.

Component Analysis, one can determine the importance of constructs and elements to the respondent. For example, if the construct has higher rating on all the elements, it means that the construct is relatively important to the respondent. On the other hand, if the construct scores lower rating, it means that the construct is relatively less important to the respondent.

In addition to the Principal Component Analysis, the INGRID shows the correlations among elements and constructs. The relationships among constructs indicate that it is possible to group the constructs into dimensions of service quality. For example, the close relationship between Availability of Space and Ability to Accept Different Sizes of Cargo implies that these two constructs are within the same dimension, that is, capacity related. The grouping is done in Stage 3 of the research.

Likewise, the grouping of elements indicates that it is possible to group the airlines into certain categories based on how the respondents view the airlines along those constructs. One method is to categorise them as "good", "average", and "poor", in terms of perceived service. This categorisation is used when designing the questionnaire for Stage 4 of the research.

5.3.6 The Limitations of the Repertory Grid Technique

The technique is good for exploring the nature and relationships between elements and constructs. However, the analysis is true only for the individual respondent, thus making generalisation difficult. It could be argued that similar constructs can be provided to respondents, thus making generalisation possible. By doing so, one loses the objective of individuality in the Personal Construct theory.

The other limitation is that it is time consuming. The average time for each interview is between sixty to ninety minutes, and there is still no assurance that the "correct" number of constructs has been elicited.

In the Principal Component Analysis, the rotation of the axes are fixed, thus limiting the data reduction capability and the ability to manipulate the data for better presentation. In contrast, the Statistical Package for Social Sciences (SPSS) allows the rotation of the axes, thus increasing the flexibility for data manipulation.

Despite its limitations, the technique is useful for Stage 2 of the research. It provides information on the attributes of service quality, which are not available in the current literature. Furthermore, the technique is not constrained by formal and detailed procedures as in structured questionnaire. The technique allows the

respondent to structure his replies in his own terms, thus removing the researcher's bias. This is supported by Barker (1978):

"the initiative during the interaction lies with the respondent because the interviewer makes no attempt to impose his own ideas or concepts, or control the order in which the information is supplied. Thus, a respondent's role is less inhibited" (p.9).

5.4 The Postal Survey (Stage 3)

In this method, the questionnaire is posted directly to the respondent. The respondent then completes and returns the questionnaire at his leisure. This is a rather convenient method and relatively inexpensive. However, this is offset by "non-response" bias. Non-response bias occurs when a large number of respondents fails to complete and return the questionnaire. If the respondents who fail to return the questionnaire differ in significant ways from those who do return it, then the survey may give answers that may not be representative of the population.

The other problem with this method is that it is difficult to know to whom the questionnaire should be addressed. Furthermore, there is always a danger of a wrong person completing the questionnaire (for example, the decision implementor instead of the decision maker).

Chernatony (1988, 1989) gave several suggestions on how to overcome the problems associated with postal survey, for example, directing the questionnaire to the correct person, accompanying the questionnaire with a well designed covering letter, having a well designed questionnaire, providing paid postage, and sending follow-up letters.

The postal survey method is chosen for Stage 3 of the research. The reasons for selecting this method are as follows:

- the objective of Stage 3 is to group the attributes of service quality into the appropriate dimensions of service quality. The questionnaire consists of service attributes and the definitions of service dimensions (see Appendix 5B). The respondent is to tick the column representing the dimension that best describes the attributes. Since it is a simple task, it is possible to use postal survey.

- financial consideration

To minimise non-response, the recommendation by Blumberg, Fuller, and Hare (1974), and Chernatony (1988) is followed, that is, to send follow-up letters when the response to the survey tails off. A graph of the cumulative response level against the number of days since posting the questionnaires (Chernatony, 1988) was plotted in order to determine the tail-off point.

5.5 Factor Analysis (Stage 4)

Factor Analysis is a flexible instrument applicable to a wide range of research designs (for example, hypothesis-testing and case studies), and a variety of data (for example, time series and sample survey responses). It allows for both deductive and inductive manipulation of quantitative as well as qualitative data.

5.5.1 Factor Theory

Factor Analysis is a general scientific method for analyzing data. There is no restriction on the content of the data; they may be on the movements of gas molecules, on group behaviour, on attitudinal data derived from questionnaire, or on any matrix⁷ (Rummel, 1970).

It is generally possible to do Factor Analysis on almost any matrix. However, not all matrices will produce useful factors. The value of a Factor Analysis is dependent on the meaningfulness of the variability in the data. If the data have no variation, that is, if all values are the same, then only one factor can be derived from the data.

The total data variation in a matrix can be divided into several component parts (see Figure 5.4). The component is made up of common and unique variances. Common variance is the variance that is shared by two or more variables. On the other hand, unique variance is that variance that is not common to the other variables. The unique variance is further divided into two variance components: specific variance and random error. What is important in this research is the reliability of a variable, which is made up of common and its specific variance. Basically, reliability means the ability to reproduce the same results. It is that portion of the variance that remains constant through replication. That portion of variance that cannot be reproduced when new data are collected is random error.

⁷ For the purpose of the research, a matrix is basically a table of numbers.

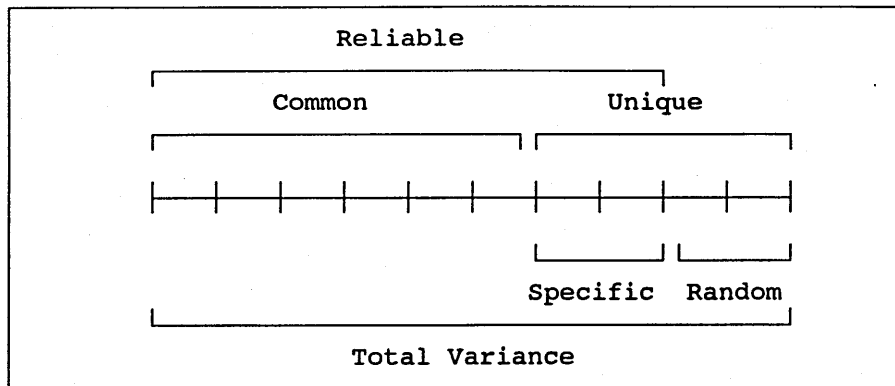


Figure 5.4 - A Schematic Illustration of Variance
Components of a Variable
Source: Rummel (1970, p.103)

Factor Analysis is primarily concerned with common variance. The general purpose of Factor Analysis is to summarise the information contained in many variables into few factors. It enables one to determine some underlying relationships among the variables. For the technique to work, it requires data to be measured on a full interval scale.

5.5.2 The Analysis

Factor Analysis is a generic term that comprises two different techniques: Principal Component Analysis and Common Factor Analysis. Both are statistical techniques that may be applied to a group of variables where none has been specified as dependent or independent variables. The main difference between the two is that Principal Component Analysis deals with the total variance, whereas Common Factor Analysis deals with the common variance only (see Figure 5.4).

The three most common applications of Factor Analysis are as follows:

- exploratory - the objective is to discover new concepts and the possibilities of data reduction. This is achieved by exploring and detecting the pattern of variables in existence
- confirmatory - the objective is to test the hypotheses on the structuring of variables in terms of the expected number of significant factors and factor loadings

- as a measuring device - the objective is to construct measurement indices to be used as new variables in the subsequent analysis

There are three steps in Factor Analysis:

- the preparation of correlation matrix
- the extraction of the initial factors
- the rotation of the factors

The first step is to prepare the correlation matrix. It provides the measure of association among variables or subjects using the R and Q techniques. The techniques are applicable if one has a matrix of m subjects (for example, airlines) and n variables (for example, service quality attributes). In the R-technique, correlations are computed for pairs of variables across subjects (Kerlinger, 1986). In contrast, the Q-technique correlates the association between subjects across variables (Stephenson, 1953).

The second step is to explore the possibilities of data reduction by constructing a set of new variables on the basis of the correlations exhibited in the data. In doing so, the new variables may be defined in two ways:

- as exact mathematical transformations of the original data, known as the Principal Component Analysis
- as inferences of the original data, known as Common Factor Analysis. In most cases, the term commonly used is Factor Analysis.

The third step is to rotate the factors. The initial factors are generally difficult or impossible to interpret. Thurstone (1944) argued that it is necessary to rotate the initial factors for easier interpretation. Thus, in general, rotation simplifies the interpretation of the factors.

There are two options available in rotation: oblique and orthogonal. Oblique means that factors are correlated and the factor axes are allowed to form acute or obtuse angles (Rummel, 1970). On the other hand, orthogonal means that the factors are uncorrelated. Thus, the angles between the axes are kept at 90 degrees apart. In orthogonal rotation, the factors are forced to be unrelated; thus, it gives artificial and inaccurate information on the subject matter. The orthogonal factors are mathematically simpler to handle, while the oblique factors are empirically more realistic (Rummel, 1970). In actual fact, there is no reason to favour one over

another (Kim, 1975). Kerlinger (1986) stated that it appears to be a matter of preference.

There are three orthogonal solutions in the SPSS program: Varimax, Quartimax, and Equimax. However, there is only one solution to the oblique rotational application, that is, Oblimin. Using Oblimin, the user can control the degree of correlation between factor axes.

Factor Analysis is used in Stage 4 of the research but limited to the exploratory use only. Between the two rotation methods, the oblique rotational method (Oblimin) is chosen for the research.

5.5.3 The Differences Between Principal Component Analysis and Factor Analysis

Principal Component Analysis is a relatively straightforward method of transforming a given set of variables into a new set of composite variables or principal components that are orthogonal (uncorrelated) to each other. The first principal component, therefore, may be viewed as a single best summary of linear relationships exhibited in the data. The second component is defined as the second best linear combination of variables on condition that the second component is orthogonal to the first. Thus, the second component accounts for the proportion of the variance not accounted for by the first one. Subsequent components are defined in the same way until all the variance in the data are exhausted.

On the other hand, Factor Analysis is based fundamentally on the belief that the observed correlations are mainly the result of some underlying regularity in the data. It is assumed that the observed variables are influenced by various determinants, some of which are shared by other variables (known as common variance) in the set, while others are not shared by any other variables (known as unique variance). The unique variance is specific to the variable; thus, it does not contribute to relationships among variables. The observed correlations are, therefore, the result of shared common variance.

The difference between Principal Component Analysis and Factor Analysis lies essentially in how they handle the unique variance. In Principal Component Analysis, all the variances of a variable are analysed. On the other hand, in Factor Analysis, only the variance that is common among variables is analysed, thus ignoring the unique variance.

The process between Principal Component Analysis and Factor Analysis is similar, except for the correlation matrix. In Principal Component Analysis, the positive

diagonal of the correlation matrix (referred to as communalities) is 1, whereas in Factor Analysis, it varies between 0 to 1. Therefore, in Principal Component Analysis, there is as much variance to be redistributed among components as there are observed variables. Thus, if all components are retained, Principal Component Analysis replicates exactly the standard scores of the observed variables by a linear combination of components. In Factor Analysis, the solution concentrates on those variables with high communality values. The sum of the communalities is the total variance being distributed among the factors, and is less than the total variance. Thus, the linear combinations would be an approximate, but not duplicating the scores of the observed variables.

Principal Component Analysis provides a good empirical summary of the data set because it retains all the variances. However, the solution of Factor Analysis is not contaminated by the unique variance and is thus suitable for making inferences. It is usually not clear whether Principal Component Analysis or Factor Analysis should be used (O'Muircheartaigh and Payne, 1977).

The objective of Stage 4 is to determine the relative importance of the dimensions of perceived service quality. As such, the focus should be on the variance shared among variables (common variance). Therefore, Factor Analysis is a better choice for the research since it is not contaminated by the unique variance.

5.5.4 Reliability and Validity Measures

The SPSS program can determine the internal reliability, that is, whether each scale is measuring a single idea or not. There are two methods available in the SPSS program:

- split-half reliability - it randomly divides the number of variables into two groups. Then, it examines the relationship between the respondent's scores for the two halves. The relationship is shown as the coefficient, and it varies between 0 and 1. The closer the result to 1, and preferably over 0.8, the more internally reliable is the scale.
- Gronbach's Alpha - it calculates the average of all the possible-half reliability coefficients. The rule of thumb is that the coefficient should also be above 0.8.

Validity refers to how far a measure really measures the concept that it is supposed to measure. There is no output from the SPSS that can be used to gauge the validity. However, some precautions have been taken when designing the questionnaire. For example, only those common attributes obtained from Stage 2

are used in Stage 4. Furthermore, the questions are duplicated to allow cross-checking the validity of the answers, such as the outputs from Part 2 of the questionnaire can be cross-checked with that of Part 3 (see Appendix 5C). This concept is in line with the recommendation given by Campbell and Fiske (1959).

5.5.5 Adequacy of Data

The decision whether to proceed with Factor Analysis can be established by analysing the correlation matrix, that is, the variables must be related to one another. If the correlations between variables are small, it is unlikely that the variables share common factors.

There are two tests available within the SPSS program to determine whether correlation matrix is suitable for Factor Analysis:

- Kaiser-Meyer-Olkin (KMO) index - the index ranges between 0 and 1. The index becomes 1 only if all the diagonal elements of the inverse correlation matrix are zero. It means that the correlations between unique factors are zero.
- Bartlett's Test of Sphericity - if the figure is large and the associated significance level is small, then the correlation matrix is unlikely to be an identity matrix⁸. If it is an identity matrix, then one should reconsider using Factor Analysis.

5.5.6 General Critiques of Factor Analysis

Factor Analysis, as a general technique, has been criticised on two aspects (Rummel, 1970). The first criticism is that the data must at least be measured on an interval scale. This objection is based on misconceptions about the technique. In reality, Factor Analysis can be applied even to nominally scaled data of a yes-no type.

The second criticism is that Factor Analysis is arbitrary, which implies that different researchers can arrive at different answers using the same data and technique. This is not likely to be true because different researchers using the same research design and factor technique on the same data must, within computation error, arrive at the same result. The idea of arbitrariness arise because of the problem associated with rotating the factors. If the method of rotation (whether oblique or orthogonal) is initially taken care of in the research design, it is unlikely that the answers will differ.

⁸ An identity matrix is where the diagonal values are 1 and the off-diagonal values are 0.

5.6 Conjoint Measurement (Stages 5 & 6)

Conjoint Measurement is also referred to in some literature as "trade-off analysis". The reason for the latter designation is that both methods were developed simultaneously but independently of each other (Wilson and Harris, 1977).

The foundations in the field of Conjoint Measurement went as far back as 1920. However, the general acceptance came about only in 1964 with the seminal paper by Luce, a mathematical psychologist, and Tukey, a statistician. Subsequently, a number of researchers, such as Krantz (1964) and Tversky (1967) contributed to the theoretical aspects of Conjoint Measurement. Kruskal (1965), Carroll (1969), and Young (1969) also provided the algorithm development pertaining to the subject.

Conjoint Measurement is a method of quantifying consumer judgements along specified attributes (Green and Rao, 1971; Green and Wind, 1973). The measurement is concerned with the joint effect of two or more independent variables on the rank-order of a dependent variable. Basically, it emphasizes the fact that the dependent and independent variables are measured simultaneously.

In the literature, it has been proposed that products or services can be characterised by a set of descriptive attributes (for example, freshness, flavour, and so on) with various attribute levels. Having obtained the attributes and their levels, it then becomes important to understand how consumers combine and weigh the various attributes to arrive at overall preference judgement of the product or the service. This information can be used to design a product or service successfully.

There are various models of the process by which consumers combine the attributes to arrive at overall preference judgements. For example, the affect referral model (Wright, 1975), the linear additive model (Wilkie and Pessimier, 1973), the conjunctive and disjunctive models (Wright, 1974), the lexicographic model (Tversky, 1972), and the additive difference model (Tversky, 1969).

All the above models deal with two parameters of the choice process (Pekelman and Sen, 1976):

- the ideal point - it is the most preferred level of each attribute
- the attribute weight - it indicates the relative importance of each attribute

Likewise, Conjoint Measurement deals with the above two parameters. It is a method of collecting information concerning the overall preference among bundles of attribute levels. It operates within a particular composition rule (additive or multiplication) in order to predict a consumer's preference in a controlled choice

environment. The composition rule most frequently assumed by Conjoint Measurement is the simple additive one.⁹ The additive model is based on the assumption that the overall utility is equivalent to the summation of the utility values of the various attribute levels.

The additive Conjoint Measurement model has been applied to several areas of psychology, particularly to the study of choice behaviour (Johnson, 1974; Montgomery, 1985; Perreault and Russ, 1979; Marr, 1983). An important advantage of Conjoint Measurement is that it forces respondents to make explicit trade-offs between the attribute levels. For example, if the customers are asked what they want in an airfreight service, most would probably indicate fast delivery at no increased cost. This is scarcely useful to the airline that is debating whether there will be enough customers who would be willing to pay for the enhanced service.

The trade-offs present the scenario to customers who may not have thought of how much they would have to pay in order to have an enhanced service, for example, if definite uplift were to improve by 5%. Even if they have thought of such a question, the indirect mode in Conjoint Measurement of inferring utilities from trade-offs is capable of eliminating self-serving answers. Thus, Conjoint Measurement can provide the airline with a good perspective of how sensitive customers would be to a price change from the current level to a higher price level.

It is useful to mention that the attribute utility values could subsequently be used to predict market shares (Johnson, 1974; Montgomery, 1985). In reflecting the relative importance of each segment in the total market, a weighting may need to be applied to the respondents in different market segments.

The additive Conjoint Measurement model is chosen for Stage 5 of the research. This model appears more popular with researchers (see, for example, Malthora, 1982; Green, Carmone, and Wind, 1972; Green and Rao, 1971). The computation output from it is similar to that from the multiplication method (Johnson, 1974).

When designing the questionnaire, the following suggestions have been considered:

- reducing the number of attributes (Cattin, 1981; Cattin and Wittink, 1982)

⁹ For example, let $A \times P$ be a weakly ordered service attributes with typical levels $(a, p)(p, q)$ with a, b in A and p, q in P . Alternately, $A \times P$ can be viewed as a data matrix. The data matrix is said to be additive if its cell entries can be rescaled such that their order is preserved. Thus, every rescaled entry is expressed as the sum of its row and column components. If such a representation exists, the two factors can be regarded as independent in the sense that they contribute independently (or additive) to produce the joint effect.

- reducing the number of attribute levels (Churchill, 1991)
- simplifying the attribute description (Green and Srinivasan, 1978)
- reducing the allowable relationships among attributes (Srinivasan, Jain, and Malhorta, 1983)

There are four steps in Conjoint Measurement:

- selecting the appropriate attributes
- determining the attribute levels
- determining the attribute combinations
- deciding how the judgement will be aggregated

5.6.1 Selecting the Attribute

The service attributes are selected based on three factors: the loading of variables on the respective factors in Stage 4, the literature review, and knowledge on the subject. The price variable is also introduced in the questionnaire (refer Appendix 5D).

The attributes used should be both actionable and important to the respondents. Actionable attributes are those attributes that the airline can improve upon, in that the airline has the technology and other resources to make the necessary changes. The important attributes are those attributes that scored highly on the respective factors in Stage 4 of the research.

Cattin and Wittink (1982) suggested that, on average, the number of attributes in Conjoint Measurement should not exceed six or seven. It is not recommended to have more than seven attributes as large numbers would create unnecessary burden on the respondent. Therefore, a total of six attributes comprising five service attributes and one price attribute have been taken. The five service attributes are as follows.

- **DEFINITE UPLIFT** - means there is no off-loading of cargo. This attribute ranked fifth (first as the most important) in the research on customer's preference in using air freight (Shaw, 1981). Furthermore

from Stage 4 of the research, this attribute is the most important service attribute.

- **HANDLING** - refers to the physical ground handling of the consignment, from the acceptance point at the airline terminal to the actual loading into the aircraft. Poor handling (mishandling) may cause the freight to be missing, damaged, or both. Damaged and missing ranked sixth and eighth respectively (first as the most important) in Shaw's (1981) research. In Stage 4 of the research, handling ranked sixth. This attribute should deserve a better ranking but some of the respondents were reluctant to rate the airline as the ground handling is the responsibility of the airport handling agent.
- **FIRM ALLOCATION** - indicates the time frame for advance confirmed booking of space from the airlines. In all cases, customers would prefer firm allocation of space from the airlines well in advance of the actual uplift. There are actually two components to firm allocation: volume and timing. Volume is referred to as adequate capacity, whereas timing is referred to as firm allocation. Volume is part of the core service, whereas timing is part of the peripheral service. The volume component ranked third in Stage 4 of the research. For the purpose of this stage of the research, the time component is more applicable for the Conjoint Measurement. This is because the time component could (in general) be traded-off with the price attribute. On the other hand, the volume component could be traded-off with price, only if there is a shortage of space.
- **IMMEDIATE CONNECTION** - means whether the airline offers a direct or indirect service. With a direct service, there is no risk of cargo being off-loaded at a transit station. Off-loading would affect mainly those shippers who practise the Just-in-Time (JIT) concept, and those dealing with perishables. On the other hand, with an indirect service, the customer would prefer a minimum number of transits and shorter transit time. In Stage 4 of the research, this attribute ranked second.
- **INTERACTION QUALITY** - refers to one of the components of perceived service quality which comprises Accessible, Courteous, and Good Relationship. The three attributes are combined together because the three are inter-related. This component is necessary if one is to determine the importance of the functional dimension.

5.6.2 Determining the Attribute Levels

There are two items that need to be considered: the number of attribute levels and the choice of attribute levels. The number of levels for each attribute has a direct bearing on the number of stimuli that respondents will be asked to judge, and consequently the burden placed on each respondent. Thus, there are two conflicting objectives: to minimise the burden on respondents, and at the same time, to achieve a good estimate of the utility on each of the attribute levels.

Another factor that affects the choice of attribute levels is their effect on customer choice. The customer choice is affected by the range of the attribute level, and the correlations among attribute levels. Using attribute levels outside the normal range that the respondent normally encounters will affect the acceptability of the questionnaire. Decreasing the correlation among attributes (such as combining low price with high service levels) may also affect the acceptability of the questionnaire. For example, the credibility of the questionnaire will be affected if MR 6.00¹⁰ is used instead of the normal price range of MR 3.00 to MR 4.00. The credibility will also be affected if low price (MR 3.00) is combined with a very high reliability level. However, in both cases, they increase the accuracy by which the parameters can be estimated statistically.

Therefore, the general recommendation is to make the ranges for the various attributes beyond the normal range but within certain acceptable limits (Green and Srinivasan, 1978). In order to ensure this, a pilot survey with four forwarders dealing with electronics was conducted. From the pilot study, it was noted that the respondents preferred a 3 by 3 matrix. The respondents appeared slightly irritated when they were asked to rank more than twelve cells (3 by 4 matrix). Therefore, only three levels have been adopted on all the service attributes with the exception of the price attribute (four levels). For the price attribute, it is necessary to adopt four levels because there is a wide price disparity among airlines on the carriage of electronics. Thus, there is a need to narrow the range between the levels on the price attribute. For example, on the sector Kuala Lumpur to Tokyo, airlines were offering rates between MR 2.80 to MR 4.00 for consignments above 100 kg. Therefore, with three levels, the range between each level is equivalent to MR 0.60, but with four levels the range is narrowed to MR 0.40. A narrow range helps in the accuracy of the statistical findings.

10 MR refers to Malaysian Ringgit (currency). 1 Sterling is approximately equal to MR 4.00.

Table 5.1 shows the actual attributes and attribute levels used in the questionnaire (Refer to Appendix 5D).

Attribute	L1	L2	L3	L4
Price [@]	3.00	3.40	3.80	4.20
Definite Uplift	98%	93%	88%	
Mishandling	2%	6%	10%	
Interaction Quality	Good	Ave.	Poor	
Firm Allocation [#]	4 wks	3 wks	1 wk	
Immediate Connection	Direct	[1] [*]	[2] ^{**}	

[@] The price quoted is in Malaysian Ringgit
[#] The unequal spacing between attribute levels will not affect the internal validity of the internal validity of the conjoint measurement (Green and Srinivasan, 1978)
^{*} [1] Indirect service - same airline but with a change of aircraft
^{**} [2] Indirect service - change airline

Table 5.1 - The Attributes and Attribute-Levels Used in the Questionnaire

5.6.3 Combining the Attributes

There are two ways of conducting the interview with the respondent using the Conjoint Measurement. The two methods are referred to as pair-wise and full-profile. The pair-wise treats two attributes at a time, and it considers all possible pairs. In contrast, the full-profile considers all the attributes at the same time. Thus, the stimulus¹¹ is made up of either two attributes (pair-wise) or all the selected attributes (full-profile).

The pair-wise method with six attributes requires a total of fifteen matrices. With three levels on service attributes and four levels on price, the number of possible judgements (equivalent to the number of cells in the matrices) equals 150. In

11 Stimuli is defined as the manner in which the respondent is presented with the attributes. The stimuli may be presented in terms of graphical, pictorial, service descriptions, and so on (Green and Srinivasan, 1978).

contrast, using the full-profile approach, the number of judgements required would be more, that is, 942 judgements.

The pair-wise method is easier for respondents than the full-profile because, at any one time, they are posed with only two attributes. However, there is a danger of missing some important trade-offs among attributes using the pair-wise method. Furthermore, there can be a potential loss in realism when only two attributes are presented at a time. This is because respondents are forced to make some implicit assumptions about other attributes which are not presented at the same time (Segal, 1982). The pair-wise method yields higher predictive validity than the full-profile (Montgomery, Wittink, and Glaze, 1978). Furthermore, the goodness-of-fit of the input data is better with the pair-wise method than the full profile (Alpert, Betak, and Golden, 1978).

The major limitation with the full-profile method is that the respondent may be overwhelmed with information. In this situation, the respondent is tempted to simplify the ranking by ignoring variations in the less important attributes or by simplifying the attribute levels themselves (Green and Srinivasan, 1978). For Stage 5 and part of Stage 6, the pair-wise method is chosen.

From the Stage 5 pilot study, it was noted that certain combinations of attributes are less meaningful, for example, the Definite Uplift and Firm Allocation matrix. Definite Uplift is dependent on Firm Allocation, that is, the two attributes are complementary. In addition to this matrix, three other matrices are excluded from the survey (see Figure 5.5). As suggested by Nehls, Seaman, and Montgomery (1976), there is no necessity to include all matrices in the pair-wise method.

Attribute	[2]	[3]	[4]	[5]	[6]
[1]	☐	☐	☐	☐	☐
[2]		☐	☐	xxx	☐
[3]			☐	xxx	xxx
[4]				☐	☐
[5]					xxx

[1] - Price
 [2] - Definite Uplift
 [3] - Handling
 [4] - Interaction Quality
 [5] - Firm Allocation
 [6] - Immediate Connection
☐ xxx - Excluded from the survey

Figure 5.5 - The Trade-off Matrices Used in the Questionnaire

5.6.4 Aggregating the Judgements

This step involves how the individual responses are aggregated in order to determine the overall utility function. The concept of aggregating individual responses is not new (see, for example, Currim, 1981; Green, 1984; Montgomery and Wittink, 1980; and Moore, 1980). According to Hagerty (1985), when the respondents are from the same group, their responses should be averaged to obtain a generalised view. However, this proposal fails to recognise any differences in preference that might exist among respondents. This, in turn, reduces the predictive power of the model.

The individual responses are meaningless to the study. However, aggregating those responses would affect the predictive validity. Thus, the aggregating is done in two stages. The first is to aggregate the individual responses into broad classification (for example, between forwarders and shippers). The second is to aggregate the

specific group within the broad classification (for example, price sensitive and less price sensitive groups, operational and non-operational groups, and so on).

However, there is a potential problem with aggregate analysis, termed as "majority fallacy" (Kuehn and Day, 1962). It occurs when the item chosen by the "average" customer is not the one chosen most often. The "majority fallacy" is caused by differences in customers' preferences. This reduces the predictive power of the aggregate model.

Aggregating the individual utility values could be accomplished using the SPSS program. It is a two-step process. The ranking from the individual respondent's matrices is first run using the trade-off program (\$FTROFF). The outputs (utility values) from the trade-off program are then run on the SPSS. The formation of respondents into specific groups, as suggested earlier, could be achieved using the Cluster Analysis within the SPSS program.

Montgomery and Wittink (1980), Moore (1980), and Currim (1981) found that, with Cluster Analysis, the predictive validity could be improved. For example, in Montgomery and Wittink's (1980) study of students' job choices, cluster analysis improves prediction from 46% to 52%.

5.6.5 The Trade-Off Program

The trade-off program (\$FTROFF), written by Nehls, Seaman, Montgomery (1976), transforms trade-off data into utility values¹². Using the utility values, one can determine which attributes are more important to the respondent. One can also determine the sensitivity of the respondent to the attribute, that is, how many utility units should the respondent be compensated with if he is asked to accept a lower attribute level.

The transformation of the raw data into utility values for the attribute level is a two-step procedure. The first step estimates utility values directly from the trade-off data. The second step is an iterative procedure which modifies each utility incrementally, attempting to improve the consistency between the observed and the ranking implied by the utility values. The objective of the procedure is to assign utility values to all attribute levels which are perfectly consistent with the observed ranking.

The inconsistencies between the observed trade-off data and the ranking of the estimated utility values are referred to as the badness-of-fit (Nehls, Seaman, and

¹² The respondent may prefer one combination of attribute to another because it has more value to him. The value is identified as "utility".

Montgomery, 1976) and Kendall's tau (Johnson, 1974). The badness-of-fit takes into account the degree of errors; 0 indicates no error of fit, whereas, 1 indicates maximum error (that is, the order of every pair of cells is incorrectly predicted).

On the other hand, Kendall's tau is based on the number of occurrences of errors irrespective of the degree of errors. 1 indicates perfect rank ordering, and 0 indicates uncorrelated ordering. Normally, respondents with high values of Kendall's tau will have lower badness-of-fit. As a rule of thumb, a Kendall's tau value of less than 0.70 would mean that the inconsistency is too great to be included in the analysis (American Telephone and Telegraph, 1974). In the \$FTROFF program, the Kendall's tau is referred to as "proportion of comparison correct" (Nehls, Seaman, and Montgomery, 1976).

5.6.6 General Critiques of the Conjoint Measurement

There are two main critiques on the Conjoint measurement. Firstly, there is no error theory available for the Conjoint Measurement. Basically, there are no significance test for the utility values.

Secondly, it is not obvious whether utility values would change over time, and at different rates for different situations (Wilson and Harris, 1977). However according to the studies of McCullough and Best (1979), and Acito (1977), Conjoint Measurement appear to be reliable over time. It would be beneficial if one could repeat the study at selected intervals.

5.7 Cluster Analysis (Stage 5)

By using Cluster Analysis, one can determine the characteristics that the respondents share as well as those in which they differ. In biology, Cluster Analysis is used to classify animals and plants (referred to as numerical taxonomy). In marketing, Cluster Analysis is used to identify persons with similar buying habits. By examining their characteristics, one may be able to target future marketing strategies more efficiently.

There are three factors to consider in Cluster Analysis:

- which variables will serve as the basis for cluster formation?
- how will the distance between respondents be measured?

- what criteria will be used for combining respondents into cluster?

The initial choice of variables determines the characteristics that can be used to identify sub-groups. For example, by excluding taste and quality from the food data, only physical characteristics and price will determine which foods are deemed similar.

There are two ways of measuring distance between respondents:

- **Similarity Measures** - similarity coefficients take values in the range of zero to one, with high values indicating that the two respondents are alike on the variables measured (Everitt, 1979). Thus, it measures the closeness of the two respondents.
- **Distance Measures** - in general, high values indicate that the respondents tend to be unlike on the variables measured (Everitt, 1979). Thus, it measures how far apart the two respondents are.

There are many criteria for deciding which respondents should be combined at each step. All of these criteria are based on a matrix of either distances or similarities between pairs of respondents. One of the simplest method is "single linkage". Here, the first two respondents are combined based on the smallest distance (or largest similarity) between them. Another commonly used method is called "complete linkage". In this method, the two respondents are combined based on the furthest distance (or largest dissimilarity) between them.

In addition to the above methods for combining clusters, there are other methods within SPSS which can be used for the same purpose. They can be classified into three groups.

- **Linkage methods** - Basically there are three sub-methods: single linkage, complete linkage, and average linkage. The single linkage and complete linkage have already been discussed earlier. The average linkage consider the average distances between all pairs of respondents. The average linkage is preferred over the other two.
- **Error sums of squares or variance method (also known as Ward's method)**
 - In this method, the means for all variables are calculated. Then, for each respondent, the squared Euclidean distance (which is the sum of the squared differences on all the variables) to the cluster means is calculated. Subsequently, these distances are summed for all of the respondents. At

each step, the two clusters that merge are those that result in the smallest increase in the overall sum of the squared within cluster distances.

- Centroid method - calculates the distance between two clusters as the distance between their means for all the variables. The main disadvantage of this method is that the distance at which clusters are combined can actually decrease from one step to the next. Therefore, the clusters that merge at the later stages are more dissimilar than those at the early stages.

Some of the above methods, such as the linkage methods, can be used with similarity or distance measures. Other methods (Ward's and Centroid) require particular types of distance measures. For example, Ward's method should use squared Euclidean distances (Kim, 1975).

There is no definite answer as to which method should be used in Cluster Analysis (Everitt, 1979). Sneath and Sokal (1973) discussed the issue in detail. What is important is the output of the clustering process, that is, the number of clusters and the cluster membership of individuals.

The linkage and Ward's methods are preferred over the Centroid method. Ward's method is chosen for Stage 5 of the research. There is no specific reason for selecting Ward's method, other than familiarity in the area.

5.8 The Questionnaire Design

Designing a questionnaire can be a difficult task. A properly designed questionnaire elicits the precise information that the researcher wants. A poorly designed questionnaire yields data that are confusing, difficult to analyse, and of little value.

The first step in designing a questionnaire is to clearly define the focus of the research (Moser and Kalton, 1972). The content of the questionnaire should elicit the responses that one is most interested in, without much extraneous information.

There are two types of questionnaire design: open-ended and close-ended. Open-ended question allows the respondent to respond using his own words. Such information may be more complete and accurate than the information obtained from a close-ended question. A drawback to the open-ended question is that the respondent may not understand exactly what is required, or may inadvertently omit

some information. Summarizing the data can also be difficult, and there is a need to decide how to classify the different answers.

In contrast, the close-ended questionnaire would demand the respondent to choose and answer from a set of alternatives. The advantage of close-ended questionnaire is that it provides control over the respondent's range of responses by providing specific response alternatives. These responses are, therefore, easier to summarise and analyse. However, the information from a close-ended questionnaire is not as "rich" as the information gathered from the open-ended questionnaire.

In the case of close-ended questionnaire, the next step is the subject of scaling. There are four types of measurement scales: nominal, ordinal, interval, and ratio. The characteristics of these four types of scales are summarized in Table 5.2 below.

Scale	Basic Empirical Operations	Typical Usage
Nominal	Determination of equality	Classification: Male-female, purchaser-non-purchaser, social class
Ordinal	Determination of greater or less	Rankings: Preference data, market position, attitude measures, many psychological measures
Interval	Determination of equality of intervals	Index numbers, attitude measures, level of knowledge about brands
Ratio	Determination of equality of ratios	Sales, units produced, number of customers, costs, age

Table 5.2 - Types of Measurement Scales
Source: Adapted from Tull (1984, p. 232)

The Ordinal scale is chosen for the Stages 2, 4, and 6 of the research. In these stages, a scale of 1 to 5 is used. The reason for choosing such a range has been addressed in Section 5.3.3.

For Stage 3, the nominal scale is chosen because the objective here is to place the attributes of service quality into the dimensions of service quality. In the case of Stage 5, since it is using the Conjoint Measurement, the scale is in terms of

customer's preference. Thus, the scale is determined by the number of cells which is a function of the number of attribute levels.

The Stage 2 questionnaire is in two parts. The first part of the questionnaire does not involve any form of scaling; it merely elicits the attributes of service quality. The second part involves rating the elements against the attributes on a scale of 1 to 5. If the element is closer to the constructs on the left-hand side of the form (emergent pole), then the element is rated towards 1 (see Appendix 5A). On the other hand, if it is closer to the right-hand side of the form (contrast pole), then it is rated towards 5.

The Stage 4 questionnaire is designed using the service attributes taken from the outcome of Stage 2. Basically, these attributes are the most common and important attributes to the respondents. The questionnaire involves both positive and negative service attributes (*Reliable/Unreliable*); thus making it similar to the concept of Semantic Differential (see Osgood, Suci and Tannenbaum, 1957). Fifty percent of the positive attributes are placed on the left-hand side of the questionnaire, whereas the balance are placed on the right-hand (see Appendix 5E). The approach is based on the recommendation of Kerlinger (1986). This is done in order to minimise the "halo effect".

There are two sets of questionnaire used in Stage 6 of the research. The first set is targeted at the airline managers and is divided into two separate parts. The first part is identical to the Stage 5 questionnaire (Conjoint Measurement), whereas the second part makes use of the statements recommended by Parasuraman, Berry, and Zeithaml (1990). The first part measures the gap between customer expectations and management perceptions of customer expectations. An alternative measuring instrument for measuring the gap is the SERVQUAL instrument, developed by Parasuraman, Zeithaml, and Berry (1988). The set-back of this instrument is that it is too general for this research. Furthermore, since the Conjoint Measurement is used in Stage 5, it then becomes necessary to use the same questionnaire in the first part of Stage 6.

The statements used in the second part are accompanied by a 5-point scale anchored at the ends by the labels Strongly Disagree (=1) and Strongly Agree (=5). The intermediate scale points are not labelled. These statements are measuring the key factors influencing the two gaps of the service quality model (see Parasuraman, Zeithaml, and Berry, 1984). The first gap is the difference between customer expectations and management perceptions of customer expectations. The second gap is the difference between management perceptions of customer expectations and service-quality specifications.

The second set of the questionnaire is targeted at the airline operational group. This set also makes use of the statements recommended by Parasuraman, Berry, and Zeithaml (1990). The labelling and rating used in this set is identical to the first set. However, the statements are measuring the key factors responsible for the gap between service-quality specifications and the service actually delivered.

5.9 Sample Size

5.9.1 Factors Affecting Sample Size

In theory, there are three factors affecting the selection of sample size:

- homogeneity of the population
- confidence level
- sampling error

Knowledge about the homogeneity of the population is important in selecting the sample size. If the population is homogeneous, then a relatively small random sample size is required.

The second and third factors are necessary if one is making inferences from the sample to the population. However, the two are related. Confidence level is the percentage indicating the long run probability that the results will be correct. In other words, how much random sampling error will be tolerated. Sampling error is the difference between the results of the survey in the sample and the results of surveying the entire population.

In order to increase the probability that the population mean lies in the confidence interval, one has to use a higher confidence level (Mohr, 1990). The traditional approach is to use a 95% confidence level (Zikmund, 1988) which gives a confidence interval of ± 1.96 standard deviation. Mohr (1990) suggested that if the 95% interval is too wide to be useful, then one should try 90%.

There is always a certain probability of being in error when one is making an estimate of the population parameter from a sample statistic. The random sampling error varies with the sample of different sizes (Kerlinger, 1986). If the sampling size increases, the sampling error is reduced. Therefore, it is important to have a

large sample size in research. However, it needs to be balanced with practicality and the required time frame to conduct the research.

5.9.2 Sampling Techniques

There are two approaches towards sampling: probability and non-probability sampling (Kidder and Judd, 1987). In probability sampling, every element in the population has a known non-zero probability of selection. The simple random sample is the best known probability sample in which each member of the population has an equal probability of being selected. In non-probability sampling, the probability of any particular member of the population being chosen is unknown. The selection of sampling units in the non-probability sampling is quite arbitrary as researchers rely heavily on personal judgement. It should be noted that there are no appropriate statistical techniques for measuring random sampling error for a non-probability sample. Thus, projecting the data beyond the sample is statistically inappropriate.

Each of the non-probability and probability sampling have four techniques. Table 5.3 gives the summary for each of the techniques in terms of its definitions and limitations.

Technique	Definition	Limitation/Advantages
1 Accidental	use what is immediately available	<ul style="list-style-type: none"> the result is only applicable to the sample studied
2 Accidental Quota	selects sample based on certain criteria	<ul style="list-style-type: none"> conclusions drawn are strictly limited to the sample studied tentative implications for others may be suggested
3 Purposive	use own judgement to select the best sample to be studied	<ul style="list-style-type: none"> only tentative suggested generalizations may be made
4 Systematic	compares two groups of different size	<ul style="list-style-type: none"> a suitable compromise when comparing groups of extremely different size
5 Simple Random	selects sample from the population randomly	<ul style="list-style-type: none"> laborious & time consuming provides most reliable sample procedure
6 Systematic	involves the selection of every n^{th} case in the list	<ul style="list-style-type: none"> independent of researcher's preferences or prejudices
7 Stratified Random	similar to (2), except that each sub-section of the population is identified and enumerated	<ul style="list-style-type: none"> laborious & time consuming provides most reliable sample procedure
8 Cluster	divide population into segments, & choose respondent within the segment	<ul style="list-style-type: none"> laborious & time consuming provides most reliable sample procedure
[1] to [4] - Non-probability Sampling [5] to [8] - Probability Sampling		

Table 5.3 - Sampling Techniques

Source: Adapted from Kidder and Judd (1987)

5.9.3 Proposed Sample Size

When conducting research, the ideal is to go for random sampling with a relatively large sample size. Without random sampling, it is difficult to conceive how the research can have the necessary viability and validity. In reality, one is faced with few constraints (for example, financial, time, and administrative). Dixon, Bouma, and Atkinson (1987) suggested the following rule of thumb:

- The minimum sample size is 30. This is to ensure that there is sufficient sample for analysis
- There should be at least 5 cases in each cell of the analytical table

Stage 2 of the research makes use of purposive sampling. The reason for choosing this sampling technique is because a broad spectrum of respondents is required. This is to ensure that the service quality attributes are representative (in general) of the air freight industry. The air freight industry involves several parties. For example, in the export section, it involves forwarder, shipper, and airline. Even within the airlines themselves, they can be further classified into all-cargo, traditional, charter, integrator, and so on. In Stage 2 of the research, fifteen respondents (five forwarders, five shippers, and five airlines) are chosen. This is based on the recommendation of Dixon, Bouma, and Atkinson (1987).

According to Mitchell (1985), 79% of the researchers use non-probability sampling. Godyer (1988) stated that there is not much difference between research based on probability sampling and non-probability sampling in terms of how representative the sample is of the population.

Random sampling is used in Stage 3 of the research. The population of air freight forwarders operating in Singapore (190) and Malaysia (90) is taken from the A-Z World Wide Air Freight Directory (1990). Based on the recommendation of Dixon, Bouma, and Atkinson (1987), a sample size of thirty is taken. Postal survey is used to send out 100 questionnaires (70 to Singapore and 30 to Malaysia). The reason for sending 100 questionnaires is because of the anticipation of non-response (estimated to be 65%) and those that would be lost in transit or unusable (estimated to be 15%).

For Stage 4 of the research, random sampling (simple and stratified) is used. There are two main populations: forwarder and shipper. For the forwarder, the simple random is applied. Thirty forwarders are selected from the list obtained from the A-Z World Wide Air Freight Directory (1990). The list does not segregate the forwarders according to the types of freight they deal with. The discussion with the

air freight forwarders during the Stage 2 of the research indicated that forwarders (in general) deal with all types of freight commodities.

In the case of shippers, thirty shippers are selected based on stratified random sampling technique. The list of shippers is obtained from the respective Government (Singapore and Malaysia) publications. The list gives the types of products (produces) that the shippers export. Generally, the types of products (produces) can be divided into perishables and non-perishables. Out of the thirty shippers, fifteen deal with perishables, and the balance deal with non-perishables. For the non-perishables, only the electrical and electronics goods have been considered. For the perishables, only those shippers dealing with ornamental fish, tuna, cut-flowers, fashion clothes, fruits, and birds are taken into the sample.

The Stage 5 of the research makes use of random sampling (simple and stratified). It is important to mention that the focus in Stage 5 is on the electronic products only. The sample consists of fifteen forwarders, and these forwarders are highly involved with electronics consignments.

In the case of shippers, fifteen shippers dealing with electronic products have been randomly selected as the sample. The list of the shippers is taken from the Malaysian Government agency (Malaysian Industrial Development Authority).

For Stage 6, the sample consists of fifteen airlines. Based on the recommendation of Dixon, Bouma, and Atkinson (1987), five airlines in each of the following categories, "good", "average", and "poor", are selected. It is important to mention here that the airlines are taken from the outcome of Stage 4 of the research.

5.10 Summary

This chapter has addressed the different methods and techniques used in the research. The choice of research methodology depends on the nature of the research, research objectives, and familiarity with the technique. For this research, the survey method is chosen. In general, more emphasis is placed on the quantitative techniques as they are capable of analysing the data statistically and testing the hypothesis more explicitly.

The only qualitative technique used is the Repertory Grid technique, and it is used in the Stage 2 of the research. Its purpose is to elicit the attributes of service quality. The major set-back with the technique is that it does not allow the

individual respondent's findings to be aggregated. The data is analysed using the INGRID program.

For the other stages of the research, quantitative techniques, namely, the Conjoint Measurement and Structured Questionnaire are used. The data are aggregated using the SPSS program. However, the usage of the program is limited to the basic statistics, Factor Analysis, and Cluster Analysis. Both the Factor and Cluster Analyses are meant for data reduction. In the case of Factor Analysis, it groups the service attributes into few factors, whereas the Cluster Analysis classifies the respondents into groups.

In summary, the three main techniques used in this research are the Repertory Grid, the Conjoint Measurement, and the Structured Questionnaire. The data from these techniques are analysed using the following computer packages: INGRID (to analyse the Repertory Grid data), \$FTROFF (to analyse the Conjoint data), and SPSS (Basic Statistics, Factor Analysis and Cluster Analysis).

The chapter also covers the subject of questionnaire design and sample size. On the subject of questionnaire design, the types of questionnaire used in the various stages of the research, and the reasons for choosing the specific design are covered. The subject of sample size covers three main issues: factors affecting sample size, sampling techniques, and the proposed sample size.

Chapter 6 - Stage 2 Findings: The Attributes of Perceived Service Quality

6.0 Introduction

Stage 2 of the research is exploratory in nature. The purpose is to elicit the attributes of service quality in the air freight industry, which will be subsequently used in Stages 3 to 6 of the research. The attributes have to be elicited as there are some limitations in using those from the literature. The attributes from the literature are limited mainly to choice attributes. Furthermore, the service attributes which are available are not specifically for the air freight industry. The terms "attribute" and "construct" are used interchangeably in this research.

This stage also explores the possibility of grouping the airlines into three categories, "good", "average", and "poor". The empirical work on the actual categorisation of the airlines will be done in Stage 4 of the research.

The attributes of service quality are elicited from both the airlines and their customers using the Repertory Grid technique. The data are analysed using simple frequency count and the INGRID program. The possible grouping of airlines and the relationship with the attributes is then obtained using Principal Component Analysis. The relationship is best described using the respondent's Cognitive Map which is produced by the INGRID program.

The possible linking of the airlines and the service quality attributes will confirm whether the questionnaire using the Repertory Grid technique can be used in Stage 4 of the research.

6.1 Data Collection

The proposed sample size, which has been covered in Chapter 5, was fifteen, comprising five air freight forwarders, five shippers, and five airlines. However, in the actual survey, the sample size for the airlines has been increased to ten in order to cover a broad spectrum of airlines, for example, the traditional passenger airlines (both regional and international) and the all-cargo airlines.

For the Repertory Grid technique to work, the respondent is required to provide at least three elements. However, in the case of the shippers, one of them could provide the names of only two airlines that they have dealt with, and the shipper

was therefore disregarded from the analysis. The shipper was not replaced as sufficient service quality attributes have been elicited from the others. A total of forty-four attributes have been elicited from the other nineteen respondents (see Appendix 6A).

The sample includes respondents from Singapore and Malaysia, dealing with perishable and non-perishable freight commodities. The two types of freight commodities are necessary as the elicited service quality attributes should be representative of the air freight industry. Purposive sampling technique was used in the survey. The reason for choosing this technique has been covered in Chapter 5.

6.2 Results: The Service Quality Attributes

The data are first grouped according to the number of occurrences of the constructs using simple frequency count. They are then reduced, based on the aggregate mean values, for Stages 3 and 4 of the research.

The number of constructs elicited from each respondent in the survey, using the Repertory Grid technique, ranges from six to fifteen. The average number of constructs per respondent is 11. The Repertory Grid technique is time consuming, and the average time spent interviewing each respondent is about one hour.

As the constructs are elicited rather than provided, they are not necessarily the same among respondents. One method to determine the common constructs is to use simple frequency count. A higher number of occurrences indicates that the construct is relatively more common; a lower number of occurrences shows that the construct is not as common among respondents.

6.2.1 Frequency Count

There is no scientific guide-line on the cut-off point in the simple frequency count technique. In this research, four occurrences, which represent approximately 20% of the actual sample size, are used as the cut-off point. Out of the forty-four attributes elicited from the airlines, forwarders, and shippers, twenty-two service quality attributes have frequency count equal to or greater than four occurrences (see Table 6.1).

No	Service Attribute	Customer	Airline	Total
1	Accessible	2	2	4
2	Adequate Capacity	5	3	8
3	Credible Service	3	9	12
4	Courteous	6	0	6
5	Definite Uplift	3	9	12
6	Firm Allocation	4	4	8
7	Good Handling	4	0	4
8	Good Relationship	7	5	12
9	Good Tracking and Monitoring	3	2	5
10	High Frequency Feedback	6	1	7
11	Higher Flight Frequency	1	4	5
12	High Quality Feedback	3	1	4
13	Immediate Connection	3	3	6
14	Infrequent Offloading	3	3	6
15	Less Pilferage	3	1	4
16	Meeting Emergency Needs	2	4	6
17	On-time Arrival	4	3	7
18	Provide Professional Advice	2	2	4
19	Quick in Responding	3	7	10
20	Reliable Carrier	8	8	16
21	Responsive to Claims	4	0	4
22	Wide Coverage	4	2	6
	Sample Size	9	10	19

Table 6.1 - The Common Service Quality Attributes
Among the Respondents

The frequency count indicates only the common attributes; it does not reflect the relative importance of the attributes to the respondents. The relative importance can be determined using the aggregate mean values.

6.2.2 Aggregate Mean Values

The INGRID program calculates the mean values of the attributes for each respondent only. The aggregate mean values can be obtained by summing the individual mean values and dividing them by the number of occurrences.

Table 6.2 shows the aggregate mean values of those attributes with frequency count equal to or greater than four.

No	Service Attribute	Aggregate Mean
1	Accessible	3.581
2	Adequate Capacity	3.764
3	Credible Service	3.620
4	Courteous	3.945
5	Definite Uplift	3.509
6	Firm Allocation	3.680
7	Good Handling	3.722
8	Good Relationship	3.445
9	Good Tracking and Monitoring	3.622
10	High Frequency Feedback	3.333
11	Higher Flight Frequency	3.022
12	High Quality Feedback	3.945
13	Immediate Connection	3.167
14	Infrequent Offloading	3.944
15	Less Pilferage	3.667
16	Meeting Emergency Needs	3.556
17	On-time Arrival	3.524
18	Provide Professional Advice	3.389
19	Quick in Responding	3.694
20	Reliable Carrier	3.903
21	Responsive to Claims	3.194
22	Wide Coverage	2.870

Table 6.2 - The Aggregate Mean Values of
the Service Quality Attributes

The number of attributes can be further reduced by ignoring those with lower aggregate mean values. This can be done using the Scree test technique (Catell, 1966). The aggregate mean values are first arranged in descending order. A graph is then drawn with the y-axis representing the aggregate mean values and the x-axis representing the service quality attributes. This is to determine the turning point between the steep and gentle slope, that is, the cut-off point between the significant and less significant attributes (see Figure 6.1).

Using the Scree test, two attributes can be removed from the listing of twenty-two attributes: Higher Flight Frequency and Wide Coverage (item 11 and 22 in Figure 6.1). Both attributes have lower aggregate mean values compared to the others.

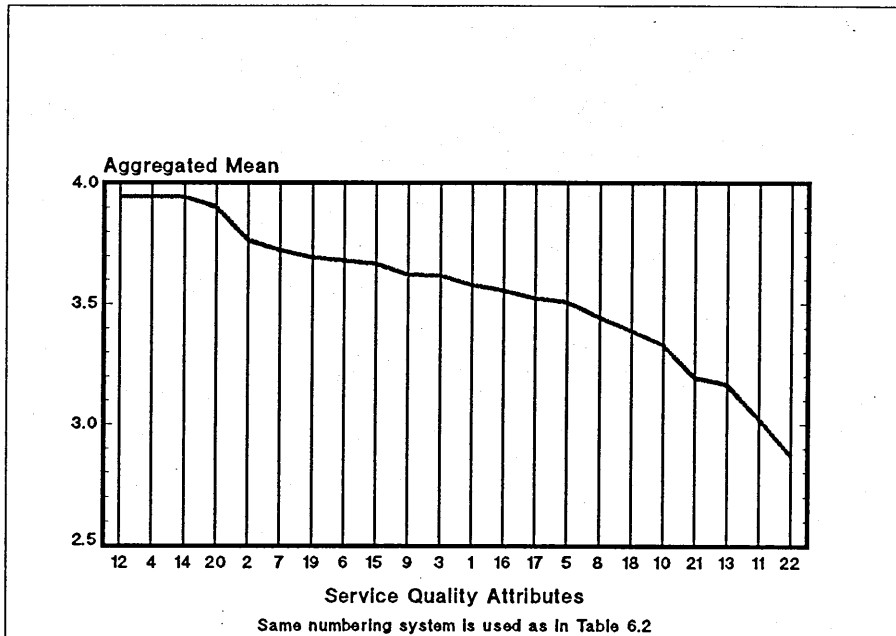


Figure 6.1 - The Scree Test on the Aggregate Mean Value

6.2.3 The Final Listing of Service Quality Attributes

Two other attributes should also be removed because they are similar with others in the listing. The attribute Infrequent Off-loading is a duplicate of another attribute, that is, Definite Uplift. The attribute Reliable Carrier encompasses other attributes, namely, Definite Uplift, Firm Allocation, Good Handling, and On-time Arrival. Thus, the final listing is reduced to eighteen attributes only, as shown in Table 6.3.

No	"Positive" Attributes	"Negative" Attributes
1	Accessible	Inaccessible
2	Adequate Capacity	Inadequate Capacity
3	Credible Service	Not Credible Service
4	Courteous	Arrogant Attitude
5	Definite Uplift	Frequent Off-loading
6	Firm Allocation	"Wait list" Status
7	Good Handling	Poor Handling
8	Good Relationship	Poor Relationship
9	Good Tracking and Monitoring	Poor in Tracking
10	High Frequency Feedback	No Feedback
11	High Quality Feedback	Poor Quality Feedback
12	Immediate Connection	Poor Connection
13	Less Pilferage	Poor Security
14	Meeting Emergency Needs	Not Interested
15	On-time Arrival	Always not on Time
16	Provide Professional Advice	Unable to Provide
17	Quick in Responding	Slow in Responding
18	Responsive to Claims	Not Responsive

Table 6.3 - The "Positive" and "Negative" Service Quality Attributes

6.3 Results: An Example of the INGRID Analysis (Respondent #2)

The constructs and elements are analysed using the INGRID program. There are three sections to the output:

- the first section shows the relationships between constructs, expressed as correlations between them
- the second section shows the relationships between elements, expressed as inter-element distances
- the final section shows the relationships between the elements and the constructs

Prior to submitting the data to the INGRID program, some of the ratings were reversed. This is because both positive and negative constructs have been elicited, and they could be positioned on either the right or left hand side of the form (see Appendix 5A). Thus, the grading could be from "very good" to "very poor" or from "very poor" to "very good". The reversal would align the "positive" and "negative" constructs on the same column on the input card, and the rating from "very poor" to "very good":

- 1 = very poor
- 2 = poor
- 3 = average
- 4 = good
- 5 = very good

This will make the output easier to read as the "positive" constructs are given the "+" sign, whereas the "negative" constructs are given the "-" sign.

The relationship between the constructs and the elements can be illustrated using the output from one respondent. The respondent selected is Respondent #2 (Schenker), who is an air freight forwarder in Malaysia with the head office in West Germany. There is no specific reason for choosing this respondent.

Nine airlines have been elicited from this respondent, as shown in Table 6.4.

Airline	Code
Malaysia Airlines	MH
Singapore Airlines	SQ
Cargolux	CV
Japan Airlines	JL
Cathay Pacific	CX
Lufthansa	LH
KLM Royal Dutch Airlines	KL
Thai International	TG
UTA French Airlines	UT

Table 6.4 - Respondent #2's Choice
of Elements

6.3.1 The Constructs Mean

A total of fifteen constructs have been elicited from Respondent #2 (see Table 6.5). Of these, Construct 8 (Immediate Connection) and 9 (Definite Uplift) have the highest mean score. This implies that the respondent has placed greater emphasis on these two constructs.

Electronics account for approximately 70% of the respondent's revenue, and perishables account for about 27%. The balance of 3% is generated from the carriage of pharmaceutical products. Many electronics firms worldwide practise the just-in-time (JIT) concept for which definite uplift and immediate connection are critical to ensure that the goods are sent and delivered at the required time. Perishable goods, by reason of their perishability, require the same attributes. Thus, it is not surprising that the respondent's emphasis is on definite uplift and immediate connection.

Construct	Mean	Variance (%)
Adequate Capacity	3.89	6.1
Ability to Accept Different Cargo Sizes	3.11	7.9
Ability to Accept Different Types of Cargo	3.44	12.7
Wide Coverage	3.33	3.6
On-time Arrival	3.33	5.3
High Frequency of Feedback	3.89	6.1
High Quality of Feedback	3.78	6.7
Immediate Connection	4.22	6.7
Definite Uplift	4.33	5.3
Good Relationship	3.33	3.6
Listen to Customers	4.00	5.3
Quick in Responding	3.89	11.5
Close to Customers	3.22	4.9
Provide Professional Advice	3.33	5.3
Firm Allocation	3.33	8.9

Table 6.5 - Respondent #2's Constructs and Mean Values

If a construct is important to the respondent, he tends to make discriminations among the elements (Smith, 1986). The discrimination is shown in the output as a high variation (in percentage). However, in practice, the ones with the larger variation may be those where the respondent's discrimination is crude. The constructs with a high percentage of variation are known as the salient constructs. They may not be the constructs with the highest means (Smith, 1986).

In the case of Respondent #2, the most salient constructs are Construct 3 (Ability to Accept Different Types of Cargo) and Construct 12 (Quick in Responding). On the other hand, the least important constructs are Construct 4 (Wide Coverage) and Construct 10 (Good Relationship). Wide coverage may not be as important to a customer who deals in specific markets as in the case of Respondent #2 who is sending the goods mainly to Europe. In this case, the relationship with the airlines is relatively less important to the respondent.

6.3.2 The Salient Element

The relative importance of the elements is indicated by their sums of squares (see Table 6.6). The sum of squares is a reflection of its distance from the dispersion in the construct space. If the sum of squares is small, then the respondent has rated the element neither high nor low but close to the mean on the constructs (Slater, 1977). This suggests that his attitude towards it is indifferent. For example, Element 9 (UTA) has been rated close to the means on all the constructs, that is, between Rating 2 and 4.

No	Element	Sum of Squares (%)
1	Malaysia Airlines	21.0
2	Singapore Airlines	7.4
3	Cargolux	8.3
4	Japan Airlines	8.4
5	Cathay Pacific	12.8
6	Lufthansa	8.8
7	KLM Royal Dutch Airlines	10.5
8	Thai International Airlines	17.5
9	UTA French Airlines	5.5
Total		100.0

Table 6.6 - The Sum of Squares for the Elements

A salient element is one with a relatively large sum of squares. It appears to be an important or distinctive element in the construct system, whether his attitude towards it is consistently unfavourable in some respects or favourable in other respects. For example, Element 1 (Malaysia Airlines) is the most distinctive element to the respondent. In this case, it is the most unfavourable airline among the nine airlines.

If the salient element is sharply distinguished from the rest, the contrast form an important axis in the construct system. It sets the scale or standard for the rest, that is, it orientates the entire construct system (Pope and Keen, 1981; Slater, 1977).

6.3.3 The Relationship Between Elements

The relationship is shown as a distance in the construct space; the smaller the distance, the closer is the relationship. However, one needs to be careful because distances reflect the amount of space available. For example, a large grid with more space, shows larger distances than a smaller grid. In order to make comparisons between grids, the expected distance should be used. A distance greater than 1 shows that the elements are not related, while a distance less than 1 shows that they are related.

Table 6.7 shows the relationship between elements. From the Table, Element 4 (Japan Airlines), 6 (Lufthansa) and 7 (KLM Royal Dutch Airlines) are related closely to each other. Thus, these three airlines can be clustered together. The relationship of this cluster with the constructs indicates whether these airlines are perceived as "good" or "poor" airlines along the constructs.

E#	1	2	3	4	5	6	7	8	9
1		1.04	0.80	1.41	1.36	1.29	1.51	0.92	1.11
2			0.92	0.85	0.61	0.88	0.94	1.19	0.75
3				0.92	1.16	0.93	1.05	0.84	0.80
4					0.98	0.59	0.41	1.16	0.79
5						0.96	0.89	1.33	0.77
6							0.46	1.28	0.87
7								1.28	0.80
8									0.96
9									

1 - Malaysia Airlines
 2 - Singapore Airlines
 3 - Cargolux
 4 - Japan Airlines
 5 - Cathay Pacific Airlines
 6 - Lufthansa
 7 - KLM Royal Dutch Airlines
 8 - Thai International Airlines
 9 - UTA French Airlines

Table 6.7 - The Relationship Between Elements
Based on the Expected Distances

6.3.4 The Relationship Between Constructs

The relationship between constructs is expressed in terms of cosine angle. A small angle implies a close relationship; angles approaching 90° indicate a chance relationship, and angles approaching 180° indicate an inverse relationship. For example, the relationship between Construct 1 (Adequate Capacity) and 2 (Ability to Accept Different Cargo Sizes) is 25° (see Table 6.8), which implies a close relationship between the two constructs. Both constructs are related to capacity.

C#	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	25	63	75	105	91	100	112	87	75	81	103	97	105	59
2		54	63	108	96	102	113	93	74	82	106	92	100	53
3			85	142	117	126	149	117	108	122	141	96	133	82
4				78	86	83	76	78	75	66	79	86	78	51
5					34	33	20	34	78	48	19	87	48	75
6						20	44	34	86	62	33	88	59	59
7							32	46	83	64	27	86	46	58
8								50	76	54	21	85	38	74
9									78	48	34	77	60	67
10										35	71	45	52	72
11											47	59	48	67
12												75	34	68
13													55	80
14														67
Construct: 1 - Adequate Space 2 - Ability to Accept Different Cargo Sizes 3 - Ability to Accept Different Types of Cargo 4 - Wide Coverage 5 - On-time Arrival 6 - High Frequency Feedback 7 - High Quality Feedback 8 - Immediate Connection 9 - Definite Uplift 10 - Good Relationship 11 - Listen to Customer 12 - Quick in Responding 13 - Close to Customer 14 - Provide Professional Advice 15 - Firm Allocation														

Table 6.8 - Angular Distances Between Constructs
(in Degrees)

On the other hand, the relationship between Construct 3 (Ability to Accept Different Types of Cargo) and Construct 4 (Wide Coverage) is 85° which implies that there is no relationship between the two constructs. This is understandable as Construct 3 is related to freight diversification, whereas Construct 4 is related to the route structure.

6.3.5 The Salient Component

The clustering of constructs can be done using Principal Component Analysis. Every component has a component vector and an element vector. A component is a measurement in which the constructs and the elements interact. Thus, the entire component space must be contained within the construct space and the element space. The variation along the axis of a component in the construct space is also the variation along its axis in the element space. This variation is referred to as the latent root (Slater, 1977).

Table 6.9 shows the variance accounted for by each component in the case of Respondent #2. The first component accounts for 49% of the information in the grid, whereas the second component accounts for 22%. Together, they account for 71% of the information in the grid. As such, the other components can be ignored.

Component	Latent Root	As Percent
1	7.37	49.14
2	3.26	21.75
3	1.96	13.08
4	0.87	5.79
5	0.77	5.12
6	0.58	3.54
7	0.16	1.04
8	0.08	0.54

Table 6.9 - Variation Along the Component Space

Similarly, the variance accounted for by the first two components for the nineteen respondents is between 70% to 95% (see Table 6.10). This implies that there are only two distinct components describing the clustering of constructs.

Respondent #	Component 1	Component 2	Total
1	51.24	21.79	73.03
2	49.14	21.75	70.89
3	53.18	18.43	71.61
4	47.24	34.11	81.35
5	88.27	6.78	95.05
6	79.89	8.70	88.59
7	60.74	12.42	73.16
8	84.53	11.10	95.63
9	44.94	32.29	77.23
10	70.20	12.51	82.71
11	81.97	7.11	89.08
12	59.61	21.28	80.89
13	44.70	39.51	84.21
14	66.14	13.09	79.23
15	70.34	20.27	90.61
16	86.95	9.79	96.74
17	80.39	13.16	93.55
18	74.66	16.97	91.63
19	82.35	10.59	92.94

Table 6.10 - The Variance Accounted by the First and Second Components for the Respondents

6.3.6 The Cognitive Map

The relationship between the elements and the constructs is best illustrated using the Cognitive Map. Since both the elements and the constructs are located in the component space, a Cognitive Map can be drawn by taking two components as the reference axes. The elements and the constructs are located on the map using their loadings on these two components.

In the map, the constructs are shown around the circumference of a circle. The circle is drawn wide enough to enclose all the elements. The location of the constructs on the circumference does not signify their actual loadings on the components. On the other hand, the element loadings on the components can be determined from the map.

The map gives the impression that the relationship between elements and constructs can be expressed as a linear distance between them. However, the linear distance between two points will change when one moves further away from the origin, while the other remains stationary. Thus, it is better to express relationships between elements and constructs in angular distances rather than linear distances.

The map is divided into four quadrants:

- 1st Quadrant: (+ +)
- 2nd Quadrant: (- +)
- 3rd Quadrant: (- -)
- 4th Quadrant: (+ -)

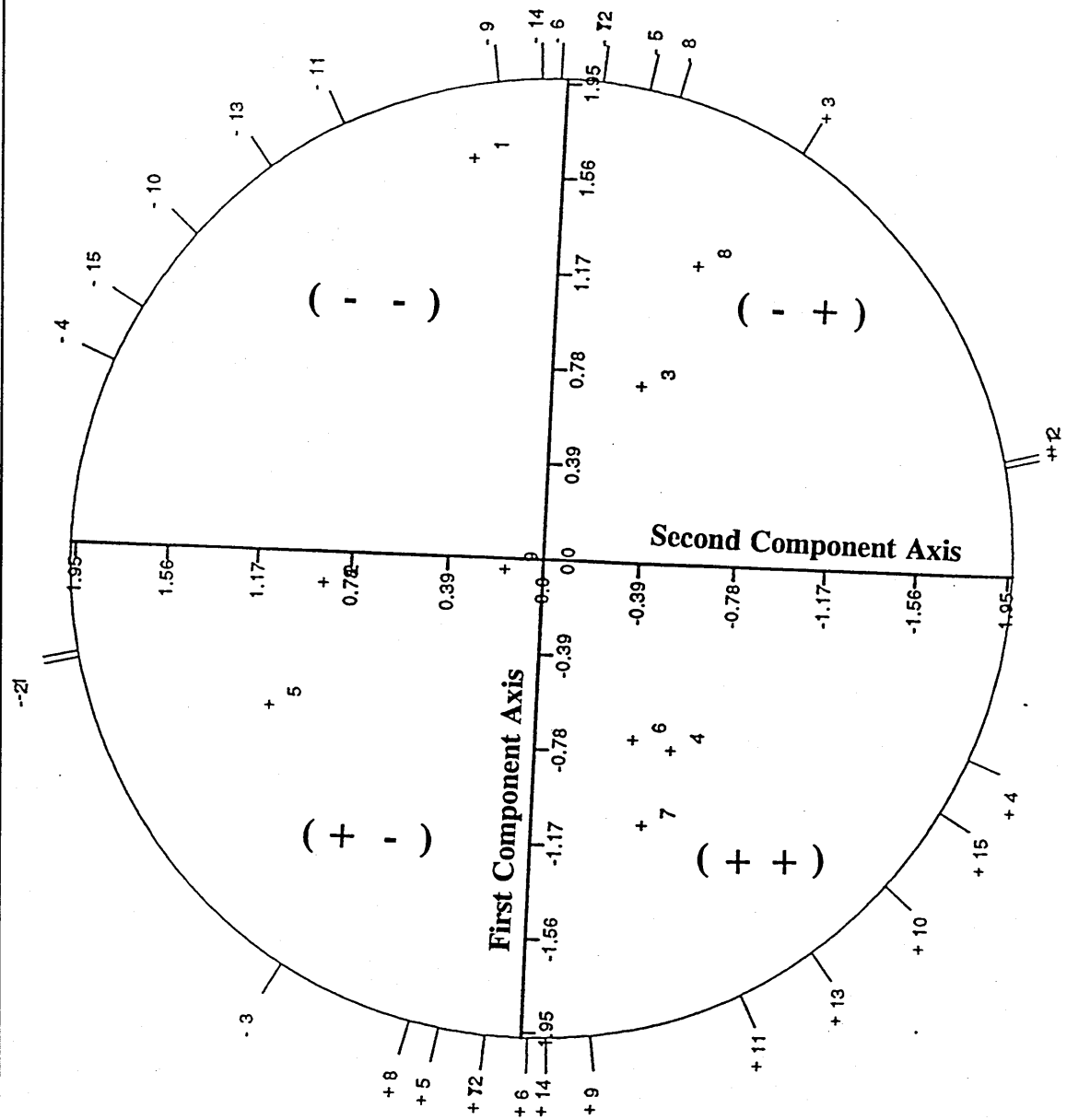
The "+ +" indicates that the quadrant is positive on both the first and second components. The airlines that are plotted in this quadrant are perceived as positive with respect to these two components.

Figure 6.2 shows the Cognitive Map for Respondent #2. In this particular example, Japan Airlines (Element 4), Lufthansa (Element 6) and KLM Royal Dutch Airlines (Element 7) are located in the first quadrant (+ +). Therefore, these three airlines are perceived as "good" airlines with respect to the two components. The first component is related to reliability, whereas the second component is related to capacity.

Cargolux (Element 3) and Thai International Airlines (Element 8) are located in the second quadrant (- +). They are therefore perceived as positive on the second component but negative on the first component. They are likely to be rated between the "good" and "poor" airlines.

Malaysia Airlines (Element 1) is located in the third quadrant (- -). It is perceived as a "poor" airline with respect to the two components.

Cathay Pacific Airlines (Element 5) and Singapore Airlines (Element 2) are located in the fourth quadrant. They are perceived as positive on the first component but negative on the second component. Therefore, they are likely to be rated between the "good" and "poor" airlines. Finally, UTA Airlines (Element 9) is perceived as average on both the components.



The numbering 1 to 15 located on the circumference refers to the fifteen constructs elicited during the interview with Respondent 2. The positive sign refers to "positive" attribute, whereas the negative sign refers to "negative" attribute. The labels of these "positive" attributes are shown in Table 6.8.

The numbering 1 to 9 inside the circumference refers to the nine elements. The labels for these nine elements are shown in Table 6.7.

Figure 6.2 - Respondent #2's Cognitive Map

6.4 Results: Summary of the Analysis

This section provides a summary of the analysis of the significant attributes on the first and second components for all the nineteen respondents.

Additionally, it addresses the elements' loading on the two components, but the analysis is limited to the customers only (nine respondents). The analysis will confirm the possibility of designing the Stage 4 questionnaire using the Repertory Grid technique. The Stage 4 questionnaire is used to determine the relationship between the airlines and the attributes of service quality. As such, the analysis is limited to the nine customers only.

In both cases, the analysis is done using the Principal Component Analysis of the INGRID program.

6.4.1 The Significant Attributes on the First and Second Components

Table 6.11 shows the significant attributes on the first and second components for all the respondents in the survey. The attributes which appear significant to the respondents are Definite Uplift, Credible Service, Accessible, and Good Relationship.

R#	First Component	Second Component
1	Definite Uplift Good Tracking/Monitoring	Good Relationship
2	On-time Arrival Immediate Connection	Adequate Capacity
3	Provide Professional Advice Responsive to Claims	High Frequency Feedback
4	Accessible Good Relationship	Firm Allocation
5	High Frequency Feedback High Quality Feedback	Reliable Carrier
6	Responsive to Claims Good Tracking/Monitoring	Firm Allocation
7	Immediate Connection Wide Coverage	Good Relationship
8	Accessible Adequate Capacity	Courteous
9	High Frequency Feedback Good Relationship	Reliable Carrier
10	Accessible Provide Professional Advice	Meeting Emergency Needs
11	Accessible Definite Uplift	High Frequency Feedback
12	Credible Service Immediate Connection	Adequate Capacity
13	Quick in Responding Meeting Emergency Needs	Good Relationship
14	Credible Service Good Relationship	High Frequency Feedback
15	On-time Arrival Definite Uplift	Higher Flight Frequency
16	Definite Uplift Quick in Responding	Immediate Connection
17	Quick in Responding Credible Service	Higher Flight Frequency
18	Definite Uplift Quick in Responding	Credible Service
19	Definite Uplift Quick in Responding	Provide Customs Clearance

Table 6.11 - The Significant Attributes on the First and Second Components for the Nineteen Respondents

6.4.2 The Elements' Loading on the First and Second Components

Table 6.12 shows the elements' loading on the first and second components. The elements with the positive loading on the two components are related positively to the significant attributes in Table 6.11, whereas those with negative loading are related negatively. The greater the loading, the stronger is the relationship.

For example, in the case of Respondent #1, KLM Airlines (KL) and Japan Airlines (JL) are related positively to the two attributes in Component 1, namely, Definite Uplift, and Good Tracking and Monitoring. They are also related positively to the attribute Good Relationship in Component 2.

On the other hand, Malaysia Airlines and Singapore Airlines are related negatively to the two attributes in Component 1 but they are related positively to the attribute in Component 2.

Thus, it implies that KLM Airlines and Japan Airlines are perceived as "good" airlines compared to Malaysia Airlines and Singapore Airlines with respect to the two components. This subject will be further explored in Stage 4 of the research (see Chapter 8).

R	AC Loading Comp1	AC Loading Comp2	R	AC Loading Comp1	AC Loading Comp2
1	KL 1.2275 JL 0.9905 KE 0.3743 LH 0.2568 FM 0.1205 UT -0.4588 SQ -0.6702 TG -0.7436 MH -1.0970	MH 0.7182 SQ 0.4258 JL 0.2887 KE 0.2602 KL 0.0539 LH -0.1551 FM -0.2447 TG -0.2633 UT -1.0837	6	MH 1.3065 BA 0.8212 CX 0.5875 QF 0.5790 SQ 0.4553 LH 0.2649 UT -0.1257 UL -1.5786 SU -2.3101	MH 0.5530 SQ 0.2702 CX 0.1521 SU 0.1221 UL 0.1083 QF -0.0507 UT -0.0803 BA -0.3771 LH -0.7989
2	KL 1.0982 JL 0.7840 LH 0.7491 CX 0.6605 SQ 0.1519 UT 0.0682 CV -0.7001 TG -1.2035 MH -1.6083	TG 0.5888 JL 0.5716 KL 0.4668 LH 0.4172 CV 0.3849 UT -0.1403 MH -0.3459 SQ -0.8681 CX -1.0750	7	MH 1.1814 FM 0.6823 JL 0.6788 KE 0.4570 CI 0.2962 SQ 0.1749 CX -1.0505 KL -1.1948 BA -1.2253	CX 0.5943 MH 0.5847 FM 0.2225 BA 0.1296 KE -0.0601 SQ -0.1688 KL -0.3860 CI -0.4137 JL -0.5025
3	JL 1.3345 QF 1.2148 LH 1.1144 CX -0.0388 BI -0.5195 TG -0.5708 MH -0.5943 SV -0.7309 CV -1.2094	CV 0.5988 SV 0.2680 JL 0.1890 LH 0.1439 TG 0.0252 QF -0.0079 CX -0.0767 MH -0.7253 BI -0.9378	8	JL 0.6685 KL 0.5878 UT 0.5794 RJ 0.5069 CI 0.4239 CV 0.3570 LH 0.3482 FM -0.8819 MH -2.5898	FM 0.9169 LH 0.2249 KL -0.0053 JL -0.0103 CV -0.0823 UT -0.1024 RJ -0.2301 CI -0.2976 MH -0.4139
4	JL 1.8201 LH 0.7055 SQ 0.1581 KE -0.2578 CX -0.3561 QF -0.3561 CI -0.4441 BA -0.4987 MH -0.7709	MH 1.4524 JL 0.7189 CI -0.0291 CX -0.1302 QF -0.1302 KE -0.1472 SQ -0.4094 BA -0.5541 LH -0.7712	9	JL 0.9278 KE 0.9200 KL 0.3984 SQ 0.2588 LH -0.0651 MH -0.1845 CV -0.4620 UT -0.5292 SU -1.2583	JL 0.5776 KL 0.5654 SU 0.5257 LH 0.3164 CV -0.0375 UT -0.0396 KE -0.3021 SQ -0.3103 MH -1.2957
5	UT 0.4085 SQ 0.4085 JL 0.4085 KL 0.4085 CX 0.1746 CI 0.0914 KE 0.0914 TG -0.0694 MH -1.9219	SQ 0.1542 UT 0.1542 KL 0.1542 JL 0.1542 MH 0.1200 CX 0.0794 TG -0.2444 KE -0.2858 CI -0.2588			

R - Respondent Number
AC - Airline Code

Table 6.12 - The Element's Loading on Component 1 and 2
for the Nine Respondents (Customers)

6.5 General Critiques of the Survey

Firstly, the constructs which are elicited from the respondents using the Repertory Grid technique are not necessarily identical among respondents. It is therefore difficult to aggregate the findings. The findings can be aggregated if the constructs are provided. However, this defeats the purpose of this stage of the research and the concept of the Personal Construct theory.

Secondly, the data which have been reduced and analysed using Principal Component Analysis includes the unique variances, thus making it difficult to analyse the common variance among the constructs. Furthermore, it is not possible to rotate the component axis. This makes it difficult to interpret the output, especially when the relationship between the components and the constructs are not very clear.

Thirdly, there may be some limitations in generalising the survey as purposive sampling has been used. However, all aspects, such as the different parties in the air freight industry, and the different freight commodities, have been taken into account in the sampling. The traditional passenger airlines, operating on regional and international basis, and the all-cargo airlines have been covered. Respondents dealing in perishable and non-perishable freight commodities have also been selected. There is also an element of country bias as the survey was conducted in Singapore and Malaysia. It may be necessary to repeat the survey in other countries in order to remove the element of country bias.

6.6 Conclusion

In Stage 2, forty-four service quality attributes have been elicited from nineteen respondents using the Repertory Grid technique. The number was subsequently reduced to eighteen based on simple frequency count and the aggregate mean values. These attributes will be used in Stages 3 and 4 of the research.

The results of Stage 2 suggest that there are only two distinct components describing the clustering of constructs. The attributes that appear to be significant to the respondents based on these two components are Definite Uplift, Credible Service, Accessible, and Good Interaction. The results also suggest that there is some form of relationship between the airlines and the service quality attributes.

Chapter 7 - Stage 3 Findings: The Dimensions of Perceived Service Quality

7.0 Introduction

The purpose of this stage of the research (Stage 3) is to group the eighteen service quality attributes obtained from Stage 2 into the ten dimensions of service quality. The dimensions of service quality are taken mainly from the literature.

The grouping is done by one hundred respondents (forwarders) through postal survey. The forwarders have been selected at random from a listing of two hundred and eighty (280) forwarders in the A to Z World-wide Air Freight Directory, 1990. These forwarders are located in Singapore and Malaysia.

7.1 Definitions of the Service Quality Attributes

Both the positive and negative constructs have been elicited from the respondents in Stage 2 of the research. For the survey in Stage 3, only the definitions of the positive service quality attributes have been addressed. The negative attributes are seen as the opposite of the positive attributes.

The definitions of the eighteen attributes are as follows:

- (1) Accessible - the airline personnel are approachable and easily available either on the phone or in person
- (2) Adequate Capacity - the airline has the ability to provide for the customer's basic needs, in terms of route structure and space availability
- (3) Credible Service - the airline is trustworthy and gives the necessary assurance in their services
- (4) Courteous - the airline's contact personnel are polite, respectful, considerate, and friendly

(5) Definite Uplift - once the space is confirmed, the airline gives the assurance that the shipment will be uplifted. In other words, the uplift is "guaranteed".

(6) Firm Allocation - the airline's ability to confirm cargo space well in advance of the required shipping time

(7) Good Handling - refers to the ground handling at the airport cargo complex, the transfer between the complex and the aircraft, and at the tarmac area. Good handling assures that goods arrive in one piece and in the original condition as shipped

(8) Good Relationship - the airline has a good working relationship with the customer

(9) Good Tracking and Monitoring - the airline is able to provide information pertaining to the status (whereabouts) of the shipment

(10) High Frequency of Feedback - the airline keeps the customer informed on regular basis, on the status of the shipment, especially when the situation is not normal

(11) High Quality Feedback - the airline provides accurate and precise information on the status of the shipment

(12) Immediate Connection - refers to the number of transits (if any) and the transit time between two points. Ideally, customers prefer a direct service or minimum transits (number and time) using the same aircraft

(13) Less Pilferage - the shipments are free from theft

(14) Meeting Emergency Needs - the airline is capable of accepting last minute requests from customers

(15) On-time Arrival - the shipments arrive on time as per the flight schedule or as promised by the airline

(16) Provide Professional Advice - the airline personnel are capable of advising customers on their air freight requirements

(17) Quick in Responding - the airline is prompt in responding to the customer's needs

(18) Responsive to Claims - the airline is helpful in assisting customers in making claims for lost or damaged shipments

7.2 Definitions of the Service Quality Dimensions

In the initial listing of forty-four service attributes (see Appendix 6A), none of the attributes is related to the Tangible dimension of service quality. Zeithaml, Parasuraman, and Berry (1990, p.25) define the Tangible dimension as the "*appearance of physical facilities, equipment, personnel, and communication materials*". This dimension does not appear in Stage 2 of the research because, in the air freight industry, the customer is excluded from the consumption phase ("service factory"). Since there is no necessity for the customers to be in the service "factory", it is reasonable for them to ignore this dimension when judging the quality of services received. Had the survey been conducted in a service industry that involves the customer in the service "factory" (for example, passenger airlines), then this dimension may be relevant.

Most of the elicited attributes appear to be related to the other nine dimensions of service quality found in Zeithaml, Parasuraman, and Berry's study (1990). However, some of the attributes do not seem to be appropriate to those nine dimensions. These attributes are:

- Ability to Accept Different Cargo Sizes
- Ability to Accept Different Types of Cargo
- Adequate Capacity
- Good International Connection
- Good Transit Facility
- Higher Flight Frequency
- Immediate Connection

- Late Night Departures
- Provide Customs Clearance
- Wide Coverage

The above ten attributes are related more to the Adequacy dimension. This dimension is defined as the airline's ability to provide the basic services, such as capacity, route coverage, schedule, storage facilities, and specialised services.

The definitions of the other nine dimensions are:

- Reliability - the airline is able to perform the promised service dependably and accurately
- Responsiveness - the airline is willing to help customers and provide prompt service
- Competence - the airline personnel have the required skills and knowledge to perform the service
- Courtesy - the airline personnel are polite, respectful, and friendly when dealing with customers
- Credibility - the airline is accepted and trusted
- Security - the shipment is free from pilferage and damage
- Communication - the airline keeps customers informed and listens to them
- Access - the airline personnel are approachable and can be easily contacted
- Understanding the Customer - the airline makes the effort to know and understand the customer's needs

7.3 Results: Grouping the Attributes Into the Dimensions of Service Quality

Prior to the actual survey, a pilot survey was carried out with three forwarders to ascertain whether the definitions of the attributes and the dimensions of service quality are clear enough to the forwarders. This is necessary as postal survey is used.

For the actual survey, seventy forwarders from Singapore and thirty from Malaysia have been selected from a total population of 280 forwarders. The initial response rate was 20%, and it increased to 35% after follow-up letters have been sent. The follow-up letters were sent when the number of responses levelled off. The monitoring chart suggested by Chernatony (1988) was used to monitor the progress (see Appendix 7A). The response from thirty-five respondents is acceptable as it exceeds the planned sample size of thirty.

The objective of the survey is to group the eighteen attributes of service quality into the ten dimensions of service quality. This is achieved by asking the respondents to do the grouping. Simple frequency count is then used to determine the outcome of the grouping. Table 7.1 shows the summary of the frequency count.

Attribute	Dimension of Service Quality										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	5	2	0	2	0	1	4	21	0	35
2	19	6	2	3	0	5	0	0	0	0	35
3	3	13	0	4	0	14	1	0	0	0	35
4	0	0	1	0	29	0	0	2	0	3	35
5	2	16	0	5	1	9	2	0	0	0	35
6	6	19	4	2	0	3	1	0	0	0	35
7	7	15	3	5	1	0	3	0	1	0	35
8	1	2	2	1	7	2	0	9	2	9	35
9	3	8	6	12	0	1	2	2	1	0	35
10	3	3	6	3	0	0	1	12	3	4	35
11	3	6	4	10	1	1	1	6	1	2	35
12	15	7	2	2	0	5	0	2	0	2	35
13	4	1	0	1	0	4	25	0	0	0	35
14	1	5	12	8	0	1	2	1	3	2	35
15	1	27	0	1	0	3	0	2	1	0	35
16	2	1	4	21	3	1	0	1	0	2	35
17	3	4	19	2	0	1	0	5	0	1	35
18	3	3	11	6	0	8	2	0	2	0	35

Service Quality Attribute	Dimension
1 - Accessible	1 - Adequacy
2 - Adequate Capacity	2 - Reliability
3 - Credible Service	3 - Responsiveness
4 - Courteous	4 - Competence
5 - Definite Uplift	5 - Courtesy
6 - Firm Allocation	6 - Credibility
7 - Good Handling	7 - Security
8 - Good Relationship	8 - Communication
9 - Good Tracking and Monitoring	9 - Access
10 - High Frequency Feedback	10 - Understanding the Customer
11 - High Quality Feedback	
12 - Immediate Connection	
13 - Less Pilferage	
14 - Meeting Emergency Needs	
15 - On time Arrival	
16 - Provide Professional Advice	
17 - Quick in Responding	
18 - Responsive to Claims	

Table 7.1 - Summary of the Frequency Count on the Grouping of Attributes into Dimensions of Service Quality, (n=35)

In Zeithaml, Parasuraman, and Berry's (1990) exploratory study, the possibility of overlapping among the ten dimensions of service quality has been acknowledged. In their subsequent empirical research, the ten dimensions have been reduced to five dimensions. This subject has been addressed in Chapter 2.

From the survey, there appears to be some degree of overlapping among the dimensions of service quality, especially on the following eight attributes:

- For the attribute Credible Service, thirteen respondents placed it under the Reliability dimension, whereas fourteen respondents placed it under the Credibility dimension.
- For the attribute Definite Uplift, sixteen respondents placed it under the Reliability dimension, whereas nine respondents placed it under the Credibility dimension.
- The attribute Good Relationship overlaps three dimensions: Courtesy, Communication, and Understanding the Customer. Seven respondents placed the attribute under the Courtesy dimension, nine respondents placed it under the Communication dimension, and another nine respondents placed it under the dimension Understanding the Customer.
- For the attribute Good Tracking and Monitoring, twelve respondents placed it under the Competence dimension, whereas eight respondents placed it under the Reliability dimension.
- The attribute High Quality Feedback overlaps the three dimensions: Competence, Reliability, and Communication.
- The attribute High Frequency of Feedback overlaps two dimensions: Responsiveness and Communication.
- The attribute Meeting Emergency Needs overlaps two dimensions: Responsiveness and Competence.
- The attribute Responsive to Claims overlaps two dimensions: Responsiveness and Credibility.

The overlapping will be further discussed in Stage 4 of the research.

7.4 Descriptions of the Service Quality Dimensions

7.4.1 The Adequacy Dimension

The Adequacy dimension has two attributes: Adequate Capacity and Immediate Connection. The total capacity offered by the airlines is transparent to the customers. What is important to them is that the airline must be able to provide the space whenever they need it. If the airline is able to satisfy only eighty out of one hundred requests, then the airline is perceived to be 80% predictable. For the balance of 20%, the airline is perceived to be not predictable in delivering this particular aspect of the service.

The customers would also like to deal with airlines that offer direct services, that is, without transit. There are two categories of transit: with or without a change of aircraft, and with the same or different airlines. There are two reasons for the customers' preference for direct services.

Firstly, it means less elapsed time for the shipments. This is very critical in the case of physically perishable goods as the shelf life deteriorates with longer elapsed transportation time. For example, in the case of ornamental fish, the mortality rate increases with an increase in elapsed time. If the elapsed time goes beyond 38 hours, the mortality rate is approximately 2% to 3%. If it is more than 72 hours, the mortality rate is approximately 5%. For a normal flight from Singapore to Europe, with two transits, the elapsed time is approximately 32 to 33 hours. A reduction in one stop would reduce the elapsed time by about 3 hours.

Secondly, with a direct service, there is no element of mishandling at the transit point. Thus, it minimises the risk of misconnection, pilferage, and so on.

Even though the airlines offer a direct service based on the flight time table, transits can still occur due to operational reasons such as last minute change of aircraft and other unforeseen circumstances. This would affect the customer's perception of the airlines.

7.4.2 The Reliability Dimension

The Reliability dimension has four attributes:

- Firm Allocation
- Definite Uplift

- On-time Arrival
- Good Handling

The first three attributes are concerned with meeting delivery schedules. In Zeithaml, Parasuraman, and Berry's (1990) study, the Reliability dimension has been found to be the most important. The last attribute is concerned with getting to the destination free from damage.

7.4.3 The Security Dimension

The Security dimension is concerned with whether the airlines have taken adequate measures to ensure that the shipments are free from pilferage by the airlines' own employees or the airport handling personnel. With less pilferage, the claims would be minimal and the consignors are assured of their shipments. With less claims, the shippers may be required to pay less insurance premiums in the future.

Some shippers demand higher security on certain shipments especially those which are high in value. Those shippers dealing with perishable goods may not demand the same level of security.

7.4.4 The Credibility Dimension

The Credibility dimension can be confused with the Reliability dimension. Zeithaml, Parasuraman, and Berry (1990) define credibility as the trustworthiness, believability, and honesty of the service provider, and reliability as the ability to perform the promised service dependably and accurately. Thus, credibility is defined in the context of the image of the performance, whereas reliability is defined in the context of the performance itself.

From Table 7.1, 40% of the respondents grouped the attribute Credible Service under the Credibility dimension, whereas 37% grouped it under the Reliability dimension. Therefore, there is a need to clarify this dimension to the respondents properly in Stage 4 of the research.

7.4.5 The Competence Dimension

The Competence dimension reflects the airline's ability to do something well or effectively. If the customer perceives an airline as competent, it means that the airline is perceived to have the ability, knowledge, and skills to perform in an efficient and effective way. This could come about only if the airline has competent personnel and the correct system to deliver the service.

This dimension is made up of three attributes:

- Good Tracking and Monitoring
- High Quality of Feedback
- Provide Professional Advice

7.4.6 The Responsiveness Dimension

Responsiveness is the willingness on the part of the airline to help customers and provide prompt service. Thus, this dimension is highly dependent on the airline personnel's willingness to deliver the service. This dimension is made up of three attributes:

- Meeting Emergency Needs
- Quick in Responding
- Responsive to Claims

7.4.7 The Communication Dimension

Communication means keeping customers informed on the status of their shipments. Communication is made possible if the airline has a good computerised tracking and monitoring system. The airline personnel should also be willing to communicate or call the customers. There is only one attribute under this dimension, that is, High Frequency of Feedback.

7.4.8 The Three Interaction Dimensions

Three of the dimensions appear related to the human interaction between airlines and customers. The three dimensions are:

- Courtesy
- Access
- Understanding the Customer

Each dimension has one attribute each (see Table 7.1) The attribute Good Relationship overlaps two dimensions: Understanding the Customer and Communication. However, it is more related to the first dimension.

Courtesy describes the behaviour of the airline's personnel, for example, whether they are considerate, polite, respectful, and friendly. Access describes the situation where the airline provides the environment for approachability and ease of contact. Finally, the attribute Understanding the Customer describes the bond between airlines and customers.

7.5 General Critiques of the Survey

Sixty-five percent of the respondents did not respond in the survey. Thus, the survey may be affected by non-response bias.

The survey was conducted with the forwarders only. Therefore, the grouping is the view of the forwarders, and not necessarily that of the shippers. The shippers have been excluded because of the difficulties in getting the list of shippers, and in identifying the correct addressee. Since the objective of this survey is merely to group the attributes into the dimensions of service quality, it is considered adequate for the grouping to be done by the forwarders only.

7.6 Conclusion

The dimensions of service quality as suggested by Zeithaml, Parasuraman, and Berry (1990) are applicable to the air freight industry except for the Tangible dimension. In addition, another dimension of service quality, that is, Adequacy, has emerged from the survey.

In the grouping of attributes into the appropriate dimensions, there is some overlapping among the dimensions. The overlapping of these dimensions will be further empirically shown in Stage 4 of the research (see Chapter 8).

Chapter 8 - Stage 4 Findings: The Components of Perceived Service Quality

8.0 Introduction

The purpose of this stage of the research (Stage 4) is to test the two hypotheses relating to the components of perceived service quality. The hypotheses state that perceived service quality is influenced by the technical and functional quality components, and that the technical quality component is more important than the functional quality component in shaping the customer's perceptions. The term "perceived" is used as the attributes of service quality are measured from the customers' perspective. These attributes are taken from Stage 2 of the research.

Stage 4 includes the two groups of customers, that is, the air freight forwarders and the shippers. In addition to the hypotheses testing, the analysis explores the differences between the two groups on the relative importance of the dimensions of service quality, and the reliability attributes. An understanding of these differences is essential in order for the airlines to deliver quality services to the appropriate customer groups.

In Stage 4, the airlines are also rated as "good", "average" or "poor" by the customers based on their overall perceptions of the airlines' service quality. The rating will be used in Stage 6 of the research.

8.1 Sample Size

There are two sets of questionnaire used in the survey. One set is for those respondents dealing with perishable goods, and the other is for those dealing with non-perishables. Since the air freight forwarders are dealing with both types of freight commodity, both sets of the questionnaire are presented to them during the survey. In the case of the shippers, only the appropriate set (either for perishables or non-perishables) is presented to them.

The planned sample size was thirty forwarders and thirty shippers. However, in the actual survey, the sample was thirty-two forwarders and twenty-five shippers. Since the forwarders answered both sets of the questionnaire, the total respondents from this group is sixty-four. In the case of the twenty-five shippers, ten deal with perishables, and the other fifteen deal with non-perishables.

There was some difficulty in obtaining the planned sample size of thirty shippers, especially those dealing with perishable goods. Many of them are small family businesses. They are reluctant to be surveyed as they are apprehensive that the research may be used by the tax authorities to gauge their financial performance. This situation is probably unique to Singapore and Malaysia.

8.2 Reliability and Validity of the Data

There are two types of reliability measurement: internal and external reliability. Internal reliability refers to whether each scale is measuring a single idea, whereas external reliability refers to the degree of consistency over time.

Using the SPSS program, there are two methods for measuring internal reliability: split-half reliability and Cronbach's Alpha. The split-half divides the eighteen attributes randomly into two groups of nine attributes each. Then, it examines the relationship between the respondents' scores for the two halves. The relationship is shown as a coefficient that varies between 0 and 1. It is interpreted in the same manner as the Pearson's Correlation Coefficient, that is, the nearer the result to 1, and preferably over 0.8, the more internally reliable is the scale. In this survey, the coefficient is 0.7973. Thus, it implies that the data is internally consistent.

On the other hand, the Cronbach's Alpha calculates the average of all the possible-half reliability coefficients. The rule of thumb is that the coefficient should also be above 0.8. In this survey, the coefficient for the first half is 0.9115, and the second half is 0.8818. This confirms the internal reliability of the data used.

The external reliability has been taken into account in the research design stage. The two different groups of customers (air freight forwarder and shipper), and the two types of freight commodity (perishables and non-perishables) have been included. In the case of the airlines, both the traditional passenger airlines and the all-cargo airlines have been taken into account.

Validity has also been taken into account in designing the questionnaire. Only those service quality attributes that are common and relatively important to the respondents have been considered. The questionnaire is also designed to enable the output from one part to be compared with another part. For example, the relative importance of the dimensions of service quality from Part 2 of the questionnaire can be compared with Part 3's (see Appendix 5C). This concept is in line with the recommendation of Campbell and Fiske (1959), that is, one measure should harmonize with another measure.

8.3 The Suitability of the Data

The objective of the analysis is to obtain factors that help to explain the correlation among the eighteen attributes. Factor Analysis is suitable if the attributes are correlated to one another. If the correlations among attributes are small, then it is unlikely that they share common factors. The correlation coefficient value of 0.3 is taken as the cut-off point in the analysis (Kaiser, 1974).

From the analysis, all the attributes have correlation coefficients greater than 0.3 except the attribute A10 (Responsive to Claims). In the case of the attribute A10, nine attributes have correlation coefficients greater than 0.3, whereas eight other attributes have correlation coefficients less than 0.3 (see Appendix 8A). As there are more attributes having correlation coefficients greater than 0.3 with A10, this attribute has been retained for the analysis.

Two other tests have been used to determine the suitability of Factor Analysis. These two tests are the KMO index and the Bartlett's test. The KMO index is between 0 to 1; the nearer the index is to 1, the smaller is the correlation between unique factors. In this case, the KMO index of the two groups of respondents is greater than 0.8 (see Table 8.1).

Customer	KMO Index
Forwarder	0.936
Shipper	0.884
Total	0.939

Table 8.1 - The KMO index

On the other hand, the Bartlett's test of sphericity assesses the significance level of the correlation. In this case, the significance level is less than 0.05 (see Table 8.2).

Customer	Bartlett's Test	Significance Level
Forwarder	3382	0.00
Shipper	1359	0.00
Total	4467	0.00

Table 8.2 - The Bartlett's Test of Sphericity

8.4 The Number of Factors to be Retained

The number of factors is equivalent to the number of attributes, that is, eighteen. As the objective of the analysis is to describe the attributes using few factors, it is therefore not necessary to retain all the factors. The inclusion of more factors improves the fit between the observed data and the reproduced correlation matrices. However, as more factors are added, it will make the interpretation more difficult. Thus, a balanced compromise between brevity and reliability is required.

The number of factors to be retained is based on its eigenvalues¹. There are two methods in determining the number of factors using the eigenvalue. Firstly, the variance of each attribute is equal to 1; thus, any eigenvalue less than 1 is considered as not important. Using this criterion, only those factors with eigenvalue greater than 1 are retained (see Table 8.3). From Table 8.3, only the first three factors have eigenvalues greater than 1. Therefore, only the first three factors have been retained.

¹ Eigenvalue is calculated by squaring the loading of each factor and summing it. It summarises a fraction of total variance in the 18 attributes. Since the attributes have been normalised, the variance of each attribute is equal to 1.

Factor	Eigenvalue	% of Variance	Cumulative (%)
1	8.94504	49.7	49.7
2	1.32252	7.3	57.0
3	1.01379	5.6	62.7
4	0.87327	4.9	67.5
5	0.80291	4.5	72.0
6	0.72236	4.0	76.0
7	0.60118	3.3	79.3
8	0.48641	2.7	82.0
9	0.46541	2.6	84.6
10	0.45045	2.5	87.1
11	0.39240	2.2	89.3
12	0.34823	1.9	91.2
13	0.31472	1.7	93.0
14	0.29672	1.6	94.6
15	0.26303	1.5	96.1
16	0.25488	1.4	97.5
17	0.23459	1.3	98.8
18	0.21211	1.2	100.00

Table 8.3 - The Factor Eigenvalues

Secondly, using the Scree test (Catell, 1966), the factors are arranged in a descending order based on their eigenvalues. A graph is then drawn with the y-axis representing the eigenvalue and the x-axis representing the factor (see Figure 8.1). The objective is to find the point of diminishing returns, where the inclusion of more factors adds very little to the variance accounted for by the solution. Using this test, only the first three factors are retained.

Both methods suggest that only the first three factors need to be retained. These three factors account for 63% of the total variance, whereas the rest account for only 37% (see Table 8.3).

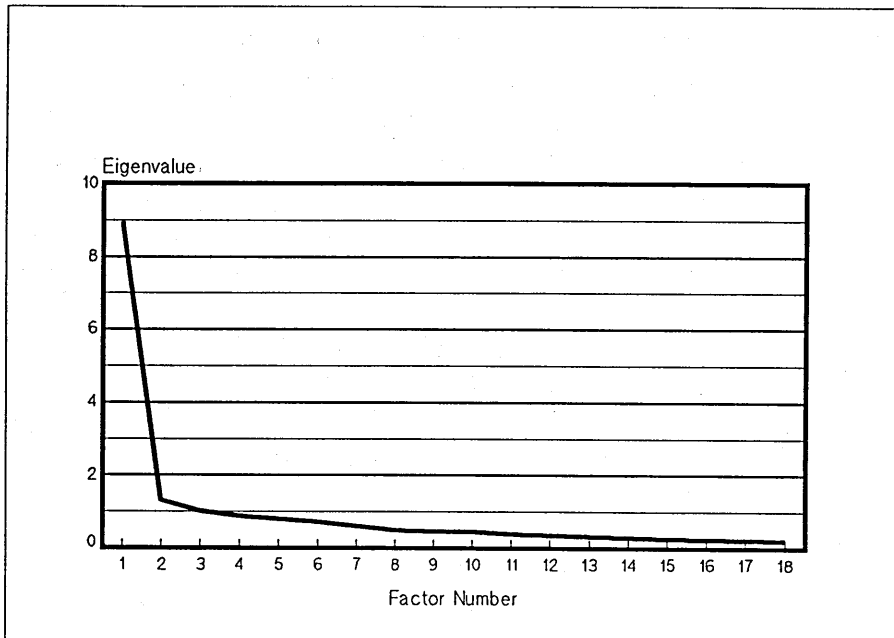


Figure 8.1 - The Scree Test on the Factor Eigenvalue

8.5 Results: The Factor Matrix

8.5.1 The Factor Correlation Matrix

The factor correlation matrix defines the size of correlation between factors. For example, if the correlation is greater than 0.3, there is enough variance to indicate correlation among the factors. In Factor Analysis, if the correlation between factors is greater than 0.3, it is more appropriate to use oblique rotation than orthogonal rotation. In this case, the correlation between factors is greater than 0.3 (see Table 8.4); thus, the oblique rotational method is used.

	Factor 1	Factor 2	Factor 3
Factor 1	1.00000		
Factor 2	0.49374	1.00000	
Factor 3	0.48204	0.43339	1.00000

Table 8.4 - The Factor Correlation Matrix

There are two matrices in the output using the oblique rotation: the pattern matrix and the structure matrix.² The pattern matrix defines the regression weights or the pattern loading. The pattern loading is interpreted as measures of the unique contribution that each factor makes to the variance of the variables. On the other hand, the structure matrix defines the product moment correlation of the variables with the oblique factors.

The problem with the structure matrix is that the correlations between variables and any given factor are likely to be inflated by the overlapping between that factor and other factors. The problem becomes more severe as the correlations among factors increase. Therefore, it becomes more difficult to determine the variables that compose the factor. In contrast, the cluster of variables that compose a factor is easier to determine with the pattern matrix. Thus, for testing the first hypothesis, the pattern matrix is used.

8.5.2 The Pattern Matrix

The rule of thumb is that if the factor loading on the attributes is greater than 0.3, then it is suitable for interpretation (Comrey, 1973). A factor loading of 0.3 indicates at least a 9% overlap in variance between the factor and the attribute. The greater the overlap between the two, the more the factor becomes a "pure" measure of the attribute. Comrey (1973) suggested the following:

- a loading in excess of 0.71 (50% overlap) = "excellent"
- a loading in excess of 0.63 (40% overlap) = "very good"
- a loading in excess of 0.55 (30% overlap) = "good"
- a loading in excess of 0.45 (20% overlap) = "fair"

² In orthogonal rotation, there is only one orthogonal factor matrix and the factors may be interpreted as pattern loading or as correlation.

- a loading in excess of 0.32 (10% overlap) = "poor"

Table 8.5 shows the factor loading on the attributes of service quality. There are three factors that describe the eighteen attributes of service quality. In this survey, these factors are subsequently referred to as the "components" of perceived service quality.

Service Quality Attribute	Factor 1	Factor 2	Factor 3
Firm Allocation	0.883	0.047	-0.095
Immediate Connection	0.840	-0.045	0.045
Adequate Capacity	0.777	-0.245	0.181
Definite Uplift	0.762	0.007	0.086
On-time Arrival	0.758	0.061	0.010
Good Handling	0.517	0.414	0.011
Meeting Emergency Needs	0.488	0.279	0.108
Less Pilferage	0.458	0.131	0.147
Credible Service	0.450	0.237	0.258
Responsive to Claims	-0.200	0.716	0.169
High Quality Feedback	0.293	0.532	0.035
Quick in Responding	0.388	0.530	-0.061
Good Tracking/Monitoring	0.453	0.492	-0.005
High Frequency Feedback	0.091	0.469	0.294
Provide Professional Advice	0.341	0.452	0.069
Courteous	-0.017	-0.028	0.883
Accessible	-0.001	0.042	0.868
Good Relationship	-0.153	0.045	0.746
NB: The three boxes denote the composition of attributes on the three factors			

Table 8.5 - The Factor Loading on the Service Quality Attributes

8.5.2.1 Component 1

Component 1 consists of nine attributes. However, only the first five attributes have factor loading greater than 0.71 (see Table 8.5). Therefore, these five attributes are considered a "pure" measure of Component 1. These five attributes are:

- Firm Allocation
- Immediate Connection
- Adequate Capacity
- Definite Uplift
- On-time Arrival

The other four attributes (Good Handling, Meeting Emergency Needs, Less Pilferage, and Credible Service) overlap more than one component. For example, the attributes Good Handling and Meeting Emergency Needs overlap Component 1 and 2. The attributes Credible Service and Less Pilferage overlap all three components.

Three of the above five attributes are related to the Reliability dimension: Firm Allocation, Definite Uplift, and On-time Arrival (see Table 7.1). On the other hand, the other two attributes Immediate Connection and Adequate Capacity fall under the Adequacy dimension. Component 1 describes the airline's ability to provide the basic services, and to perform the promised service dependably and accurately. Based on these descriptions, Component 1 can be labelled as "Predictability".

8.5.2.2 Component 2

Component 2 is loaded on six attributes, that is:

- Responsive to Claims
- High Quality Feedback
- Quick in Responding
- Good Tracking and Monitoring
- High Frequency Feedback
- Provide Professional Advice

The loading on these attributes are less than 0.71, except for one attribute (Responsive to Claims). Furthermore, the loading on these five attributes are shared between two components. For example, the loading on High Quality Feedback, Quick in Responding, Good Tracking and Monitoring, and Providing

Professional Advice overlap Component 2 and 1. The attribute High Frequency Feedback overlaps Component 2 and 3. Thus, Component 2 seems to overlap both Component 1 and 3. However, the overlapping is more towards Component 1.

The only "pure" measure of this component is the attribute Responsive to Claims. This attribute falls under the Responsiveness dimension, that is, the airline's willingness to help customers and provide prompt service.

The six attributes in Component 2 reflect the capability of the airline to provide the necessary supporting services. Therefore, Component 2 can be labelled as "Capability".

8.5.2.3 Component 3

Component 3 is loaded on the three attributes: Courteous, Accessible, and Good Relationship. The component loading on these attributes are greater than 0.71. Thus, these attributes are considered a "pure" measure of Component 3.

The attribute Courteous falls under the Courtesy dimension of service quality. The attribute Accessible falls under the Accessibility dimension. The attribute Good Relationship overlaps three of the dimensions of service quality: Communication, Understanding the Customer, and Courtesy (see Table 7.1).

The above dimensions are all related to the outcome of the interaction process between the airline personnel and its customer. Therefore, Component 3 can be labelled as "Interaction".

8.5.2.4 An Overview of Perceived Service Quality

The overlapping between components on the attributes of service quality is best illustrated in Figure 8.2. The different sizes of the circles reflect the percentage of variance accounted for by each component (see Table 8.3).

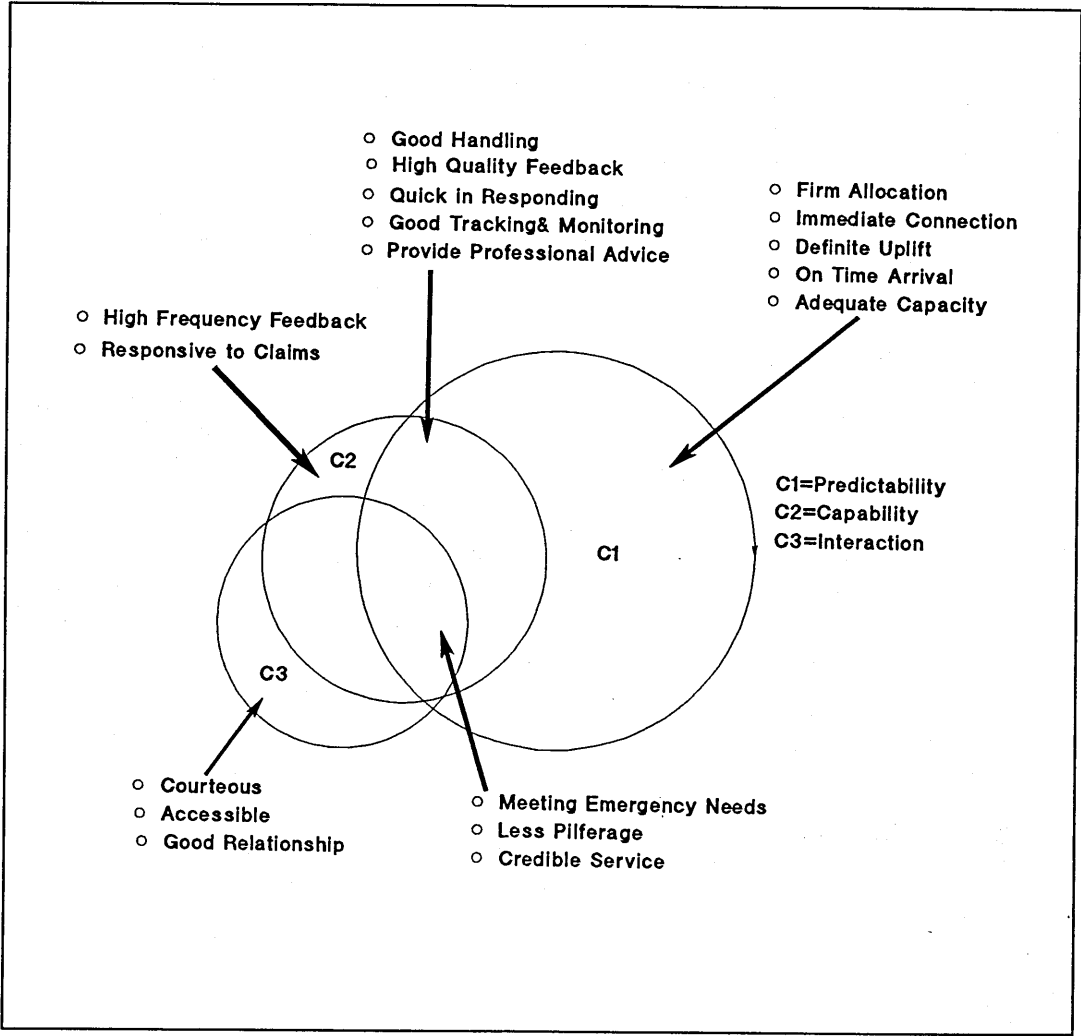


Figure 8.2 - The Schematic Illustration on the Overlapping of the Three Components of Perceived Service Quality

Each of the three components are made up of few dimensions, and each of the dimensions are made up of few attributes. Figure 8.3 illustrates the hierarchical relationship among the components, dimensions, and attributes of perceived service quality.

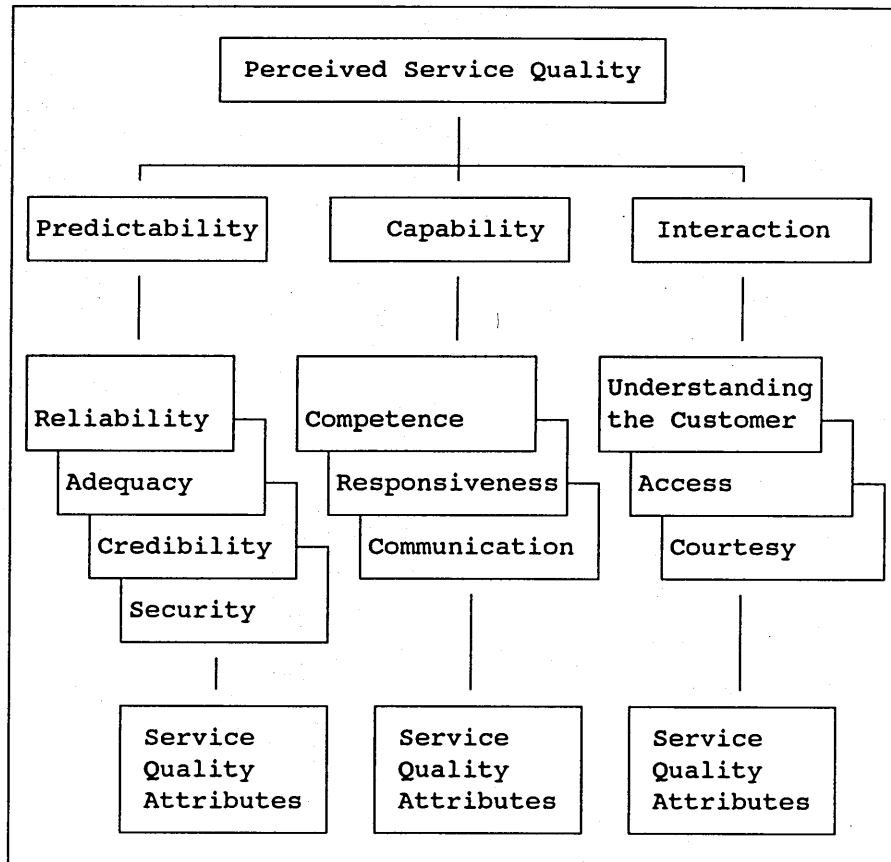


Figure 8.3 - The Hierarchical Relationship of Components, Dimensions, and Attributes of Perceived Service Quality

8.5.3 Hypotheses Testing

8.5.3.1 Hypothesis H1.1

The first hypothesis states that:

- H1.1 - Perceived service quality is influenced by two components: the technical and functional quality components.

According to Parasuraman, Zeithaml, and Berry (1990), consumers use five dimensions in evaluating service quality: Reliability, Responsiveness, Assurance, Empathy, and Tangibles. The Reliability dimension concerns the main service outcome (whether the promised service is delivered). This outcome can be referred to as the technical outcome in Gronroos's (1984) terminology. The other four dimensions are related to the outcome of the service process dimension, that is, the

functional outcome in Gronroos's terminology. The functional dimension is related to the outcome of the buyer-seller interaction.

In this survey, the analysis shows that there are three components of perceived service quality: Predictability, Interaction, and Capability. All three components are the outcomes of the service production system. Predictability is related to the airline's ability to provide the basic services dependably and accurately. Thus, it is similar to the technical component described by Gronroos (1984). It must be emphasised that the Predictability component describes mainly the core or the main aspect of the service.

On the other hand, the Interaction component relates to the interaction process between the airline and the customer. This component is similar to the functional component described by Gronroos (1984).

The Capability component refers to the outcome of the supporting services. However, this component overlaps the Predictability and the Interaction components. The overlapping is more on the Predictability component than the Interaction component, which tends to suggest that it is part of the technical outcome of the service delivery process.

In summary, the outcomes of the service production system are divided into two components: the technical and the functional components. However, the technical component can be further divided into two: primary and secondary. The primary technical component refers to the Predictability component, that is, those outcomes associated mainly with the core or the main aspect of the service. The secondary technical component refers to the Capability component, that is, those outcomes associated with the supporting services (see Fig 8.4).

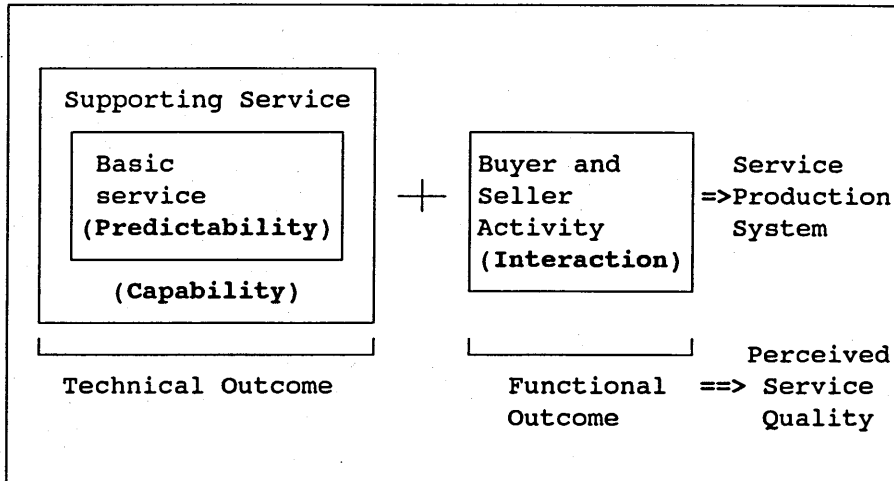


Figure 8.4 - A Diagrammatic Illustration of Perceived Service Quality

Since both the Predictability and Capability components address the technical aspect of the service, and the Interaction component addresses the functional aspect of the service, the hypothesis should be accepted.

8.5.3.2 Hypothesis H1.2

The second hypothesis states that:

- H1.2 - The technical component is more important than the functional component in shaping the customer's perceptions of service quality.

According to Gronroos (1984), the functional component is more important to the perceived service than the technical component provided the technical component has reached a satisfactory level. In other words, if the technical component has not reached a satisfactory level, then the functional component is less important than the technical component.

In Parasuraman, Zeithaml, and Berry's (1990) study, the technical component (Reliability dimension) is more important than the functional component which comprise the Responsiveness, Assurance, Empathy, and Tangibles dimensions.

It is important to note that this hypothesis is also derived from the literature. Since the term "technical" component refers to the main aspect of the service (which is the

Predictability component in the survey), the Capability component is not considered in the hypothesis testing. This is because it is not addressing the main aspect of the service production system.

There are two approaches in testing the hypothesis. The first approach makes use of Factor Analysis. From the analysis, the Predictability component accounts for 49.7% of the variance (see Table 8.3). The Capability and Interaction components account for 7.3% and 5.6% respectively. As the Predictability component accounts for the highest variance, the hypothesis H1.2 should be accepted.

The second approach makes use of the ranking on the ten dimensions of service quality. The respondents ranked the ten dimensions, with 1 as the most important and 10 as the least important (see Appendix 5C). Table 8.6 shows the ranking of the ten dimensions of service quality based on the mean score values.

Dimension of Service Quality	Mean (n=89)	Standard Deviation
Reliability	2.2135	1.7994
Adequacy	2.8539	2.5475
Credibility	4.5618	2.3401
Competence	5.4494	2.2054
Responsiveness	5.4831	2.1956
Communication	5.8989	2.2816
Access	6.6067	1.7940
Security	6.0674	2.7086
Understanding the Customer	7.4045	2.3728
Courtesy	8.5506	1.8403
The lower the mean value, the more important is the dimension.		

Table 8.6 - The Relative Ranking of the Dimensions
of Service Quality

From the Table, the Reliability, Adequacy, and Credibility dimensions are the three most important dimensions. These three dimensions and the Security dimension form the Predictability component (see Figure 8.3).

The three dimensions that constitute the Capability component are Competence, Responsiveness, and Communication. These three dimensions are ranked fourth, fifth, and sixth respectively.

The three dimensions that constitute the Interaction component are Access, Understanding the Customer, and Courtesy. These three dimensions are ranked seventh, ninth, and tenth respectively.

Table 8.7 shows the ranking of the three components. From the Table, the Predictability component is the most important component, followed by the Capability component and the Interaction component. Therefore, the hypothesis H1.2 should be accepted.

Component of Service Quality	Mean (n=89)	Standard Deviation
Predictability	3.9242	0.9685
Capability	5.6105	1.0338
Interaction	7.5206	1.1225
The lower the mean value, the more important is the component		

Table 8.7 - The Relative Ranking of the Three Components of Service Quality

8.6 Results: The Dimensions of Perceived Service Quality

This section covers the analysis on the relative importance of the ten dimensions of service quality. It also covers the comparison on the differences between the two groups of respondents (air freight forwarder and shipper), and between the two freight commodities (perishables and non-perishables).

8.6.1 Differences Between Air Freight Forwarder and Shipper

Table 8.8 shows the relative importance of the dimensions of service quality between the air freight forwarder and the shipper.

Dimension of Service Quality	Forwarder (n=64)			Shipper (n=25)		
	Mean	S.D	OR	Mean	S.D	OR
Reliability	2.167	1.86	1	2.348	1.64	1
Adequacy	2.758	2.47	2	3.131	2.80	2
Credibility	4.379	2.20	3	5.087	2.70	5
Competence	5.591	2.21	4	5.044	2.21	4
Responsiveness	5.652	2.24	5	5.000	2.05	3
Communication	5.697	2.23	6	6.478	2.39	7
Access	6.470	1.77	7	7.000	1.83	8
Security	6.303	2.65	8	5.391	2.82	6
Understanding the Customer	7.349	2.36	9	7.565	2.45	9
Courtesy	8.682	1.76	10	8.174	2.04	10
<p>The lower the mean value, the more important is the dimension.</p> <p>OR : The observed ranking of the dimensions.</p>						

Table 8.8 - The Relative Importance of the Dimensions of Service Quality Between the Air Freight Forwarders and the Shippers

For both groups, the Reliability and Adequacy dimensions are ranked first and second respectively. The Access, Understanding the Customer, and Courtesy dimensions are ranked eighth, ninth, and tenth respectively. The Competence dimension is ranked fourth by both groups.

However, there are differences on the relative importance of the Credibility, Responsiveness, Communication, and Security dimensions between the two groups. For example, Credibility is ranked third by the forwarder but fifth by the shipper. In the case of Responsiveness, it is ranked fifth by the forwarder but third by the shipper. Communication is ranked sixth by the forwarder but seventh by the shipper. Finally, Security is ranked eighth by the forwarder but sixth by the shipper. However, the differences on the relative importance of the dimensions of service quality between the two groups are not significant at $p < 0.05$.

8.6.2 Differences Between Perishables and Non-perishables

Table 8.9 shows the differences on the relative importance of the dimensions of service quality between the perishable and non-perishable commodities.

Dimension of Service Quality	Perishables (n=41)			Non-Perishables (n=48)		
	Mean	S.D	OR	Mean	S.D	OR
Reliability	2.293	1.89	1	2.146	1.72	1
Adequacy	2.512	2.31	2	3.146	2.72	2
Credibility	4.829	2.43	3	4.333	2.26	3
Competence	5.244	2.18	4	5.625	2.24	6
Responsiveness	5.390	2.29	5	5.563	2.13	5
Communication	5.951	2.29	6	5.854	2.30	7
Access	6.415	1.80	7	6.771	2.79	8
Security	6.732	2.59	8	5.500	2.71	4
Understanding the Customer	7.195	2.39	9	7.583	2.37	9
Courtesy	8.561	1.86	10	8.542	1.85	10
<p>The lower the mean value, the more important is the dimension.</p> <p>OR: The observed ranking of the dimensions</p>						

Table 8.9 - The Relative Importance on the Dimensions of Service Quality Between Perishables and Non-perishables

There is no difference on the relative importance between the perishables and non-perishables on the first three dimensions (Reliability, Adequacy, and Credibility), and on the last two dimensions (Understanding the Customer and Courtesy).

However, there are differences between the two freight commodities on the other five dimensions. For example, the Competence dimension is more important in the case of perishables (ranked fourth) than non-perishables (ranked sixth). This is because perishables are time sensitive. On the other hand, the Security dimension is more important for non-perishable goods (ranked fourth) than perishable goods (ranked eighth). This is understandable as the sample for non-perishables are mainly electronics.

The relative importance of the service quality dimensions between the two types of freight commodity are not significant at $p < 0.05$. It is important to note that the Reliability, Adequacy, and Credibility dimensions are ranked first, second, and third respectively for the two groups.

8.7 Results: The Relative Importance of the Reliability Attributes

The Reliability dimension is ranked as the most important dimension by both the air freight forwarders and the shippers, and for both the perishable and non-perishable commodities. It consists of four attributes:

- Firm Allocation
- Good Handling
- Definite Uplift
- On-time Arrival

The four attributes are related to the sequence of activities in the air freight system. The customers have to make a booking with the airlines in order to secure the space. The airline may confirm the space or waitlist the booking until a few days before the flight, depending on cancellations from other customers. During the interview, the respondents commented on the necessity of getting earlier confirmation as they have to commit to their buyers.

After the space is confirmed, the shipments are delivered to the airline processing area. The airlines personnel will raise the necessary documentation and then store the shipments in the airport cargo complex or deliver them direct to the aircraft. The handling may or may not be done by the airlines themselves. For example, in Malaysia, the handling is done by Malaysia Airlines for all the airlines operating in and out of Malaysia. In Singapore, it is handled by two handling agents, that is, Changi International Airport Services (CIAS) and Singapore Airport Terminal Services (SATS).

Even if the space is confirmed, and the shipments have been physically accepted by the airlines, there is no guarantee that the shipments will be uplifted on the designated flight. This could be due to a change in aircraft configuration, or mishandling by the airlines or the airport handling agent's personnel. It could also be due to the over booking policy practised by some airlines.

Finally, even if the shipments are uplifted, there is no guarantee that they will arrive on time. The reasons could be due to emergency transit, or delay in departures.

In order to determine the relative importance of the four attributes, the respondents were asked to give a weighting on the four reliability attributes in Part 4 of the questionnaire (see Appendix 5C). The total weighting should equal ten; this is to

prevent the respondent from giving equal weighting to all the four attributes. The higher number on the individual attribute signifies its importance to the respondent.

8.7.1 Differences Between Air Freight Forwarder and Shipper

The mean weighting of the reliability attributes of the air freight forwarders and shippers is analysed using the SPSS program. Table 8.10 shows the differences on the weighting scores of these attributes between the air freight forwarders and the shippers.

Attribute	Total	Forwarder (n=64)		Shipper (n=25)		t-test
		Mean	S.D	Mean	S.D	
Definite Uplift	2.9663	3.0909	1.224	2.6087	1.469	0.126
Firm Allocation	2.6854	2.7424	1.373	2.5217	0.994	0.481
On-time Arrival	2.4719	2.2879	1.160	3.0000	1.537	0.023
Good Handling	1.8539	1.8485	0.916	1.8696	1.290	0.932
The higher the mean score, the more important is the attribute						

Table 8.10 - The Relative Importance on the Reliability Attributes Between the Air Freight Forwarders and the Shippers

From the Table, Definite Uplift has been rated by the customers as the most important attribute, followed by Firm Allocation, On-time Arrival, and Ground Handling.

However, there are differences on the relative importance of these attributes between the air freight forwarders and the shippers. For example, the most important attribute to the forwarders is Definite Uplift. However, the most important attribute to the shipper is On-time Arrival, but it is ranked third by the forwarders. The difference in the mean rating on On-time Arrival between the two groups is significant at $p < 0.05$.

The difference on the two attributes, Definite Uplift and On-time Arrival, between the two groups could be explained by their respective job functions. The air freight

forwarders view their task as completed when the goods have been uplifted on board the aircraft. On the other hand, the shippers view their task as completed only when the goods have been received by their customers.

8.7.2 Differences Between Perishables and Non-perishables

Table 8.11 shows the differences on the relative importance of these attributes between the two groups.

Attribute	Total	Perishables (n=41)		Non-Perishables (n=48)		t-test
		Mean	S.D	Mean	S.D	
Definite uplift	2.9663	3.1463	1.389	2.8125	1.214	0.230
Firm allocation	2.6854	2.6585	1.371	2.7083	1.220	0.857
On time arrival	2.4719	2.3415	1.316	2.5833	1.286	0.384
Good handling	1.8539	1.8049	1.078	1.8958	0.973	0.667

Table 8.11 - The Relative Importance on the Reliability Attributes Between the Perishables and Non-perishables

From the Table, Definite Uplift is the most important attribute for both the perishables and the non-perishables. Firm Allocation, On-time Arrival, and Good Handling are rated second, third, and fourth respectively. There is no difference in the relative importance of these attributes between the two groups.

The mean weighting on Definite Uplift is slightly higher for the perishables than the non-perishables. This is expected due to the nature of the perishables. However, the difference in the mean scores is not significant at $p < 0.05$. There are two possible reasons for this. Firstly, the non-perishables in the survey are biased towards electronics. Had it been general cargo, then the difference with perishable goods could be significant. Secondly, it could be due to the sample size. If the sample size is increased, then the difference is more significant at lower significance level.

8.8 Results: Relationship Among the "Good", "Average", and "Poor" Airlines on the Components of Service Quality.

In the survey, the respondents were asked to provide the names of any six airlines that they have dealt with. These six airlines are then rated on the scale of 1 to 5 on the eighteen attributes of service quality. Prior to the rating exercise, the respondents grouped the airlines (two each) into three categories: "good", "average", and "poor". The grouping of the airlines into these three categories is based on their perceptions of the quality of services provided by these airlines.

At this stage, the analysis is limited to the mean scores of the three categories of airlines on the eighteen attributes. The specific airline's mean score is relevant to Stage 6 of the research only and shall be covered in Chapter 10.

Table 8.12 shows the mean scores of the three categories of airlines on the three components of service quality.

Component of Service Quality	"Good" Airline (n=166)*		"Average" Airline (n=150)*		"Poor" Airline (n=96)*	
	Mean	S.D	Mean	S.D	Mean	S.D
Predictability	4.2751	0.506	3.7807	0.644	2.6354	0.759
Capability	3.8805	0.564	3.5778	0.667	2.7431	0.756
Interaction	4.2269	0.628	4.0511	0.731	3.2569	0.841
* - n denotes the number of cases from the 89 respondents. The maximum number of cases per respondent is 12, and the minimum is 3.						

Table 8.12 - The Mean Scores on the Three Components of Service Quality for the Three Categories of Airlines

In the case of the "good" airline, the Predictability component has the highest mean score, followed by the Interaction and Capability components. However, for the "average" and "poor" airlines, the Interaction component has the highest mean score. For the "average" airline, it is followed by the Predictability and Capability components. In the case of the "poor" airlines, it is followed by the Capability and Predictability components.

The finding shows that the "good" airlines are perceived to perform better on the Predictability component whereas the "average" and "poor" airlines perform better on the Interaction component.

The other interesting finding is that the "poor" airlines are perceived to perform better on the Capability component than the Predictability component. However, in the case of the "good" and "average" airlines, they are perceived to perform poorly on the Capability component in relation to the other two components.

The differences in the components' mean scores among the three categories of airlines are significant at $p < 0.001$, except for the Interaction component between the "good" and "average" airlines where $p = 0.022$ (see Table 8.13).

Component of Service Quality	t-test Between "Good" & "Average"	t-test Between "Good" & "Poor"	t-test Between "Average" & "Poor"
Predictability	0.000	0.000	0.000
Capability	0.000	0.000	0.000
Interaction	0.022	0.000	0.000

Table 8.13 - The t-test (two-tailed) of the Components' Mean Scores between the Three Categories of Airlines

8.9 General Critiques of the Survey

The findings from this survey show that perceived service quality is made up of the technical and functional components. The technical component is further divided into two components: Predictability (primary technical outcome) and Capability (secondary technical outcome). This is a new finding and should be taken with caution because of certain limitations pertaining to the location of the survey and the sample size.

There may be some degree of bias as the survey was conducted in Singapore and Malaysia. For example, in the case of non-perishables, the sample is made up mainly of electronics as electronics are mainly air-freighted out of these two countries. Had the survey been conducted in other countries such as India, the sample may consist of general cargo such as leather goods.

This is further compounded by the use of the random sampling technique. In order to minimise the bias, either purposive sampling or stratified random sampling should be used.

The actual sample size of the shippers dealing with perishables is not as planned. Some of the shippers refused to be surveyed; therefore, there is the problem of non-response bias. Many of those surveyed are small family businesses; therefore, the shippers' views are more skewed towards small shippers and may not be representative of the large shippers.

8.10 Conclusion

The analysis in Stage 4 of the research shows that there are three components of perceived service quality; they are Predictability, Capability, and Interaction. The Predictability and Capability components are the technical outcomes of the service production system, whereas the Interaction component is the functional outcome. The Predictability component represents the main or basic aspect of the service, whereas the Capability component represents the supporting services. Thus, the Predictability component is addressing the primary technical outcome, whereas the Capability component is addressing the secondary technical outcome.

The Predictability component is the most important component to the customers, followed by the Capability and Interaction components. Within the Predictability component, the Reliability dimension is the most important dimension to the two groups of customers and for the two types of freight commodity.

The Reliability dimension is made up of four attributes: Firm Allocation, Ground Handling, Definite Uplift, and On-time Arrival. The relative importance of the attributes Definite Uplift and On-time Arrival differ between the air freight forwarders and the shippers. The air freight forwarders emphasise on Definite Uplift, whereas the shippers emphasise on On-time Arrival.

The airlines have been categorized as "good", "average", and "poor" by the customers based on their perceptions on the quality of services. The "good" airlines are perceived to perform better on the Predictability component than the Interaction and Capability components. On the other hand, the "average" and "poor" airlines are perceived to perform better on the Interaction component than the Predictability and Capability components.

Chapter 9 - Stage 5 Findings: The Trade-off Among the Price and Service Attributes

9.0 Introduction

This stage of the research (Stage 5) addresses the trade-off among the price and service attributes. Conjoint Analysis is used for the testing. The data are analysed using the \$FTROFF program, which provides an individual respondent's utility values on the price and service attributes. The data are subsequently aggregated using the SPSS program. This is to test the first hypothesis that price is less important than the service attributes to both the forwarder and the shipper in the air freight industry.

The respondents are then grouped based on the similarities of their responses using Cluster Analysis (SPSS). This is used to test the second hypothesis that there is a significant difference in emphasis on the price and service attributes between groups having different job descriptions. Basically, these groups tend to focus on those functions and activities that have the most direct impact on their performance. Therefore, groups from different functional areas are likely to have different emphasis on the price and service attributes.

9.1 The Service Concept

The service package is normally divided into two main categories: the core service (Gronroos, 1978, Eiglier and Langeard, 1981, and Normann, 1984) and the peripheral services (Eiglier and Langeard, 1981; and Normann, 1984). The set back with this categorisation is that it does not include the element of interaction. According to Gronroos (1990), a model of the service offering as a product has to be customer oriented. Thus, the categorisation has to include all the attributes of a service that customers perceive. Since the Interaction attribute is part of the perceived service quality, this attribute should be included in the service offering. Gronroos (1990) refers to this as an augmented service offering.

In the conventional marketing terminology, the term "peripheral" does not include the element of interaction. However, since this element is necessary in shaping the customer's perceptions of service quality, it should be included in the peripheral services.

This stage of the research makes use of six attributes, consisting of five service attributes and one price attribute. The five service attributes are:

- Definite Uplift
- Good Handling
- Firm Allocation
- Immediate Connection
- Interaction Quality

The first four service attributes are part of the basic service as mentioned in Chapter 8. The first two form the core service, whereas the other two together with Interaction Quality are part of the peripheral services. The service attributes are arranged with three levels each, whereas the price attribute has four levels (see Table 5.1 in Chapter 5).

9.2 Sample Size

Two surveys were conducted in this stage of the research. The initial survey was conducted with a sample size of seventeen air freight forwarders and fifteen shippers. An extended survey was subsequently conducted in order to confirm the outcome of the initial survey, that is, the importance of the core and peripheral services to the respondents (air freight forwarders) with different job functions. The extended survey was conducted with a sample size of sixteen air freight forwarders.¹ The respondents from the initial and extended survey are from the same firms.

In the initial survey, the respondents are selected from two functional areas: operational and non-operational. The respondents from the non-operational area are from the sales division and top management. On the other hand, the respondents from the operational area are those involved in the operational activities of the service delivery.

In the extended survey, the respondents are also from the two functional areas. If the respondent in the initial survey is from the operational area, then the respondent in the extended survey would be from the non operational area in the same firm.

This stage of the research involves the forwarders and shippers dealing specifically in electronic goods. In the case of the shippers, they are from both the industrial and consumer electronic manufacturing concerns. This is to establish the differences, if any, on the trade-off among the price and service attributes. The air

¹ The data from one of the respondents in the initial survey had a high badness-of-fit and Kendall's tau. As such, the extended survey covered only sixteen respondents.

freight forwarders are those that have dealing with electronics shippers; however, the percentage of their dealings in electronics varies between 5% to 95%.

The commodity codes in the Air Cargo Tariff Manual is used to determine the different types of electronic products. These codes are used by the International Air Transport Association (IATA) in establishing the specific commodity rates for various freight commodities. In the survey, the codes 4400 to 4499 are used. These codes cover electrical and electronic appliances, machinery and parts, communications, and signal devices. Out of the fifteen shippers, eleven manufacture silicon wafers, integrated circuits, semi-conductors, and other various electronics components. The other four shippers are manufacturers of cameras and quartz components for watches. Most of these products are sent to Japan and USA for further assembly and distribution to customers.

The respondents for the initial survey are selected at random. However, about 35% from the initial listing were not willing to be interviewed. Additional respondents were subsequently added to the list to make up the sample size of fifteen forwarders and fifteen shippers. About 50% of these respondents had participated in Stages 2, 3, and 4 of the research.

9.3 The Reliability of the Data

The data from the respondents are analysed using the trade-off (\$FTROFF) program. This program transforms the pair-wise trade-off data into utility values. However, the analysis is limited to the individual respondent only. From the utility values, one could determine the respondent's sensitivity to the attribute, that is, how many utility units the respondent must be compensated with in order for him to forego that attribute level.

The data are transformed into utility values in two steps. The first step estimates the utility values directly from the trade-off data. The second step is an iterative procedure which modifies each utility incrementally. This is to improve the consistency between the observed trade-off ranking and the ranking which are implied by the utility values. The objective is to assign utility values to all attribute levels which are perfectly consistent with the observed pair-wise ranking.

The inconsistencies between the observed trade-off data and the estimated utility values are referred to as the badness-of-fit and Kendall's tau. The badness-of-fit takes into account the degree of errors; 0 indicates no error of fit, whereas 1 indicates maximum error. On the other hand, Kendall's tau is based on the number of errors without regard to the degree of errors; 1 indicates perfect rank ordering, whereas 0 indicates unrelated ordering.

The set back with the two reliability figures is that there is no guide-line on the cut-off point, that is, the point at which one would treat the output as doubtful. In this survey, a cut-off point of 0.15 and 0.85 are taken for the badness-of-fit and Kendall's tau respectively. Using this cut-off point, only one respondent (Respondent #7) failed to meet the criterion (see Appendix 9A). The badness-of-fit for Respondent #7 is 0.18, whereas the Kendall's tau is 0.80. Since this respondent failed to meet the criterion on the badness-of-fit, this respondent is excluded from the aggregate-level analysis.

9.4 Results: The Initial Survey

The advantage of the aggregate-level analysis is that one can use the results to identify the optimum level of the attribute and the importance of each attribute in structuring a new service offering. Furthermore, aggregating respondents with similar preferences or utility functions would assist the marketing personnel in designing the appropriate service offerings for the various market segments.

In this survey, there are two ways of aggregating the respondents. Firstly, the data is aggregated according to the two customer groups: the air freight forwarder and the shipper. Secondly, the data is aggregated based on the outcome of the Cluster Analysis. The Cluster Analysis groups the respondents into the price sensitive and less price sensitive groups.

Table 9.1 shows the aggregate mean utility values of the forwarders and the shippers on the six attributes. The last column indicates the significance level on the differences of the mean utility values between the forwarders and the shippers.

Attribute	Forwarder (n=16)			Shipper (n=15)			Signi- ficance level t-test p^*
	Mean (%)	S.D. (%)	R	Mean (%)	S.D. (%)	R	
Price	19.05	5.83	2	15.95	7.02	3	0.19
Definite Uplift	18.60	4.76	3	15.04	3.39	5	0.02
Good Handling	20.13	4.78	1	23.23	3.45	1	0.04
Interaction Quality	13.85	5.21	5	14.42	6.91	6	0.80
Firm Allocation	12.65	6.50	6	15.39	7.12	4	0.27
Immediate Connection	15.76	4.01	4	15.96	5.53	2	0.91
* - two-tail t-test R - Attribute ranking based on the mean utility value							

Table 9.1 - The Attributes Mean Utility Value of the Forwarders and the Shippers.

9.4.1 The Core Service

9.4.1.1 Definite Uplift

From Table 9.1, the forwarders (mean = 18.60%) place more emphasis than the shippers (mean = 15.04%) on the attribute Definite Uplift. The difference between the two mean utility values is significant at $p < 0.05$. This finding is consistent with the finding in Stage 4 of the research. Furthermore, the forwarders are more sensitive to changes in the attribute level. For example, for 98% definite uplift, the forwarders' mean utility value is higher than the shippers at $p < 0.10$ (see Figure 9.1). Similarly for 88% definite uplift, the forwarders' mean utility value (negative) is also higher than the shippers at $p < 0.05$.

The reason why the forwarders place more emphasis on definite uplift is because of the differences in their business functions. This subject has already been addressed in Chapter 8. The difference in emphasis is also due to the sales collections. For example, as soon as the goods are uplifted, the forwarder can invoice the airline for the commission. Similarly, he can also use the uplift as the triggering point to invoice the shipper. In contrast, the shipper does not use uplift as the triggering point to invoice the customer.

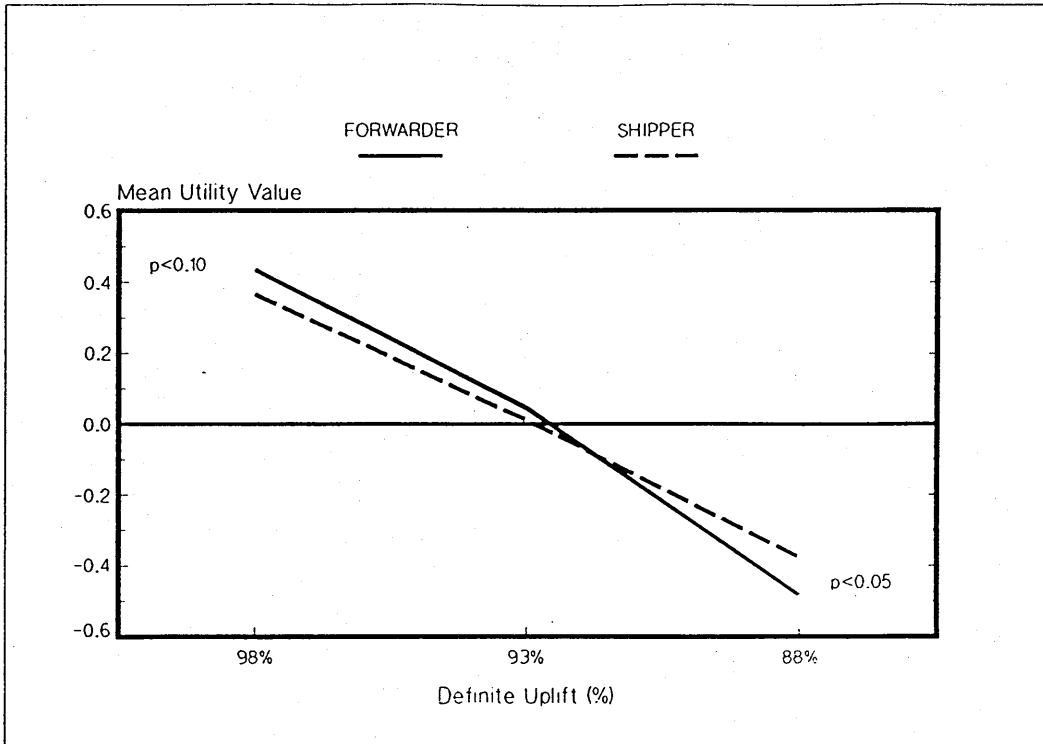


Figure 9.1 - The Comparison on the Definite Uplift Mean Utility Values Between the Forwarders and the Shippers

9.4.1.2 Good Handling

From Table 9.1, the attribute Good Handling is the most important service attribute to the two groups. However, the standard deviation for the shippers is lower compared to the forwarders. In Stage 4, this attribute is not ranked as the most important attribute. This could be due to the choice of the freight commodity in the survey. Stage 4 concentrates on the broad classifications of the freight commodity, whereas Stage 5 focuses specifically on electronics. Furthermore, the respondents in Stage 4 were not able to rate this attribute properly as handling is normally provided by the handling agent. In contrast, in Stage 5, the questionnaire does not address the airlines.

The difference on the mean utility values between the two groups is consistent in both Stages 4 and 5. In both cases, the shippers place more emphasis than the forwarders on this attribute. For example, the shipper's mean utility value is 23.23%, whereas the forwarder's is 20.13%. The difference of the two means is significant at $p < 0.05$. Furthermore, the shippers are more sensitive to changes in

two means is significant at $p < 0.05$. Furthermore, the shippers are more sensitive to the changes in the attribute level of good handling (see Figure 9.2). For example, at 2% mishandling, the shippers' utility value is higher than the forwarders at $p < 0.05$. Furthermore, at 6% mishandling, the shippers' utility value (negative) is also higher than the forwarders at $p < 0.10$.

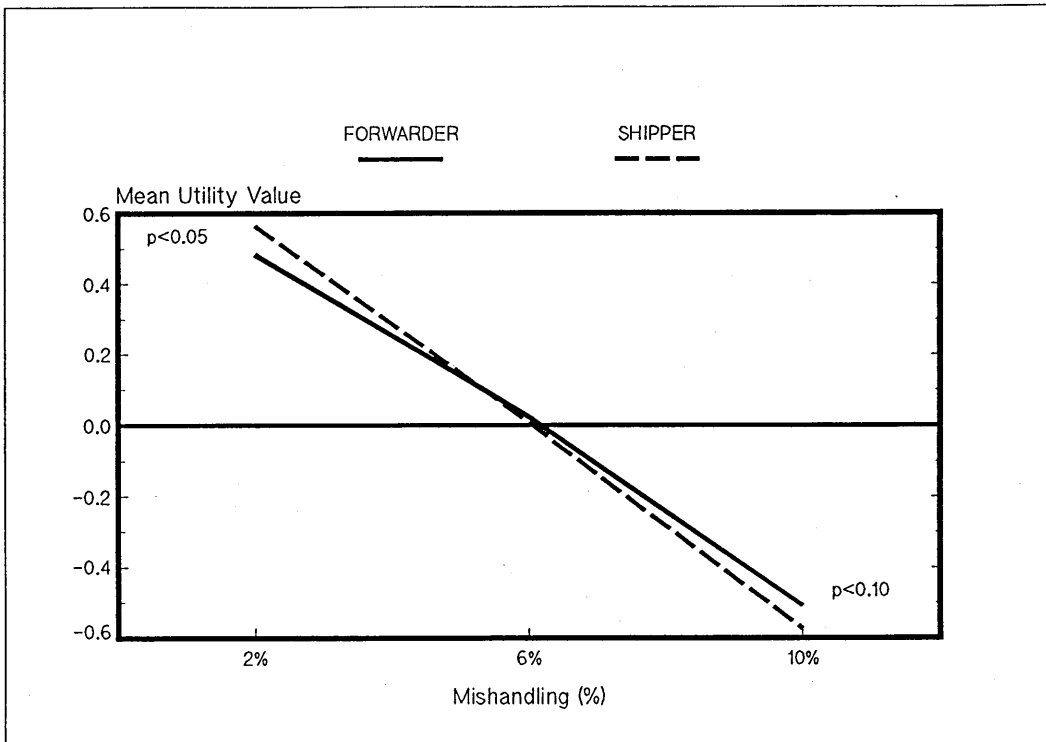


Figure 9.2 - The Comparison on the Good Handling Mean Utility Values Between the Forwarders and the Shippers

There are two reasons why the handling utility value for the shippers is higher than the forwarders. Firstly, misplacement or missing consignments would affect their revenue and subsequently the profit level. The shippers could make an insurance claim. However, it may take three to six months to get the claim, and they may not get the full insured value. Furthermore, mishandling of consignments would affect the shippers' service level to the customers. The research conducted by Christopher, Scharyand, and Skjott-Larsen (1979, p.53), confirmed that product availability is the most important variable affecting customer service level.

Secondly, any mishandling (short shipments) may delay the clearance of goods from import warehouse, thus affecting their customer service level. Most of the

electronics firms in Japan and USA are working on the just-in-time (JIT) concept, which makes timely delivery important.

The forwarders place less emphasis on the attribute Good Handling. The forwarder, being an intermediary, will not be affected directly because he will still get paid by the airline (in terms of commission) and the shipper.

9.4.2 Peripheral Services

The peripheral services consist of three attributes: Immediate Connection, Interaction Quality, and Firm Allocation. The attribute Immediate Connection is ranked fourth for the forwarders, whereas it is ranked second for the shippers (see Table 9.1). However, the difference in the mean utility values between the two groups is not statistically significant.

The shippers place more emphasis on the attribute Firm Allocation than the forwarders. This attribute is ranked fourth for the shippers, whereas it is ranked sixth for the forwarders. In Stage 4 of the research, it is the forwarders who place more emphasis on this attribute than the shippers. In both Stages 4 and 5, the difference in the emphasis between the two groups on this attribute is not statistically significant.

Interaction Quality is ranked fifth and sixth for the forwarders and shippers respectively. The difference in the mean utility values between the two groups is not statistically significant.

9.4.3 Price

From Table 9.1, price is ranked second by the forwarders and third by the shippers. Furthermore, the forwarders are less variable in their responses than the shippers, as indicated by the lower standard deviations. However, the difference in the price mean utility values between the two groups is not statistically significant.

9.4.4 The Price Sensitive and Less Price Sensitive Groups

Cluster Analysis is used to group the respondents based on the similarities of their responses. From the analysis, there are two groups of respondents:

- price sensitive group
- less price sensitive group

The difference in responses between the price sensitive group and the less price sensitive group is due to their different perceptions on the trade-off between the

price and service attributes. The difference in perceptions could be due to their different job functions in the organization. Within the same job function, the perceptions among respondents should be similar. This is supported by the "Commonality Corollary" of the Personal Construct Theory (Kelly, 1955). The corollary states that:

"To the extent that one person employs a construction of experience which is similar to that employed by another, his processes are psychologically similar to those of the other person"

Kelly (1955, p. 55)

The different perceptions are further supported by Christopher, Schary, and Skjolt-Larsen's (1979) study which identified two factors responsible for the differences in perceptions: the organisation and the respondent's job descriptions.

9.4.4.1 The Forwarder

In the case of the forwarders, the price sensitive group comprises respondents from the sales division or top management (for example, managing director or general manager). The less price sensitive group comprises respondents from the operational area, that is, the operations manager. There is no significant difference in the activities and size of the organisation of these two groups.

From the Cluster Analysis, the respondents from the operational area are less price sensitive than those from the sales division and top management. The difference in the price mean utility values of these two groups is significant at $p < 0.05$. Table 9.2 shows the job title of the respondents and the mean utility values of the two groups.

Cluster Analysis	Respondent Number	Job Title	Mean Utility Value	Two-tail t-test
Price Sensitive Group	5	1	21.74%	0.034
	10	1		
	9	3		
	8	1		
	32	3		
	11	1		
	29	3		
	17	1		
	23	3		
	25	1		
Less Price Sensitive Group	24	2	15.60%	
	28	2		
	6	2		
	18	2		
	27	2		
	26	2		
Job Title 1 = Managing Director or General Manager				
Job Title 2 = Operations Manager				
Job Title 3 = Sales Director or Sales Manager				

Table 9.2 - The Respondents' Job Title in the Price Sensitive and Less Price Sensitive Groups

The responses from the top management are expected to differ from that of the sales and operations management, because of their different decision-making perspectives and area of responsibility in the organisation. However, there is one similarity between the top management and the sales management, that is, both are concerned with revenue performance. The top management is concerned with the financial performance of the company, whereas the sales management is concerned with his internal performance appraisal system. In most cases, the performance of sales personnel is appraised on their ability to generate revenue for the company. Thus, both the top management and the sales personnel are concerned with maximising revenue.

One way of maximising revenue is to get the lowest possible rate (cost price) from the airline and charge the maximum possible rate (selling price) to the shipper. If the objective is to get the lowest rate from the airline, then these two groups are likely to be sensitive to the airline selling rate.

On the other hand, the operational manager's performance is measured using different criteria. For example, his performance is measured by his efficiency in serving the customers. Therefore, it is not surprising that the operations manager is

less sensitive on the price attribute. Instead, he is expected to be more sensitive on the service attributes.

9.4.4.2 The Shipper

There is a vast difference in the price mean utility values between the price sensitive and less price sensitive shipper. For the price sensitive group, the mean utility value is 24.80%, whereas for the less price sensitive group, it is 11.53% (see Table 9.4). The difference in the price mean utility values between the two groups is statistically significant at $p < 0.001$.

Unlike the forwarders, there is no difference in the respondents' job title among the shippers. All the shippers in the survey are dealing in logistics and shipping. However, there is a difference in the types of electronic products they manufacture. The less price sensitive group manufactures semi-conductors and electronic components mainly for industrial purposes. The price sensitive group manufactures consumer electronic goods, for example, cameras, and quartz parts for watches, except for one who manufactures industrial electronics. This company has been in recession since early 1992. They have cut their production level and working hours. The working hours has been reduced from a 5-day shift to a 4-day shift. The respondent, during the survey, indicated the necessity to cut the shipping budget in the organization. Thus, this probably explains his sensitivity on the price attribute.

The buyers of the watch quartz components are price sensitive. This is because the final products are sold in the market at a very competitive price. Thus, the manufacturers are forced to lower the price of these components. One way of lowering the price is to minimise the freight charges. Thus, it is not surprising they are sensitive on the price attribute.

Similarly, the camera manufacturers are also concerned on the cost of air freight per unit of camera. The rate for air freighting (in general) is based on the weight of the consignment. Thus, given a fixed weight allocation, the camera manufacturers are able to send only a smaller number of items than the manufacturers of industrial electronics, and therefore their unit cost is relatively higher.

In summary, the difference in emphasis on the price attribute between the price sensitive and less price sensitive groups among the shippers and forwarders is due to two factors:

- the respondent's job title
- the type of organisation

In the case of the forwarders, the difference in emphasis on the price attribute is due to the respondents' job title. Thus, the two groups (price sensitive and less price sensitive) that emerged from the analysis do not reflect the types of forwarders in the industry. It merely shows the two types of respondents.

In contrast, there are two distinct groups of electronics manufacturers: industrial electronics and consumer electronics. These two groups reflect the types of electronics they manufacture.

9.4.5 Differences Between the Price Sensitive and Less Price Sensitive Groups on the Service Attributes

The finding indicates that the price sensitive group places more emphasis on Good Handling and Definite Uplift, whereas the less price sensitive group emphasises Immediate Connection, Firm Allocation, and Interaction Quality. Definite Uplift and Good Handling are part of the physical distribution, whereas Immediate Connection, Firm Allocation, and Interaction Quality are not. These three, however, are part of the elements of the marketing mix. Definite Uplift and Good Handling are part of the core service, whereas the other three are part of the peripheral services.

For the forwarders, the differences in the mean values of the core and peripheral services between the two groups of respondents are significant at $p < 0.05$. The price sensitive group places more emphasis on the core service, whereas the less price sensitive group places more emphasis on the peripheral services (see Table 9.3).

Attribute	Price Sensitive Group Mean (%) (n=10)	Less Price Sensitive Group Mean (%) (n=6)	two-tail t-test
Price	21.74	15.60	0.034
Core service	41.62	35.56	0.020
Peripheral services	36.64	48.84	0.001
Total	100.00%	100.00%	

Table 9.3 - The Relative Importance of Attribute Mean Utility Values for the Price Sensitive and Less Price Sensitive Groups (Forwarders)

In the case of the shippers, the price sensitive group places more emphasis than the less price sensitive group on the core service. However, the difference in the mean utility values on the core services between the two groups is not significant (see Table 9.4). In contrast, the difference in the mean utility values on the peripheral services between the two groups is statistically significant at $p < 0.005$.

Attribute	Price Sensitive Group Mean (%) (n=5)	Less Price Sensitive Group Mean (%) (n=10)	two-tail t-test
Price	24.80	11.53	0.001
Core service	39.16	37.83	0.654
Peripheral services	36.04	50.64	0.002
Total	100.00%	100.00%	

Table 9.4 - The Relative Importance of Attribute Mean Utility Values for the Price Sensitive and Less Price Sensitive Shippers

9.5 Results: The Extended Survey

The extended survey was conducted with sixteen air freight forwarders. These sixteen respondents came from the same firms as those respondents in the initial survey. Out of the sixteen respondents, ten are selected from the operational area, whereas the other six are from the non-operational area (five from the sales division, and one from the top management). Table 9.5 shows the breakdown of the respondents by job title in both the initial and extended surveys.

Job Title	Initial Survey (n=16)	Extended Survey (n=16)
Managing Director/General Manager	6	1
Operations Manager	6	10
Sales Director or Manager	4	5

Table 9.5 - The Sample of Respondents in the Initial and Extended Surveys

The analysis in the extended survey shows that the top and sales management are more price sensitive than those in the operations group (see Table 9.6). The difference in the mean utility value between the two groups is statistically significant at $p < 0.05$. The price sensitive group (non-operational group) in the extended survey also places more emphasis on the core service, whereas the less price sensitive group places more emphasis on the peripheral services. The differences in the mean utility values on the core and peripheral services between the two groups are statistically significant at $p < 0.01$.

Attribute	Non-operational Group Mean (%) (n=6)	Operational Group Mean (%) (n=10)	two-tail t-test
Price	17.85	12.86	0.036
Core service	45.00	36.34	0.005
Peripheral services	37.15	50.80	0.000
Total	100.00%	100.00%	

Table 9.6- The Relative Importance of Mean Utility Values of the Attribute for the Two Groups of Forwarders in the Extended Survey

Therefore, the findings from the extended survey confirm that the different emphasis on price and service attributes is due to the difference in job title. Furthermore, the findings also confirm that the price sensitive group places more emphasis on the core service, whereas the less price sensitive group places more emphasis the peripheral services.

9.6 Hypotheses Testing

9.6.1 Hypothesis H2

The hypothesis states that:

- H2 - Price is less important than the service attributes to both the forwarder and the shipper in the air freight industry.

The analysis includes the data from both the initial and extended surveys. Thus, the sample size for the analysis is forty-seven: thirty-two forwarders and fifteen shippers. The analysis is done in two stages. The first stage is to determine the importance of the attributes to both the forwarders and the shippers. The second stage is to determine the importance of the same attributes to the price sensitive and less price sensitive groups.

Table 9.7 shows the mean utility values of the price and service attributes of both the forwarders and the shippers.

Attribute	Forwarder (n=32)		Shipper (n=15)	
	Mean Utility Value (%)	Standard Deviation (%)	Mean Utility Value (%)	Standard Deviation (%)
Price	17.06	5.70	15.95	7.02
Definite Uplift	17.91	4.80	15.05	3.39
Good Handling	21.57	4.40	23.23	3.45
Interaction Quality	14.26	5.30	14.42	6.91
Firm Allocation	13.68	6.50	15.39	7.12
Immediate Connection	15.52	5.56	15.96	5.53
Total	100.00%		100.00%	

Table 9.7 - The Relative Importance of Mean Utility Values of the Service and Price Attributes of both the Forwarders and the Shippers

From Table 9.7, the forwarders place more emphasis on Good Handling and Definite Uplift. In this case, price is ranked third. On the other hand, the shippers place more emphasis on Good Handling, followed by price. The reason why the forwarders place greater emphasis on Definite Uplift has already been explained earlier.

Since price is not ranked first for both the forwarders and the shippers, the hypothesis H2 should be accepted.

9.6.2 Hypothesis H3

The hypothesis states that:

- H3 - There is a significant difference in emphasis on the price and service attributes between the operational and non-operational groups in organizations within the air freight industry.

The analysis is limited to the air freight forwarders only. Of interest in this survey are the two distinct functional areas in the air freight forwarder's organization: operations and sales. The main function of the operations unit is to service the customers and satisfy the commitments made by the sales personnel. On the other hand, the sales department is to secure the space and the freight rates from the airlines. The space is subsequently sold to the customers at a higher rate. In this survey, these two groups are referred to as the operational and non-operational groups.

In the case of the manufacturers, the shipping department deals with the air freight forwarders and the airlines to secure the cargo space and rates for the distribution of their goods. The department's main task is to ensure that the goods reach the customers on time. Unlike the forwarders, the shipping department is not in the business of selling the cargo space to another party. Therefore, the concept of "sales" as in the air freight forwarders does not exist in the shipping department. Thus, the manufacturers (shippers) are excluded from the hypothesis testing.

Table 9.8 shows the mean utility values of the price and service attributes of the operational and non-operational groups.

Attribute	Non-Operational Group (n=16)		Operational Group (n=16)		two-tail t-test
	Mean Utility Value (%)	Std. Dev. (%)	Mean Utility Value (%)	Std. Dev. (%)	
Price	20.27	5.50	13.89	4.00	0.001
Definite uplift	19.65	4.80	16.13	4.30	0.036
Good handling	23.23	4.60	19.92	3.40	0.029
Interaction quality	12.08	4.50	16.43	5.30	0.018
Firm allocation	13.32	7.30	14.04	5.80	0.762
Immediate connection	11.45	4.30	19.59	2.90	0.000
Total	100.00%		100.00%		

Table 9.8 - The Relative Importance of Mean Utility Values of the Price and Service Attributes of both the Operational and Non-operational Groups

For the non-operational group, Good Handling is ranked first, whereas price is ranked second. In the case of the operational group, Good Handling is ranked first, whereas price is ranked last. The difference on the price mean utility values between the two groups is statistically significant at $p < 0.01$. Therefore, the non-operational group is referred to as the price sensitive group, and the operational group is referred to as the less price sensitive group.

The other difference between the two groups is on the attribute Immediate Connection. This attribute is ranked sixth by the non-operational group; however, it is ranked second by the operational group. This implies that the non-operational group is less concerned with the number of transits, whereas the operational group prefers a direct service. The difference in the mean utility values between the two groups is statistically significant at $p < 0.001$.

The non-operational group places less emphasis on Interaction Quality than the operational group. The attribute is ranked fifth by the non-operational group, whereas it is ranked third by the operational group. This is due to the nature of the task of the operational group, that is, the need to service the customers with information obtained from the airlines.

Since the two groups differ in their sensitivity towards price, it is meaningful to further analyse their emphasis on the core and peripheral services. This analysis is shown in Table 9.9.

Attribute	Non-operational Group (n=16)		Operational Group (n=16)		two-tail t-test
	Mean Utility Value (%)	Std. Dev. (%)	Mean Utility Value (%)	Std. Dev. (%)	
Price	20.28	5.50	13.89	4.40	0.001
Core Service	42.89	6.20	36.05	2.40	0.000
Peripheral Service	36.86	6.20	50.06	3.80	0.000
Total	100.00%		100.00%		

Table 9.9 - The Relative Importance of Mean Utility Values of the Core and Peripheral Services of both the Operational and Non-operational Groups

From Table 9.9, the operational group (less price sensitive) places more emphasis on the peripheral services. In contrast, the non-operational group (price sensitive) places more emphasis on the core services. The differences in the mean utility values on the core and peripheral services between the two groups are statistically significant at $p < 0.001$.

There is a significant difference between the operational and non-operational groups on their emphasis on the price and service attributes. Therefore, the hypothesis H3 should be accepted.

9.7 General Critiques of the Survey

The main critique of this stage of the research is on the sample size. Stage 5 focuses specifically on the shippers and the forwarders, dealing with electronics. The mean utility value of the attribute Firm Allocation is expected to be higher for the shippers dealing with electronics than the forwarders, as shown in Table 9.1. This is because the airlines allocate cargo space specifically for electronics on a six-month basis to the forwarders and not to the shippers. This situation is currently in practice in the air freight industry in Malaysia. Since the forwarders are given the allocation in advance, it is reasonable for them to place less emphasis on this attribute. On the other hand, the shippers have to rely on the forwarders to get the space allocation. Thus, it is reasonable for them to place a greater emphasis on this attribute.

From Table 9.1, the difference in the mean utility value of the attribute Firm Allocation between the forwarders and the shippers is not statistically significant. This is probably due to the small sample size of both the forwarders and the shippers. The finding may be significant if the sample size is increased.

The survey reveals that there are two groups of shippers: the price sensitive and the less price sensitive. The price sensitive group are the consumer electronics manufacturers, whereas the less price sensitive group are the industrial electronics manufacturers. This is expected as the market for consumer electronics is more competitive than for industrial electronics. However, the findings should be treated with caution due to the small sample size on the manufacturers of consumer electronics. The small sample size could also affect the significance testing of the mean utility values of the core service between the two groups (see Table 9.4).

The relationship between the two groups of respondents (price sensitive and less price sensitive) and the service attributes (core and peripheral) is a new empirical finding. However, it should be accepted with reservation as the research is conducted in one specific industry and one country only. The research should be extended to cover different service industries and in different countries.

9.8 Conclusion

The forwarders place more emphasis on the attribute Definite Uplift than the shippers. On the other hand, the shippers place more emphasis on the attribute Good Handling. The differences on the mean utility values of these two attributes between the forwarders and the shippers are statistically significant ($p < 0.05$). These two attributes form the core service. The differences on the mean utility values on the three peripheral service attributes between these two groups are not statistically significant.

The Cluster Analysis grouped the respondents into the price sensitive and less price sensitive groups. In the case of the forwarders, the two groups differ in their job titles. The operational group is less price sensitive than the non-operational group (sales and top management). On the other hand, the two groups of shippers differ in the types of products they manufacture. The manufacturers of industrial electronics are less price sensitive than the manufacturers of consumer electronics.

The price sensitive group places more emphasis on the core service, whereas the less price sensitive group emphasises more on the peripheral services. This is considered a new empirical finding. The finding is statistically significant for both the forwarders and the shippers. The only exception to this is on the core service between the two groups of shippers where the difference in the mean utility values is not statistically significant.

Chapter 10 - Stage 6 Findings: A Comparative Study Among the Airlines on the Key Factors Affecting the Service Production System

10.0 Introduction

In business, it is important for the service firm to know what the customer wants exactly and how they perceive the company's offer. Thus, the customer's perceptions of the company, and the way in which the company views the customer and its perceptions are important in shaping the corporate and marketing strategies.

There are various individuals in different functional areas involved in any purchasing process. These individuals are likely to have different perceptions of the services provided by the supplier. Such differences are likely to be more pronounced in the perception of services than in the perception of products due to the relatively intangible nature of services (Parasuraman and Zeithaml, 1983). Discrepancies between customer and management perceptions have been portrayed as "gaps" in the service quality model of Parasuraman, Zeithaml, and Berry (1985) which can be a set-back to the service production system. The gaps have been discussed in Chapter 2.

This stage of the research (Stage 6) has four objectives:

- To compare the gap between customer expectations and management perceptions of those expectations, known as Gap 1. The purpose of the comparison is to determine whether the managers' assumptions about customers' expectations are accurate. If they are not, then appropriate steps and measures should be taken to improve the service production system.
- To compare the airlines' emphasis on the key factors to Gap 1. The airlines are grouped into three categories, "good", "average", and "poor", based on the customers' perceptions of the airlines services.
- To compare the emphasis among the three categories of airlines on the key factors to the gap between management perceptions of customer expectations and the service-quality specifications (Gap 2).
- To compare the emphasis among the three categories of airlines on the key factors to the gap between the service-quality specifications and the service delivery (Gap 3).

The outcome of such comparisons will assist the airlines to narrow the gaps and improve the customers' perceptions of the quality of the service production system.

10.1 Sample Size

The sample size for this stage of the research is dependent on the outcome of Stage 4. Stage 4 deals with both types of freight commodity: perishables and non-perishables. In Stage 4, the respondents were asked to provide the names of six airlines that they dealt with. Subsequently, they were asked to group the six airlines into three categories (two airlines in each category) based on their perceptions of the airlines' quality of service: "good", "average", and "poor". Finally, they were asked to rate the six airlines on a scale of 1 to 5 (1 = very poor, and 5 = very good) on the eighteen service attributes (see Chapter 8).

In Stage 4, the respondents have provided the names of forty-one airlines. However, it is not possible to cover all the forty-one airlines in this stage of the research. Thus, the number has to be reduced to a manageable size. This is done by using simple frequency count on the number of occurrences of these airlines. Those airlines with frequency count less than six are removed from the sample. The concept of the Scree test (Catell, 1964) is used to determine the cut-off point of six. Using this criterion, only nineteen out of the forty-one airlines have been selected for this stage of the research.

Subsequently, three of these airlines were reluctant to participate in the survey. Thus, the final sample size was reduced to sixteen airlines only. There are three respondents from each airline: one management personnel and two operations personnel. The management personnel is required to answer the first set of the questionnaire, whereas the operations personnel are required to answer the second set (see Appendix 10A). The first set covers the management perceptions of customer expectations and the key factors to Gap 1 and 2. These key factors are referred to as management key factors. The second set covers the key factors to Gap 3 only; these key factors are referred to as operations key factors.

10.2 The Categorisation of Airlines into "Good", "Average", and "Poor"

Two methods can be used to categorise the nineteen airlines into the "good", "average", and "poor" airlines. The first method is to calculate the number of occurrences of these airlines in each of the three categories (see Table 10.1).

Airline	"Good"	"Ave."	"Poor"	Total
Japan Airlines	21	5	1	27
Qantas Airways	3	6	0	9
Lufthansa Airlines	12	9	1	22
Singapore Airlines	33	17	5	55
Cargolux	6	9	2	17
KLM Airlines	10	8	1	19
Korean Airlines	8	10	4	22
Malaysian Airlines	28	18	3	49
UTA French Airlines	3	1	2	6
Federal Express	3	7	3	13
China Airlines	4	7	7	18
Cathay Pacific	6	12	2	20
NorthWest Airlines	3	5	4	12
Thai International	7	4	8	19
British Airways	4	5	6	15
Royal Jordanian	1	3	3	7
Saudi Airlines	1	3	5	9
Pakistan Airlines	0	4	9	13
Aeroflot Airlines	0	0	9	9

Table 10.1 - The Number of Occurrences of the Airlines as Perceived by the Respondents in the "Good", "Average", and "Poor" Categories

The following criteria have been used to determine the appropriate placement of the airlines into the categories of "good", "average" and "poor" airlines:

- if the frequency count of the airline in the "good" category is greater than the summation of the frequency count of the "average" and "poor" categories, then the airline is considered as "good"
- if the frequency count of the airline in the "average" category is greater than that in the "poor" category, then the airline is considered as "average"
- if the frequency count of the airline in the "poor" category is greater than that in the "average" category, then the airline is considered as "poor"

Using the above criteria, five airlines fall under the "good" category, eight airlines in the "average" category, and six in the "poor" category (see Table 10.2). There would be a difficulty in placing the airlines in its appropriate category if there is a

tie in the frequency count between two categories. For example, in the case of China Airlines and Royal Jordanian Airlines, it is not clear whether they should fall into the "average" or "poor" category.

"Good" Airline	"Average" Airline	"Poor" Airline
Japan Airlines Lufthansa Airlines Singapore Airlines KLM Airlines Malaysia Airlines	Qantas Airways Cargolux Korean Airlines UTA Airlines Federal Express China Airlines Cathay Pacific NorthWest	Thai international British Airways Royal Jordanian Saudi Airlines Pakistan Airlines Aeroflot Airlines

Table 10.2 - The Categorisation of the Airlines Based on the Frequency Counts

The set-back with the first method is that the placement of the airlines into each category is based solely on the customer's overall perceptions of the airlines' services. These perceptions are not measured in an objective manner. Furthermore, if there is a tie on the number of occurrences between two categories, it would be difficult to determine which is the "correct" category for the airline.

The second method is to calculate the perceived service quality index of the nineteen airlines. This method makes use of the airline's rating score on the eighteen service quality attributes. The perceived service quality index is calculated based on:

- the factor loading on each attribute
- the airline's score on the attribute

The formula used in calculating the perceived service quality index is:

$$PSQ = \alpha(\text{Component 1}) + \beta(\text{Component 2}) + \Theta(\text{Component 3})$$

where,

PSQ = perceived service quality index

$$\text{Component 1} = \sum_{i=1}^n (\text{FA}_{ic1} * \text{AA}_{ic1}) + \dots + (\text{FA}_{nc1} * \text{AA}_{nc1})$$

$$\text{Component 2} = \sum_{i=1}^n (\text{FA}_{ic2} * \text{AA}_{ic2}) + \dots + (\text{FA}_{nc2} * \text{AA}_{nc2})$$

$$\text{Component 3} = \sum_{i=1}^n (\text{FA}_{ic3} * \text{AA}_{ic3}) + \dots + (\text{FA}_{nc3} * \text{AA}_{nc3})$$

α = variance (in percent) accounted by Component 1 (Predictability)

β = variance (in percent) accounted by Component 2 (Capability)

Θ = variance (in percent) accounted by Component 3 (Interaction)

FA_{ic1} = Factor loading on the attribute Ai of Component 1

AA_{ic1} = The airline score on the attribute Ai of Component 1

FA_{ic2} = Factor loading on the attribute Ai of Component 2

AA_{ic2} = The airline score on the attribute Ai of Component 2

FA_{ic3} = Factor loading on the attribute Ai of Component 3

AA_{ic3} = The airline score on the attribute Ai of Component 3

Table 10.3 shows the perceived service quality index of the nineteen airlines. Assuming that one airline scored a minimum rating (=1) on all the eighteen service attributes, and another airline scored maximum rating (=5), then the minimum and maximum perceived service quality index is 5.29 and 26.45 respectively.

Airline	Air-line Code	Comp 1 PSQ Index	Comp 2 PSQ Index	Comp 2 PSQ Index	Total PSQ Index
Japan Airlines	JL	19.88	1.15	1.20	22.23
Qantas Airways	QF	20.02	1.08	1.13	22.23
Lufthansa Airlines	LH	19.65	1.14	1.24	22.03
Singapore Airlines	SQ	19.32	1.08	1.19	21.59
Cargolux	CV	19.13	1.03	1.22	21.38
KLM Airlines	KL	18.71	1.28	1.14	21.13
Korean Airlines	KE	18.50	1.05	1.15	20.70
Malaysian Airlines	MH	18.20	0.98	1.22	20.40
UTA French Airlines	UT	18.02	1.02	1.02	20.06
Federal Express	FM	17.63	1.04	1.12	19.79
China Airlines	CI	17.63	0.94	1.11	19.68
Cathay Pacific	CX	17.55	0.96	1.11	19.62
NorthWest Airlines	NW	17.51	0.91	1.04	19.46
Thai International	TG	16.36	1.00	1.13	18.49
British Airways	BA	16.36	0.99	1.13	18.48
Royal Jordanian	RJ	14.87	1.00	1.34	17.21
Saudi Airlines	SV	14.10	0.82	0.99	15.91
Pakistan Airlines	PK	11.41	0.78	0.93	13.12
Aeroflot Airlines	SU	9.28	0.61	0.91	10.80

Table 10.3 - The Perceived Service Quality Index of the Airlines

Having obtained the specific perceived service quality index of the nineteen airlines, the next task is to segregate them into the three categories of perceived service ranking: "good", "average", and "poor". The assumption is that the airline with a high perceived service quality index would be rated as a "good" airline, whereas those with a low index would be rated as "poor" airlines. For example, Japan Airlines and Qantas Airways are rated as "good" airlines, whereas Pakistan Airlines and Aeroflot Airlines are rated as "poor" airlines. In Table 10.3, there is a clear distinction between the "good" and "poor" airlines in terms of perceived service quality index. However, the distinction is less clear with the "average" airlines; for example, whether to consider Korean Airlines and Malaysia Airlines as "good" or "average" airlines, and Thai International Airlines and British Airways as "average" or "poor" airlines.

The Scree test is used to segregate the airlines into the three categories. This test makes use of the perceived services quality index (see Figure 10.1).

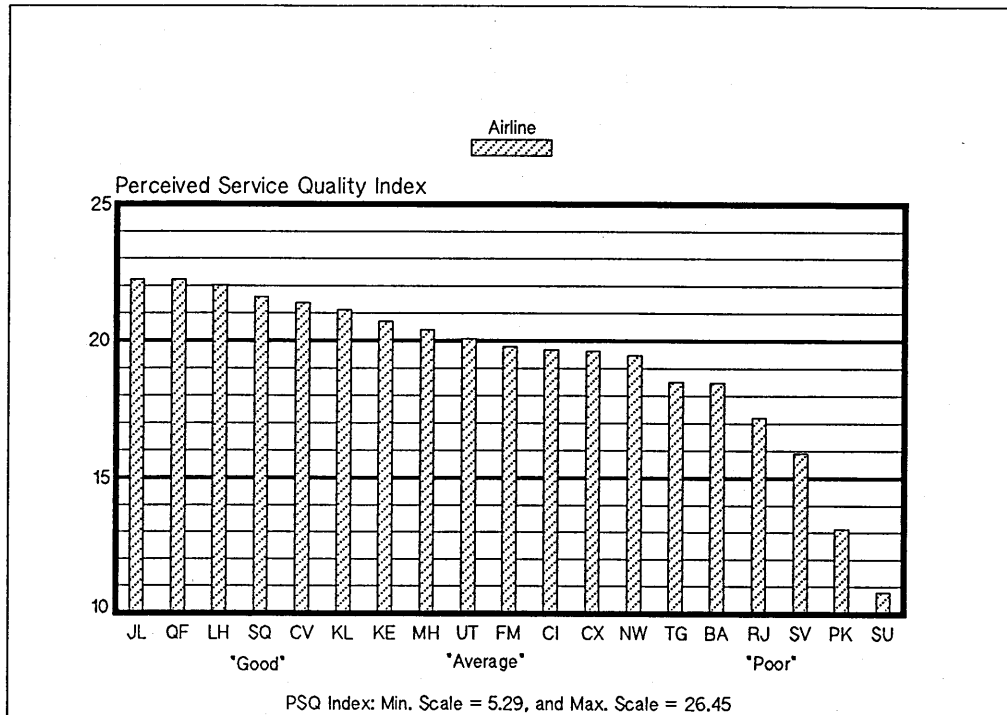


Figure 10.1 - The Three Categorisation of Airlines Based on the Perceived Service Quality Index

Table 10.4 shows the three categories of airlines based on their perceived service quality index. Comparing Table 10.4 with Table 10.2, there is a clear agreement on the grouping of these airlines except on three airlines (Qantas Airways, Cargolux, and Malaysia Airlines). Table 10.2 shows that both Qantas Airways and Cargolux Airlines are considered as "average", whereas in Table 10.4, these two airlines are shown as "good" airlines. Table 10.2 shows Malaysia Airlines as a "good" airline, whereas Table 10.4 reflects it as an "average" airline. The second method is considered more scientific than the first method. Thus, the second method is chosen for this stage of the research.

"Good" Airline	"Average" Airline	"Poor" Airline
Japan Airlines Qantas Airways Lufthansa Airlines Singapore Airlines Cargolux KLM Airlines	Korean Airlines Malaysia Airlines UTA Airlines Federal Express China Airlines Cathay Pacific NorthWest	Thai international British Airways Royal Jordanian Saudi Airlines Pakistan Airlines Aeroflot Airlines

Table 10.4 - The Grouping of Airlines Based on the PSQ Index

10.3 Results: The Gap Between Customer Expectations and Management Perceptions of Those Expectations (Gap 1)

The gap between customer expectations and management perceptions of customer expectations is referred to as Gap 1. In conducting the trade-off matrices with the respondents from the airline management group, it was made clear to them that the customer expectations in the survey refer specifically to the air freight forwarders and not the shippers. Furthermore, on the freight commodity, only industrial electronics have been chosen for this survey. These emphases are necessary in order to compare the outcomes of this stage with that of the Stage 5 (specifically that of the forwarders). In Stage 5, it has been found that the air freight forwarders and shippers place different emphasis on the price and service attributes.

The data from the trade-off matrices are analysed in two stages. Firstly, the data are processed using the \$FTROFF program. The program provides the attribute utility values for each respondent in the survey. Secondly, the attribute utility values of each respondent are processed using the SPSS program. The SPSS program provides the aggregate attribute utility values. The aggregate attribute utility values are then compared with that from the air freight forwarders in Stage 5 of the research. The difference between the two values is known as Gap 1.

10.3.1 Between the Airlines and the Air Freight Forwarders

This section of the analysis covers the size of Gap 1. Firstly, it compares the gap on the price and service attributes between the airlines and the forwarders. Secondly, the service attributes are grouped into the core and peripheral services.

This is to allow comparison to be made on the core and peripheral services between the airlines and the forwarders.

The first stage of the analysis is to determine the size of Gap 1 on the price and service attributes between the airlines and the forwarders. Table 10.5 shows the mean utility values and the size of Gap 1 on the price and service attributes.

Attribute	Airline (n=16)		Forwarder (n=32)		Diff. in the two Means (%)	two- tail t-test
	Mean (%)	S.D (%)	Mean (%)	S.D (%)		
Price	20.16	7.4	17.06	5.7	3.10	0.105
Definite Uplift	15.63	5.1	17.91	4.8	-2.28	0.118
Good Handling	18.91	5.2	21.57	4.4	-2.66	0.056
Interaction Quality	12.23	3.4	14.26	5.3	-2.03	0.144
Firm Allocation	14.63	6.4	13.68	6.5	0.95	0.615
Immediate Connection	18.43	6.5	15.52	5.6	2.91	0.093

Table 10.5 - The Mean Utility Values and Size of Gap 1 on the Price and Services Attributes

Gap 1 is positive on the price attribute. The positive gap on the price attribute means that the airlines perceive that the forwarders demand low pricing, whereas the forwarders seem to be willing to pay a higher price. However, the gap is not significant at $p < 0.10$. The airlines place the greatest emphasis on the price attribute, whereas the forwarders place more emphasis on the attribute Good Handling and Definite Uplift.

The attributes Definite Uplift, Good Handling, and Interaction Quality have a negative Gap 1. A negative gap means the forwarders place more emphasis on these attributes than the airlines. Thus, there is a shortfall between the airlines' perceptions of customer expectations and customer expectations.

The attribute Good Handling has a wider gap (-2.66) than Definite Uplift (-2.28) and Interaction Quality (-2.03). The size of Gap 1 on the attribute Good Handling between the airlines and the air freight forwarders is statistically significant

($p < 0.10$). However, this is not the case with the attributes Definite Uplift and Interaction Quality. The size of Gap 1 on the attributes Definite Uplift and Interaction Quality between the airlines and the air freight forwarders is not statistically significant.

In the case of the attributes Firm Allocation and Immediate Connection, the gaps are positive. A positive gap means that the airlines place more emphasis on these two attributes than the forwarders. For example, on the attribute Immediate Connection, the airlines perceive that the customers demand a direct service, whereas the customers might accept services with one or two transits. The size of Gap 1 on the attribute Immediate Connection is statistically significant at $p < 0.10$. However, it is not significant for the attribute Firm Allocation.

It is understandable for Gap 1 to be positive on the attribute Immediate Connection. This is because some airlines are operating a non-stop service for the passenger market segment in order to be competitive in the travel industry, and they apply the same strategy to the air freight industry.

The next stage of the analysis is to group the service attributes into the core and the peripheral services. The core service comprise the attributes Definite Uplift and Good Handling. On the other hand, the peripheral services comprise the attributes Interaction Quality, Firm Allocation, and Immediate Connection. Table 10.6 shows the differences of the mean utility values on the core service, and peripheral services between the airlines and the air freight forwarders.

	Airline (n=16)		Forwarder (n=32)		Diff. in the two Means (%)	two- tail t-test
	Mean (%)	S.D (%)	Mean (%)	S.D (%)		
Price	20.16	7.4	17.06	5.7	3.10	0.105
Core Service	34.54	6.8	39.47	5.8	-4.93	0.009
Peripheral Services	45.29	7.8	43.46	8.5	1.83	0.446

Table 10.6 - The Size of Gap 1 on the Core and Peripheral Services

Gap 1 is negative on the core service, whereas it is positive on the peripheral services. A positive gap means that the airlines place more emphasis on the service than the forwarders, whereas a negative gap means that the forwarders place more emphasis on it than the airlines. The size of Gap 1 on the core service is

statistically significant ($p < 0.01$). However, it is not statistically significant on the peripheral services.

The finding suggests that the airlines understand the customer expectations on the peripheral services but not on the core service. Therefore, the airlines need to improve on the core service reliability.

10.3.2 Between the Airlines and the Two Groups of Respondents in the Forwarding Company (Operations and Non-Operations)

This part of the analysis covers the size of Gap 1 between the airlines and the two groups of respondents in the forwarding company. The two groups of respondents are the operations group (less price sensitive) and the top management/sales group (price sensitive). Table 10.7 shows the size of Gap 1 on the price attribute, core service, and peripheral services between the airlines and the two groups of respondents.

	Air-line n=16 Mean (%)	Forwarder		Gap 1		Two-tail t-Test	
		P++ n=16 Mean (%)	P-- n=16 Mean (%)				
	(1)	(2)	(3)	(4) (1-2)	(5) (1-3)	(6) (1-2)	(7) (1-3)
Price	20.16	20.28	13.89	-0.12	6.27	0.959	0.005
Core	34.54	42.89	36.05	-8.39	-1.51	0.001	0.407
Peripheral	45.29	36.86	50.06	8.43	-4.77	0.002	0.032
P++ - Price sensitive group (Top/Sales Managers)							
P-- - Less price sensitive group (Operations Managers)							

Table 10.7 - The size of Gap 1 on the Price, Core Service, and Peripheral Services Between the Airlines and the Two Groups of Respondents

In Table 10.7, Gap 1 is negative on the price attribute between the airlines and the top management/sales group. However, this gap is not statistically significant. On the other hand, the gap is positive on the price attribute between the airlines and the operations group. This gap is statistically significant at $p < 0.01$. The analysis suggests that the airlines and the top management/sales group in the forwarding

company place almost equal emphasis on the price attribute. This is understandable as price is generally market driven, and it is normally the top management/sales group that negotiates on the price.

Gap 1 is negative on the core service between the airlines and the two groups of respondents in the forwarding company. However, the size of Gap 1 is larger between the airlines and the top management/sales group than between the airlines and the operations group. In the first case, the gap is statistically significant at $p < 0.01$, whereas in the latter, the gap is not statistically significant. This suggests that the top management/sales group are more demanding than the operations group on the core service.

In the case of the peripheral services, the gap is positive between the airlines and the top management/sales group, and it is statistically significant at $p < 0.01$. In contrast, the gap is negative between the airlines and the operations group. This gap is also statistically significant at $p < 0.05$. The analysis suggests that the operations group is more demanding than the top management/sales group on the peripheral services. In this case, the airlines are likely to satisfy the top management/sales group but not the operations group.

Figure 10.2 illustrates the gap between the airlines and the two groups of respondents (top management/sales and operations) on the price, core service, and peripheral services.

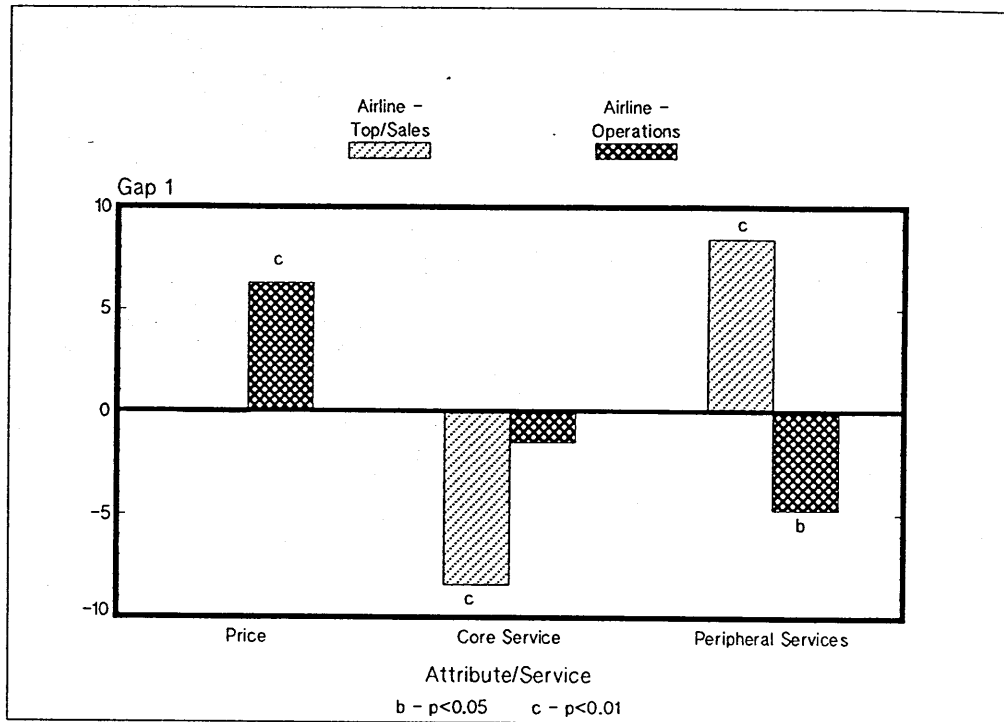


Figure 10.2 - The Size of Gap 1 on the Price, Core Service, and Peripheral Services Between the Airlines and the Two Group of Respondents in the Forwarding Company

10.3.3 Hypotheses Testing (H4.1.1 & H4.1.2)

10.3.3.1 Hypothesis H4.1.1

The first hypothesis states that:

- H4.1.1 - There is a significant gap between customer expectations and management perceptions of those expectations

In order to test this hypothesis, a comparison on the price and service attributes between the airline management and the forwarders is required. The forwarders' data from Stage 5 of the research are compared with the airlines' data from this stage. The analyses are shown in Table 10.5 and 10.6. Table 10.5 shows the differences on the mean utility values on the price and service attributes between the airlines and the forwarders. The airline mean utility value represents the management perceptions of customer expectations, whereas that of the forwarders

represents the customer expectations. The difference between the two mean utility values is the gap between management perceptions of customer expectations and customer expectations. Table 10.6 shows the differences on the core and peripheral services between the airlines and the forwarders.

Table 10.5 shows that the gaps are significant on the attributes Good Handling and Immediate Connection between the airlines and the forwarders. The gap on the attribute Good Handling is negative, whereas the gap on Immediate Connection is positive.

Table 10.6 indicates that the gap is negative on the core service, and positive on the peripheral services. The negative gap on the core service is significant at $p < 0.10$. However, the positive gap on the peripheral services is not significant.

As the gaps are significant between management perceptions of customer expectations and customer expectations, the hypothesis H4.1.1 should be accepted.

10.3.3.2 Hypothesis H4.1.2

The hypothesis states that:

- H4.1.2 - The size of the gap between customer expectations and management perceptions of those expectations differs between the operational and non-operational groups

There are two groups of respondents from the forwarding company: operational group and top management/sales group. The operational group consists of the personnel directly involved in the operations. The top management/sales group consists of top managers and sales managers, also known as the non-operational group. The operational group is less price sensitive than the top management/sales group (see Chapter 9).

In order to test this hypothesis, a comparison on the price, core service, and peripheral services between the airlines and the two groups of respondents from the forwarding company is required. This comparison is shown in Table 10.7.

The findings show that the gap on the price attribute is positive between the airlines and the operational group, whereas it is negative between the airlines and the non-operational group. The positive gap is statistically significant at $p < 0.01$.

The gap on the core service is negative between the airlines and both groups. However, it is larger in the case of the non-operational group and is statistically significant at $p < 0.01$.

The gap on the peripheral services is positive between the airlines and the non-operational group, whereas it is negative between the airlines and the operational group. In both cases, the gaps are statistically significant at $p < 0.05$.

As there are significant differences on the size of the gap between the operational and non-operational groups, the hypothesis H4.1.2 should be accepted.

10.4 Results: The Differences Among The Airlines on the Key Factors to the Gap Between Customer Expectations and Management Perceptions of Those Expectations (Gap 1)

This part of the analysis covers the differences among the three categories of airlines on the three key factors affecting the size of Gap 1. The three categories of airlines are the "good", "average", and "poor" airlines. The categorisation is based on the perceived service quality index from Stage 4 of the research. The three key factors are:

- lack of marketing research orientation
- inadequate upward communication
- too many levels of management

The first two key factors are related negatively with Gap 1, whereas the third factor is related positively. A high mean score (see Table 10.8) on the first two key factors suggests that the airlines are likely to understand the customer's expectations. This would subsequently reduce the size of Gap 1. On the other hand, a high mean score (see Table 10.8) on the third factor is likely to inhibit the airline management's understanding of the customers' expectations. It is important to note that the study conducted by Parasuraman, Zeithaml, and Berry (1990) showed a weak correlation between the three factors and the size of Gap 1.

Table 10.8 shows the differences on the key factors' mean scores among the three categories of airlines. Each of the statements in the questionnaire (see Appendix 10A) is accompanied by a 5-point scale (1=Strongly Disagree, and 5=Strongly Agree).

Key Factors	Mean Score			Mean Score Difference		
	(1) "Good" (n=6)	(2) "Ave." (n=4)	(3) "Poor" (n=6)	(4) (1)-(2)	(5) (2)-(3)	(6) (1)-(3)
MRO	4.36	3.88	3.79	0.48	0.09	0.57 ^a
UC	4.35	3.58	3.71	0.77 ^b	-0.13	0.64 ^b
LOM	4.29	3.00	3.67	1.29 ^a	-0.67	0.62
MRO - Marketing Research Orientation UC - Upward Communication LOM - Levels of Management a - $p < 0.10$ b - $p < 0.05$						

Table 10.8 - The Differences on the Key Factors (Gap 1)
Mean Scores Among the Three Categories
of Airlines

Table 10.8 shows that the differences on the mean scores of the key factors between the "average" and "poor" airlines are not statistically significant. On the other hand, the differences on the mean scores between the "good" and "average" airlines, and between the "good" and "poor" airlines are statistically significant at $p < 0.05$ except in two cases. The first case is on the difference in the mean score of Marketing Research Orientation (MRO) between the "good" and "average" airlines. The second case is on the difference in the mean score of Levels of Management (LOM) between the "good" airlines and the "poor" airlines.

Marketing Research Orientation is the extent to which airline managers make an effort to understand customer's needs and expectations. The finding suggests that the "good" airlines place more emphasis on Marketing Research Orientation than the "average" and "poor" airlines. This is because the mean score on this key factor is higher for the "good" airlines than the "average" and "poor" airlines.

Upward Communication is the extent to which top management seeks, stimulates, and facilitates the flow of information from employees at lower levels. The finding suggests that the "good" airlines place more emphasis on Upward Communication than the "average" and "poor" airlines. The difference in the mean score on this key factor is significant between the "good" and "average" airlines, and between the "good" and "poor" airlines ($p < 0.05$).

The table also shows that the "good" airlines have higher mean score on Levels of Management than the "average" and "poor" airlines. In this case, a high mean score indicates that there are too many levels between the customer-contact personnel and the top management. The finding suggests that the "good" airlines have more levels between customer-contact personnel and top management than the "poor" airlines. The literature states that if there are too many levels between the two groups, there is a greater tendency for miscommunication to occur, thus leading to poor service quality. The "good" airlines should have a lower mean score than the "poor" airlines on this key factor. However, this outcome is possible because most of these "good" airlines have a bigger office set-up in Malaysia than the "poor" airlines. A bigger office set-up tends to have more levels of management. However, the finding is not conclusive as the difference on the mean scores between the "good" and "poor" airlines is not statistically significant.

10.4.1 Hypothesis Testing (H4.2)

The hypothesis states that:

- H4.2 - There are differences in emphasis among the "good", "average", and "poor" airlines on the key factors to the gap between customer expectations and management perceptions of those expectations.

There are three key factors identified in the literature contributing to the size of Gap 1. These three factors are Marketing Research Orientation, Upward Communication, and Levels of Management. The first two factors are related negatively to Gap 1, whereas the third factor is related positively to the gap.

The findings in Table 10.8 show that the "good" airlines have higher mean score on two key factors (Marketing Research Orientation and Upward Communication) than the "average" and "poor" airlines. The difference in the mean score is statistically significant between the "good" and "poor" airlines. The findings suggest that there are differences in emphasis on the two key factors between the "good" and "poor" airlines. Furthermore, the difference in the mean score on the key factor Upward Communication is statistically significant between the "good" and "average" airlines. However, the differences between the "average" and "poor" airlines are not statistically significant. This could be due to the small sample size used in the survey.

Since, the differences are significant only between the "good" and "poor" airlines, and between the "good" and "average" airlines, only part of the hypothesis could be accepted.

10.5 Results: The Differences Among the Airlines on the Key Factors to the Gap Between the Management Perceptions of Customer Expectations and Service-Quality Specifications

The literature states that the gap between management perceptions of customer expectations, and service-quality specifications (Gap 2) is affected by four key factors:

- inadequate management commitment to service quality
- lack of perception of feasibility
- inadequate task standardisation
- absence of goal setting

These four factors are related negatively to the size of the gap between management perceptions of customer expectations, and service-quality specifications. A high mean score suggests that the airlines are likely to translate the customer's expectations into service-quality specifications accurately, thus reducing the size of Gap 2.

The goals set by service firms should be based on customer's requirements and expectations rather than internal company standards. The "good" airlines have a higher mean score on the key factor Goal Setting than the "average" and "poor" airlines. This suggests that the goal setting of the "good" airlines is based on customer's expectations. The difference in the mean score between the "good" and "average" airlines is not statistically significant, whereas the difference between the "good" and "poor" airlines is statistically significant at $p < 0.10$.

Table 10.9 shows the mean score on the four key factors among the three categories of airlines.

Key Factors	Mean Score			Mean Score Difference		
	(1) "Good" (n=6)	(2) "Ave." (n=4)	(3) "Poor" (n=6)	(4) (1)-(2)	(5) (2)-(3)	(6) (1)-(3)
MCSQ	3.82	3.67	3.67	0.15	0.00	0.15
GS	4.57	4.33	3.58	0.24	0.75	0.99 ^a
TS	4.64	4.50	3.58	0.14	0.92	1.06 ^a
POF	4.14	4.06	4.00	0.08	0.06	0.14
MCSQ - Management Commitment to Service Quality GS - Goal Setting TS - Task Standardisation POF - Perception of Feasibility a - $p < 0.10$						

Table 10.9 - The Differences Among the Three Categories of Airlines on the Four Key Factors to Gap 2

In the case of the key factor Task Standardisation, the mean score of the "good" airlines is higher than the "average" and "poor" airlines. The difference in the mean score between the "good" and "poor" airlines is statistically significant at $p < 0.10$. However, the difference in the mean score between the "good" and "average" airlines is not significant.

On the other two key factors (Management Commitment to Service Quality and Perception of Feasibility), the "good" airlines have a higher mean score than the "average" and "poor" airlines. However, the differences in the mean score between the "good" airlines and the "average" are not statistically significant; they are also not significant between the "good" airlines and the "poor" airlines. This could be due to the small sample size in the survey.

In summary, the mean scores on all the four key factors are higher for the "good" airlines than the "average" and "poor" airlines. These four key factors are related negatively to the size of Gap 2.

10.5.1 Hypothesis Testing (H5)

The hypothesis states that:

- H5 - There are differences in emphasis among the "good", "average", and "poor" airlines on the key factors to the gap between the management perceptions of customer expectations and service-quality specifications.

There are four key factors influencing the size of this gap. The four key factors are Management Commitment to Service Quality, Goal Setting, Task Standardisation, and Perception of Feasibility. All these four key factors are related negatively to the gap. However, the fourth factor Perception of Feasibility has weak correlations with the gap. The finding from Table 10.9 shows that the differences in the mean scores on the two key factors Goal Setting and Task Standardisation are statistically significant between the "good" and "poor" airlines. However, the differences are not significant between the "good" and "average" airlines; they are also not significant between the "average" and "poor" airlines. This could be due to the small sample size used in the survey.

Since there are differences only between the "good" and "poor" airlines, only part of this hypothesis could be accepted.

10.6 Results: The Differences Among the Airlines on the Key Factors to the Service Performance Gap

This survey was conducted with the non-management personnel of the airlines. The respondents (2 respondents per airline) are from the operational area. This analysis covers the differences among the three categories of airlines on the key factors to the gap between service-quality specifications and service delivery. This gap is referred to as Gap 3 or Service Performance Gap.

The key factors contributing to this gap between the service-quality specifications and service delivery are:

- team-work
- employee-job fit
- technology-job fit

- perceived control
- supervisory control system
- role conflict
- role ambiguity

The first five factors are related negatively to the size of the gap, whereas the last two factors are related positively. For the first five factors, a high mean score would lead to a smaller service performance gap. A small gap means that the service delivery conforms with the service-quality specifications.

On the other hand, a high mean score for the last two key factors would lead to a larger service performance gap. A large gap between the service-quality specifications and the service delivery will subsequently affect the perceived service quality.

The differences in the mean scores between the "average" and "poor" airlines are not statistically significant. However, the differences in the mean scores on certain key factors are significant between the "good" and "average" airlines; they are also significant between the "good" and "poor" airlines.

On the key factor Technology-job Fit, the differences in the mean scores between the "good" and "average" airlines are significant at $p < 0.01$; they are also significant between the "good" and "poor" airlines. The mean score for the "good" airlines is higher than the "average" and "poor" airlines. The "good" airlines appear to have the appropriate tools and technology for the employees to perform their tasks.

Perceived Control is the extent to which employees perceive that they are in control of their jobs and can act flexibly. For this key factor, the "good" airlines have a higher mean score than the "average" and "poor" airlines. The difference in the mean score on this factor is significant between the "good" and "poor" airlines only.

Role Conflict is the extent to which employees feel pressured due to competing or conflicting demands made on them by customers, supervisors, and top managers. A high mean score indicates a high degree of conflicting demands faced by the customer-contact personnel. This key factor is related positively with the size of the service performance gap. The finding shows that the "good" airlines have a higher mean score than the "average" and "poor" airlines. Furthermore, the difference in

the mean score is significant between the "good" and "average" airlines; it is also significant between the "good" and "poor" airlines ($p < 0.05$).

Key Factors	Mean Score			Mean Score Difference		
	(1) "Good" (n=12)	(2) "Ave." (n=8)	(3) "Poor" (n=12)	(4) (1)-(2)	(5) (2)-(3)	(6) (1)-(3)
TEAM	4.50	4.30	4.25	0.20	0.05	0.25 ^a
EFIT	4.33	3.90	4.21	0.43	-0.31	0.12
TFIT	4.75	3.60	3.25	1.29 ^c	0.35	1.50 ^c
PC	3.69	3.20	2.96	0.15	0.24	0.73 ^b
SCS	3.33	3.03	3.13	0.30	-0.10	0.20
RC	3.79	3.08	3.15	0.71 ^b	-0.07	0.64 ^b
RA	3.95	3.42	3.82	0.53 ^b	-0.40	0.13
TEAM - Team-Work EFIT - Employee-Job Fit TFIT - Technology-Job Fit PC - Perceived Control SCS - Supervisory Control System RC - Role Conflict RA - Role Ambiguity a - $p < 0.10$ b - $p < 0.05$ c - $p < 0.01$						

Table 10.10 - The Differences Among the Three Categories of Airlines on the Seven Key Factors to Gap 3

The key factor Role Ambiguity is also related positively to the service performance gap. Role Ambiguity is the extent to which employees are uncertain about what managers and supervisors expect from them and how to satisfy those expectations. Table 10.10 shows that the "good" airlines have a higher mean score than the "average" and "poor" airlines. The difference in the mean score between the "good" and "poor" airlines is not statistically significant. On the other hand, it is statistically significant between the "good" and "average" airlines. However, the difference in the mean score between the "average" and "poor" airlines is not statistically significant.

The empirical study conducted by Parasuraman, Berry, and Zeithaml (1990) showed that there is a strong correlation between the four key factors and the service performance gap. These four key factors are Team-work, Employee-job Fit, Technology-job Fit, and Perceived Control. On the other two key factors Role Conflict and Role Ambiguity, the correlation with the service performance gap is weak. Finally, their study revealed that there is virtually no correlation between the key factor Supervisory Control System and the service performance gap.

10.6.1 Hypothesis Testing (H6)

The hypothesis states that:

- H6 - There are differences in emphasis on the key factors to the service performance gap among the "good", "average", and "poor" airlines.

The service performance gap refers to the gap between the service-quality specifications and the service delivery. According to the literature, there are seven key factors influencing this gap. These seven key factors are: Team-work, Employee-job Fit, Technology-job Fit, Perceived Control, Supervisory Control System, Role Conflict, and Role Ambiguity. The first five key factors are related negatively to the gap, whereas the last two are related positively.

Table 10.10 shows that there are significant differences in the mean scores on four of the key factors between the "good" and "poor" airlines. These four key factors are Team-work, Technology-job Fit, Perceived Control, and Role Conflict. Furthermore, there are significant differences in the mean scores on three key factors between the "good" and "average" airlines. The three key factors are Technology-job fit, Role conflict, and Role Ambiguity. However, the differences between the "average" and "poor" airlines are not statistically significant.

Since there are differences only between the "good" and "poor" airlines, and between the "good" and "average" airlines, only part of the hypothesis could be accepted.

10.7 General Critiques of the Survey

Most of the empirical research to measure the gap between management perceptions of customer expectations and customer expectations make use of statements on a scale of 1 to 5 or 1 to 7. For example, Parasuraman, Zeithaml, and Berry (1988) introduced a multiple-item scale to measure customer expectations and perceptions, and the various gaps depicted in the gaps model. This multi-item scale is known as SERVQUAL. The set-back with SERVQUAL is that it does not reflect the level of emphasis of a particular service attribute to the respondents. Instead, it merely shows the arithmetical differences between two scores: management and customer.

This survey makes use of Conjoint Analysis to determine the gap between management perceptions of customer expectations and customer expectations. The Conjoint Analysis shows the attribute mean utility values and the degree of emphasis placed on those attributes. The measurement of the gap using Conjoint Analysis shows the differences in emphasis on the service quality attributes between the two groups. Since this is the first attempt using Conjoint Analysis to measure Gap 1, the issue of validity should be further considered.

This stage of the research makes use of the key factors from the literature, specifically from the study conducted by Zeithaml, Berry, and Parasuraman (1988). Their study on the key factors affecting the magnitude of the gaps is still at its infant stage. Therefore, the acceptance of those key factors should be considered with reservation.

The Gap 1 analysis makes use of one specific type of freight commodity, that is, industrial electronics. The analysis should be extended to include other types of freight commodity. This is important as different emphases are placed on different types of freight commodity. Since the analysis is limited to one type of freight commodity, the findings of this analysis cannot be generalised to cover other types of freight commodity.

The findings on the differences on the mean scores of the key factors between the "average" and "poor" airlines are not statistically significant. This could be due to the small sample size used in the survey. Since the differences are not statistically significant between these two categories of airlines, it is therefore difficult to make valid conclusions on the findings. Thus, the acceptance of the findings are limited to the differences between the "good" and "average" airlines, and between the "good" and "poor" airlines.

10.8 Conclusion

There are five hypotheses in this stage of the research. Three of these hypotheses relating to the differences among the three categories of airlines on the key factors affecting the service production system could be accepted partially. The other two hypotheses relating to the size of Gap 1 are supported by the findings.

The first and second hypotheses makes use of the Gap model introduced by Parasuraman, Zeithaml, and Berry (1988). The most critical gap is Gap 1, which represents the differences between management perceptions of customer expectations and customer expectations. All of the gaps in the model have a role, but unless the differences between the two groups are understood, quality delivery will be built on doubtful information. The size of the gap is obtained by measuring the differences in the price and service mean utility values between the airlines and the air freight forwarders.

The findings show that Gap 1 is negative on three service attributes: Definite Uplift, Good Handling, and Interaction Quality. However, it is statistically significant for two of these attributes, that is, Definite Uplift and Good Handling. These two attributes form the core service. The other interesting finding is that airlines tend to emphasise on a direct service, whereas the forwarders would not mind one or two transits. The forwarders are more concerned about the reliability of the core service.

On the peripheral services, Gap 1 is positive between the airlines and the top management/sales managers of the forwarding company, whereas it is negative between the airlines and the operations managers. The finding suggests that airlines need to emphasise more on the peripheral services, especially if they are dealing with the less price sensitive customers. In this case, the less price sensitive customers are the operations managers.

The third hypothesis makes use of the key factors to Gap 1. These key factors are compared among the three categories of airlines: "good", "average", and "poor". The Perceived Service Quality index is used to group the airlines into the three categories. Two of the three key factors are found significant between the "good" and "poor" airlines. These two key factors are Marketing Research Orientation and Upward Communication. The "good" airlines have higher mean scores on these two key factors than the "poor" airlines, which suggests that the "good" airlines place more emphasis on the two factors than the "poor" airlines. On Upward Communication, the difference in the mean scores between the "good" and "poor" airlines is also significant. The "good" airlines seem to place more emphasis on Upward Communication than the "poor" airlines.

The fourth hypothesis makes use of the four key factors to the gap between the management perceptions of customer expectations and service-quality specifications. The analysis compares the differences among the three categories of airlines on the four key factors to this gap. The findings suggest that the "good" airlines place more emphasis on two key factors Goal Setting and Task Standardisation than the "poor" airlines. In setting the company's goals, the "good" airlines seem to place more emphasis on customer's requirements and expectations rather than internal company standards. On the other two key factors Management Commitment to Service Quality and Perception of Feasibility, the differences in the mean score between these two categories of airlines are not statistically significant.

Finally, the fifth hypothesis makes use of the seven key factors to the gap between the service-quality specifications and the service delivery. The analysis compares the differences among the three categories of airlines on the seven key factors to this gap. The findings suggest that the "good" airlines place more emphasis on three key factors than the "poor" airlines. These three key factors Team-work, Technology-job Fit, and Perceived Control are related negatively to the size of the gap. On the key factor Technology-job Fit, the difference in mean scores between the "good" and "poor" airlines is also statistically significant. This suggests that the "good" airlines have the appropriate tools and technology for the employees to perform their tasks.

In summary, the "good" airlines place more emphasis on seven key factors affecting the service production system than the "poor" airlines. These seven key factors are related negatively to Gap 1, 2, and 3. Out of these seven, four are management key factors: Marketing Research Orientation, Upward Communication, Goal Setting, and Task Standardisation. The other three are operations key factors: Team-work, Technology-job Fit, and Perceived Control.

The unexpected findings are on two key factors: Role Conflict and Role Ambiguity. These two key factors are related positively to the gap between the service-quality specifications and the service delivery. The "good" airlines have higher mean score on the two key factors than the "average" and "poor" airlines. The findings suggest that the employees of the "good" airlines feel more pressured due to competing or conflicting demands made on them by customers, supervisors, and top managers. Additionally, the employees of the "good" airlines are more uncertain about what their supervisors and managers expect from them and how to satisfy those expectations.

Chapter 11 - Conclusions

11.0 Introduction

This chapter gives a summary of the significant results of the research and the contributions to knowledge. It also discusses the limitations of the research and provides suggestions for future research. The research was conducted in 6 stages (Stages 1 to 6). Stage 1 reviewed the literature on service quality and the air freight industry. The actual survey was conducted in Stages 2 to 6.

11.1 Summary of the Results

There are six main hypotheses in this research and all of them are accepted, except on those hypotheses relating to the differences among the three categories of airlines on their emphasis on the key factors affecting the service production system.

The first hypothesis addresses the components of perceived service quality. This hypothesis is divided into two parts. The first part states that perceived service quality is influenced by two components: the technical and functional quality components. The finding confirms that perceived service quality is made up of the technical and functional components, thus supporting the hypothesis. The technical component is made up of the Predictability and Capability components. The Predictability is the primary technical outcome, whereas Capability is the secondary technical outcome. The Interaction component, which is related to the buyer and seller activity, refers to the functional outcome.

The second part of this hypothesis states that the technical component is more important than the functional component in shaping the customer's perceptions of service quality. The finding shows that the Predictability component is the most important component, followed by the Capability and Interaction components. Since the Predictability and Capability components are the two most important components, the hypothesis is accepted.

The second hypothesis states that price is less important than the service attributes to both the forwarder and the shipper in the air freight industry. The finding reveals that the forwarders place more emphasis on Good Handling and Definite Uplift than price. On the other hand, the shippers place more emphasis on Good Handling, followed by price. Since price is not ranked first for both the forwarders and the shippers, this hypothesis is accepted.

The third hypothesis suggests that there is a significant difference in emphasis on the price and service attributes between the operational and non-operational groups in the forwarding company. The finding supports this hypothesis. For the non-operational group, Good Handling is ranked first, whereas price is ranked second. In the case of the operational group, Good Handling is ranked first, whereas price is ranked last. Furthermore, the operational group places more emphasis on Immediate Connection and Interaction Quality than the non-operational group.

The fourth hypothesis relates to the gap between customer expectations and management perceptions of those expectations (Gap 1). There are two parts to this hypothesis. The first part suggests that the size of Gap 1 is significant between the airlines and the forwarders, and the size of Gap 1 differs between the operational and non-operational groups. The finding shows that Gap 1 is negative on the core service. However, this gap is larger for the non-operational group than the operational group. The gap on the peripheral services is positive for the non-operational group, whereas it is negative for the operational group. Thus, the hypothesis is accepted.

The second part of the fourth hypothesis states that there are differences among the three categories of airlines on their emphasis on the key factors affecting the size of Gap 1. Similarly, the fifth and sixth hypotheses also state that there are differences among the three categories of airlines on their emphasis on the key factors affecting the size of Gap 2 and Gap 3 respectively. The key factors affecting the size of Gap 1 and Gap 2 are referred to as management key factors, whereas the key factors affecting the size of Gap 3 are the operations key factors.

On the management key factors, the "good" airlines place more emphasis on four factors than the "poor" airlines; the four factors are Marketing Research Orientation, Upward Communication, Goal Setting, and Task Standardisation. Similarly, on the operations key factors, the "good" airlines place more emphasis on three factors than the "poor" airlines; the three factors are Team-work, Technology-job Fit, and Perceived Control. The "good" airlines also place more emphasis on Upward Communication and Technology-job Fit than the "average" airlines. However, the differences between the "average" and "poor" airlines on the key factors are not statistically significant. Therefore, only part of these hypotheses could be accepted.

The research also reveals the following findings:

- Within the Predictability component, the Reliability dimension is the most important dimension to the airline's customers for both the perishable and non-perishable freight commodities.

- Within the Reliability dimension, the forwarders ranked the attribute Definite Uplift as the most important attribute, whereas the shippers ranked On-time Arrival as their most important.
- One of the ten dimensions (Tangibles) is found not relevant to the air freight industry. Instead, another dimension labelled as Adequacy has emerged from the survey.
- The "good" airlines are perceived by the customers to perform better than the "average" and "poor" airlines on the Predictability component, followed by the Capability and Interaction components. Among the three components, the "average" and "poor" airlines are seen to perform better on the Interaction component.
- The price sensitive respondents place more emphasis on the core service, whereas the less price sensitive respondents place more emphasis on the peripheral services. In the case of the forwarders, the price sensitive respondents are those from the top/sales management group, whereas the less price sensitive respondents are those from the operations group. For the shippers, the price sensitive respondents are the manufacturers of consumer electronics, whereas the less price sensitive respondents are the manufacturers of industrial electronics.
- The employees of the "good" airlines appear to have greater role conflict and role ambiguity than those employees in the "poor" airlines.

11.2 Contributions of the Research

Gronroos is one of the first researchers to address the subject of perceived service quality. The outcome of his study showed that perceived service quality is made up of two generic components: technical and functional. In another study conducted by Parasuraman, Zeithaml, and Berry (1985), ten generic dimensions of service quality have been identified. However, the two research were conducted independently of one another. To date, there is no effort to correlate the two models. The findings of this research linked the two models of perceived service quality. The finding shows that there are three components of perceived service quality: Predictability, Capability, and Interaction. The Predictability and Capability components are responsible for the technical outcome, whereas the Interaction component is responsible for the functional outcome. These three components can be correlated with nine out of the ten dimensions of perceived service quality in Parasuraman, Zeithaml, and Berry's study. The Predictability

component consists of four dimensions: Reliability, Adequacy, Credibility, and Security. On the other hand, the Capability component is made up of three dimensions: Competence, Responsiveness, and Communication. Finally, the Interaction component consists of three dimensions: Understanding the Customer, Access, and Courtesy. The relationship is illustrated in Figure 11.1.

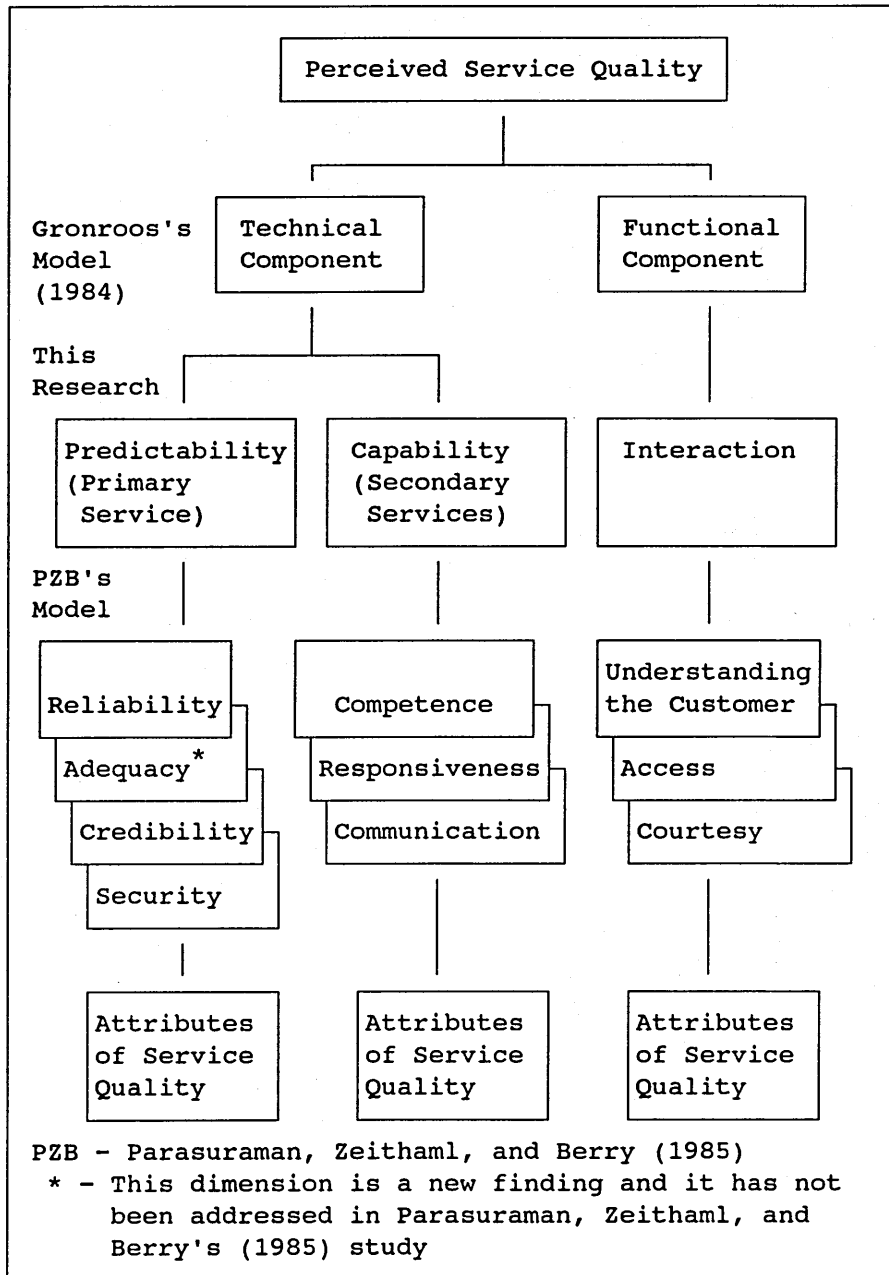


Figure 11.1 - An Illustration on the Linkages of the Dimensions and Components of Perceived Service Quality Among the Three Studies

Figure 11.1 shows the different levels that one can choose when addressing perceived service quality. The lowest level would be the attributes of service quality. Thus, the first contribution of this research is the ability to bridge the two models of perceived service quality.

Figure 11.1 also shows that the technical component is made up of the primary (addressing the main aspect of the service) and secondary (addressing the supporting services) components. The Predictability component is the primary technical component, whereas the Capability is the secondary. The Interaction component constitutes the service delivery process. These three components form an Augmented Service Offering (see Gronroos, 1990). Thus, the second contribution of this research is that it further refines Gronroos's model by dividing the technical component into the primary and secondary technical outcomes.

The third contribution of this research is based on the outcome of the trade-off analysis on the price and service attributes among the respondents. The finding reveals that there are two groups of respondents, that is, the price sensitive and less price sensitive groups. The trade-off analysis shows the correlation between the two groups of respondents and their emphasis on the service attributes. For example, it shows that the price sensitive group gives more emphasis to the core service, whereas the less price sensitive group gives more emphasis on the peripheral services. Thus, with this finding, service firms can plan their service offering to suit the different groups in the market. Quality occurs when the service firm's offer matches the customer's needs.

The fourth contribution of this research is that it is the first empirical study done on perceived service quality from the view point of the industrial buyers. All the previous studies had concentrated on the consumer buyers.

The fifth contribution of the research is based on the design of the Stage 4 questionnaire. The questionnaire is designed along the concept of the Repertory Grid technique, that is, a matrix concept. However, the data was analysed using the SPSS program. The advantage of this questionnaire design is that it allows the researcher to get both the components of perceived service quality and the perceived service quality ranking of airlines from one interview alone. Normally, researchers tend to use the program associated with the Repertory Grid technique (for example, ADELA and SERIES). These two programs have limited statistical testing capabilities as the technique was developed along the concept of a qualitative research approach. The successful application of the SPSS program to the Stage 4 data has therefore contributed to the research methodology area.

Stages 5 and 6 of the research make use of the Trade-off technique to measure the gap between customer expectations and management perceptions of those

expectations (Gap 1). Zeithaml, Parasuraman, and Berry (1990) introduced the use of SERVQUAL instrument to measure the various gaps on a scale of 1 to 7. Using SERVQUAL, the extent of Gap 1 is measured by determining the discrepancy between the service provider's ratings and the customer's ratings on certain set of statements. By using an identical Trade-off questionnaire to two different groups, one can also measure the magnitude of Gap 1. The Trade-off analysis provides a more realistic picture as it measures the group's utility values. SERVQUAL merely measures the arithmetical difference between two rating scores. Therefore, this successful attempt in introducing the Trade-off technique to measure the magnitude of Gap 1 has broadened the choice of research techniques.

11.3 Limitations of the Research

There are some limitations in generalizing the research findings as it is specific to the industry. There are also some limitations due to the sample size and the technique used. These limitations will be addressed in relation to the findings from each stage of the research.

The finding from Stage 2 reveals that the Tangibles dimension is not relevant to the air freight industry. As explained earlier, this is probably due to the fact that the customers are not in the service "factory", that is, the consumption phase. This dimension is probably applicable to those industries where the customers are present in the service "factory", for example, passenger airlines. The limitation of this research is that it concentrates on one specific industry only. Therefore, further research should be conducted in other service industries where the customers are also excluded in the consumption phase.

The finding from Stage 5 reveals that the top/sales managers of the forwarding company are more price sensitive than the operations managers in the same company. Although the top and sales managers are price sensitive, there may be some differences due to their respective job functions. The top management are interested to improve the company's profit. On the other hand, the sales managers are interested to meet their sales target. Since they differ in their job functions, there may be some distinct differences in how these two groups view the price and service attributes. In order to establish their different emphasis on price, additional research should be conducted separating the two groups.

The finding in Stage 5 also reveals that the industrial electronics manufacturers are less price sensitive than the consumer electronics manufacturers. In general, the findings show that the price sensitive group places more emphasis on the core

service, whereas the less price sensitive group places more emphasis on the peripheral services. However, the difference in emphasis on the core service between the industrial and consumer electronics manufacturers is not statistically significant at $p < 0.10$. This could be due to the small sample size used in the survey, especially with the consumer electronics manufacturers. Therefore, further research should be conducted in this area in order to generalise the finding that the manufacturers of consumer electronics place more emphasis on the core service than the manufacturers of industrial electronics.

In Stage 6, the differences on the mean scores of the key factors are not statistically significant between the "average" and "poor" airlines at $p < 0.10$. There are two possible reasons. Firstly, it could be due to the small sample size used in the survey. Secondly, the categorisation of airlines is based on the Perceived Service Quality Index. The set-back with this index is that the cut-off point between two categories of airlines is subjective. Therefore, further research should be conducted with a bigger sample size.

11.4 Generalizability of the Research Findings

The issue of generalizability addresses the following two fundamental questions.

- Are the findings applicable to other service industries?
- Are the findings applicable to the air freight industry in other countries?

It is felt that the finding of Stage 4 on the three components of perceived service quality could be generalised to other service industries. The three components are Predictability, Capability, and Interaction. This is because the three components address both the technical and functional outcomes of the service production system. The Predictability component addresses the main aspect or the basic service, whereas the Capability component addresses the supporting services. These two outcomes are generally applicable in service production systems. However, it should be noted that the service attributes differ among the different types of service industries. Furthermore, the significance of the components may also differ among the different types of service offerings.

The finding from Stage 5 reveals that the price sensitive group places more emphasis on the core service, whereas the less price sensitive group places more emphasis on the peripheral services. In any service offering, it is likely to have a core service and the peripheral services. Furthermore, in any industry, there is

likely to exist a price sensitive group and a less price sensitive group. What differs among industries is the degree of correlation between the price sensitive/less price sensitive group and the core/peripheral services. Even though the research is conducted in the air freight industry, there is no reason why the finding should not be applicable to other service industries.

The findings from Stage 4 and 6 reveal that there is some form of correlation between customers' perceptions on the quality of services provided and how the service providers perform on the key factors affecting the service production system. Even though these findings pertain to the air freight industry, there is no reason why it should not be applicable to other service industries.

Finally, even though the research is conducted in Malaysia and Singapore, there is no reason why the findings could not be generalized to the air freight industry in other countries. For example, the applicability of the ten dimensions and the three components of perceived service quality are not location related. However, the location may have an effect on the relative significance of the attributes and dimensions of service quality. For example, customers operating in a location where demand is greater than supply may have different emphasis from those customers operating in an environment where supply is greater than demand. In the former environment, customers may place more emphasis on the attribute space allocation. On the other hand, those operating in the latter environment may place more emphasis on the reliability attributes.

11.5 Suggestions for Future Research

The air cargo industry is divided into the air freight and the air express industry. Within the air freight industry, it is further divided into airport-to-airport and door-to-door services. This is the first attempt to carry out a research on the subject of perceived service quality in the air cargo industry. Within the air cargo industry, this research is limited to the air freight industry, specifically on the airport-to-airport services. It is felt that there is a need to carry out research on door-to-door air freight and air express services. This initiative would complete the research on the subject of perceived service quality in the air cargo industry.

In freight distribution, the service providers of the different modes of transport are basically providing services to customers to move their goods from one point to another. Therefore, the concept of perceived service quality is applicable to all the different modes of transport. As such, further research should be conducted to cover the other modes of transport.

The research shows that the price sensitive group places more emphasis on the core service, whereas the less price sensitive group places more emphasis on the peripheral services. However, this research did not address the correlation between the service package and customer needs. The customer needs can be divided into primary and secondary needs. The service package refers to the core and peripheral services. Therefore, further research should be carried out to determine the correlation between the customer needs and service package for both the price sensitive and less price sensitive groups.

The finding in Stage 6 shows that there are differences in emphasis among the three categories of airlines on the key factors affecting the service production system. The key factors are limited to those taken from the literature. Furthermore, the comparisons made do not include the key factors to Gap 4. Gap 4 is the difference between the service delivered and what is communicated about the service to customers. Further research should be carried out to include the key factors to Gap 4. Additionally, further research should be carried out to determine the key factors affecting the service production system in the air freight industry.

Further research should also be carried out to ascertain how the corporate image affects perceived service quality. The research should also determine whether the corporate image is influenced by the technical and/or the functional quality.

11.6 Summary

This chapter gives the overall summary of the research. Of significance here is that perceived service quality is made up of three components. These three components are Predictability, Capability, and Interaction. The "good" airlines are perceived to perform better on all the three components than the "average" and "poor" airlines. In addition, the "good" airlines are seen to perform better on the Predictability component than the other two components. In the case of the "average" and "poor" airlines, they are seen to perform better on the Interaction component than the other two components.

On the issue of price sensitivity, the price sensitive group places more emphasis on the core service, whereas the less price sensitive places more emphasis on the peripheral services. In the case of forwarders, the price sensitive group are the top management/sales group, whereas the less price sensitive group are the operations group. In the case of shippers, the price sensitive group are the manufacturers of consumer electronics, whereas the less price sensitive group are the manufacturers of industrial electronics.

The comparative study among the airlines shows that the "good" airlines perform better on the management and operations key factors affecting the service production system than the "poor" airlines. The exception to this is on the key factors Role Ambiguity and Role Conflict.

This research managed to link the two models of perceived service quality (Gronroos's model and the Gap model). The linkages show the different levels that one can choose when addressing perceived service quality. The research has also shown that the technical component can be further divided into the primary and secondary components. In this case, the Predictability component is considered as primary, whereas the Capability is considered as secondary component. The other contributions of this research are related to the technique used to measure Gap 1, and using the SPSS to analyse the data from the Repertory Grid matrix.

Despite the research contributions to enrich the existing knowledge on perceived service quality and the research methodology, there are few limitations to this research. Among them are the small sample size used in Stage 5 (in the case of shippers) and Stage 6. However, the findings from this research could be generalized to both the transportation industry and other service industries. The study of perceived service quality is still at its infancy. Therefore, further research should be conducted to enrich the existing knowledge in this area.

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Appendix 4A - Airlines Operating In and Out Of Singapore and Malaysia

No.	Airline	M'sia	S'pore
1	Aeroflot	X	X
2	Air Canada	X	X
3	Air France	X	X
4	Air Hong Kong	X	
5	Air India	X	X
6	Air Lanka	X	X
7	Air Mauritius	X	X
8	Air Nauru		X
9	Air New Zealand		X
10	Air Niugini		X
11	Alitalia	X	X
12	American Airlines	X	X
13	Ansett	X	X
14	Australian Airlines		X
15	Bayu Indonesia Air		X
16	Biman Bangladesh Airlines		X
17	British Airways	X	X
18	Burma Airways		X
19	CAAC		X
20	Canadian Airlines		X
21	Cargolux	X	X
22	Cathay Pacific	X	X
23	China Airlines	X	X
24	Czechoslovak Airlines	X	X
25	Delta Airlines	X	
26	Ethiopian Airlines		X
27	Federal Express	X	X
28	Finnair		X
29	Garuda Airways	X	X
30	Iraqi Airways		X
31	Japan Airlines	X	X
32	KLM	X	X
33	Korean Airlines		X
34	Kuwait Airways	X	X
35	Lufthansa	X	X
36	Malaysia Airlines	X	X
37	Northwest Airlines		X
38	Olympic Airways		X
39	Pakistan Airlines	X	X
40	Pan American		X
41	Philippine Airlines	X	X
42	Pt Bouraq Indonesia Airlines		X
43	Qantas Airways	X	X
44	Royal Brunei Airways	X	X
45	Royal Jordanian	X	
46	Royal Nepal Airlines		X

x - operating into

No	Airline	M'sia	S'pore
47	Sabena		X
48	Saudia	X	X
49	Scandinavia Airlines System	X	X
50	Singapore Airlines	X	X
51	Swissair	X	X
52	Tarom Romanian Air		X
53	Thai International	X	X
54	Trade Winds		X
55	Trans World Airlines		X
56	Turkish Airlines	X	
57	United Airlines	X	X
58	UTA French Airlines	X	
59	UTA-Union De Transports Aeriens		X
60	Yemenia Airlines	X	X
61	Yugoslav Airlines	X	X

x - operating into

Source: A-Z Worldwide Airfreight Directory
May-October 1990

Appendix 5A - Stage 2 Repertory Grid Interview Form

Resp. # _____	Time Start _____
Customer/Airline _____	Time Finish _____
Name _____	Date _____
Title _____	Country _____

123	456	789	147	258	369
159	267	348	169	248	357

Elem- ent #	Construct (Emergent Pole) Rating, (1)	Element									Construct (Contrast Pole) Rating, (5)	Elem- ent #
		1	2	3	4	5	6	7	8	9		

[illegible]

Appendix 5B - Stage 3 Questionnaire

Please put a cross [X] under the appropriate dimensions where you think the attribute of service quality should fit in. For example, if you think that "Adequate Capacity" should fall under "Adequacy" dimension, then please mark "X" in row 2 column 1 (see below). There are no right or wrong answers.

Dimension of Service Quality

1 - Adequacy
2 - Reliability
3 - Responsiveness
4 - Competence
5 - Courtesy

6 - Credibility
7 - Security
8 - Communication
9 - Access
10 - Understanding the Customer

No:	Attribute of Service Quality	1	2	3	4	5	6	7	8	9	10
2	Adequate Capacity	X									

Dimension of Service Quality											
No:	Attribute of Service Quality	1	2	3	4	5	6	7	8	9	10
1	Accessible										
2	Adequate Capacity										
3	Credible Service										
4	Courteous										
5	Definite Uplift										

No:	Attribute of Service Quality	Dimension of Service Quality									
		1	2	3	4	5	6	7	8	9	10
6	Firm Allocation										
7	Good Handling										
8	Good Relationship										
9	Good Tracking and Monitoring										
10	High Frequency Feedback										
11	High Quality Feedback										
12	Immediate Connection										
13	Less Pilferage										
14	Meeting Emergency Needs										
15	On-time Arrival										
16	Provide Professional Advice										
17	Quick in Responding										
18	Responsive to Claims										

Appendix 5C - Stage 4 Questionnaire

Perceived Service Quality in the Air Freight Industry

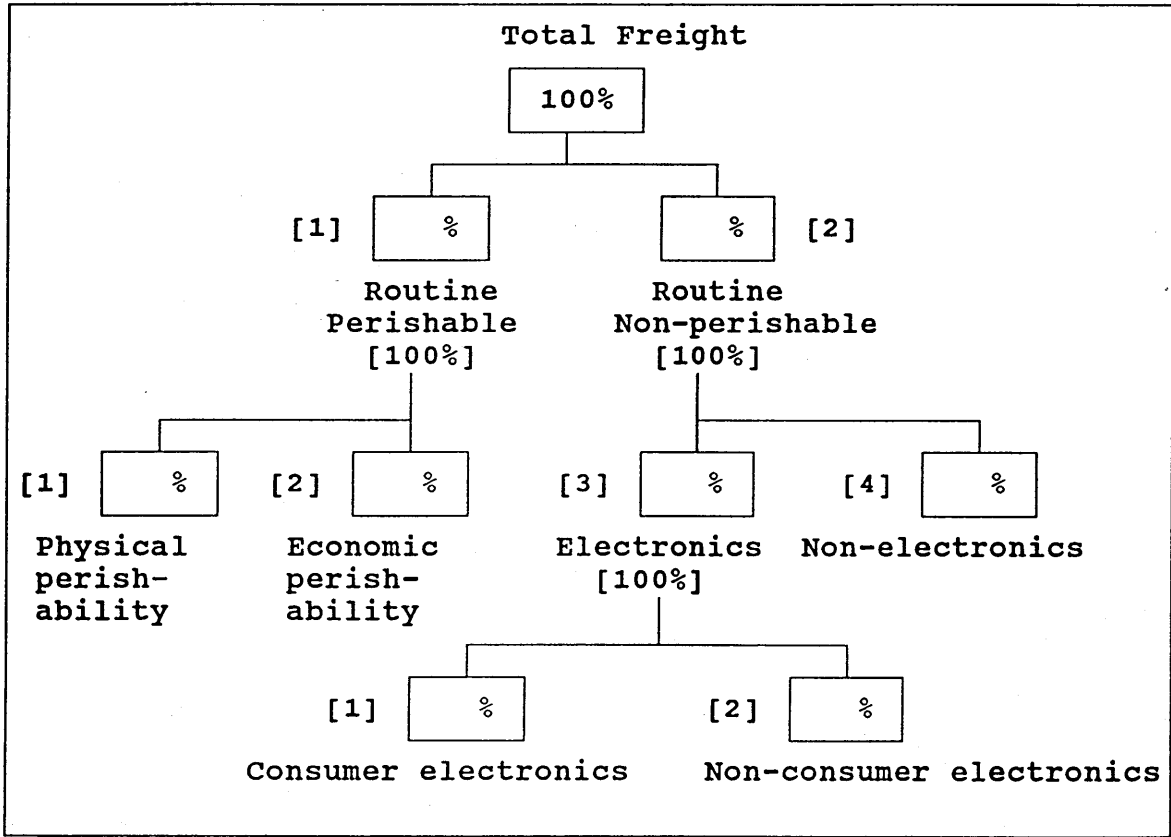
STAGE 4 - CUSTOMER - EXPORT

Firm: _____	Date: _____
Name: _____	Time start: _____
Title: _____	Time finish: _____

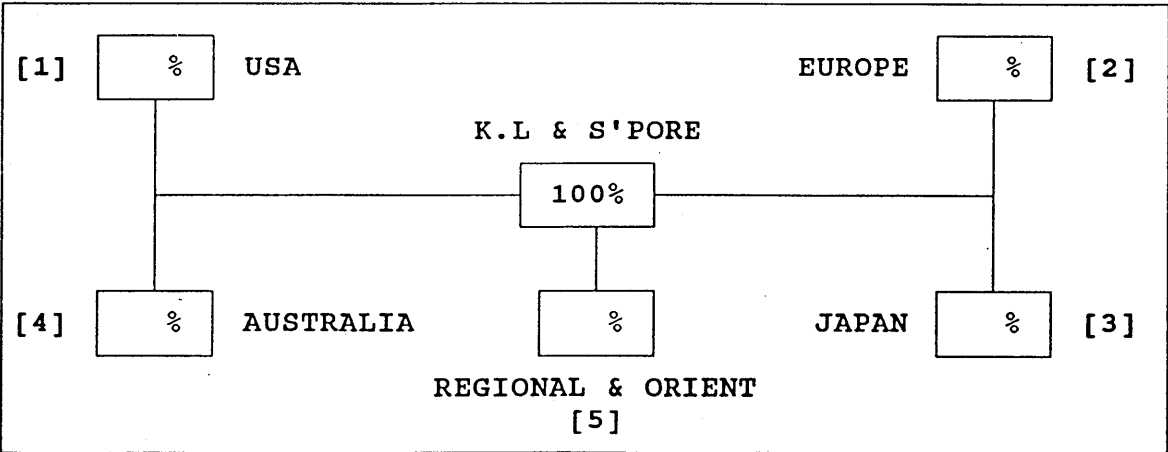
Respondent # (001 - 100)	<input type="text"/>	WORD5\FEEDBACK\...
		WORD5\DATA\...
		WORD5\ANALYSIS\...
		WORD5\PROGRAM\...
	Hard Copy	
Data entry form #1 (Rating reversal form) (Analysis #1)	<input type="text"/>	File # <input type="text"/> FESTG31?.DAT
Data entry form #2 (Analysis #2)	<input type="text"/>	File # <input type="text"/> FESTG32?.DAT
Data entry form #3 (Analysis 3#)	<input type="text"/>	File # <input type="text"/> FESTG33?.DAT
Analysis #1 ANALYSIS/FESTG31?.LIS	<input type="text"/>	File # <input type="text"/> FESTG31?.LIS
Analysis #2 ANALYSIS/FESTG32?.LIS	<input type="text"/>	File # <input type="text"/> FESTG32?.LIS
Analysis #3 ANALYSIS/FESTG33?.LIS	<input type="text"/>	File # <input type="text"/> FESTG33?.LIS
Feedback F/FE01 - FE60 YES ☐ NO ☐	<input type="text"/>	File # <input type="text"/> FE01-FE60

NB: There are three ways of measuring the amount of freight: FTK, RTK, and Tonnes. In the research we are using the last measuring unit (tonnes) as an indicator on the amount of freight.

THE AMOUNT OF FREIGHT EXPORTED ON THE FOLLOWING
FREIGHT CLASSIFICATIONS



THE AMOUNT OF FREIGHT EXPORTED ON THE FOLLOWING
ROUTES

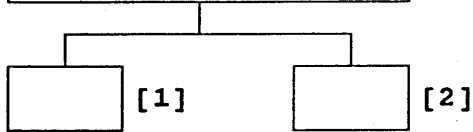


GRID # 1

GRID # 2

Please select one with the higher amount of export.

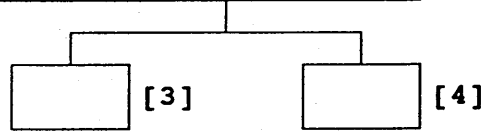
Routine perishable [1]



Physical perishability Economic perishability

Please select one with the higher amount of export.

Routine Non-perishable [2]



Electronics Non-electronics

Please indicate the amount of freight (in %) exported on the following routes (see below). Then select the most competitive route: that is, the route that offers a wide choice of carriers.

Route % Select one

USA	<input type="text"/>	<input type="text"/>
[1]		
EUROPE	<input type="text"/>	<input type="text"/>
[2]		
JAPAN	<input type="text"/>	<input type="text"/>
[3]		
AUSTRALIA	<input type="text"/>	<input type="text"/>
[4]		
REG/ORIENT	<input type="text"/>	<input type="text"/>
[5]		

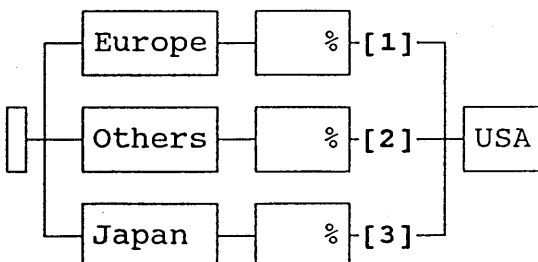
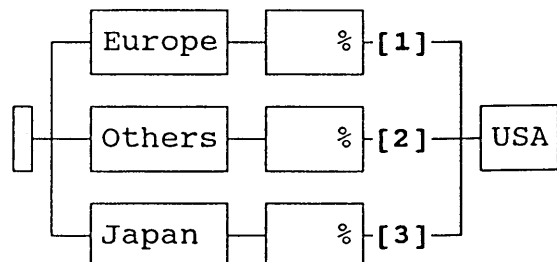
Total 100%

Route % Select one

USA	<input type="text"/>	<input type="text"/>
[1]		
EUROPE	<input type="text"/>	<input type="text"/>
[2]		
JAPAN	<input type="text"/>	<input type="text"/>
[3]		
AUSTRALIA	<input type="text"/>	<input type="text"/>
[4]		
REG/ORIENT	<input type="text"/>	<input type="text"/>
[5]		

Total 100%

Please indicate the amount of freight (in %) transported to the USA via the following countries. The total must be 100%. Skip the question if the above selection is not the USA.



GRID # 1

GRID # 2

Please provide the list of 6 airlines with 2 airlines in each of the following category: good perceived service quality, average perceived service quality, and poor perceived service quality. Please indicate the freight share (in %) carried by each airline: the total carried by the 6 airlines are 100%.

Preferred [1]	<input type="text"/>	<input type="text"/>
Good [2]	<input type="text"/>	<input type="text"/>
Average [3]	<input type="text"/>	<input type="text"/>
Average [3]	<input type="text"/>	<input type="text"/>
Poor [4]	<input type="text"/>	<input type="text"/>
Poor [4]	<input type="text"/>	<input type="text"/>
Total 100%		

Preferred [1]	<input type="text"/>	<input type="text"/>
Good [2]	<input type="text"/>	<input type="text"/>
Average [3]	<input type="text"/>	<input type="text"/>
Average [3]	<input type="text"/>	<input type="text"/>
Poor [4]	<input type="text"/>	<input type="text"/>
Poor [4]	<input type="text"/>	<input type="text"/>
Total 100%		

Please select one:

Grid #1 – Perishable

--

Grid #2 – Non-perishable

--

Forwarder

--

Shipper

--

Firm

--

Please rate the airlines on a scale of 1 to 5 against each attribute.

If the airline fits in with the left hand description, please give it a score of 1.

If the airline fits in with the right hand description, please give it a score of 5.

If the airline fits in between, please choose a number between the two extremes.

THERE ARE NO RIGHT OR WRONG ANSWERS.

		AIRLINE						
	ATTRIBUTE OF SERVICE QUALITY	Ave	Good	Poor	Good	Ave	Poor	ATTRIBUTE OF SERVICE QUALITY
	[1]							[5]
1	Adequate capacity							Inadequate capacity
2	Immediate connection							Poor connection
3	Frequent offloading							Definite uplift
4	"Wait list" status							Firm allocation
5	Very poor in handling							Very good in handling
6	On time arrival							Always not on time
7	Meeting emergency needs							Not interested
8	Provides professional advice							Unable to provide the services
9	Very quick in responding							Very slow in responding
10	Not responsive at all							Responsive to claims
11	Very poor in tracking/monitoring							Very good in tracking/monitoring
12	Very poor quality of feedback							Very high quality of feedback
13	Arrogant attitude (rude)							Courteous
14	Credible service							Not Credible Service
15	Very good security							Lax in security
16	High frequency of feedback							No feedback
17	Inaccessible							Accessible
18	Poor relationships with customers							Good relationships with customers

Please select one:

Grid #1 – Perishable

Grid #2 – Non-perishable

Forwarder

Shipper

Firm

Please rate the airlines on a scale of 1 to 5 against each attribute.

If the airline fits in with the left hand description, please give it a score of 1.

If the airline fits in with the right hand description, please give it a score of 5.

If the airline fits in between, please choose a number between the two extremes.

THERE ARE NO RIGHT OR WRONG ANSWERS.

		AIRLINE									
	ATTRIBUTE OF SERVICE QUALITY	Ave	Good	Poor	Good	Ave	Poor		ATTRIBUTE OF SERVICE QUALITY		
	[1]								[5]		
1	Adequate capacity								Inadequate capacity		
2	Immediate connection								Poor connection		
3	Frequent offloading								Definite uplift		
4	"Wait list" status								Firm allocation		
5	Very poor in handling								Very good in handling		
6	On time arrival								Always not on time		
7	Meeting emergency needs								Not interested		
8	Provides professional advice								Unable to provide the services		
9	Very quick in responding								Very slow in responding		
10	Not responsive at all								Responsive to claims		
11	Very poor in tracking/monitoring								Very good in tracking/monitoring		
12	Very poor quality of feedback								Very high quality of feedback		
13	Arrogant attitude (rude)								Courteous		
14	Credible service								Not Credible Service		
15	Very good security								Lax in security		
16	High frequency of feedback								No feedback		
17	Inaccessible								Accessible		
18	Poor relationships with customers								Good relationships with customers		

RANKING THE DIMENSIONS OF SERVICE QUALITY

Please rank the following dimensions on a scale of 1 to 10:

1 = Most important dimension.

10 = Least important dimension.

P = Routine perishable

NP = Routine non-perishable

	P		NP
ADEQUACY (capacity & routes)			
ACCESS			
CREDIBILITY			
UNDERSTANDING THE CUSTOMERS			
RELIABILITY			
COMPETENCE			
COURTESY			
SECURITY			
COMMUNICATION			
RESPONSIVENESS			

WEIGHTING THE RELIABILITY ATTRIBUTES OF SERVICE QUALITY

Please give a weight between 1–10 on the following four attributes.

The total must not exceed 10.

	P		NP
DEFINITE UPLIFT			
FIRM ALLOCATION			
GOOD HANDLING			
ON TIME ARRIVAL			
Total	10		10

Do you need the analysis?

Yes

☐

No

☐

If yes, write the address below:

Appendix 5D - Stage 5 Questionnaire

PERCEIVED SERVICE QUALITY IN THE AIR FREIGHT INDUSTRY

TRADE-OFF QUESTIONNAIRE

[1] Respondent No.

[2] Date

[3] Respondent Classification
(please select one)

[a] Forwarder

[b] Shipper

[4] Route
(please select one)

[a] KUL - TYO

NB: Plse select the correct set of forms [b] KUL - LAX

[5] Quantity of Freight/Wk (electronics only)

Tonnes

[6] Feedback required

YES

NO

TRADE-OFF EXAMPLE (Car selection attributes)

Please rank 1 to 9 in terms of your preference:

1 = most preferred

2 = second most preferred

3 = etc.

M.P.G	PRICE		
	Rgt 30K	Rgt 35K	Rgt 40K
50 m.p.g.	1		
40 m.p.g.			
30 m.p.g.			9

Please rank each cell in each table of your customer's preference:
1 = customer most preferred choice
2 = customer second most preferred choice
3 = etc.

[T1]		[1] PRICE (KUL - TYO)			
[2] DEFINITE UPLIFT		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
98%					
93%					
88%					

[T2]		[1] PRICE (KUL - TYO)			
[3] MISHANDLING		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
2%					
6%					
10%					

[T3]		[1] PRICE (KUL - TYO)			
[4] INTERACTION QUALITY		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
Good					
Average					
Poor					

Please rank each cell in each table of your customer's preference:
1 = customer most preferred choice
2 = customer second most preferred choice
3 = etc.

[T4]		[1] PRICE (KUL - TYO)			
[5] FIRM ALLOCATION		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
4 Weeks					
3 Weeks					
1 Week					

[T5]		[1] PRICE (KUL - TYO)			
[6] IMMEDIATE CONNECTION		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
Direct service					
Indirect (same airline)					
Indirect (change airline)					

NB: Examples of Immediate Connection

- [a] Direct Service -

KUL - TYO (no transit)
KUL - LAX (with technical transit)
- [b] Indirect Service -
(same airline)

KUL - LAX via TYO.
The goods are transferred into another A/C.
- [c] Indirect Service -
(change airline)

KUL - LAX via TYO.
With KUL-TYO on MH,
and TYO-LAX on other airlines.

Please rank each cell in each table of your customer's preference:

1 = customer most preferred choice

2 = customer second most preferred choice

3 = etc.

[T6]		[3] MISHANDLING		
[2] DEFINITE UPLIFT		2%	6%	10%
98%				
93%				
88%				

[T7]		[4] INTERACTION QUALITY		
[2] DEFINITE UPLIFT		Good	Average	Poor
98%				
93%				
88%				

[T8]		[6] IMMEDIATE CONNECTION		
[2] DEFINITE UPLIFT		Direct service	Indirect (same airline)	Indirect (chg. airline)
98%				
93%				
88%				

NB: Examples of Immediate Connection

- [a] Direct Service - KUL - TYO (no transit)
KUL - LAX (with technical transit)
- [b] Indirect Service - KUL - LAX via TYO.
(same airline) The goods are transferred into another A/C.
- [c] Indirect Service - KUL - LAX via TYO.
(change airline) With KUL-TYO on MH,
and TYO-LAX on other airlines.

Please rank each cell in each table of your customer's preference:

1 = customer most preferred choice

2 = customer second most preferred choice

3 = etc.

[T9]	[3] MISHANDLING		
	2%	6%	10%
[4] INTERACTION QUALITY			
Good			
Average			
Poor			

[T10]	[5] FIRM ALLOCATION		
	4 Weeks	3 Weeks	1 Week
[4] INTERACTION QUALITY			
Good			
Average			
Poor			

[T11]	[6] IMMEDIATE CONNECTION		
	Direct	Indirect	Indirect
[4] INTERACTION QUALITY	service	(same airline)	(chg. airline)
Good			
Average			
Poor			

NB: Examples of Immediate Connection

[a] Direct Service - KUL-TYO (no transit)
KUL-LAX (with technical transit)

[b] Indirect Service - KUL-LAX via TYO
(same airline) The goods are transferred into another A/C

[c] Indirect Service - KUL-LAX via TYO
(change airline) and TYO-LAX on other airlines

Appendix 5E - The Arrangement of the Positive and Negative Service Quality Attributes as Shown in Stage 4 Questionnaire

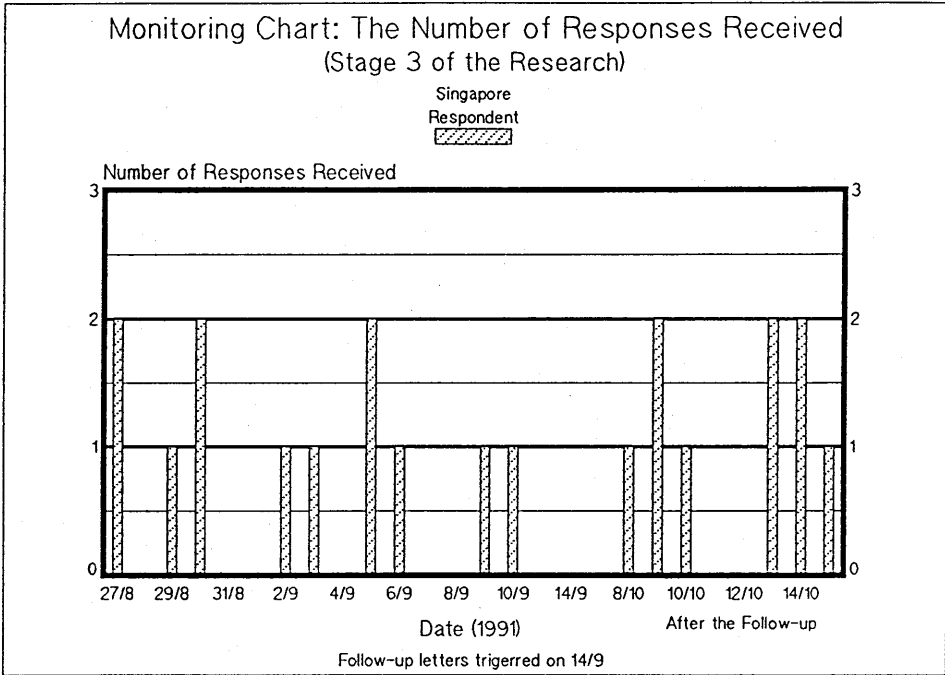
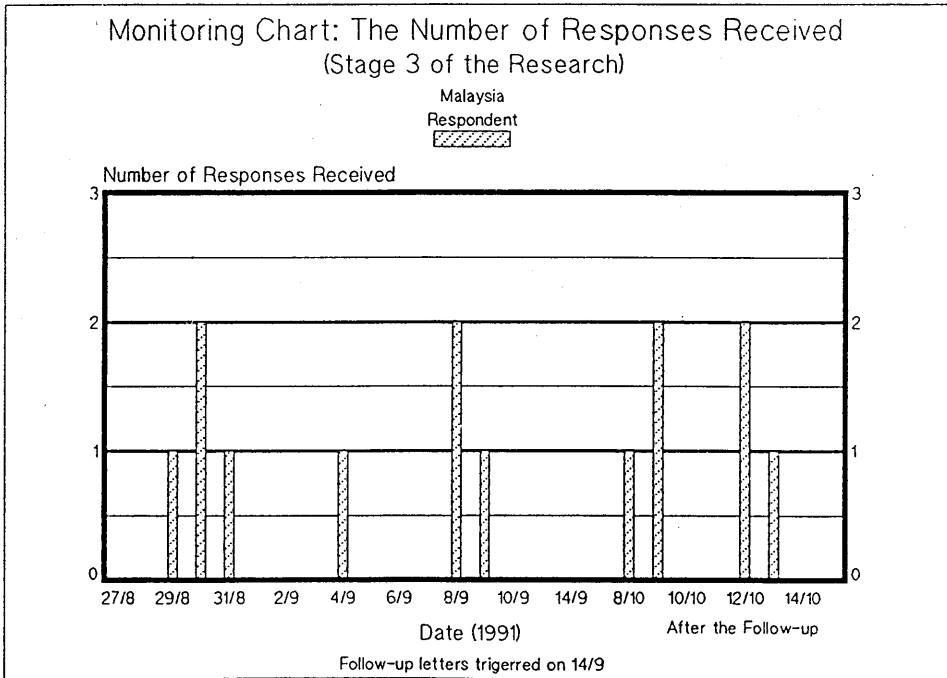
The "+" sign indicates the positiveness of the attribute.
 For example, if the "+" is on the L/H column it means the left hand attribute is positive (good attribute) and the right hand attribute is negative (poor attribute).
 The attributes are well dispersed to minimise the "halo effect".
 We followed Kerlinger's (1986) recommendation: that is, 50% of the positive attributes are located on the left hand side and the other 50% on the right hand side.

	ATTRIBUTE OF SERVICE QUALITY [1]	L/H	R/H	ATTRIBUTE OF SERVICE QUALITY [5]
1	Adequate capacity	+		Inadequate capacity
2	Immediate connections	+		Poor connections
3	Frequent offloading		+	Definite uplift
4	"Wait list" status		+	Firm allocation
5	Very poor in handling		+	Very good in handling
6	On time arrival	+		Always not on time
7	Meeting emergency needs	+		Not interested
8	Provides professional advice	+		Unable to provide the services
9	Very quick in responding	+		Very slow in responding
10	Not responsive at all		+	Responsive to claims
11	Very poor in tracking/monitoring		+	Very good in tracking/monitoring
12	Very poor quality of feedback		+	Very high quality of feedback
13	Arrogant attitude (rude)		+	Courteous
14	Credible service	+		Not credible service
15	Very good security	+		Lax in security
16	High frequency of feedback	+		No feedback
17	Inaccessible		+	Accessible
18	Poor relationships with customers		+	Good relationships with customers

Appendix 6A - The Service Quality Attributes From Stage 2 of the Research

No	Service Quality Attributes
1	Ability to Accept Different Cargo Sizes
2	Ability to Accept Different Types of Cargo
3	Accessible
4	Arrive in Good Condition
5	Adequate Capacity
6	Approachable
7	Close to Customer
8	Credible Service
9	Courteous
10	Definite Uplift
11	Fair Treatment
12	Fast in Solving Problem
13	Firm Allocation
14	Frequent Sales Call/Visit
15	Good Attitude
16	Good Communication
17	Good Handling
18	Good International Connection
19	Good Relationship
20	Good Support
21	Good Tracking and Monitoring
22	Good Transit Facility
23	High Frequency Feedback
24	Higher Flight Frequency
25	High Quality Feedback
26	Immediate Connection
27	Infrequent Off-loading
28	Late Night Departures
29	Less Pilferage
30	Listen to Customer
31	Meeting Emergency Needs
32	On-time Arrival
33	Personalised Treatment
34	Plan Customer's Needs
35	Polite
36	Provide Alternate Routes
37	Provide Customs Clearance
38	Provide Professional Advice
39	Quality Contact
40	Quick Delivery
41	Quick in Responding
42	Reliable Carrier
43	Responsive Claims
44	Wide Coverage

Appendix 7A - The Postal Survey (Stage 3) Monitoring Chart



Appendix 8A - The Correlation Coefficient of the Service Quality Attributes

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18
A1	1.00																	
A2	0.60	1.00																
A3	0.53	0.61	1.00															
A4	0.61	0.65	0.66	1.00														
A5	0.42	0.58	0.58	0.60	1.00													
A6	0.47	0.67	0.57	0.61	0.62	1.00												
A7	0.52	0.48	0.56	0.56	0.51	0.44	1.00											
A8	0.36	0.44	0.42	0.51	0.55	0.48	0.58	1.00										
A9	0.39	0.48	0.47	0.55	0.51	0.44	0.55	0.59	1.00									
A10	0.25	0.26	0.22	0.25	0.41	0.28	0.32	0.32	0.32	1.00								
A11	0.47	0.56	0.60	0.58	0.61	0.55	0.47	0.47	0.55	0.39	1.00							
A12	0.37	0.52	0.55	0.51	0.57	0.47	0.50	0.48	0.56	0.41	0.75	1.00						
A13	0.34	0.34	0.35	0.33	0.38	0.37	0.36	0.36	0.32	0.25	0.38	0.37	1.00					
A14	0.44	0.60	0.54	0.51	0.59	0.59	0.51	0.52	0.47	0.33	0.57	0.59	0.44	1.00				
A15	0.39	0.45	0.42	0.40	0.53	0.50	0.39	0.39	0.39	0.22	0.46	0.42	0.39	0.55	1.00			
A16	0.33	0.39	0.42	0.33	0.48	0.37	0.48	0.37	0.44	0.28	0.51	0.55	0.46	0.50	0.41	1.00		
A17	0.40	0.44	0.45	0.33	0.41	0.38	0.40	0.35	0.36	0.40	0.44	0.45	0.63	0.50	0.34	0.41	1.00	
A18	0.45	0.44	0.50	0.44	0.47	0.40	0.51	0.53	0.44	0.32	0.43	0.47	0.61	0.55	0.34	0.41	0.68	1.00

The Service Quality Attributes in the Air Freight Industry

Attribute Number	Attribute
A1	Adequate Capacity
A2	Immediate Connection
A3	Definite Uplift
A4	Firm Allocation
A5	Good Handling
A6	On-time Arrival
A7	Meeting Emergency Needs
A8	Provide Professional Advice
A9	Quick in Responding
A10	Responsive to Claims
A11	Good Tracking/Monitoring
A12	High Quality Feedback
A13	Courteous
A14	Credible Service
A15	Less Pilferage
A16	High Frequency Feedback
A17	Accessible
A18	Good Relationship With Customers

Appendix 9A - The Badness-of-fit and Kendall's tau of the Seventeen Respondents (Forwarders) of the Initial survey

Resp. #	Total inconsis- tencies remaining	Kendall's Tau	Badness of Fit	Number of iterations
5	26.00	0.87	0.08	2
6	25.00	0.87	0.08	1
7	39.00	0.80	0.18	2
8	25.50	0.87	0.08	1
9	25.50	0.87	0.09	1
10	27.00	0.86	0.11	3
11	31.50	0.84	0.11	2
17	26.00	0.87	0.05	1
18	21.50	0.89	0.03	1
23	27.00	0.86	0.08	2
24	27.00	0.86	0.08	1
25	28.50	0.85	0.09	3
26	26.50	0.86	0.06	1
27	29.00	0.85	0.07	1
28	37.50	0.81	0.10	3
29	22.00	0.89	0.06	2
32	24.00	0.88	0.07	1

Resp. #7 has been excluded from the subsequent analysis

Appendix 10A - Stage 6 Questionnaire

PERCEIVED SERVICE QUALITY IN THE AIR FREIGHT INDUSTRY
TRADE-OFF QUESTIONNAIRE

[1] Respondent No.

[2] Date

[3] Airline Code
(please select one)

[4] Route
(please select one)

[a] KUL - TYO

NB: Plse select the correct set of forms [b] KUL - LAX

[5] Quantity of Freight/Wk (electronics only)

Tonnes

[6] Feedback required

YES

NO

TRADE-OFF EXAMPLE (Car selection attributes)

Please rank 1 to 9 in terms of your preference:

1 = most preferred

2 = second most preferred

3 = etc.

M.P.G	PRICE		
	Rgt 30K	Rgt 35K	Rgt 40K
50 m.p.g.	1		
40 m.p.g.			
30 m.p.g.			9

Please rank each cell in each table of your customer's preference:
1 = customer most preferred choice
2 = customer second most preferred choice
3 = etc.

[T1]		[1] PRICE (KUL - TYO)			
[2] DEFINITE UPLIFT		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
98%					
93%					
88%					

[T2]		[1] PRICE (KUL - TYO)			
[3] MISHANDLING		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
2%					
6%					
10%					

[T3]		[1] PRICE (KUL - TYO)			
[4] INTERACTION QUALITY		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
Good					
Average					
Poor					

Please rank each cell in each table of your customer's preference:

1 = customer most preferred choice

2 = customer second most preferred choice

3 = etc.

[T4]		[1] PRICE (KUL - TYO)			
[5] FIRM ALLOCATION		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
4 Weeks					
3 Weeks					
1 Week					

[T5]		[1] PRICE (KUL - TYO)			
[6] IMMEDIATE CONNECTION		Rgt. 3.00	Rgt. 3.40	Rgt. 3.80	Rgt. 4.20
Direct service					
Indirect (same airline)					
Indirect (change airline)					

NB: Examples of Immediate Connection

- [a] Direct Service - KUL - TYO (no transit)
KUL - LAX (with technical transit)
- [b] Indirect Service - KUL - LAX via TYO.
(same airline) The goods are transferred into another A/C.
- [c] Indirect Service - KUL - LAX via TYO.
(change airline) With KUL-TYO on MH,
and TYO-LAX on other airlines.

Please rank each cell in each table of your customer's preference:
1 = customer most preferred choice
2 = customer second most preferred choice
3 = etc.

[T6]	[3] MISHANDLING		
	[2] DEFINITE UPLIFT		
	98%	2%	6%
	93%		10%
	88%		

[T7]	[4] INTERACTION QUALITY		
	[2] DEFINITE UPLIFT		
	98%	Good	Average
	93%		Poor
	88%		

[T8]	[6] IMMEDIATE CONNECTION		
	[2] DEFINITE UPLIFT		
	98%	Direct service	Indirect (same airline)
	93%		Indirect (chg. airline)
	88%		

NB: Examples of Immediate Connection

- [a] Direct Service - KUL - TYO (no transit)
KUL - LAX (with technical transit)
- [b] Indirect Service - KUL - LAX via TYO.
(same airline) The goods are transferred into another A/C.
- [c] Indirect Service - KUL - LAX via TYO.
(change airline) With KUL-TYO on MH,
and TYO-LAX on other airlines.

Please rank each cell in each table of your customer's preference:
1 = customer most preferred choice
2 = customer second most preferred choice
3 = etc.

[T9]	[3] MISHANDLING		
[4] INTERACTION QUALITY	2%	6%	10%
Good			
Average			
Poor			

[T10]	[5] FIRM ALLOCATION		
[4] INTERACTION QUALITY	4 Weeks	3 Weeks	1 Week
Good			
Average			
Poor			

[T11]	[6] IMMEDIATE CONNECTION		
	Direct service	Indirect (same airline)	Indirect (chg. airline)
[4] INTERACTION QUALITY			
Good			
Average			
Poor			

- NB: Examples of Immediate Connection
- [a] Direct Service - KUL-TYO (no transit)
KUL-LAX (with technical transit)
 - [b] Indirect Service - KUL-LAX via TYO
(same airline) The goods are transferred into another A/C
 - [c] Indirect Service - KUL-LAX via TYO
(change airline) and TYO-LAX on other airlines

Appendix 10A - Stage 6 Questionnaire

Stage 6**Gap 1 & 2**

Airline _____

Date _____

Name _____

Resp. # _____

Title _____

Instructions:

Listed on page 2, 3, & 4 are a number of statements intended to measure your perceptions about your airline and its operations. **Please indicate the extent to which you disagree or agree with each statement by crossing [X] on one of the five numbers next to each statement.**

If you strongly disagree, cross [1].

If you strongly agree, cross [5].

If your feelings are not strong, cross one of the numbers in the middle, i.e., [2], [3], or [4].

**There are no right or wrong answers.
Please tell us honestly how you feel.**

Statement	Strongly Disagree		Strongly Agree		
[1] We regularly collect information about the needs of our customers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
[2] We rarely use marketing research information that is collected about our customers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
[3] We regularly collect information about the service-quality expectations of our customers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
[4] The managers in our company rarely interact with customers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
[5] The customer-contact personnel in our company frequently communicate with management	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
[6] The managers in our company rarely seek suggestions about serving customers from customer-contact personnel.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
[7] The managers in our company frequently have face-to-face interactions with customer-contact personnel.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
[8] The primary means of communication in our company between contact personnel and managers is through memos.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
[9] Our company has too many levels of management between contact personnel and top management.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Statement	Strongly Disagree					Strongly Agree				
[10] Our company does not commit the necessary resources for service quality.	☐	☐	☐	☐	☐					
[11] Our company has internal programs for improving the quality of service to customers.	☐	☐	☐	☐	☐					
[12] In our company, managers who improve quality of service are more likely to be rewarded than other managers.	☐	☐	☐	☐	☐					
[13] Our company emphasises selling as much as or more than it emphasises serving customers.	☐	☐	☐	☐	☐					
[14] Our company has a formal process for setting quality of service goals for employees.	☐	☐	☐	☐	☐					
[15] In our company we try to set specific quality of service goals.	☐	☐	☐	☐	☐					
[16] Our company effectively uses automation to achieve consistency in serving customers.	☐	☐	☐	☐	☐					
[17] Programs are in place in our company to improve operating procedures so as to provide consistent service.	☐	☐	☐	☐	☐					
[18] Our company has the necessary capabilities to meet customers' requirements for service.	☐	☐	☐	☐	☐					

Statement	Strongly Disagree	Strongly Agree			
[19] If we gave our customers the level of service they really want, we would go broke.	1	2	3	4	5
[20] Our company has the operating systems to to deliver the level of service customers demand	1	2	3	4	5

Stage 6**Gap 3**

Airline	_____	Date	_____
Name	_____	Resp. #	_____
Title	_____		

Instructions:

Listed on page 2, 3 & 4 are a number of statements intended to measure your perceptions about your airline and its operations. **Please indicate the extent to which you disagree or agree with each statement by crossing [X] on one of the five numbers next to each statement.**

If you **strongly disagree**, cross [1].
If you **strongly agree**, cross [5].
If your feelings are not strong, cross one of the numbers in the middle, i.e., [2], [3], or [4].

**There are no right or wrong answers.
Please tell us honestly how you feel.**

Statement	Strongly Disagree					Strongly Agree				
[1] I feel I am part of a team in my own company.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					
[2] Everyone in my company contributes to a team effort in servicing customers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					
[3] I feel a sense of responsibility to help my fellow employees do their jobs well.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					
[4] My fellow employees and I cooperate more often than we compete.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					
[5] I feel I am an important member of this company.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					
[6] I feel comfortable in my job in the sense that I am able to perform the job well.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					
[7] My company hires people who are qualified to do their jobs.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					
[8] My company gives me the tools and equipment that I need to perform my job well.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					
[9] I spend a lot of time in my job trying to resolve problems over which I have little control.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					
[10] I have the freedom in my job to truly satisfy my customers' needs.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5					

Statement	Strongly Disagree					Strongly Agree				
[18] What my customers want me to do and what management wants me to do are usually the same thing.	☐	☐	☐	☐	☐					
[19] My company and I have the same ideas about how my job should be performed.	☐	☐	☐	☐	☐					
[20] I receive a sufficient amount of information from management concerning what am I supposed to do in my job.	☐	☐	☐	☐	☐					
[21] I often feel that I do not understand the services ¹ offered by my company.	☐	☐	☐	☐	☐					
[22] I am able to keep up with changes in my company that affect my job.	☐	☐	☐	☐	☐					
[23] I feel that I have not been well trained by my company in how to interact effectively with customers.	☐	☐	☐	☐	☐					
[24] I am not sure which aspects of my job my supervisor will stress most in evaluating my performance.	☐	☐	☐	☐	☐					

¹ Air freight services only.